USDA NRCS

U.S. Department of Agriculture
Natural Resources Conservation Service

History of Wisconsin Soil Survey

PREFACE

The year 2006 marked the completion of the initial field mapping for the National Cooperative Soil Survey in Wisconsin. This publication was undertaken to recognize the agencies and individuals who have invested time, funding, and manpower in completing the initial field mapping of the state over the last 100 years or so. Wisconsin has had a rich and productive soil survey program. It was not until the latter part of the 1800's that interest in agricultural land use from the public and the United States Department of Agriculture (USDA) convinced the United States Congress to make an inventory of the nation's soils and their production potential. This interest led to the creation of the soil survey program in 1899 under the USDA Division of Soils, directed by Milton Whitney. Thereafter, soil survey became a cooperative effort between the U.S. Department of Agriculture and state agencies. The Wisconsin Geologic and Natural History Survey, the Soils Department at the University of Wisconsin, and the U.S. Bureau of Soils did much of the early survey work. This publication contains two history articles, which contain a more complete picture of the early history of soil surveys in Wisconsin.

ACKNOWLEDGEMENTS

This document was prepared under the direction of Soil Scientists Art Voigtlander, Roger Dahl, and Donna Ferren Guy, with the assistance of Renae Anderson, NRCS public affairs specialist in Wisconsin. A special thanks and recognition is extended to all those who contributed to the extensive work and quality soil survey products produced by the soil scientists and other disciplines in the completion of the "once-over" and to those who contributed to the completion of this publication.

This document on the History of the Wisconsin Soil Survey is not all-inclusive. Those developing this report made sincere efforts to capture the significant events in the state soil survey program. We apologize for any omissions, oversights, and inconsistencies of the information presented in this document.

Individuals who wish to provide additional information or make corrections to any part of this report may send them to the NRCS State Office at 8030 Excelsior Drive, Suite 200, Madison, WI. 53717-2906.

This publication has utilized selected information from other reports, such as NRCS State files, individual soil survey reports, and others.

The content and format are designed to highlight the accomplishments of the soil scientists working in the state and not necessarily a chronological report of the state soil survey program. This report will serve to document some parts of the cooperative soil survey program.

A number of photographs showing various phases of the Wisconsin Soil Survey Program are included at the end of several sections. The developers of this report chose not to give credit to those who took each photograph. The photographs were a collection of original color photographs, and black and white photos from old Soil Conservation Service files and personal photographs of NRCS soil scientists.

United States Department of Agriculture **2007**
Natural Resources Conservation Service **Wisconsin**

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Who We Are

Honor Roll of Soil Scientists in Wisconsin Making Soil Surveys for Publication – (1900 - 2006)

This is a compilation of the names of soil scientists who have mapped soil in Wisconsin. The names were obtained from the soil survey publications, and therefore there may be some who were missed. For any one who has been inadvertently omitted we apologize and will gladly update the listing. Send name, years, and counties mapped to State Soil Scientist at the Wisconsin NRCS State Office, **www.wi.nrcs.usda.gov**

Pre 1959 Period

*Ableiter, Kenneth J. WGNHS Bayfield 1929

Albert, A. R. WGNHS Vilas 1915, Recon of North part of North Central WI 1916

Anderson, A. C. USDA Sauk 1925, Manitowoc 1926, Washington & Ozaukee 1926, Washington & Ozaukee 1926, Winnebago 1927, Green 1928, Green Lake 1928, Vernon 1928, Brown 1929, Green Lake 1929, Monroe 1929, Sheboygan 1929, Green 1930, Monroe 1931

Ayrs, Orla L. USDA Racine 1907

Bailey, E. H. USDA Sauk 1925, Trempealeau 1927, Green Lake 1928, Green Lake 1929, Monroe 1929, Pierce 1930, Monroe 1931

Baker, O. E. WGNHS Juneau 1914

Bandoli, Harold WGNHS Brown 1929

Barnes, E. T. WGNHS Barron 1958

Bartholomew, Robert WGNHS Monroe 1929, Sheboygan 1929, Monroe 1931

Bergh, O. J. WGNHS Recon of North part of North Western WI 1914

Born, C. E. WGNHS Brown 1929

Boardman, W. C. WGNHS Vilas 1915, Recon of North part of North Central WI 1916, Wood 1917, Wood 1918

Buser, A. L. WGNHS Recon of North Eastern WI 1916

*Butman, Burel WGNHS Trempealeau 1927, Bayfield 1929

Carlisle, F. J. WGNHS Barron 1958

Cantrell L. USDA Buffalo 1917

*Carter, W. W. USDA Barron 1958

Chapman, Homer WGNHS Sauk 1925, Green Lake 1928, Green Lake 1929, Monroe 1929, Monroe 1931

Chucka, J. A. WGNHS Calumet 1925, Vernon 1928

Clevenger, C. B. WGNHS Racine & Kenosha 1923, Walworth 1924. USDA Jackson 1922, Jackson 1923, Washington & Ozaukee 1926

Cobb, W. B. USDA Walworth 1924, Walworth 1924

Conrey, Guy W. USDA Waushara 1913, Fond du Lac 1914. WGNHS Dane 1915, Columbia 1916, Dane 1917, Wood 1917, Wood 1918, Rock 1920, Rock 1922

*Cook, Harold WGNHS Trempealeau 1927, Bayfield 1929

Dahlstrand, N. P. WGNHS Langlade 1947

Dickey, J. B. R. USDA Recon of South part of North Central WI 1917, Recon of South Part of North Central WI 1918

Dunnewald, T. J. WGNHS Iowa 1912, Iowa 1914, La Crosse 1914, Recon of North part of North Western WI 1914, Vilas 1915, Recon of North part of North Central WI 1916, Buffalo 1917, Recon of South part of North Central WI 1917, Recon of South Part of North Central WI 1918, Milwaukee 1918, Portage 1918, Milwaukee 1919, Jackson 1922, Jackson 1923, Adams 1924, Adams 1924, Sauk 1925, Green 1928, Green Lake 1928, Green Lake 1929, Green 1930

Edwards, M. J. USDA Sauk 1925, Manitowoc 1926, Trempealeau 1927, Green Lake 1928, Vernon 1928, Brown 1929, Green Lake 1929, Monroe 1929, Pierce 1929, Crawford 1930, Pierce 1930, Monroe 1931. WGNHS Green 1928, Green 1930

*Erickson, R. A. USDA Barron 1958

*Fink, Delmar S. WGNHS Bayfield 1929

Ford, Marion C. WGNHS Outagamie 1921, Outagamie 1921

*Fosberg, Maynard A. WGNHS Barron 1958

Fudge, J. F. WGNHS Sauk 1925, Trempealeau 1927

*Gallatin, M. H. WGNHS Bayfield 1929

Geib, Horace V. WGNHS Door 1918, Door 1919 USDA Outagamie 1921, Outagamie 1921

*Geib, W. J. WGNHS Waushara 1913, Bayfield Area 1914, Fond du Lac 1914, Iowa 1914, Juneau 1914, Kewaunee 1914, La Crosse 1914, Waukesha 1914, Columbia 1916, Jefferson 1916, Recon of North Eastern WI 1916, Recon of North part of North Central WI 1916, Buffalo 1917, Dane 1917, Portage 1918, Recon of South Part of North Central WI 1918, Wood 1918, Door 1919, Milwaukee 1919, Outagamie 1921, Waupaca 1921, Rock 1922, Jackson 1923, Racine & Kenosha 1923, Adams 1924, Walworth 1924, Washington & Ozaukee 1926, Bayfield 1929, Green Lake 1929, Pierce 1930, Monroe 1931

USDA Dane 1915, Portage 1917, Recon of South part of North Central WI 1917, Wood 1917, Door 1918, Milwaukee 1918, Rock 1920, Waupaca 1920, Outagamie 1921, Jackson 1922, Kenosha & Racine 1922, Adams 1924, Walworth 1924, Calumet 1925, Sauk 1925, Manitowoc 1926, Washington & Ozaukee 1926, Trempealeau 1927, Winnebago 1927, Green 1928, Green Lake 1928, Brown 1929, Monroe 1929, Pierce 1929, Sheboygan 1929, Crawford 1930

Gibbs, W. M. WGNHS Rock 1920, Kenosha & Racine 1922, Rock 1922, Racine & Kenosha 1923

Goodman, A. L. USDA Jackson 1922, Jackson 1923

Graul, E. J. WGNHS Kewaunee 1914, Outagamie 1921, Barron 1958

Hall, E. B. WGNHS Recon of North Part of North Western WI 1911, Recon of South Part of North Western WI 1914

Hanson, Lewis P. WGNHS Portage 1917, Portage 1918

*Hole, Francis D. WGNHS Langlade 1947, Grant 1956, Waukesha 1956, Barron 1958

*Hull, H. H. WGNHS Calumet 1925, Manitowoc 1926, Winnebago 1927, Bayfield 1929

Jones, Grove B. USDA Racine 1907, Waukesha 1914

*Kellogg, Charles E. WGNHS Bayfield 1929

*Klingelhoets, A. J. WGNHS Barron 1958

Kubier, Julius E. USDA Adams 1924, Adams 1924, Washington & Ozaukee 1926, Washington & Ozaukee 1926

WGNHS Kenosha & Racine 1922

Kuhlman, A. K. WGNHS Waushara 1913

Larson, Olaf WGNHS Crawford 1930

Lathrop H. R. WGNHS Pierce 1929, Pierce 1930

Le Clair, C. A. WGNHS Juneau 1914

Leaper, Vern C. WGNHS Walworth 1924, Washington & Ozaukee 1926, Washington & Ozaukee 1926

Lounsbury, Clarence USDA Iowa 1912, Iowa 1914, La Crosse 1914, Buffalo 1917, Waupaca 1920, Waupaca 1921

Magistad, Oscar WGNHS Adams 1924, Washington & Ozaukee 1926, Washington & Ozaukee 1926, Green Lake 1928, Green Lake 1929 USDA Adams 1924

Maynadier, Gustavus B. USDA Bayfield Area 1914

Meyer, A. H. WGNHS Waukesha 1914, Calumet 1925, Vernon 1928, Sheboygan 1929

Muckenhirn, R. J. WGNHS Langlade 1947, Barron 1958

Musbach, F. L. WGNHS Recon of North Part of North Western WI 1911, Bayfield Area 1914, Fond du Lac 1914, Recon of South Part of North Western WI 1914, Recon of North part of North Western WI 1914, Pierce 1930

Musgrave, G. W. USDA Jackson 1922, Jackson 1923

*Nelson, Erling F. USDA Barron 1958

Nelson, J. W. USDA Waushara 1913

Nelson, L. B. WGNHS Barron 1958

Noer, O. J. WGNHS Jefferson 1916, Buffalo 1917

*O'Connell, F. J. WGNHS Green Lake 1928, Green Lake 1929

USDA Adams 1924, Adams 1924, Green 1928, Green 1930

Ouellette, J. G. WGNHS Barron 1958

Pierre, W. H. WGNHS Walworth 1924, Walworth 1924, Washington & Ozaukee 1926, Washington & Ozaukee 1926, Sheboygan 1929, Pierce 1930

Post, Clinton B. WGNHS Vilas 1915, Recon of North Eastern WI 1916, Recon of North part of North Central WI 1916, Recon of South

part of North Central WI 1917, Wood 1917, Recon of South Part of North Central WI 1918, Wood 1918

Rieger, Samuel WGNHS Barron 1958

*Robinson, Glenn H. USDA Grant 1956, Barron 1958

Scarseth, G. D. WGNHS Sheboygan 1929

Schoenmann, L. R. WGNHS Bayfield Area 1914, Fond du Lac 1914, Juneau 1914, Recon of North Eastern WI 1916, Recon of North part of North Central WI 1916

USDA Portage 1917, Portage 1918, Walworth 1924, Walworth 1924

Stewart, H. W. WGNHS Kenosha & Racine 1922, Racine & Kenosha 1923, Adams 1924, Adams 1924

Stockstad, O. L. WGNHS Sauk 1925, Monroe 1929, Monroe 1931

Taylor, Arthur E. USDA –Fond du Lac 1914, Dane 1915, Columbia 1916, Recon of North Eastern WI 1916, Recon of North part of North Central WI 1916, Dane 1917, Recon of South part of North Central WI 1917, Recon of South Part of North Central WI 1918, Rock 1920, Kenosha & Racine 1922, Rock 1922, Racine & Kenosha 1923

Templin, E. H. USDA Pierce 1929, Pierce 1930

Thompson, Carl USDA Recon of North part of North Western WI 1914, Recon of North Eastern WI 1916, Recon of North part of North Central WI 1916, Recon of South part of North Central WI 1917, Recon of South Part of North Central WI 1918, Door 1918, Door 1919

*Torrance, Stuart W. USDA Barron 1958

Tosterud, Martin O. WGNHS Waupaca 1920, Outagamie 1921, Outagamie 1921, Waupaca 1921

Truog, Emil WGNHS Iowa 1912, Iowa 1914

Tyner, E. H. WGNHS Crawford 1930

Vessel, A. J. USDA Barron 1958

Vosquil, Walter WGNHS Green 1928, Green 1930

Watson, E. B. USDA Juneau 1914

Weidman, Samuel WGNHS Marinette 1911, Recon of North Part of North Western WI 1911, Recon of South Part of North Western WI 1914

Weslow, J. A. USDA Adams 1924, Adams 1924

Whitson, A. R WGNHS Waushara 1913, Bayfield Area 1914, Fond du Lac 1914, Iowa 1914, Juneau 1914, Kewaunee 1914, La Crosse 1914, Vilas 1915, Waukesha 1914, Columbia 1916, Jefferson 1916, Recon of North Eastern WI 1916, Recon of North part of North Central WI 1916, Buffalo 1917, Dane 1917, Portage 1918, Recon of South Part of North Central WI 1918, Wood 1918, Door 1919, Milwaukee 1919, Outagamie 1921, Waupaca 1921, Rock 1922, Jackson 1923, Racine & Kenosha 1923, Adams 1924, Walworth 1924, Washington & Ozaukee 1926, Bayfield 1929, Green Lake 1929, Green 1930, Pierce 1930, Monroe 1931

Whitson, Kenneth WGNHS Green 1928, Green Lake 1928, Green Lake 1929, Green 1930

*Whitson, Merritt B. WGNHS Manitowoc 1926, Winnebago 1927, Bayfield 1929, Brown 1929

Wilcox, D. E. WGNHS Vernon 1928, Crawford 1930

*Wilke, S. E. USDA Barron 1958

Wood, Percy O. USDA Marinette 1911, Waukesha 1914

* Also appears in 1959-2006 listing

WGNHS publication (shown in red)
USDA publication (shown in blue)
USDA – includes “Bureau of Soils”, “Bureau of Chemistry and Soils”, and “Soil Conservation Service.

1959-2006 Period

Ableiter, J. Kenneth - Bayfield 1961

Alfred , S. D. - Richland 1959, La Crosse 1960

Anderson, Deanna M. - Dunn 2005, Ashland 2006, Bayfield 2006, Pierce 2006, Rusk 2006

Anderson, Frank L. - Rock 1974, Green Lake 1977, Adams 1984

Anderson, Keith A. - Barron 2001, Menominee 2004,Washburn 2006, Burnett 2006,

Anderson, W. W. - Richland 1959, Vernon 1969

Arkley, R. J. - Buffalo 1962

Axley, J. H. - Iowa 1962

Ayen, James E. - Dane 1978, Jefferson 1979

Babik, Neil R. - Winnebago 1980, Monroe 1984

Barnes, E. T. – (WGNHS) - Richland 1959

Barnes, James R. - Forest 2005, Ashland 2006, Iron 2006, Price 2006, Sawyer 2006

Barndt, Wayne D. - Brown 1974, Trempealeau 1977, Door 1978, Outagamie 1978, Sheboygan 1978, Monroe 1984

Bartelme, Robert J. - Buffalo 1962, Wood 1977, Portage 1978, Marathon 1989

Bass, T. C. - Buffalo 1962

Beardsley, James B. - Grant 1961

Beatty, Marvin T. - La Crosse 1960

Behrends, R. - Dodge 1980

Bender, W. H. - Richland 1959

Benson, Nels - Richland 1959

Blevins Jr., Marion M. - Rock 1974

Boelter, Joseph M. - Dunn 1975, Eau Claire 1977, Wood 1977, St. Croix 1978, Oneida 1993, Florence 2004, Forest 2005, Taylor 2005, Price 2006

Bonack, Tina - Price 2006

Boman, Martha C. - Monroe 1984

Breska, George J. - Lafayette 1966

Buss, David A. - Marathon 1989

Butman, Burel S. - Bayfield 1961, Crawford 1961, Grant 1961, Buffalo 1962, Iowa 1962, Lafayette 1966, Fond du Lac 1973, Brown 1974, Green 1974, Door 1978, Outagamie 1978, Calumet & Manitowoc 1980

Cain, John M. - Walworth 1971, Dodge 1980

Campbell, John E. - Calumet & Manitowoc 1980, Kewaunee 1980, Shawano 1982, Waupaca 1984, Oconto 1988, Lincoln 1996, Clark 2002, Menominee 2004, Forest 2005, Taylor 2005, Ashland 2006, Iron 2006, Price 2006, Sawyer 2006

Cannon, S. B. - Crawford 1961, Iowa 1962

Carter, W. W. - Buffalo 1962

Chibirka, John D. - Clark 2002

Church, R. P. - Crawford 1961, Vernon 1969

Cook, Harold - Bayfield 1961

Corey, R. B. – (WGNHS) - Richland 1959, Grant 1961

Cribe, H. C. - Iowa 1962

Cummings, J. F. - Crawford 1961

Dahl, Roger A. - Chippewa 1989, Lincoln 1996, Jackson 2001, Clark 2002, Pepin 2002, Dunn 2005, Taylor 2005, Pierce 2006, Rusk 2006, Sawyer 2006

Day, Larry L. - Oneida 1993

Decker, Randall L. - Rock 1974

Demo, Owen R. -Kenosha & Racine 1970, Rock 1974, Marquette 1975

Denow, Kenneth A. - Dane 1978, Winnebago 1980

DesForge, Kathryn M. - Douglas 2006, Sawyer 2006

Diers, Richard W. - Polk 1979

Ditzler, Craig A. - Monroe 1984

Drozd, Edward M. - Wood 1977, Dodge 1980, Chippewa 1989

Eichner, Stacy S. - Florence 2004, Taylor 2005, Ashland 2006, Price 2006, Rusk 2006, Sawyer 2006

Elg, Angela M. - Florence 2004, Forest 2005, Taylor 2005, Ashland 2006, Price 2006

Elmer, Steven L. - Brown 1974, Door 1978, Monroe 1984

Engel, Robert J. - Rock 1974, Sheboygan 1978

Erickson, R. A. - Buffalo 1962

Evenson, Emil W. - Buffalo 1962, Pepin 1964

Fanning, Delvin S. - Green 1974, Marquette 1975

Felts, Dennis A. - Shawano 1982

Ferren Guy, Donna E. - Barron 2001, Pepin 2002, Richland 2002, Dunn 2005, Ashland 2006, Bayfield 2006, La Crosse 2006, Pierce 2006

Fiala, William D. - Portage 1978, Marathon 1989, Taylor 2005, Ashland 2006, Bayfield 2006, Iron 2006, Price 2006, Rusk 2006, Sawyer 2006

Fink, D. S. - Bayfield 1961

Fosberg, Maynard – (WGNHS) - Richland 1959

Fox, Robert E. - Dodge 1980

Frazier, Bruce E. - Rock 1974, Dane 1978

Frings, Steven W. - Outagamie 1978, Kewaunee 1980, Waupaca 1984, Price 2006

Gafvert, Ulf B. - Lincoln 1996, Taylor 2005, Ashland 2006, Bayfield 2006, Douglas 2006, Iron 2006, Sawyer 2006

Gallatin, M. H. - Bayfield 1961, Buffalo 1962

Garvey, Glenn D. - Crawford 1961, Vernon 1969

Geib, W. J. - Bayfield 1961

Genson, Jerry J. - Rock 1974

Gibbs, Daunte S. - Rusk 2006

Gilbertson, Randall R. - Monroe 1984, Juneau 1991, Ashland 2006, Douglas 2006, Rusk 2006

Gile, L. - Dodge 1980

Glenn, R. - Dodge 1980

Glocker, Carl L. - Iowa 1962, Lafayette 1966, Green 1974, Rock 1974, Green Lake 1977, Dane 1978, Jefferson 1979

Goerg, Kim C. - Langlade 1986, Oneida 1993, Lincoln 1996, Forest 2005, Ashland 2006, Bayfield 2006, Douglas 2006

Gray, Fenton - Iowa 1962, Lafayette 1966, Green 1974

Gruel, Duane L. - Oneida 1993

Gundlach, David – Iron 2006

Gundlach, Howard F. - Rock 1974, Green Lake 1977, Sauk 1980, Shawano 1982, Monroe 1984, Juneau 1991

Hagedorn, Sam D. - Marathon 1989, Lincoln 1996, Clark 2002, Taylor 2005, Rusk 2006, Sawyer 2006

Hains, W. E. - Buffalo 1962

Haley, Scot A. - Washburn 2006, Bayfield 2006, Burnett 2006, Douglas 2006, Sawyer 2006

Haszel, Orville L. - Buffalo 1962, Pepin 1964, Pierce 1968, Kenosha & Racine 1970, Walworth 1971, Washington 1971, Dunn 1975, St. Croix 1978, Vilas 1988

Haverland, F. A. - Richland 1959, Crawford 1961, Vernon 1969

Helwig, Carl - Bayfield 1961

Herish, D. E. - Buffalo 1962

Higgins, Richard - Fond du Lac 1973, Brown 1974, Dodge 1980

Hoene, Robert - Grant 1961

Hole, Francis D. – (WGNHS) - Oneida 1959, Richland 1959, La Crosse 1960, Grant 1961, Florence 1962, Menominee 1967, Jefferson 1970

Huffman, Terry J. - Polk 1979, Shawano 1982

Hull, H. H. - Bayfield 1961

Hutchinson, Dennis E. - Outagamie 1978, Portage 1978

Hvizdak, David J. - Vilas 1988, Oneida 1993, Lincoln 1996, Florence 2004, Burnett 2006, Iron 2006, Price 2006, Rusk 2006, Sawyer 2006, Washburn 2006

Irvine, A. W. - Richland 1959

Jakel, Dale E. - Kenosha & Racine 1970, Milwaukee & Waukesha 1971, Dunn 1975, Eau Claire 1977, St. Croix 1978, Adams 1984, Chippewa 1989, Barron 2001, Jackson 2001, Taylor 2005

Jeffrey, A. H. - La Crosse 1960

Johannes, Richard M. - Juneau 1991, Jackson 2001, Clark 2002, Menominee 2004, Dunn 2005, Taylor 2005, Ashland 2006, Price 2006, Rusk 2006, Sawyer 2006

Johnson, B. - Dodge 1980

Johnson, Norman L. - Trempealeau 1977, Dodge 1980

Kaatz, Dean M. - Marathon 1989

Karraker, E. L. - Crawford 1961

Keller, Theon J. - Crawford 1961, Buffalo 1962, Green 1974

Kellogg, Charles E. - Bayfield 1961

Kempf, Leonard S. - Taylor 2005, Ashland 2006, Bayfield 2006, Price 2006, Sawyer 2006

Keyes, John - Iowa 1962

Kidney, Kim A. - Green Lake 1977, Calumet & Manitowoc 1980, Kewaunee 1980, Marathon 1989

Kilmer, Victor - Fond du Lac 1973

Kintner, G. E. - Buffalo 1962

Kissinger, Everett J. - Columbia 1978, Dane 1978, Polk 1979, Calumet & Manitowoc 1980, Vilas 1988

Klauss, Donald W. - La Crosse 1960

Klingebeil, A. A. - La Crosse 1960, Crawford 1961

Klingelhoets, A. J. – (WGNHS) - Richland 1959, Grant 1961, Iowa 1962, Florence 2004

Kluess, Steven K. - Oneida 1993

Kluz, Mary A. - Clark 2002

Knight, Gregory A. - Taylor 2005, Ashland 2006, Bayfield 2006, Price 2006, Sawyer 2006

Kodet, L. B. - La Crosse 1960

Kolka, Pete - Sawyer 2006

Kopecky, Mark J. - Oneida 1993

Korth, Irving L. - Fond du Lac 1973, Dodge 1980

Kowalski, William L. - Shawano 1982

Kroll, Jeff - Iron 2006

Kroll, Terry L. - Oconto 1988, Marinette 1991, Bayfield 2006, Ashland 2006, Douglas 2006, Iron 2006

Krupinski, Mark A. - Bayfield 2006, Burnett 2006, Douglas 2006, Iron 2006, Sawyer 2006, Washburn 2006

Kurer, Donald C. - Kenosha & Racine 1970, Ozaukee 1970, Walworth 1971, Washington 1971

Langton, John E. - Marquette 1975, Trempealeau 1977, St. Croix 1978, Monroe 1984, Chippewa 1989, Jackson 2001, Clark 2002, Taylor 2005

Lee, Gerhard B. – (WGNHS) - Richland 1959, Marquette 1961, Marquette 1975, Dodge 1980

Leonard, Charles F. - Fond du Lac 1973, Brown 1974, Door 1978, Outagamie 1978, Calumet & Manitowoc 1980, Oconto 1988, Marinette 1991

Liberty, John B. - Shawano 1982

Lindgren, Peter D. - Eau Claire 1977, Portage 1978, Chippewa 1989

Lindwall, Lance R. - Langlade 1986, Oneida 1993, Florence 2004

Link, Ernest G. - Kenosha & Racine 1970, Fond du Lac 1973, Brown 1974, Door 1978, Outagamie 1978, Calumet & Manitowoc 1980, Kewaunee 1980, Oconto 1988

Lorenz, Howard E. - Brown 1974, Door 1978, Outagamie 1978, Oconto 1988, Marinette 1991, Jackson 2001, Clark 2002, Florence 2004, Menominee 2004

Lowenthal, Daniel - La Crosse 1960

Lubich, Kenneth W. - Calumet & Manitowoc 1980, Oneida 1993, Taylor 2005, Burnett 2006, Washburn 2006

Lucassen, John A. - Ashland 2006, Bayfield 2006, Iron 2006

Luethe, Ronald W. - Marinette 1991

Marchant, M. A. - Buffalo 1962

Marsh, James N. - La Crosse 1960, Crawford 1961

Martin, Neil H. - Forest 2005

Martinson, Albin H. - Kenosha & Racine 1970

Martzke, James A. - Shawano 1982, Lincoln 1996, Burnett 2006, Washburn 2006

Mayer, D. - Langlade 1986

Maziasz, Jennifer L. - Ashland 2006, Bayfield 2006, Iron 2006, Sawyer, 2006

McCauley, J. P. - Buffalo 1962

McColley, Phillip D. - Columbia 1978

Medin, David A. - Rock 1974, Eau Claire 1977, Dane 1978, Jefferson 1979

Meyer, Phillip D. - La Crosse 2006, Richland 2002, Burnett 2006, Washburn 2006

Meyer, Theron A. - Monroe 1984, Juneau 1991, Jackson 2001, Clark 2002, Pepin 2002, Dunn 2005, Pierce 2006, Rusk 2006

Miland, Timothy J. - Dunn 2005, Taylor 2005, Ashland 2006, Bayfield 2006, Pierce 2006, Price 2006, Rusk 2006, Sawyer 2006

Milfred, C. J. – (WGNHS) – Florence 1962, Menominee 1967, Jefferson 1970

Mitchell, Michael J. - Green Lake 1977, Columbia 1978, Dane 1978, Winnebago 1980, Langlade 1986, Lincoln 1996, Menominee 2004

Moeller, Henry T. - Columbia 1978, Dane 1978, Sheboygan 1978

Natzke, Larry L. - Calumet & Manitowoc 1980, Winnebago 1980, Vilas 1988, Clark 2002, Pepin 2002, Florence 2004, Dunn 2005, Pierce 2006, Price 2006

Nelson, Erling F. - La Crosse 1960

Neumann, Edwin W. - Langlade 1986, Oconto 1988, Vilas 1988, Oneida 1993, Florence 2004, Forest 2005

Newbury, Raymond L. - Grant 1961, Shawano 1982, Oconto 1988

Nygard, Iver J. - La Crosse 1960, Bayfield 1961

O'Connell, F. J. - La Crosse 1960

Olson, G. W. – (WGNHS) - Florence 1962, Menominee 1967

Omernik, David L. - Dane 1978, Portage 1978, Jefferson 1979, Langlade 1986, Clark 2002

Otter, Augustine J. - Kenosha & Racine 1970, Milwaukee & Waukesha 1971, Green 1974, Portage 1978, Calumet & Manitowoc 1980, Kewaunee 1980, Waupaca 1984, Waushara 1989, Clark 2002, Taylor 2005

Otto, Matt R. - Richland 2002, La Crosse 2006

Otto, Rebecca A. - Menominee 2004

Ouellete, Gerard – (WGNHS) - Richland 1959

Owen, Donald W. - Walworth 1971

Parker, Dale E. - Pierce 1968, Ozaukee 1970, Washington 1971, Dunn 1975, St. Croix 1978

Parker, William - Fond du Lac 1973

Paschall, A. H. - La Crosse 1960, Bayfield 1961

Patzer, Robert A. - Washington 1971, Fond du Lac 1973, Brown 1974, Rock 1974, Green Lake 1977, Dane 1978, Jefferson 1979, Calumet & Manitowoc 1980

Payne, Steve W. - Milwaukee & Waukesha 1971, Washington 1971, Vilas 1988, Oneida 1993

Peck, Theodore R. – Marquette 1961, Marquette 1975, Dodge 1980

Peterson, R. F. – (WGNHS) - Richland 1959, Grant 1961

Pollack, S. - Dodge 1980

Pomerening, James - Grant 1961

Reynolds, Charles A. - Kenosha & Racine 1970, Milwaukee & Waukesha 1971, Wood 1977

Rieger, Samuel – (WGNHS) - Richland 1959

Riopel, Yves E. - Oneida 1993

Roberts, Bruce A. - Sheboygan 1978, Winnebago 1980

Roberts, David C. - Sauk 1980, Shawano 1982, Adams 1984, Oconto 1988, Clark 2002, Forest 2005

Robinson, Glenn H. - Richland 1959, Grant 1961, Dodge 1980

Sasman, R. T. - Richland 1959

Satterfield, H. R. - Crawford 1961, Iowa 1962

Schaefers, Patrick - Sawyer 2006

Schmeichel, Norman - Fond du Lac 1973

Schmude, Keith O. – (WGNHS) - Oneida 1959, Florence 1962

- (SCS) - Washington 1971, Rock 1974, Marquette 1975, Dodge 1980

Schoenemann, Mark R. - Chippewa 1989

Schultz, Thomas - Fond du Lac 1973

Seibel, Harold - Fond du Lac 1973

Shipman, Guyon D. - La Crosse 2006

Shivers, S. Michael - Lafayette 1966, Green 1974, Rock 1974, Green Lake 1977, Dane 1978

Sigmund, Debra L. - Ashland 2006, Bayfield 2006, Price 2006, Sawyer 2006

Silkworth, Darin R. – Ashland 2006, Bayfield 2006, Price 2006, Sawyer 2006

Simerson, A. H. - Buffalo 1962

Simeth, Fred J. - Waupaca 1984, Waushara 1989, Lincoln 1996, Clark 2002, Burnett 2006, Douglas 2006, Sawyer 2006, Washburn 2006

Simonson, Duane T. - Waupaca 1984, Waushara 1989, Jackson 2001, Clark 2002, Richland 2002, La Crosse 2006

Skrivseth, Katherine K. - Vilas 1988

Slota, Robert W. - Crawford 1961, Vernon 1969, Sauk 1980, Adams 1984

Spangelberg, D. - Dodge 1980

Starzinski, Gary W. - Marathon 1989

Steingraeber, Joseph A. - Kenosha & Racine 1970, Ozaukee 1970, Milwaukee & Waukesha 1971, Walworth 1971, Sheboygan 1978, Jefferson 1979

Stimac, M. R. - Buffalo 1962

Strelow, Harvey V. - Richland 1959, Crawford 1961, Vernon 1969, Wood 1977, Portage 1978, Shawano 1982, Vilas 1988, Oneida 1993, Florence 2004

Suhr, Marvin C. - Portage 1978, Calumet & Manitowoc 1980, Kewaunee 1980

Suhs, Stephen C. - Jefferson 1979, Waupaca 1984

Sund Jr., John J. - Lafayette 1966, Green 1974, Dodge 1980

Talsky, Jeff C. - Florence 2004, Burnett 2006, Douglas 2006, Iron 2006, Sawyer 2006, Washburn 2006

Thomas, Delbert D. - Crawford 1961, Grant 1961, Buffalo 1962, Pepin 1964, Pierce 1968, Fond du Lac 1973, Dunn 1975, Eau Claire 1977, St. Croix 1978, Chippewa 1989

Tikalsky, Susan M. - Monroe 1984

Tomlinson, James - Fond du Lac 1973

Tomlinson, Tom - Grant 1961

Torrance, Stuart W. - Crawford 1961, Buffalo 1962, Iowa 1962, Lafayette 1966, Green 1974

Traastad, Kevin C. – Iron 2006, Price 2006, Sawyer 2006

Trowbridge, A. L. - La Crosse 1960

Turk, Jesse M. - Ashland 2006, Bayfield 2006, Douglas 2006, Iron 2006

Vanderveen, Sidney A. - Door 1978

Vogel, Chanc L. - Richland 2002, Burnett 2006, Washburn 2006

Voigtlander, Arthur L. - Iron 2006, Price 2006, Rusk 2006, Sawyer 2006

Walker, George O. - La Crosse 1960, Fond du Lac 1973

Walsh, Arthur - Fond du Lac 1973

Watson, Bruce G. - Lafayette 1966, Kenosha & Racine 1970, Green 1974, Green Lake 1977, Jefferson 1979

Watson, E. M. - Richland 1959, Iowa 1962

Watson, J. Phillip - Grant 1961

Weber, Edward L. - Rock 1974

Weber, Roger - Kenosha & Racine 1970, Milwaukee & Waukesha 1971, Washington 1971, Green 1974, Dane 1978

Weber, Ronald C. - Iowa 1962, Lafayette 1966

Weihrouch, Robert D. - Marinette 1991, Taylor 2005, Burnett 2006, Washburn 2006

Werlein, John O. - Marathon 1989

Wertz, William A. - Vilas 1988

Westin, Fred C. - Crawford 1961, Lafayette 1966, Green 1974

Westin, Paul R. - Grant 1961

Whitson, M. - Bayfield 1961

Widdel, Keith H. - St. Croix 1978, Sauk 1980, Adams 1984

Wikle, S. E. - Buffalo 1962

Wilkenson, Charles E. - Monroe 1984, Marinette 1991

Wilkins, J. Ann - Clark 2002

Wing, Gordon N. - Buffalo 1962, Pepin 1964, Pierce 1968, Dunn 1975, Eau Claire 1977, St. Croix 1978, Polk 1979, Vilas 1988

Others who worked in Wisconsin

Aldridge, Scott - Bayfield
Freese, Robert - Bayfield
Hempel, Jon - Sawyer
Johnson, Daniel - Bayfield
Myers, Cecil - Bayfield
Paulson, Dale J. - Rusk
Schoephorster, Dale H. - Price
Wacker, Carl

WGNHS Publications (shown in red)
USDA SCS/NRCS Publications (shown in black)

Major Field Mapping Contributors

US Forest Service
Soil Conservation Service
Natural Resource Conservation Service
Bureau of Chemistry and Soils, USDA
Bureau of Plant, Industry, Soils, and Agricultural Engineering
Wisconsin Geological and Natural History Survey
Wisconsin Agricultural Experiment Station

Soil Scientists and Publication Dates of Wisconsin Soil Survey Areas Since 1959

This section gives the year each county soil survey was completed and the major soil scientists who contributed to the field mapping. Soil scientists from several agencies were involved in field operations. They included Natural Resources Conservation Service or Soil Conservation Service - USDA, US Forest Service, Wisconsin Geological and Natural History Survey, the Wisconsin Agricultural Experiment Station, and others.

The legend identifying who employed the soil scientists is as follows:

Symbol	Agency
No designation	Natural Resources Conservation Service – USDA
No designation	Soil Conservation Service – USDA
FS	Forest Service – USDA
SWCD	Soil and Water Conservation District
LCD	Land Conservation District
NCWRPC	North-Central Wisconsin Resource Planning Commission
UW	University of Wisconsin
BPI	Bureau of Plant Industry
WGNHS	Wisconsin Geological and Natural History Survey
WAES	Wisconsin Agricultural Experiment Station
RC&D	Pri-Ru-Ta RC&D Council, Inc.

COUNTY	YEAR	SOIL SCIENTISTS
Adams	1984	Frank L. Anderson, Dale E. Jakel, David C. Roberts, Keith H. Widdel, Robert W. Slota
Ashland	2006	Deanna M. Anderson, James R. Barnes, John E. Campbell, Stacy S. Eichner, Angie Elg, Donna E. Ferren Guy, Randall R. Gilbertson, William D. Fiala, Ulf B. Gafvert, Kim C. Goerg, Richard M. Johannes, Terry L. Kroll, John A. Lucassen, Jennifer L. Maziasz, Timothy J. Miland, Jesse M. Turk, Lenny S. Kempf-FS, Gregory A. Knight-FS, Debra L. Sigmund-FS, Darin R. Silkworth, FS contractor
Barron	2001	Keith A. Anderson, Donna E. Ferren, Dale E. Jakel
Bayfield	2006	Deanna M. Anderson, Donna E. Ferren Guy, William D. Fiala, Ulf B. Gafvert, Kim C. Goerg, Scot A. Haley, Terry L. Kroll, Mark A. Krupinski, John A. Lucassen, Jennifer L. Maziasz, Timothy J. Miland, Jesse M. Turk, Leonard S. Kempf-FS, Gregory A. Knight-FS, Debra L. Sigmund-FS, Darin R. Silkworth, FS contractor
Brown	1974	Ernest G. Link, Charles F. Leonard, Howard E. Lorenz, Wayne D. Barndt, Steven L. Elmer, Robert A. Patzer, Richard Higgins, Burel S. Butman

Buffalo	1962	Orville L. Haszel, Gordon N. Wing, Delbert D. Thomas, M. H. Gallatin, A. H. Simerson, W. E. Hains, B. S. Butman, R. A. Erickson, J. P. McCauley, M. A. Marchant, T. J. Keller, D. E. Herish, S. W. Torrance, W. W. Carter, R. J. Arkley, G. E. Kintner, S. E. Wikle, M. R. Stimac, T. C. Bass, R. J. Bartelme, Emil W. Evenson
Burnett	2006	Keith A. Anderson, Scot A. Haley, David J. Hvizdak, Mark A. Krupinski, Kenneth W. Lubich, James A. Martzke, Phillip D. Meyer, Fred J. Simeth, Jeff C. Talsky, Chanc L. Vogel, Robert D. Weihrouch
Calumet and Manitowoc	1980	Burel S. Butman, John E. Campbell, Kim A. Kidney, Everett J. Kissinger, Charles F. Leonard, Ernest G. Link, Kenneth W. Lubich, Larry L. Natzke, Augustine J. Otter, Robert A. Patzer, Marvin C. Suhr
Chippewa	1989	Roger A. Dahl, Edward M. Drozd, Dale E. Jakel, John E. Langton, Peter D. Lindgren, Mark R. Schoenemann, Delbert D. Thomas
Clark	2002	John E. Campbell, John D. Chibirka, Roger A. Dahl, Sam D. Hagedorn, Richard M. Johannes, Mary A. Kluz, John E. Langton, Howard E. Lorenz, Theron A. Meyer III, Larry L. Natzke, David L. Omernik, Augustine J. Otter, David C. Roberts, Fred J. Simeth, Duane T. Simonson, J. Ann Wilkins
Columbia	1978	Michael J. Mitchell, Everett J. Kissinger, Henry Moeller, Phillip McColley
Crawford	1961	Robert W. Slota, B. Butman, S. B. Cannon, R. P. Church, J. F. Cummings, F. Haverland, E. L. Karraker, T. Keller, A. A. Klingebiel, J. N. Marsh, H. R. Satterfield, H. V. Strelow, D. Thomas, S. Torrance, F. C. Westin
Dane	1978	Robert Patzer, David Medin, Roger Weber, Bruce Frazier, Everett Kissinger, Michael Mitchell, S. Michael Shivers, Carl Glocker, Kenneth Denow, Henry Moeller, James Ayen, David Omernik
Dodge	1980	R. Behrends-UW, L. Gile-UW, I. Korth-UW, G. Lee-UW, T. Peck-UW, S. Pollack-UW, G. Robinson-BPI, J. Cain, E. Drozd, R. Glenn, R. Higgins, B. Johnson, N. Johnson, K. Schmude, D. Spangelberg, J. Sund
Door	1978	Wayne D. Barndt, Burel S. Butman, Steven L. Elmer, Ernest G. Link, Charles F. Leonard, Howard E. Lorenz, Sidney A. Vanderveen
Douglas	2006	Kathryn M. DesForge, Ulf B. Gafvert, Randall R. Gilbertson, Kim C. Goerg, Scot A. Haley, Terry L. Kroll, Mark A. Krupinski, Fred J. Simeth, Jeff C. Talsky, Jesse M. Turk
Dunn	1975	Delbert D. Thomas, Dale E. Jakel, Joseph M. Boelter, Dale E. Parker, Orville L. Haszel, Gordon N. Wing
Dunn	2004	Deanna M. Anderson, Roger A. Dahl, Donna E. Ferren Guy, Richard M. Johannes, Theron A. Meyer, Timothy J. Miland, Larry L. Natzke
Eau Claire	1977	Peter D. Lindgren, Delbert D. Thomas, Gordon N. Wing, Joseph M. Boelter, Dale C. Jakel, David A. Medin
Florence	2004	Joseph M. Boelter, Angela M. Elg, David J. Hvizdak, A. J. Klingelhoets,

		Howard E. Lorenz, Larry L. Natzke, Harvey V. Strelow, Jeff A. Talsky, Stacy S. Webb, Lance R. Lindwall-FS, Edward W. Neumann-FS
Fond du Lac	1973	Richard Higgins, Irving L. Korth, Ernest G. Link, Robert A. Patzer
Forest	2005	James R. Barnes, Joseph M. Boelter, John E. Campbell, Angela M. Elg, Kim C. Goerg, David C. Roberts, Neil Martin-Ohio DNR, Edward Neumann-FS
Grant	1961	Glenn H. Robinson, Burel S. Butman, F. D. Hole-WGNHS, Robert Hoene, Delbert Thomas, Tom Tomlinson, James B. Beardsley-WAES, R. B. Corey-WAES, Raymond L. Newbury-WAES, F. F. Peterson-WAES, James Pomerening-WAES, J. Phillip Watson-WAES, Paul R. Westin-WAES
Green	1974	Burel S. Butman, Carl L. Glocker, S. Michael Shivers, Stuart W. Torrance, Bruce G. Watson, Fenton Gray, Delvin S. Fanning, Theon Keller, Augustine Otter, John Sund, Jr., Roger Weber, Fred C. Westin
Green Lake	1977	Frank L. Anderson, Howard F. Gundlach, Kim A. Kidney, Michael Mitchell
Iowa	1962	Stuart W. Torrance, Burel S. Butman, H. R. Satterfield, Ronald C. Weber, John Keyes, Carl Glocker, E. M. Watson, H. C. Cribe, Fenton Gray, S. B. Cannon, J. H. Axley
Iron	2006	James R. Barnes, William D. Fiala, Ulf B. Gafvert, David Gundlach, David J. Hvizdak, Jeff Kroll, Terry L. Kroll, Mark A. Krupinski, John A. Lucassen, Jennifer L. Maziasz, Jeff C. Talsky, Kevin C. Traastad, Jesse M. Turk, Art L. Voigtlander
Jackson	1998	Roger A. Dahl, Dale E. Jakel, Richard M. Johannes, John E. Langton, Howard E. Lorenz, Theron A. Meyer III, Duane T. Simonson
Jefferson	1979	James E. Ayen, Carl L. Glocker, David L. Omernik, Joseph A. Steingraeber, Stephen C. Suhs, Bruce G. Watson
Juneau	1991	Randall R. Gilbertson, Howard F. Gundlach, Richard M. Johannes, Theron A. Meyer III
Kenosha and Racine	1970	Owen R. Demo, Orville R. Haszel, Dale E. Jakel, Donald C. Kurer, Ernest G. Link, Albin H. Martinson, Augustine J. Otter, Charles A. Reynolds, Joseph A. Steingraeber, Bruce Watson, Roger Weber
Kewaunee	1980	John E. Campbell, Steven W. Frings, Kim A. Kidney, Ernest G. Link, Augustine J. Otter, Marvin C. Suhr
La Crosse	1960	S. D. Alfred, A. H. Jeffrey, Donald W. Klauss, A. A. Klingebiel, L. B. Kodet, Daniel Lowenthal, James N. Marsh, Erling F. Nelson, F. J. O'Connell, A. L. Trowbridge, George O. Walker
La Crosse	2006	Duane T. Simonson, Donna E. Ferren Guy, Phillip D. Meyer, Matt R. Otto, Guyon D. Shipman
Lafayette	1966	Burel S. Butman, Stuart W. Torrance, John J. Sund, Jr., S. Michael Shivers,

		Bruce G. Watson, George J. Breska, Carl L. Glocker, Ronald C. Weber, Fenton Gray, Fred C. Westin
Langlade	1986	Kim C. Goerg, Michael J. Mitchell, David L. Omernik, L. Lindwall-FS, D. Mayer-FS, E. Neumann-FS
Lincoln	1996	John E. Campbell, Roger A. Dahl, Ulf B. Gafvert, Kim C. Goerg, Sam D. Hagedorn, David J. Hvizdak, James A. Martzke, Michael J. Mitchell, Fred J. Simeth
Marathon	1989	Robert J. Bartelme, David A. Buss, William D. Fiala, Sam D. Hagedorn, Kim A. Kidney, John O. Werlein, Dean M. Kaatz-LCD, Gary W. Starzinski-NCWRPC
Marathon	2003	Robert J. Bartelme, David A. Buss, William D. Fiala, Sam D. Hagedorn, Richard M. Johannes, Kim A. Kidney, John O. Werlein, Dean M. Kaatz-LCD, Gary W. Starzinski-NCWRPC
Marinette	1991	Terry L. Kroll, Charles F. Leonard, Howard E. Lorenz, Ronald W. Luethe, Robert D. Weihrouch, Charles E. Wilkinson
Marquette	1975	Keith O. Schmude, Owen E. Demo, Delvin S. Fanning, John E. Langton, Theodore R. Peck, Gerhard B. Lee-UW
Menominee	2004	Keith A. Anderson, John E. Campbell, Richard M. Johannes, Howard E. Lorenz, Michael J. Mitchell, Rebecca A. Otto
Milwaukee & Waukesha	1971	Dale Jakel, Augustine Otter, Steve Payne, Charles A. Reynolds, J. A. Steingraeber, Roger Weber
Monroe	1984	Neil R. Babik, Wayne D. Barndt, Martha C. Boman, Craig A. Ditzler, Steven L. Elmer, Randall R. Gilbertson, Howard F. Gundlach, John E. Langton, Theron A. Meyer, Susan M. Tikalsky, Charles E. Wilkinson
Oconto	1988	John E. Campbell, Terry L. Kroll, Charles F. Leonard, Ernest G. Link, Howard E. Lorenz, Raymond L. Newbury, David C. Roberts, Edwin W. Neumann-FS
Oneida	1993	Joseph M. Boelter, Kim C. Goerg, David J. Hvizdak, Steven K. Kluess, Mark J. Kopecky, Kenneth W. Lubich, Steve W. Payne, Harvey V. Strelow, Larry L. Day-NCWRPC, Duane L. Greuel-NCWRPC, Yves E. Riopel-NCWRPC, Lance R. Lindwall-FS, Edward W. Neumann-FS
Outagamie	1978	Howard E. Lorenz, Steven W. Frings, Ernest G. Link, Charles F. Leonard, Dennis E. Hutchinson, Burel S. Butman, Wayne D. Barndt
Ozaukee	1970	Dale E. Parker, Donald C. Kurer, Joseph A. Steingraeber
Pepin	1964	Orville L. Haszel, Gordon N. Wing, Emil Evenson, Delbert D. Thomas
Pepin	2001	Roger A. Dahl, Donna E. Ferren, Theron A. Meyer, Larry L. Natzke
Pierce	1968	Dale E. Parker, Delbert D. Thomas, Gordon N. Wing

Pierce	2006	Deanna M. Anderson, Roger A. Dahl, Donna E. Ferren Guy, Theron A. Meyer, Timothy J. Miland, Larry L. Natzke
Polk	1979	Richard Diers, Terry J. Huffman, Everett J. Kissinger, Gordon Wing-SWCD
Portage	1978	Augustine J. Otter, William D. Fiala
Price	2006	James R. Barnes, Tina Bonack, Joe M. Boelter,John E. Campbell, Stacy S. Eichner, Angela M. Elg, David J. Hvizdak, Rich M. Johannes, Kevin C. Traastad, Larry L. Natzke, William D. Fiala, Timothy J. Miland, Arthur L. Voigtlander, Leonard S. Kempf-FS, Gregory A. Knight-FS, Debra L. Sigmund-FS, Darin R. Silkworth-FS contractor
Richland	1959	Glenn H. Robinson, F. A. Haverland, F. D. Hole-WGNHS, S. D. Alfred, W. W. Anderson, W. H. Bender, Nels Benson, A. W. Irvine, R. F. Peterson, R. T. Sasman, Harvey V. Strelow, E. M. Watson, E. T. Barnes-WGNHS, R. B. Corey-WGNHS, Maynard Fosberg-WGNHS, A. J. Klingelhoets, Gerhard B. Lee-WGNHS, Gerard Ouellete-WGNHS, F. F. Peterson-WGNHS, Samuel Rieger-WGNHS
Richland	2006	Duane Simonson, Donna E. Ferren Guy, Phillip D. Meyer, Matt R. Otto, Chanc L. Vogel
Rock	1974	Robert J. Engel, Howard F. Gundlach, Keith O. Schmude, Carl L. Glocker, Edward L. Weber, Frank L. Anderson, Owen R. Demo, Randall L. Decker, S. Michael Shivers, Robert A. Patzer, David A. Medin, Jerry J. Genson, Marion M. Blevins, Jr., Bruce E. Frazier
Rusk	2006	Deanna M. Anderson, Roger A. Dahl, Stacy S. Eichner, William D. Fiala, Daunte S. Gibbs, Randy R. Gilbertson, David J. Hvizdak, Rich M. Johannes, Theron A. Meyer, Timothy J. Miland, Arthur L. Voigtlander, Sam D. Hagedorn-RC&D contractor
Sauk	1980	Howard F. Gundlach, David C. Roberts, Robert W. Slota, Keith H. Widdel
Sawyer	2006	James R. Barnes, John E. Campbell, Roger A. Dahl, Kathy M. DesForge, Stacy S. Eichner, William D. Fiala, Ulf B. Gafvert, Scot A. Haley, David J. Hvizdak, Rich M. Johannes, Mark A. Krupinski, Jennifer L. Maziasz, Timothy J. Miland, Patrick Schaefers, Fred J. Simeth, Jeff C. Talsky, Kevin C. Traastad, Arthur L. Voigtlander, Sam D. Hagedorn-RC&D contractor, Leonard S. Kempf-FS, Gregory A. Knight-FS, Debra L. Sigmund-FS, Darin R. Silkworth-FS contractor, Pete Kolka-LCD
Shawano	1982	John E. Campbell, Howard F. Gundlach, Terry J. Huffman, William L. Kowalski, John B. Liberty, Raymond L. Newbury, David C. Roberts, Dennis A. Felts-SWCD, James A. Martzke-SWCD, Harvey V. Strelow-SWCD
Sheboygan	1978	Wayne D. Barndt, Robert J. Engel, Henry T. Moeller, Bruce A. Roberts, Joseph A. Steingraeber
St. Croix	1978	Joseph M. Boelter, Dale E. Jakel, Keith H. Widdel, John E. Langton
Taylor	2005	Joseph M. Boelter, John E. Campbell, Roger A. Dahl, Stacy S. Eichner,

		Angela M. Elg, William D. Fiala, Ulf B. Gafvert, Sam D. Hagedorn, Dale E. Jakel, Richard M. Johannes, John L. Langton, Kenneth W. Lubich, Tim J. Miland, Augustine J. Otter, Robert D. Weihrouch, Leonard S. Kempf-FS, Gregory A. Knight-FS
Trempealeau	1977	Norman L. Johnson, Wayne D. Barndt, John E. Langton
Vernon	1969	Robert W. Slota, W. W. Anderson, R. Church, G. D. Garvey, F. H. Haverland, H. Strelow
Vilas	1988	Orville L. Haszel, David J. Hvizdak, Everett J. Kissinger, Larry L. Natzke, Steve W. Payne, Harvey V. Strelow, Gordon H. Wing-LCD, Edwin W. Neumann-FS, William A. Wertz-FS, Katherine K. Skrivseth-FS
Walworth	1971	John M. Cain, Donald W. Owen, Donald C. Kurer, Joseph A. Steingraeber, Orville L. Haszel
Washburn	2006	Keith A. Anderson, Scot A. Haley, David J. Hvizdak, Mark A. Krupinski, Kenneth W. Lubich, James Martzke, Phillip D. Meyer, Fred J. Simeth, Jeff C. Talsky, Chanc L. Vogel, Robert D. Weihrouch
Washington	1971	Orville R. Haszel, Donald C. Kurer, Dale E. Parker, Robert Patzer, Steve Payne, Roger Weber, Keith O. Schmude
Waupaca	1984	John E. Campbell, Steven W. Frings, Augustine J. Otter, Fred J. Simeth, Duane T. Simonson, Stephen C. Suhs
Waushara	1989	Augustine J. Otter, Fred J. Simeth, Duane T. Simonson
Winnebago	1980	Neil R. Babik, Kenneth A. Denow, Michael J. Mitchell, Larry L. Natzke, Bruce A. Roberts
Wood	1977	Harvey Strelow, Charles Reynolds, Joseph Boelter, Edward Drozd, Robert J. Bartelme

Wisconsin Soil Scientist Workshop
University of Wisconsin, Wausau Campus
February 4-7, 1980

Front row, left to right
John E. Campbell, SS, SCS, Shawano
Howard E. Lorenz, SS, SCS, Marinette
William D. Fiala, SS, SCS, Wausau
George W. Hudelson, Soil Correlator, SCS, Madison

Second row, left to right
Carl L. Glocker, SS, SCS, Madison
Terry L. Kroll, SS, SCS, Oconto
Orville L. Haszel, SS, SCS, Eagle River
John E. Langton, SS, SCS, Sparta
Dale E. Jakel, SS, SCS, Chippewa Falls

Third row, left to right
Gary W. Starzinski, SS, Lincoln County SWCD
David L. Omernik, SS, SCS, Antigo (with beard)
John I. Brubacher, SSS, SCS, Madison
Larry L. Natzke, SS, SCS, Eagle River
Kenneth W. Lubich, SS, SCS, Rhinelander
Frank L. Anderson, Asst. SSS, SCS, Madison
Michael J. Mitchell, SS, SCS, Antigo
Augustine J. Otter, SS, SCS, Waupaca

Fourth row, left to right
Joseph M. Boelter, SS, SCS, Rhinelander
David A. Buss, SS, SCS, Wausau
Dean M. Kaatz, SS, SWCD Coordinator for Marathon Co.
Roger A. Dahl, SS, SCS, Chippewa Falls
David C. Roberts, SS, SCS, Shawano
Howard F. Gundlach, SS, SCS, Shawano
Fred J. Simeth, SS, SCS, Waupaca
William L. Kowalski, SS, SCS, Shawano
Kim A. Kidney, SS, SCS, Wausau

Soil Scientist Meeting – Treehaven – March 1986

Front row
Dave Omernik, Joe Boelter, Mike Mitchell, Rich Johannes, Augustine Otter, Frank Anderson, Duane Simonson, Howard Gundlach, Dave Roberts, Roger Dahl, Bob Weihrouch, Terry Huffman

Back row
Mark Kopecky, Larry Natzke, Tim Meyer, Ken Lubich, Bill Fiala, Steve Payne, Sam Hagedorn, Howard Lorenz, Terry Kroll, John Campbell, John Langton, Dale Jakel, Fred Simeth

Soil Scientist Meeting
Treehaven, Wisconsin
February 2-4, 1993

Front Row
Lenny Kempf
Greg Knight
Milo Harpstead
John Langton
Terry Kroll
Bill Fiala
Ken Lubich
Angela Elg

Middle Row
Carl Wacker
Larry Natzke
Nathan McCaleb
Auggie Otter
Paulette Falk
Stacy Webb
Barb Nigh
Dave Hoppe
Donna Ferren
Keith Anderson
Richard Johannes
Roger Dahl
Jeff Brubacher
Marlene Reitmeier
Fred Simeth
Howard Gundlach
Mike Mitchell
Ron Yeck
Brian Slater
Kevin McSweeney (visiting professor)
Fred Madison

Back Row
Tim Meyer
Dave Omernik
Dave Roberts
Duane Simonson
John Kabrick
Kim Goerg
Jim Barnes
Joe Boelter

Soil Scientist Meeting - Treehaven – February 2005

Front row, left to right
Jeff Talsky, SS, Spooner
Art Voigtlander, SS, Ladysmith
Jim Barnes, SS, Phillips
Don Fehrenbacher, State Soil Scientist, Madison
Rich Johannes, SS, Medford
Kathy DesForge, SS, Spooner
Randy Gilbertson, SS, Spooner
Larry Natzke, RSS, Altoona
Kevin Traastad, RSS, Juneau

Middle row, left to right
Ken Lubich,Soil Survey Division, Program Manager, Washington DC
Terry Kroll, SS, Ashland
John Campbell, SS, Phillips
Karla Petges, SS, Juneau
Daunte Gibbs, SS, Altoona
Stacy Eichner, SS, Ladysmith
Scot Haley, SS, Spooner
Joe Jahnke, Soil Specialist (CORR), St. Paul, MN
Phil Meyer, SS, Richland Center

Back row, left to right
Jesse Turk, SS, Ashland
Carl Wacker, ASSS, Madison
John Lucassen, SS, Ashland
Asghar Chowdhery, SDQS, Indianapolis, IN
Roger Dahl, SS, Altoona
Chanc Vogel, SS, Richland Center
Gary Struben, SDQS, Indianapolis, IN
Robert Vobora, Area Resource Soil Scientist, IA
Mark Krupinski, SS, Madison
Travis Neely, SSS, MO11 Leader, Indianapolis, IN
Fred Simeth, SS, Spooner
Tim Meyer, SS, Altoona
Dave Hvizdak, SS, Spooner
Daune Simonson, RSS, Richland Center
Tim Miland, SS, Altoona
Howard Gundlach, State Soil Correlator, Madison

Iron County Glacial Geology Tour, May 2003

From left to right:
Lee Clayton - WI Geologic Survey
Fred Madison - UW
John Lucassen - NRCS
Jim Barnes- NRCS
Jim Jordan - USFS
Cindy Stiles - UW
Darrin Silkworth - NRCS MI
Dave Hvizdak- NRCS
Howard Gundlach- NRCS
Tom Hooyer - WI Geologic Survey
Terry Kroll- NRCS
Jennifer Masziaz- NRCS

Development and Management of the Wisconsin Cooperative Soil Survey

National Cooperative Soil Survey in Wisconsin - A Brief History

By Howard F. Gundlach, Assistant Soil Scientist, Wisconsin
USDA Natural Resources Conservation Service
March 31, 2006

The soil survey program in the United States is a cooperative endeavor of Federal, state, and local government. The National Cooperative Soil Survey initiative in the U.S. was launched in 1899 under the leadership of the U.S. Department of Agriculture's (USDA) Division of Agricultural Soils, which became USDA's Bureau of Soils in 1901.

Soil Survey work in Wisconsin began in the early 1900s shortly after the inception of the National Cooperative Soil Survey. One of the earliest Wisconsin soil surveys published is the Soil Survey of Racine County, Wisconsin. Field mapping for this survey was completed during the summer of 1906 and the report with soil map was published in 1907. This soil survey was somewhat unique in that it was not a cooperative effort. It was done solely by the USDA, Bureau of Soils.

1910-1940

Most of the soil surveys produced during this period in Wisconsin were products of a cooperative effort between the USDA, Bureau of Soils and the University of Wisconsin, Geological and Natural History Survey. The two agencies worked together in the field to prepare the soil legends; to identify, describe and classify the soils; and to produce the soil maps. Upon completion of the basic fieldwork, each agency commonly published its own unique soil survey report. In some instances, however, only one report was published (sometimes by the Bureau of Soils and sometimes by the Wisconsin Geological and Natural History Survey).

The majority of these early soil surveys were of individual counties but a few were made of parts of counties. The soil maps were generally made at a scale of 1 inch equals 1 mile (1:63,360) but some were at a scale of 1-inch equals 0.98 miles (1:62,500). Soils were delineated as map units of named soil series, but series concepts were vague and were very broad (the same series had map units that were all clay or all sand). Map units within series were based on the presumption of a uniform soil texture for the whole soil (e.g. Miami silt loam had a texture of silt loam throughout).

In addition to the individual county soil surveys, a number of multi-county soil surveys were made at a broader scale in the northern part of the state. These surveys were called reconnaissance soil surveys and the maps were made at a scale of 1-inch equals 3 miles (1:190,080). Like the individual county surveys, these reconnaissance surveys were a

cooperative effort between the Bureau of Soils and Wisconsin Geological and Natural History Survey with each agency commonly producing its own publication.

By 1931, thirty-eight individual county soil surveys had been published along with seven multi-county reconnaissance soil surveys and one general soil textural map of northern Wisconsin titled ***Soils of Northern Wisconsin***. The Wisconsin Geological and Natural History Survey produced nine more of these general surveys in the 1940s, 1950, and 1960s some with USDA cooperation and some not. The most recent was an update of Jefferson County in 1970. These newer surveys are much more technically accurate than their earlier counterparts but are still done at a large scale, which limits detail.

1940-1965

The Soil Erosion Service was created in 1933 within the U.S. Department of Interior to address the nation's severe soil erosion problems. In 1935, the Soil Erosion Service was transferred to the U.S. Department of Agriculture, along with its Chief, Hugh Hammond Bennett, and became the Soil Conservation Service (SCS). The Soil Conservation Service was also in the business of making soil surveys and worked cooperatively/competitively with the Bureau of Soils for many years. In November of 1952, Congress enacted legislation that combined USDA's Bureau of Soils with the Soil Conservation Service and designated the SCS as the single agency in charge of the National Cooperative Soil Survey within the U.S. Department of Agriculture. Cooperators during this period included Wisconsin Geologic and Natural History Survey and Wisconsin Agricultural Experiment Station, both of the University of Wisconsin.

The 1940's marked the advent of more "modern" soil surveys in Wisconsin. These surveys show the soil in much more detail because they were mapped and published at a larger scale, generally 1 inch equals 0.25 miles (1:15,840) or 1 inch equals 0.32 miles (1:20,000). They used the 1938 Soil Classification by Marbut (the then-current national standard) and as a result, the soil series and map unit concepts are much narrower and much better defined. Most of these surveys use aerial photography as the base map for field mapping and publication. Publication of soil surveys lagged greatly during this time. A number of soil surveys, which had field mapping completed in the 1940s and 1950s, were not published until the 1960s. By 1965, seven "modern" soil surveys were published.

The first of the more "modern" soil surveys to be published was Richland County in 1959. This survey was the one exception that was not published on aerial photo base maps. (An update of Richland County was completed in 2001 and will be published on ortho-photo base maps.) The next "modern" soil survey to be published was La Crosse County in 1960. It and all subsequent surveys are published on aerial photo base maps.

As part of the National Cooperative Soil Survey in Wisconsin, the University of Wisconsin created a position of Extension Specialist in Soil Survey Interpretation in 1956. The advent of "modern" soil surveys and the accelerated educational programs for land use planners, zoning administrators, and engineers that resulted from the UW-SCS educational collaboration created a great increase in public demand for information on the farm and non-farm uses and management of soils to the extent that the Soil

Conservation Service did not have the funds or staff to keep up with the demand. A cost sharing program to accelerate the soil survey in seven southeastern Wisconsin counties originated with the Southeast Wisconsin Regional Planning Commission. Other counties and public entities then began to appropriate funds to cost-share with the Soil Conservation Service.

1965 to 2006

In 1965, the National Cooperative Soil Survey adopted a new system of soil classification for use in making soil surveys. This system, which can be used worldwide, is Soil Taxonomy, A Basic System of Soil Classification for Making and Interpreting Soil Surveys (Soil Taxonomy for short). All soil surveys that were in progress in Wisconsin in 1965 or were started after 1965, use this system for classifying, mapping, and interpreting soils. The first soil survey to be published in Wisconsin using Soil Taxonomy was Pierce County in 1968. Currently, all but five of the completed county soil surveys in Wisconsin have their soils classified using Soil Taxonomy. The five counties are Buffalo, Crawford, Grant, Iowa, and LaFayette. These soil surveys will eventually be updated using Soil Taxonomy.

During the 1960s, 1970s, and 1980s, soil survey work in Wisconsin tended to leapfrog around the state on a county-by-county basis as cost-sharing monies became available from counties and other sources. By about 1992, most counties in the state had a completed "modern" soil survey or had a soil survey in progress with a near-future completion date. The exception was a group of ten counties in northwestern Wisconsin (NW10). These were Ashland, Bayfield, Burnett, Douglas, Iron, Price, Rusk, Sawyer, Taylor and Washburn counties. For the most part, these counties were unable to generate enough revenue to provide cost-share monies to accelerate their soil surveys. In 1992, only about 40 percent of the 7.03 million acres in the NW10 was considered to be soil mapped. Much of this acreage was Forest Service lands. The Forest Service made soil surveys of their lands and the Soil Conservation Service reviewed the work and correlated it into the National Cooperative Soil Survey. About half of the mapped acreage in the NW10 needed to be reviewed, updated, and in some cases, remapped.

The NW10 Soil Survey was begun in 1992 with the signing of a Memorandum of Understanding between the USDA Soil Conservation Service; USDA Forest Service; the NW10 counties; the Northwest Regional Planning Commission; USDI Bureau of Indian Affairs; five bands of Lake Superior Chippewa Indians; USDI National Park Service; Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and Research Division, College of Agricultural and Life Sciences, University of Wisconsin. Based on the current staff and funds, the projected completion date for soil survey fieldwork in this MOU was December, 2008.

Over the years, some additional funding came into the NW10 soil survey for specific projects within the area. The USDI, Bureau of Indian Affairs provided funds to accelerate the soil surveys of the Bad River, Red Cliff, and Lac du Flambeau Indian Reservations. The Lac Courte Oreilles Tribal Governing Board provided funds to accelerate the soil survey of their lands. The State of Wisconsin, Department of Natural Resources provided funds to accelerate the soil survey of the Brule River State Forest. Taylor County

provided funds in the last two years of their soil survey to accelerate its completion. The USDI, National Park Service provided funds to complete the soil survey of the Apostle Islands National Lakeshore and the St. Croix National Scenic Riverway. These additional funds produced short-term boosts in staff and production but overall, progress was slow. By 2000 it was apparent that the 2008 completion goal was not attainable with the current funding and staff.

Then in 2000, the State of Wisconsin weighed in to support and accelerate soil survey in Wisconsin. The Wisconsin Department of Administration (DOA) signed an agreement with the Natural Resources Conservation Service to complete the NW10 Soil Survey. (The Soil Conservation Service was renamed the Natural Resources Conservation Service [NRCS] in 1995.) This agreement provided $2.6 million to help accomplish this task. With this influx of funds, NRCS was able to hire more staff and opened two more soil survey offices in Phillips and Medford. By 2001, there were 29 field soil scientists working on the NW10 Soil Survey. With the additional staff, soil survey progress was rapid and the last of the field mapping was completed in the fall of 2005. The Last Acre Ceremony for the NW10 Soil Survey was held October 7, 2005 at the Lac Courte Oreilles Conference Center in Hayward.

The completion of field mapping was not the end of the job, however. In about 1995, with the burgeoning of Geographic Information System (GIS) technology, the NRCS began a national initiative to digitize all the soil surveys in the nation and create a national Soil Survey Geographic Database (SSURGO). Digitized soil surveys could then be used in GIS systems. NRCS in Wisconsin actually began digitizing soil surveys on its own about two years prior to this. The national initiative was to be completed in about seven years. Each state was charged with digitizing their own soil surveys and submitting them to the National Cartographic Center in Fort Worth for certification of the digitized product (SSURGO Certification). This system soon proved unworkable, however, and about 1997 the NRCS established seven Digitizing Centers, which would handle the digitizing, and SSURGO Certification of all soil surveys. The NRCS digitizing center in Wisconsin became one of the seven national centers.

The 2000 agreement with DOA also provided $1.6 million to digitize and SSURGO Certify by June 30, 2006, all the soil surveys in Wisconsin that were not yet digitized. With this fund boost, all the soil surveys in Wisconsin outside the NW10 were SSURGO Certified by May of 2005 except Pierce County that was being updated and was SSURGO Certified in May 2006. Within the NW10, Taylor County was first to be SSURGO Certified in May of 2002; Washburn was next in January of 2003; then Burnett in June of 2004; then Bayfield and Douglas, both in October of 2005; then Price and Rusk both in April of 2006; and then Sawyer, Ashland, and Iron in June of 2006. The goal of completing the NW10 soil survey mapping and of digitizing and SSURGO Certifying all the remaining soil surveys in the Wisconsin by June 30, 2006 has been accomplished.

The Future – 2006 and beyond

The completion of field mapping marked the end of one era of soil survey in Wisconsin and the start of another. The central focus of Soil Survey in Wisconsin will now be on the maintenance and update of existing soil surveys. Older soil surveys will be brought up to modern standards; more detailed soil maps and data will be developed as needed. This process was actually begun about 10 years ago and soil surveys in Dunn, La Crosse, Pepin, Pierce, and Richland Counties have already been updated. Future updates will likely not be on a county-by-county basis but rather will be done by major physiographic regions known as Major Land Resource Areas (MLRA). Additional emphasis is also being placed on providing training and support for the interpretation and use of soil survey information.

The following article was written for inclusion in a WSPSS newsletter by former State Soil Scientist A. J. Klingelhoets *****

History of the Soil Survey in Wisconsin from 1800 to 1980

The first soil map of Wisconsin was published in 1882. It was part of the first geological survey of the state under the direction of T. C. Chamberlin. Much of the early survey work was done by the Wisconsin Geologic and Natural History Survey, the Soils Department at the University of Wisconsin, and the U. S. Bureau of Soils.

The pioneer work in soil survey in the state was initiated at a meeting of the Wisconsin Academy of Science, Arts and Letters on December 27, 1893, when a committee chaired by C. R. Van Hise was appointed to secure legislation establishing a geological and natural history survey. This became a reality in 1897, when the survey was approved to study mineral resources, soils, plants, animals, physical geography, natural history, and to do topographic mapping. E. A. Birge was the first director from 1897 to 1918. He was followed by W. O. Hotchkiss from 1918 to 1924, by E. F. Bean from 1924 to 1953, by George Hanson from 1953 to 1972, and by M. E. Ostrom from 1972 to the present time. The soil mapping program of the Geological and Natural History Survey was in response to a legislative directive "to cause a soil survey and a soil map of the state" to be prepared.

The federal soil survey work in Wisconsin began in 1899 and thereafter soil survey became a cooperative effort between the U. S. Dept. of Agriculture and state agencies.

Prof. A. R. Whitson of the Soils Dept. of College of Agriculture was in charge of Soil Survey Division of Wisconsin Geological and Natural History Survey from 1909 to 1933. During this period, under the leadership of W. J. Geib, a number of general soil maps of the northern half of the state were published as well as detailed reconnaissance maps of the state. The U. S. Bureau of Soils and later the U. S. Bureau of Plant Industry carried on work cooperatively during this period and published a number of soil maps and bulletins.

In the 1930's, state funds for soil survey lapsed, but the U. S. Dept. of Agriculture carried on soil mapping. It was in this period that the Soil Conservation Service became active in making soil surveys for conservation planning. Much of the early mapping was in erosion-prone areas such as southwestern Wisconsin. None of these surveys were published.

In 1945, the Soil Survey Division of the Geological & Natural History Survey was reactivated, largely through the efforts of State Geologist E. F. Bean, Prof. Emil Truog, and R. J. Muckenhirn of the College of Agriculture. Much of the fieldwork was directed to making detailed soil surveys for farm planning to assist the Soil Conservation Service. The Geological and Natural History Survey also resumed publication of semi-detailed

county soil maps during this period. R. J. Muckenhirn and F. D. Hole provided leadership for the state survey program during this period.

In 1952 the Soil Conservation Service began publication of detailed soil maps for counties in Wisconsin. The reports accompanying the maps contained useful information for farm planning, erosion control and some crop yield predictions. This work was done by soil scientists under the administration of M. F. Schweers, State Conservationist (1937-1962), W. W. Russell (1962-1971), Richard Akely (1971-1975), J. C. Hytry (1976-1980), and under the technical direction of State Soil Scientists T. C. Boss (1942-1946), William DeYoung (1946-1960), and A. J. Klingelhoets (1960-1979). Some of the early soil scientists were Erling Nelson, Roy Erickson, Burel Butman, Gordon Wing, Harvey Strelow, Robert Bartelme, Joe Steingraeber, and Del Thomas. Leadership for the state soil survey program was provided during this period by Profs. G. B. Lee and F. D. Hole.

In the 1960's, increased interest by urban groups led to acceleration of soil surveys in many counties including the Southeastern Wisconsin Regional Planning Area. Much of this interest was a direct result of broadening interpretations of soils for many uses besides crop production and erosion control. Early leaders in developing these interpretations in Wisconsin include Dr. M. F. Beatty, Dr. G. B. Lee of the Soils Dept. University of Wisconsin, and Robert Fox, Paul Carroll and A. J. Klingelhoets of the Soil Conservation Service.

Early correlation of soils in Wisconsin was performed by U.S.D.A. personnel covering several states. Iver Nygard, Glen Robinson, Jerry Paschall and Lacy Harmon were early correlators. Paul Carroll, the first state correlator, and more recently George Hudelson now perform this task for all Wisconsin Soil Surveys.

* Much of this was extracted from an article prepared by F. D. Hole for Wisconsin Academy Re. 1962, 9(4): 167-169.

Leadership of the Wisconsin Soil Survey During the Past 50 Years

There have been a large number of very capable staff and leadership of the lead agencies contributing to the State Cooperative Soil Survey Program during the past fifty years. This section provides a chronological listing of a few selected individuals from the Soil Conservation Service and Natural Resources Conservation Service.

The technical and management leadership responsible for conducting the State Soil Survey program has been relatively stable and proactive in taking opportunities to improve soil survey products.

SCS/NRCS State Staffs

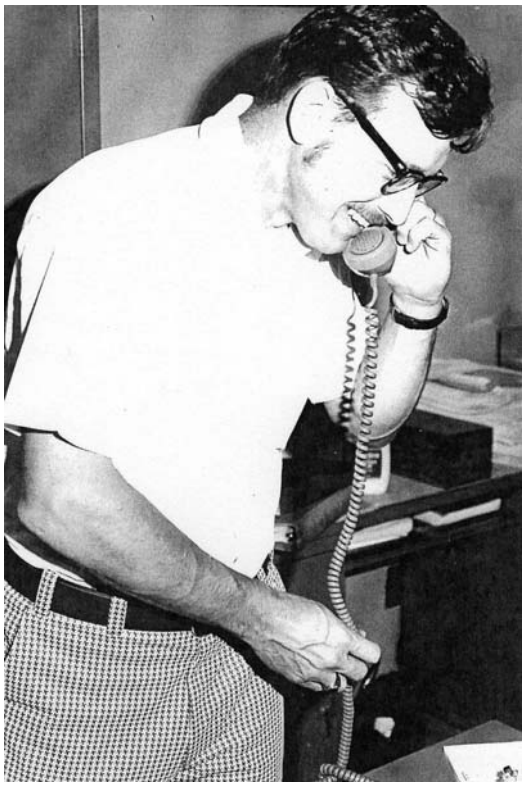
State Soil Scientists
T. C. Boss (1942-1946)
William DeYoung (1946-1960)
A. J. Klingelhoets (1960-1979)
John Brubacher (1979-1985)
Steve Payne (1986-1991)
Ken Lubich (1991-2000)
Jon Hempel (2000-2005)
Donald Fehrenbacher (2005- present)

Soil Correlation, Manuscripts, and Publication Production
Iver Nygard
Glen Robinson
Jerry Paschall
Lacy Harmon
Frank Anderson (Asst. State Soil Scientist)
Joe Jahnke

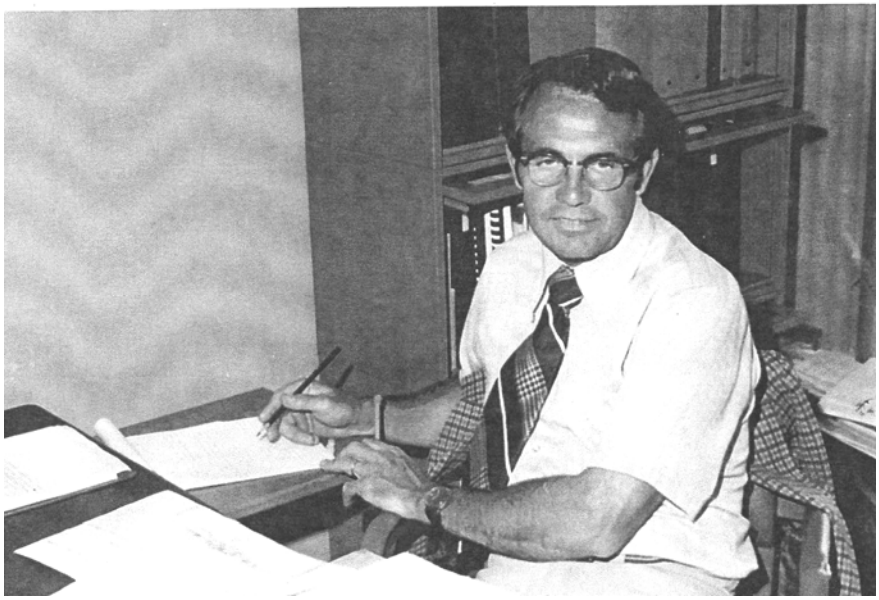
State Correlators
Paul Carroll (first state correlator)
George Hudelson
Howard Gundlach

State Conservationists
M. F. Schweers (1937-1962)
W. W. Russell (1962-1971)
Richard Akely (1971-1975)
Jerome C. Hytry (1976-1980)
Cliffton A. Maguire (1980-1989)
Duane L. Johnson (1989-1990)
Earl Cosby (1990-1994)
Patricia S. Leavenworth (1994-present)

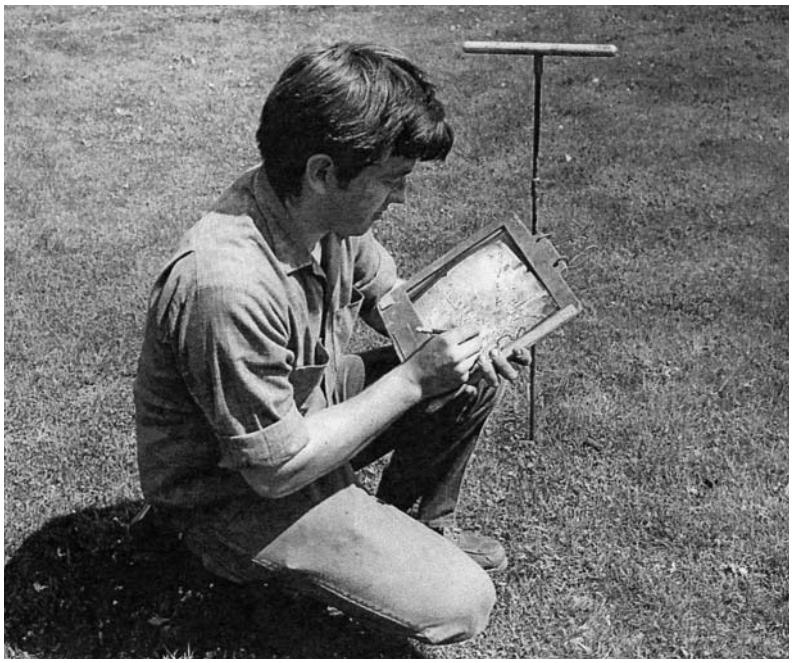
A. J. Klingelhoets, former State Soil Scientist.



George Hudelson, former State Correlator.



Frank L. Anderson, former Assistant State Soil Scientist .



Steve Payne (above) and Ken Lubich (below) during their field days as soil scientists in Wisconsin. These individuals became State Soil Scientists for Wisconsin later in their careers.

William DeYoung , John Brubacher, and A. J. Klingelhoets.
These individuals all served as State Soil Scientists in Wisconsin.

Joe Jahnke, Soil Data Quality Specialist, St. Paul, dips clods during a dense till sampling trip in the NW10.

Don Fehrenbacher, State Soil Scientist, at the 2005 Treehaven Meeting.

Accelerated State Funding – Northwest 10 Project

The following section was prepared by David J. Hvizdak, Soil Scientist, Wisconsin USDA Natural Resources Conservation Service

BACKGROUND

In 1992, the ten northwestern counties were the last in Wisconsin without comprehensive soil survey information. At the time, existing soil survey information consisted of scattered individual projects that were completed over a 50 year timeframe on various vintages of aerial photography, with soil map unit legends varying from county to county and project to project. Most areas within the ten-county area had no soil survey information. In 1992, only about 40 percent of the 7.03 million acres in the NW10 was considered mapped. Of that 40 percent, about half needed to be reviewed, updated, and in some cases remapped. This situation made objective land use planning extremely difficult, inefficient, and in many cases inadequate.

The NW10 Soil Survey began in 1992 with the signing of a Memorandum of Understanding between USDA Natural Resources Conservation Service; ten northwestern Wisconsin counties (Ashland, Bayfield, Burnett, Douglas, Iron, Price, Rusk, Sawyer, Taylor, and Washburn); Northwest Regional Planning Commission; USDA Forest Service; Bureau of Indian Affairs; five Bands of Lake Superior Chippewa Indians (Bad River, Lac Courte Oreilles, Lac du Flambeau, Red Cliff, and St. Croix); National Park Service; Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection; and the Research Division of the College of Agricultural and Life Sciences of the University of Wisconsin. The completion of this 7.03 million acre soil survey marks the conclusion of the initial phase of the National Cooperative Soil Survey (NCSS) program in Wisconsin, which began in 1899. Now, every acre in the state of Wisconsin has soil information available to serve as a valuable tool in land use planning. The next phase of the NCSS in Wisconsin will be to update older soil surveys and to continually maintain the newer ones in order to meet the growing demand for land information.

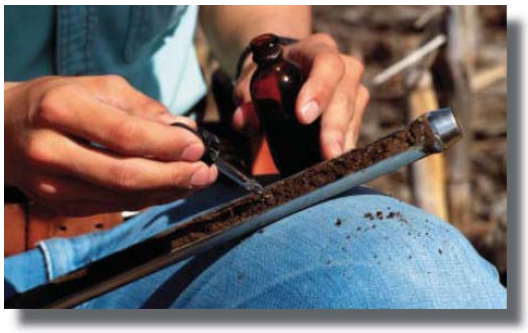
NW10 SOIL SURVEY

In order to complete a project of this magnitude and produce a consistent quality soil survey product in a timely fashion, the entire ten-county area was treated as one large soil survey rather than

ten individual soil surveys. The NW10 concept was a precursor to the Major Land Resource Area (MLRA) concept currently being implemented for conducting soil surveys nationally. Only one soil map unit legend was developed for the entire ten-county area, along with only one corresponding soil database. Map unit concepts and legend development were based on a geomorphic regional basis rather than on a county by county basis, ensuring consistent soil data and soil maps between counties and states, while eliminating duplication. From this data individual county soil surveys will be generated.

Initially, three soil survey offices (Ashland, Ladysmith, and Spooner) were established with a core of nine NRCS soil scientists, including one overall project coordinator. Later, with financial input from the State of Wisconsin to accelerate the soil survey, two more offices were established (Medford and Phillips), additional soil scientists were hired, soil scientists were detailed in from other areas, and two soil scientists from the private sector were contracted. In 2001 there were as many as 29 field soil scientists working on the NW10 soil survey. Soil mapping, soil map unit legend development, data collection, data file sharing, special soil investigations, and quality control was closely coordinated among the soil survey offices. All pre-NW10 soil survey projects were researched, investigated, recorrelated, and in some cases remapped in order to incorporate them into NW10 map unit

concepts. Quality control was implemented by the project leaders and project coordinator throughout the course of the survey and, through annual field reviews and correlation visits, by the Data Quality Specialists from the Major Land Resource Area (MLRA) Soil Survey Region Office 10 in St. Paul, Minnesota.



TOOLS USED FOR THE SURVEY

Soil survey tools included hand-operated bucket augers capable of digging to a depth of 80 inches, tile spades, soil probes, post-hole diggers, and other shovels. Observation tools included a Munsell color book, clinometer, pH kit, hand lens, water bottle (to moisten soil for texturing), map board (to hold aerial photography), tape measure, stereoscope, soil description and note taking forms, sample bags, soil knife, and compass. Most soil scientists had 4WD trucks and/or ATVs to access mapping areas. Global Positioning System (GPS) units were used for data logging and orienteering. A Ground Penetrating Radar (GPR) unit and a Giddings soil probe unit were available for special field investigations. Backhoes were used periodically to get very detailed descriptions of soil layers and to collect soil samples for lab data. Piezometers were installed to monitor soil saturation on select soils. Up-to-date high-flight and low-flight leaf-off photography, along with the recently implemented 3D Mapper computer program provided for accurate delineations of map units. High-end computers with Orthomapper, 3D Mapper, ArcView, ArcGIS, and Terrain Navigator software accelerated the conversion of soil maps to a digital format and provided a platform for soil survey display and analysis.

PRODUCTS

The field work is complete as of the date of this ceremony. By June 2006 all remaining soil maps will be digitized, the database populated, individual county manuscripts edited, and the soil survey SSURGO certified. Bayfield, Burnett, Douglas, Taylor and Washburn Counties are currently SSURGO certified and the information is available to the public. Once certified, soil surveys can be downloaded from the Soil Data Mart (**http://soildatamart.nrcs.usda.gov**), which houses all digital soil maps and corresponding databases and interpretations. Web Soil Survey (**http://websoilsurvey.nrcs.usda.gov**) is an interactive website where soil survey information can be viewed without having to download the information. Soil survey information, including the manuscript, will also be available on compact discs for home computers.

NW10 Soil Survey Timeline

1985 Northwest Regional Planning Commission (NWRPC) endorses passage of state soil survey mapping bill.

1986 Bureau of Indian Affairs (BIA) signs agreement with the Soil Conservation Service (now NRCS) to accelerate soil survey for Bad River, Red Cliff, and Lac du Flambeau (Iron County portion) Indian Reservations. Field work begins.

1989 Member counties request NWRPC establish regional committee to review mapping standards and investigate funding sources. Wisconsin Land Information Board (WLIB) created via Wisconsin Acts 31 and 339 to implement the Wisconsin Land Information Program.

1990 Northwest Wisconsin Soil Survey Advisory Committee established.

Field work for the Bad River, Red Cliff and Lac du Flambeau Indian Reservations completed.

The Lac Courte Oreilles (LCO) Tribal Governing Board signs Memorandum of Understanding (MOU) to accelerate soil survey of LCO Reservation. Field work begins.

1992 NW10 Soil Survey MOU signed, with a field work completion date projected for December, 2008. Signatories include USDA Soil Conservation Service; Ashland, Bayfield, Burnett, Douglas, Iron, Price, Rusk, Sawyer, Taylor and Washburn counties; NWRPC; USDA Forest Service; BIA; five Bands of Lake Superior Chippewa Indians (Bad River, Lac Courte Oreilles, Lac du Flambeau, Red Cliff and St. Croix); National Park Service (NPS); Wisconsin DNR; Wisconsin Department of Agriculture, Trade and Consumer Protection; and Research Division, College of Agricultural and Life Sciences, University of Wisconsin.

Initial NW10 staff of nine soil scientists located in Ashland, Ladysmith and Spooner offi ces.

1993 DNR provides funding to accelerate Brule River State Forest survey. Field work begins.

Field work completed for the LCO Reservation.

Northwest Wisconsin Physiographic (Landtype) Map developed to identify geomorphic patterns for soil map unit development and correlation, and to form the basis for an initial NW10 General Soil Map.

1994 Field work completed on Brule River State Forest.

1995 Soil Conservation Service (SCS) renamed Natural Resources Conservation Service (NRCS). National Soil Survey program transitions toward MLRA concept with correlation and quality control shifting from state office to the new MLRA Soil Survey Region 10 Office (MO-10) in St. Paul, Minnesota. NW10 Soil Survey Completion Plan drafted to streamline operations and to develop strategy to complete the NW10 Soil Survey by 2005.

1996 Northwest Wisconsin Physiographic (Landtype) Map is incorporated into the Landtype Association (LTA) map for the northern one-third of Wisconsin. Correlation of NW10 shifts from Madison to MO-10 office in St. Paul, MN. Taylor County allocates funds to accelerate soil survey for completion in 1998. NW10 soil database converted from State Soil Survey Database (SSSD) program to National Soil Information System (NASIS).

1998 LTA map is completed for the northern one-half of Wisconsin.
Field work in Taylor County completed. Taylor County has a Last Acre Ceremony.
NPS provides funding to accelerate soil survey for Apostle Islands and field work begins.

1999 Sawyer County hires a soil scientist to accelerate soil survey for two seasons.

2000 Wisconsin Department of Administration (DOA) signs agreement with NRCS to complete NW10 Soil Survey ($2.6 million) and digitize and Soil Survey Geographic Database (SSURGO) certify entire state

($1.6 million) by June 30, 2006 as part of the Wisconsin Land Information Program to modernize land records.

Fourth soil survey office established in Phillips.

LTA map is completed for the entire state of Wisconsin.

NPS provides funding to accelerate soil survey for St. Croix National Scenic Riverway in Sawyer, Bayfield and Douglas Counties. Field work begins in Sawyer County.

Field work for the Apostle Islands completed.

Field work in Washburn County completed. State Soil Scientist Ken Lubich named National Soils Digitizing Coordinator. Jon Hempel named new State Soil Scientist.

2001 Fifth soil survey office established in Medford. In all, 29 field soil scientists working on NW10 survey.

2002 Field work for St. Croix National Scenic Riverway completed. Field work on Chequamegon National Forest, begun in 1966, completed. Field work in Burnett County completed.

2003 Field work in Bayfield County completed.

2004 Taylor County Soil Survey is first NW10 county to be SSURGO certified. Washburn County Soil Survey is SSURGO certified. Field work in Douglas, Rusk and Price Counties completed. State Soil Scientist Jon Hempel named Co-Director of National Cartographic and Geospatial Center.

Don Fehrenbacher named new State Soil Scientist.

2005 Burnett County Soil Survey is SSURGO certified. Field work in Ashland, Iron and Sawyer Counties completed. Bayfield and Douglas County Soil Surveys are SSURGO certified. Last Acre Ceremony for the NW10 Soil Survey Project held October 7 at the Lac Courte Oreilles Conference Center near Hayward.

2006 Ashland, Iron, Price, Rusk and Sawyer County Soil Surveys are SSURGO certified.

NW10 Final Acre Ceremony, Lac Courte Oreilles Conference Center, October 7, 2005

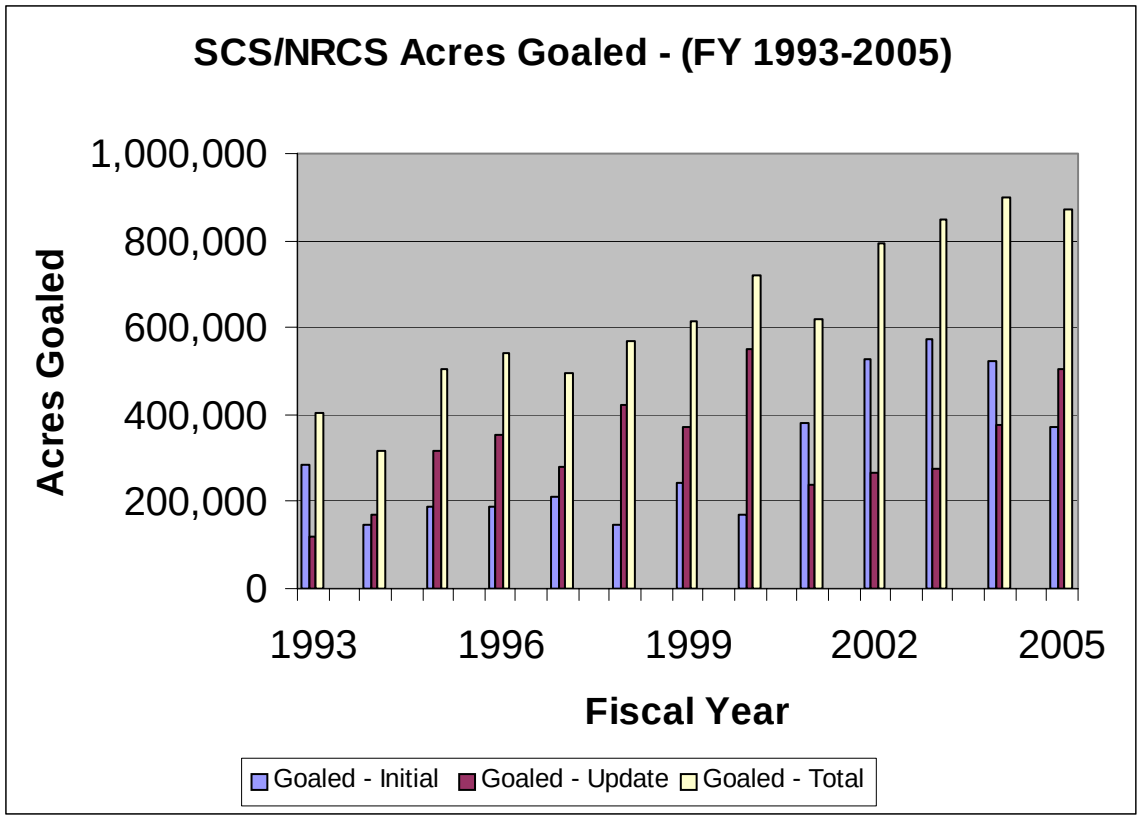
PRE-NW10 AND CONCURRENT-NW10 SOIL SURVEY PROJECTS

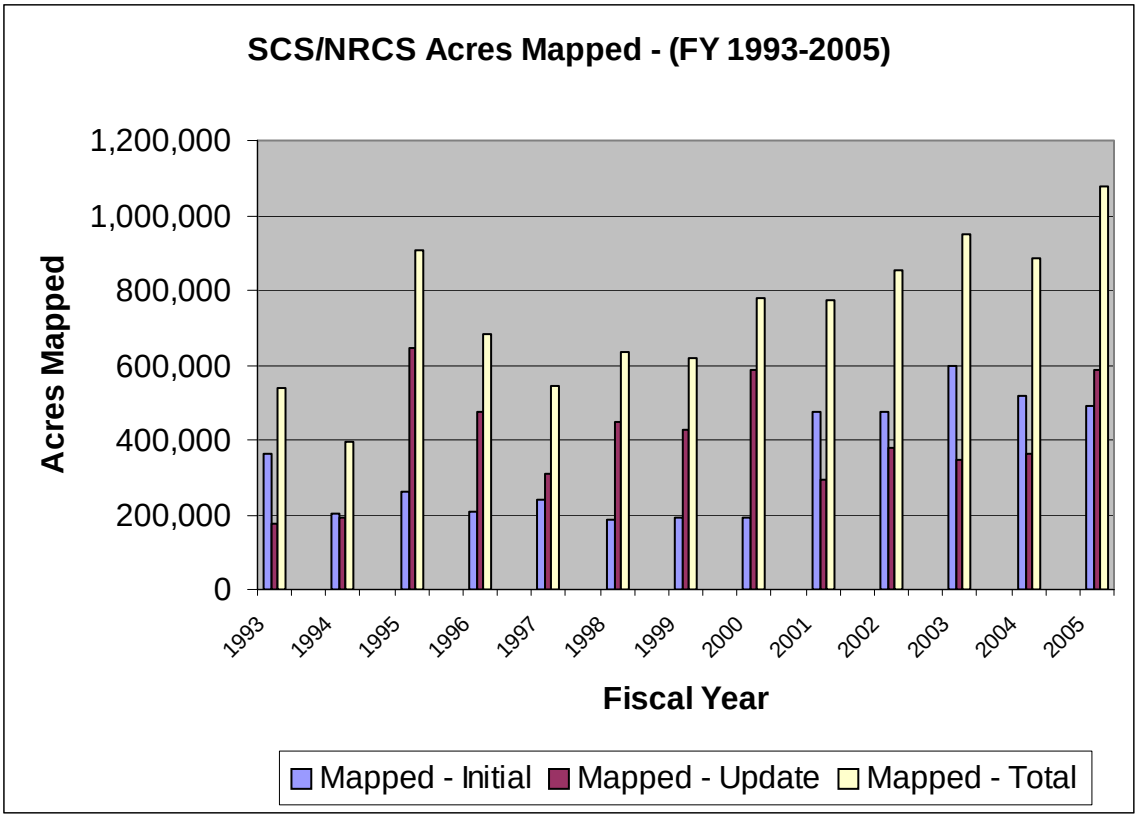
1807	US Geological Survey starts inventory geology and soils of Wisconsin
1879	US Geological Survey publishes "Geology of Wisconsin 1873-1879"
1911	Reconnoissance [sic] Soil Survey of Part of North Western Wisconsin (first edition)
1914	Reconnoissance [sic] Soil Survey of North Part of North Western Wisconsin (first edition)
	Reconnaissance [sic] Soil Survey of South Part of North Western Wisconsin (second edition)
	Soil Survey of Bayfield Area, Wisconsin
1916	Reconnaissance [sic] Soil Survey of North Part of North Central Wisconsin
1917	Reconnoissance [sic] Soil Survey of South Part of North-Central Wisconsin
1918	Reconnoissance [sic] Soil Survey of South Part of North Central Wisconsin
1921	Soil Survey of Northern Wisconsin
1927-1939	Soil Survey of Bayfield County (Reconnaissance) - Issued 1961
1965	Town of Dewey (Rusk Co.)
1966	Town of Kennan (Price Co.)
	City of Medford (Taylor Co.)
1966-1967	Grow and Marshall Townships (Rusk Co.)
1966-1968	Flambeau-Ladysmith-North Grant Community (Rusk Co.)
1966-1971	Trade Lake Township (Burnett Co.)
1966-2002	Chequamegon National Forest
1967	Madeline Island (Apostle Islands)
1968	Phillips Area (Price Co.)
	Park Falls Area (Price Co.)
1969	Pine Lake Area (Iron Co.)
1969-1973	Village of Lake Nebagamon (Douglas Co.)
1970	Loon Lake Area (Burnett Co.)
1971	St. Croix Scenic Riverway (includes Burnett Co.)
	Hurley-Montreal (Iron Co.)
	Deer Creek Township (Taylor Co.)
1973	Butternut Lake Area (Price and Ashland Counties)
	Grindstone Lake Lac Courte Oreilles Area (Sawyer Co.)
	Upper St. Croix-Village of Solon Springs (Douglas Co.)
1973-1977	Nemadji River Watershed (Douglas County)
1974	Town of True (Rusk Co.)
1975-1976	Red Clay Project (Bayfield, Ashland, Douglas, & Iron Counties)
1975-1977	Fish Creek Watershed (Bayfield County)
1976	Beaver Brook Township (Washburn Co.)
	Elk River Area (Price Co.)
	Yellow-Devils Lake Area (Burnett Co.)
1976-1977	Rocky, Oak, York, & Raspberry Island (Apostle Islands)
1978	Outer Island (Apostle Islands)
1979	Stockton Island (Apostle Islands)
1980	Sand Island (Apostle Islands)
1981	Basswood, Manitou, and Hermit Islands (Apostle Islands)
1984-1990	Food Security Act (FSA) Soil Survey (All Counties)
1986-1991	Bad River, Lac du Flambeau (Iron Co.), Red Cliff Reservations
1991-1993	Lac Courte Oreilles Reservation

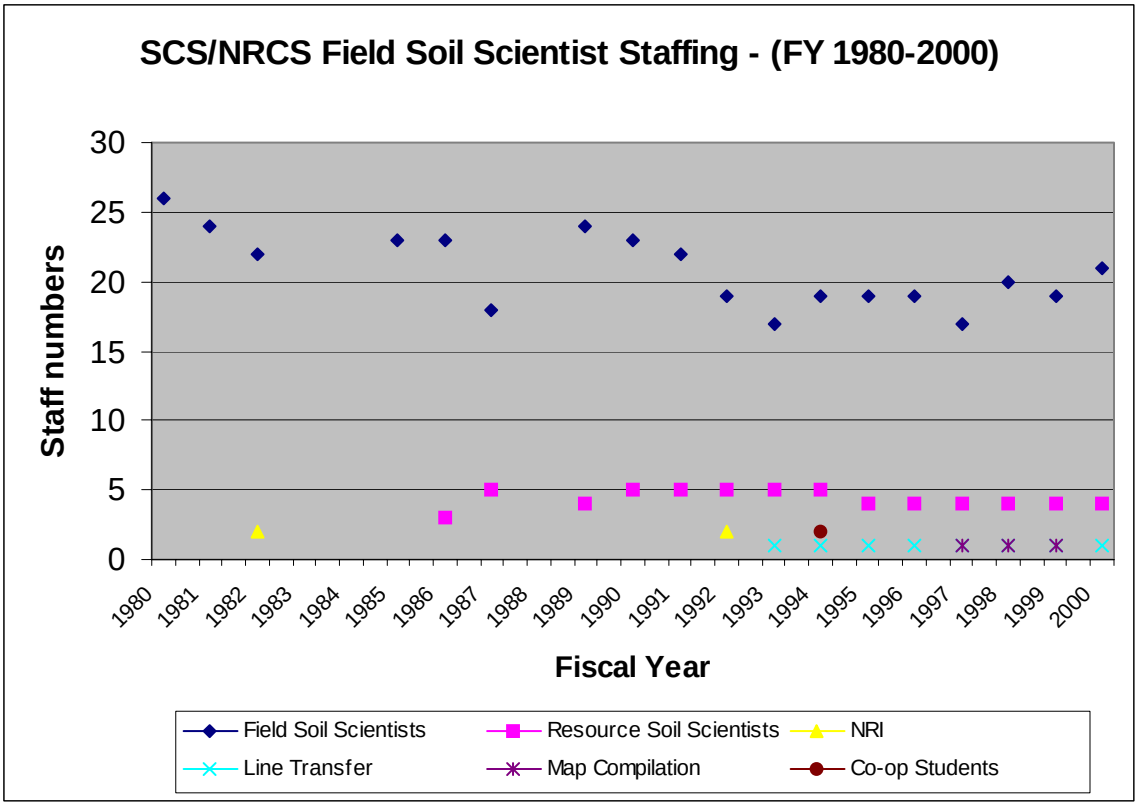
NW10 SOIL SCIENTISTS

First	Last	Agency	Survey Years	Office Location(s)
Scott	Aldridge	NRCS	1993	Ashland (Detail from Kentucky)
Deanna	Anderson	NRCS	1994-2004	Ashland & Ladysmith
Keith	Anderson	NRCS	1992-1999	Spooner
Jim	Barnes	NRCS	2002-2005	Phillips
Joseph	Boelter	NRCS	1996-2000	Rhinelander
Tina	Bonak	NRCS	2000	Phillips
John	Campbell	NRCS	2001-2005	Phillips
Roger	Dahl	NRCS	1992-2004	Altoona
Kathryn	DesForge	NRCS	2001-2005	Spooner
Stacy	Eichner	NRCS	1995-2005	Rhinelander & Ladysmith
Angie	Elg	NRCS	1996-2001	Rhinelander & Phillips
Angie	Elg	Contractor	2004-2005	
William	Fiala	NRCS	1992-2005	Ashland & Ladysmith
Robert	Freese	NRCS	1993	Ashland (Detail from No. Carolina)
Ulf	Gafvert	NRCS	1992-2002	Ashland
Daunte	Gibbs	NRCS	2001-2002, 2004	Ashland & Altoona
Randall	Gilbertson	NRCS	2001-2005	Spooner
Kim	Goerg	NRCS	1992-1996	Ashland
David	Gundlach	NRCS	2004	Ashland
Sam	Hagedorn	NRCS	1992-1994	Ladysmith
Sam	Hagedorn	Contractor	2001-2005	
Scot	Haley	NRCS	2001-2004	Spooner
Jon	Hempel	NRCS	2003	Madison
David	Hvizdak	NRCS	1992-2005	Spooner
Rich	Johannes	NRCS	1997, 2001-2005	Medford
Daniel	Johnson	NRCS	1993	Ashland (Detail from Louisiana)
Greg	Knight	USFS	2001-2002	Medford
Peter	Kolka	Sawyer Co.	1999-2000	Spooner
Jeff	Kroll	NRCS	2003-2004	Ashland
Terry	Kroll	NRCS	1992-2005	Ashland
Mark	Krupinski	NRCS	2000-2005	Spooner
John	Lucassen	NRCS	2000-2005	Ashland
Jennifer	Maziasz	NRCS	2000-2004	Ashland
Tim	Meyer	NRCS	2002-2004	Altoona
Phillip	Meyer	NRCS	2001	Spooner
Tim	Miland	NRCS	1993-2004	Ladysmith & Altoona
Cecil	Myers	NRCS	1993	Ashland (Detail from Louisiana)
Larry	Natzke	NRCS	2002	Altoona
Matt	Otto	NRCS	2000	Spooner
Patrick	Schaefers	NRCS	2000-2001	Ladysmith
Deb	Sigmund	USFS	2001-2002	Washburn, Hayward, & Park Falls
Fred	Simeth	NRCS	1992-2005	Spooner
Jeff	Talsky	NRCS	1993-2005	Spooner
Kevin	Traastad	NRCS	2000-2004	Phillips
Jesse	Turk	NRCS	1997-2005	Ashland
Chanc	Vogel	NRCS	2000-2001	Spooner
Art	Voigtlander	NRCS	2000-2005	Ladysmith

Dave Hvizdak, MLRA project coordinator, Fred Simeth, MLRA project leader, and Chris Borden, PRI-RU-TA RC&D, at the NW10 last acre ceremony.

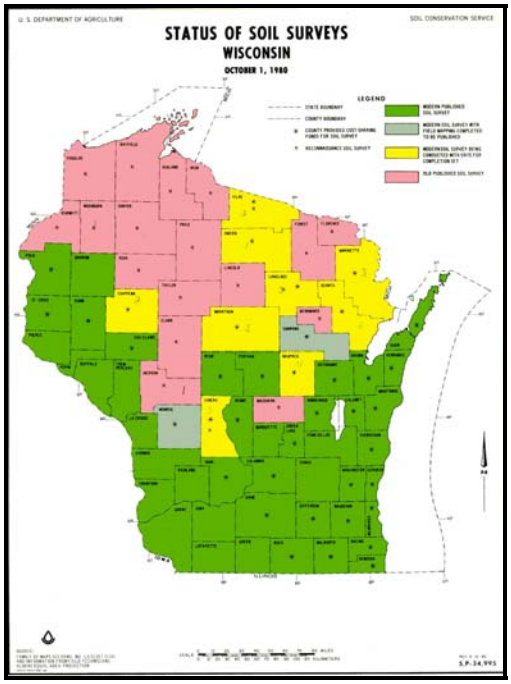


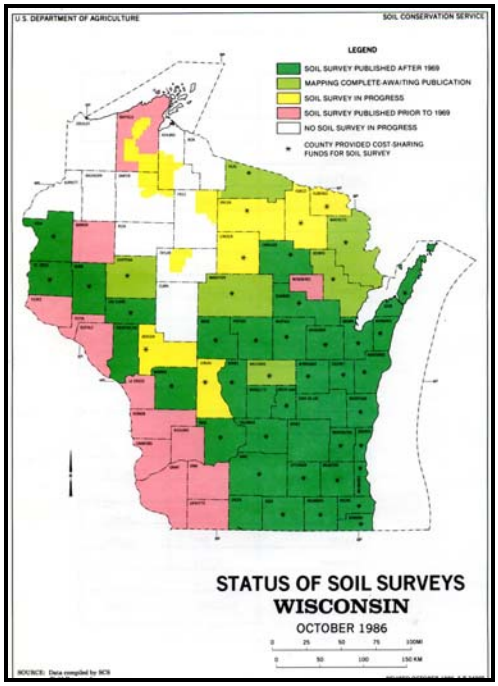


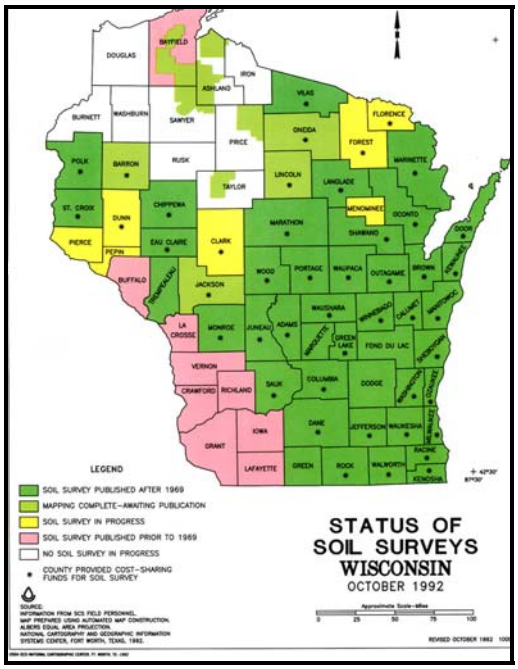


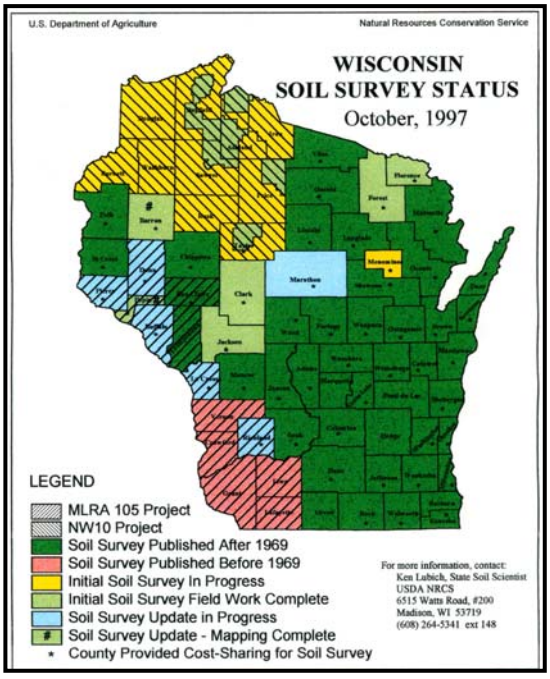
Data unavailable for FY1983, 1984, and 1988.

Wisconsin Soil Survey Status maps from 1980, 1986, 1992, and 1997









Of Special Interest

This section includes a variety of interest stories submitted to the Committee. These special interest stories represent only a small number of similar stories that have occurred in doing the soil surveys over the years. The parts by Delbert Thomas and John Langton were solicited by the Committee and are greatly appreciated.

A Soil Scientist's Career - Delbert Thomas

After a three year hiatus with the military I graduated from UW Madison in the spring of 1948 with a Bachelors degree in soils.

There were no soil scientist positions open. I did find out about one opening for a soil scientist position on a large sugar cane plantation in Cuba. A number of us applied but no one even received a response.

I went to the state SCS office in Madison and visited with the State Conservationist, M.F. Schweers. He was a large portly individual. He could not understand why I wanted to be a soil scientist and pull a soil auger all day long, fight mosquitoes and walk for miles. Being there were no jobs open at that time for soil scientists he suggested I become a Soil Conservation Planner and do the important work of developing soil conservation plans and applying conservation practices on the land. He was not favorable to soil scientists and did not want to spend money on soil survey. I left there thinking I would never work for that man.

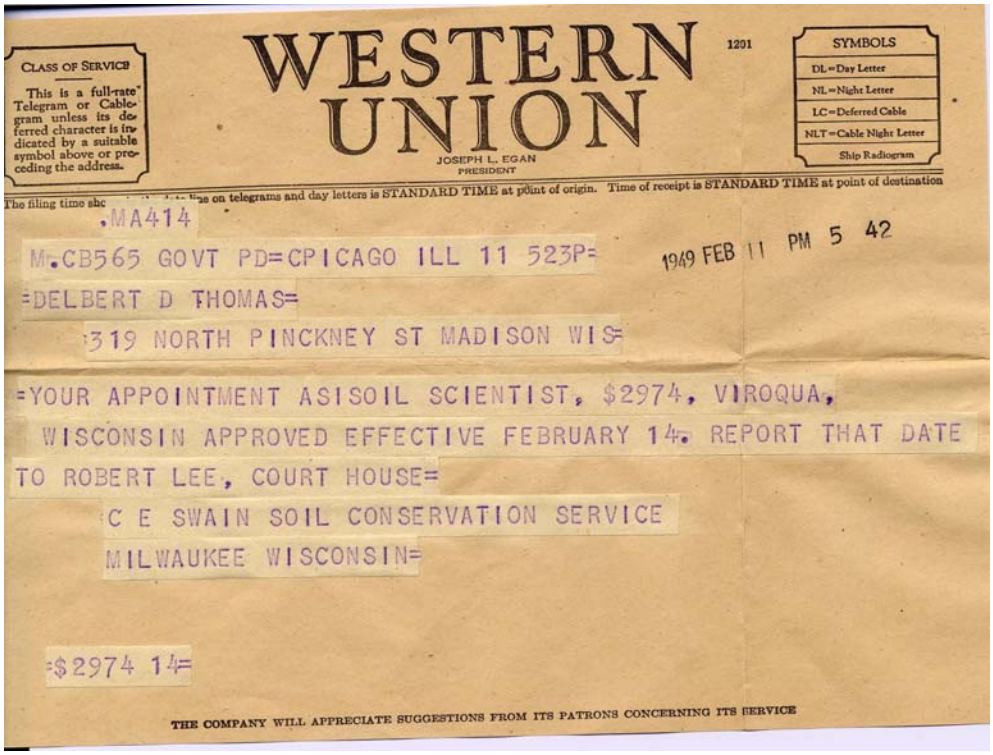
A friend told me to go back and talk to the State Soil Scientist, William DeYoung. He was a real gentleman; friendly, courteous and kind. He told me "Those long legs are well adapted to clearing fences and moving quickly over the landscape." I left with a much better feeling about being a soil scientist.

After graduation I was working in the Department of Plant Pathology. I had received a graduate research assistantship to work on an advanced degree in plant pathology. In December of 1948 as I was completing exams for the second semester, I received a call from the SCS state office that there was an opening in Wisconsin and that I was among the top three on the Civil Service exam I had written. I wanted a few days to think over the offer but was told that I had until 5 o'clock that afternoon which was four hours away. I went home and discussed the pros and cons of the offer with my wife, who was expecting at the time. We considered our housing needs, our start of a family, and a need to settle down and start a career. I accepted the job.

I was instructed to report to District Conservationist Robert Lee in Viroqua, WI on February 14, 1949. Even as a native Wisconsinite I had to get out a map to locate this small town in Western Wisconsin. I was also warned that Robert was very demanding and had released my predecessor, who had a Masters Degree. I will always remember that harried first drive to Viroqua in a February ice storm in 1949. We arrived safely after negotiating the steep hills and narrow roads of the driftless region in our new 1948 Plymouth.

I found Robert to be an amicable person. Since I was starting as a P1, I made a deal with him. I told him that if my work met with his approval he would advance me to P2, otherwise I would leave. We shook hands on the deal. I took my wife back to Madison where she stayed until the baby was born. I returned to Viroqua, rented a room and started work as a soil scientist.

The starting salary was $2,974/year. The retirement benefits looked favorable however there was no life or health insurance at that time. At this time there were nine field soil scientists, a state soil scientist, and a newly created assistant state soil scientist position. Being that I started in the winter I was assigned to developing soil conservation plans. Until the crops were planted I laid out conservation strips and helped design and install other conservation practices. This was the heyday of SCS applying practices to the land.



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=DELBERT D THOMAS=

319 NORTH PINCKNEY ST MADISON WIS=

=YOUR APPOINTMENT AS SOIL SCIENTIST, $2974, VIROQUA, WISCONSIN APPROVED EFFECTIVE FEBRUARY 14. REPORT THAT DATE TO ROBERT LEE, COURT HOUSE=

C E SWAIN SOIL CONSERVATION SERVICE
MILWAUKEE WISCONSIN=

=$2974 14=

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

My initial soil survey training consisted of a two day session in saturated conditions in late March in the rain with William DeYoung. The new assistant state soil scientist, Stuart Torrance, would occasionally stop by to aid this somewhat bewildered soil scientist. In June I was detailed to Lancaster, WI in Grant County for training and to help complete the soil survey of Grant County with a University of Wisconsin soil survey crew. Burl Butman, SCS soil scientist for that area, was the trainer in Grant County. Per diem for this three month detail was $3.50/day.

In September I was sent to Coshocton, Ohio for a six week training and orientation session. This training included conservation planning, engineering, and public relations. District Conservationist Lee kept his word and promoted me to P2 at the end of the year at a salary of $3225/year, an increase of $251.

In June of 1950, due to lack of funding, the soil position in Viroqua was abolished and I was transferred to Durand, WI a little farther north in Western Wisconsin. The District Conservationist there was Hal Smith who was a wonderful administrator. He was a former Camp Superintendent of a Civilian Conservation Camp and had a degree in engineering. I worked on the soil survey of individual farms for conservation planning in Buffalo, Pepin, and Trempealeau Counties. Soil mapping was done on 1936 photos in some counties while others used 1938 photos for farm planning.

In 1953 there was a reorganization of administrative areas in Wisconsin. Hal Smith was transferred to Eau Claire. I soon followed in 1954. It was there that I joined with soil

scientist Gordon Wing. Gordy was a very fine person whose work dated back to the late 1930's on the first SCS project in the nation in Coon Valley, Wisconsin. We continued to work together as a team for the next 25 years. The administrative titles were changed from District Conservationist to Area Conservationist. The soil survey area included the following counties: Dunn, Eau Claire, Pepin, Buffalo, Clark, Taylor, St. Croix and Marathon.

In 1953 I was detailed to Wilmington, Ohio in January through March to help complete the soil survey of Clinton County, Ohio. Sam Bone was the Party Leader. Cold rainy and snowy weather along with irate farmers slowed the progress and made for less than pleasant working conditions.

Since Buffalo County was about 2/3 mapped, Hal Smith, and State Soil Scientist William DeYoung decided to complete the county starting in the spring of 1954. Gordy Wing left the SCS for a year to start a soil testing laboratory. All other counties in the area were given a ration of 2500 acres of soil survey per year so I could spend more time on the Buffalo County survey. While working in St. Croix County we would stay in private homes as there were no motels at that time.

Orville Haszel reported for duty in 1956. After some field training he helped complete Buffalo County in 1957. Gordy Wing rejoined SCS and was assigned as Party Leader for Dunn County. We had then turned our attention to Pepin County. Dale Parker joined the service in 1957, received training and helped to complete Pepin County.

During the winter months we wrote the soil reports for Buffalo and Pepin Counties. The SCS had not completed the format for a more modern soil survey report. Thus we had no published guidelines for writing these first two soil survey reports. A.J. Klingelhoets, who was then the state soil scientist, was very helpful in suggesting and editing sections of the reports. These reports were typed and retyped many times as changes in concepts and usage was developed. The clerical staff was a tremendous help being that they were asked to type pages upon pages over just to change wording.

Buffalo County was finally published in March of 1962 and Pepin County in March of 1964. The SCS Technical Center in Lincoln, Nebraska edited and compiled the soil maps.

Then our attention was turned to the completion of Eau Claire County. By now the technical center had developed a format for soils survey reports. Joe Boelter then joined us to map in Eau Claire and Dunn Counties. Joe then mapped in St.Croix County before transferring to Oneida County as Party Leader. Orville Haszel was assigned the leadership to complete Pierce County and Dale Parker was assigned St. Croix County. When Dale left to complete his doctorate in soils, John Langton completed the survey and wrote the report.

As the soil survey progressed in Eau Claire County, I was given the assignment by the State Office as official trainer of soil scientists in their first years of soil survey in Wisconsin. I had many fine young men as student interns or student trainees work with me. Pete Lindgren was also transferred to Eau Claire to help with the soil survey of Eau Claire County.

In 1961 I was detailed to Alaska from May thru September to do a remote soil survey of about 300,000 acres in the Big Susitna Valley. Since there were no formal roads, only a railroad, I was given surplus military service vehicles, namely a weasel and two waterproof jeeps, tents and cooking gear to explore the valley.

After a month of writing soil descriptions and developing a legend, as well as determining the logistics of movement up the valley, I was joined by soil scientist Bill Parker from Alabama. We each were given a local helper to assist us in our work and living in the wilderness. We moved our camps along streams as we progressed up the valley. When streams were too deep or swift to cross we returned to the railroad track and flagged down the train to load our equipment on a flat car to get us across. We dragged our own staging timbers

along so we could always load our equipment on to the train. For each loading like this the train engineer would send a bill to the SCS headquarters in Palmer. Some of the soils and geological data were used in building the new Parks Highway (State Hwy 3) which now leads to Mt. McKinley and Fairbanks. The survey also met its intended use to guide the settlement and land use as the highway was extended through the valley.

I was chosen to attend a special six week academic training session in January 1966 at Iowa State University. Former sessions like this had been held at Cornell University. This was the first time it was held at Iowa. One soil scientist was selected from each state. We covered 12 graduate credit level courses during that 6 week period. Although much was learned this was quite a demanding and exhaustive session.

The soil survey of Eau Claire County was completed in 1973 and was published in 1977. When the Lincoln Nebraska map center decided to stop map compilation I was given the assignment of establishing a cartographic unit in Eau Claire to compile soil maps so they were ready to print for publication. Fortunately Lois Ristow, a student at UW Eau Claire, had been working part time at the area office and was very good at sketching maps. We hired three other young women who soon became very skilled in the articulate job of map compilation. They completed a backlog of several counties in Wisconsin. Other states wanted to contract with us, but after completing a county for the state of Maryland we found it was not cost effective.

In the early 1970's Wisconsin soil scientists felt the need to form their own organization to gain recognition and promote public information about the soils of their state. In 1971 I, along with others, helped establish the Wisconsin Society of Professional Soil Scientists. It has gained support from soil scientists in both the government and private sector and has become a highly effective organization.

Upon the completion of Eau Claire County emphasis was directed toward the completion of the Chippewa County soil survey. A very experienced and capable soil scientist Dale Jakel joined the soil survey group. Much of the work was in a vast wooded county forest. Concerns for someone getting lost or other ill effects prompted me to have a designated meeting place at noon for lunch. On one particular day student trainee Mark Schoeneman and I were to map in a sensitive area on the edge of the forest. There was an open area of a small farm at the end of a mile long road in the county forest. There were threatening signs by the landowner along this mile long dead end road. In talking with this landowner, he became very threatening. I had some concern about our safety in this area. I told Mark to take the car and photos and go down along a county road and walk the trails and check out the maps of that area where we would be moving to in the next few days. I decided to map the forested area and he could pick me up a short distance up the dead end road. When he did not show up at noon I walked out to the main county road where another soil scientist picked me up. When Mark had returned to the car at noon both back tires were losing air and the radiator was leaking. It was quite traumatic to this young man to realize that this was the result of bullet holes. I contacted the District Conservationist who in turn contacted the Sheriffs department which declined to send a Deputy out to the scene. They said it did not surprise them as there were a lot of renegades in the area. We were able to get the car back to the work unit. Even with the involvement of the FBI nothing ever became of it. We did retrieve the bullets from the rear tires which I suspect Mark kept as part of his memory of soil survey training. I told the crew I would complete the mapping in this sensitive area. Soil Scientist Ed Drozd, a Viet Nam veteran, insisted that he accompany me. Our first stop was at a cabin on a lake. I knocked on the door. As the door opened I found myself looking down the barrel of a pistol. Ed was as surprised as I was. After explaining our purpose and that we meant no harm

he relented and allowed us to do our job. We completed the mapping in that area without any more incidences. For the most part mapping went well in Chippewa County.

For 17 years of my career I had the opportunity to lecture at UW Eau Claire once each semester to the Conservation, Geography and Geology classes. I also lectured and showed slides of soils and erosion control practices at the first Earth Day celebration at UW Eau Claire in 1973. I also truly enjoyed working with elementary school students showing them the different landscapes and how soils formed along with the significance of caring for our soil resources. Each year soil judging contests for high school FFA Soils teams were set up and conducted in areas I mapped. University soil judging contests, which are more involved in the description of the soil profile, were held in this area of Western Wisconsin. I enjoyed being the judge for these contests as well as the interaction with the students.

After 31 years as a soil scientist I felt it was time to hang up the spade and auger and retire on January 11, 1980 from the Soil Conservation Service.

During my working years I was active and involved in the Wisconsin Soil and Water Conservation Society of America. I have remained interested in and have attended meetings of the Wisconsin Society of Professional Soil Scientists.

My career has covered a part of a major transition in soil mapping. Initial mapping was done on 1936 or 1938 photos for each individual farm plan. Then, in the mid 1950's, soil mapping changed to being done on a county-by-county basis. More recently progress has been made to map by major land resource areas. With the implementation of the computer era, I have been informed that soil maps are now available on the internet through web soil survey. I have seen the Soil Conservation Service grow and change to the Natural Resource Conservation Service in 1995. A soil scientist's job has also changed from being just a "mapper" to include on-site interpretations, presentations to public groups on soils, as well as training others in soils. As need for state and county regulations for on-site disposal developed, I trained soil testers to evaluate the soils for these requirements in the field and at sessions held at UW Stout, Menomonie. Soil classification started to change early in my career. About 5500 soil series were recognized in 1951. As new series were continually being added, there was a need to separate them into more precise categories based on soil profiles or soil properties. With the development of soil taxonomy in the late 1960's , existing soil series (9500+) were separated into orders, suborders, great groups, and subgroups

I have a sense of pride and satisfaction of having worked with so many fine soil scientists throughout my career. I have watched and helped them grow in their careers. I relished being part of a team of blended disciplines, conservationists, soil scientists, engineers, administrative personnel, and secretarial support staff that has accomplished so much in saving our soil and water resources. There was always a great sense of pride to work with individual landowners and assist them in the development of their property to conserve the natural resources they had.

I also have a great appreciation for my family for the patience and understanding while I was away from home for much of my career. As a soil scientist I was able to experience a true relationship with some of the natural resources of this country. I am proud that I was a part of conserving our soil and water resources and helping to improve the environment.

Written by Delbert Thomas, age 85, November 2006, assisted by Roger Dahl

Del Thomas, right, with Jim Tomlinson, DC, Eau Claire County. Photo from the Eau Claire Leader Telegram, Nov. 1, 1968.

My Career as a Soil Scientist - John Langton

After getting out of the Army in 1956, the Soil Conservation Service (now called the Natural Resource Conservation Service) was accelerating the Soil Survey in Wisconsin and was actively hiring soil scientists. Although I had a BS degree from the Wisconsin State College at Stevens Point, it did not qualify me for a soil scientist position. By using the G.I. Bill, I enrolled in the University of Wisconsin, Madison as a special student. In 1958, I worked as a student trainee for the SCS during the summer. At that time Marv Schweers was the State Conservationist, Bill DeYoung was the State Soil Scientist, A.J. Klingelhoets was Assistant State Soil Scientist and Norm Johnson was the Soil Survey leader in Trempealeau County. Norm, as were most soil scientists at that time, was a World War II veteran. He had flown 25 missions as a tail gunner in a Flying Fortress B-17. Anyone who survived 25 missions as a tail gunner was considered serving above and beyond the call of duty and was rotated out of combat. Most of the soil scientists at the time had been in the Army, Navy, Marines or Air Corp and already had a lifetime of experiences of the Greatest Generation. Each possessed various experiences, training, and talents.

After working in Trempealeau County, I returned to school to earn a M.S. degree with Dr. Gerhard Lee as my advisor. I continued doing field work in Marquette County in the summer with Keith Schmude, Party leader, Owen Demo, Delvin Fanning, Theodore Peck, all of the Soil Conservation Service and Dr. Gerhard Lee of the University of Wisconsin. After the survey Owen transferred to the Farmers Home Administration, and after several years went into his own private consulting business. After completing their PhD's, Delvin and Ted became professors at Cornell and Illinois Universities, respectively. After being Party Leader in a couple other counties in Wisconsin, Keith became State Soil Scientist out East and was on the Soil Survey staff in Washington, D. C. I had resigned from the SCS in order to continue my education and did field and laboratory work for the Wisconsin Geological and Natural History Survey. During this time I worked with Clarence Milfred and Ed Ciolkosz who both were PhD candidates in soils. After graduating Clarence (Curly) took a job at the University of Wisconsin Stevens Point, and Ed went to Penn State.

In 1965 I returned to the SCS as party leader for the Trempealeau County soil survey after Norm resigned. Later Norm was hired as a soil scientist in Iowa. By then Bill DeYoung had retired, Kling was State Soil Scientist and Paul Carroll was Assistant State Soil scientist and State Correlator. About one year later, Wayne (Skip) Barndt, an energetic, recent graduate of University Wisconsin joined me. At that time Soil taxonomy was being implemented into soil survey. Prior to Soil Taxonomy, we were using the 7th approximation of soil classification. The fieldwork in Trempealeau County spanned over a period of time where various criteria of soil classification and soil mapping were used. Soil Conservation Surveys in different watersheds with over 600 map units correlated had to be updated to a standard Soil Survey. I believe Norm was one of the best and most precise soil mappers at that time. He made very detailed maps during a time when many soils were not well defined or very well correlated. It was at this time, we could have used an active and full time State Correlator, but Paul had been assigned by USDA to some place in Africa to do reconnaissance soil survey. Paul wore many hats. He was a scholar, gentleman, liaison between the SCS and University of Wisconsin, and Poet Laureate of soil survey. A couple of his poems are included in the **Poetry of Soil section**. We had problems classifying substratum phases. Also correlators hesitated to set up too many substratum phases. Now that soil Taxonomy allows control sections greater than 40 inches, this wouldn't be such a confusing problem. Later,

when Skip became party leader in Monroe County, he and his crew started to define the siliceous equivalents (Tarr and Impact series) of the Plainfield and Sparta series. As the soil surveys of other counties in the driftless region were updated, siliceous and/or deep and very deep analogs of moderately deep soils over sandstone bedrock were established. I believe it was near the end of the Trempealeau survey that Robert Fox joined the state staff as a report-writing specialist.

In 1967, when the field work in Trempealeau County was finished, I moved to St. Croix County to fill a vacancy created by former party leader Dale Parker, when he left to pursue a PhD at the University of Wisconsin. But I didn't start working in St. Croix County immediately. I was detailed to Dunn County to help complete the fieldwork. In anticipation of being party leader in St. Croix County, I had been promoted to GS 11, but was working under the supervision of Gordie Wing, a GS 9 Party Leader in Dunn County for many years. Needless to say this created an awkward situation that resulted in Gordie being promoted from GS 9 to GS 11. It was common in those days to have quite a few GS 9 Party leaders. So not only did I help finish the fieldwork but my presence promoted Gordie to a GS 11. I believe Dale was one of the first to develop soil interpretation sheets for various soil series. Later the state and the Lincoln Technical Center developed more guidelines and expanded the sheets. State Soil Scientist A. J. Klingelhoets told me "If you can map soils in St. Croix County, you can map anywhere". Kling was probably just trying to psych me out but the county was a challenge. There were driftless soils, tills of various ages, textures and colors. As a result there are soils with colors normally associated with aquic moisture regimes that are in higher positions in the landscape that are not wet (paleosols). Other members of the survey party were Joe Boelter, Dale Jakel, Sid VanderVeen, and Keith Widdel. Near the end of the survey, other progressive soil surveys were being initiated in other counties, so Dale and Joe were promoted to party leader in Adams and Oneida Counties respectively. Sid was back in school and Keith went to Adams County. That left me to wrap up the survey alone. There was some pre 1969 mapping that I felt needed some field checking to verify if the mapping met the criteria of the descriptive legend. Wes Sanders, Soil Conservationist in St. Croix County let me use Gary Schmiedlin, a Soil Conservationist trainee who knew some basic soil classification. Gary and I would go in the field together. He would work on one field sheet and I would work on another. I would tell him what kinds of soil morphology to check. Then we would meet at noon and make any necessary changes. This allowed Gary to get additional soil training and help me fight some deadlines. The fieldwork was completed in 1975. Unfortunately Gary died suddenly from a heart attack when he was a relatively young and highly regarded Soil Conservationist. It was during the St. Croix county soil survey that Paul Carroll retired and George Hudelson joined the soil staff in Madison in charge of correlation. Later Bob Fox retired and was replaced by Frank Anderson.

Next came the Poplar River Soil Survey project in Clark County from 1975 to 1978. Near the completion of the survey I was suddenly transferred to Monroe County when Skip Barndt, with little or no interaction with the state office, moved to Montana and started working with the Forest Service. I arrived in the field office just before Louis Buller, correlator from Lincoln, was scheduled to arrive. Thankfully the field correlation went very smoothly because Skip had left a very complete descriptive legend and a knowledgeable staff consisting of Neil Babik, Craig Ditzler, and Susan Tikalsky. Susan was the first female soil scientist I worked with in soil survey. She was petite, very physically fit and could keep up with most of the guys in the field. She enjoyed the outdoors and had hiked the Chilcoot Trail, which was used by the gold miners heading into the Yukon during the gold rush. Definitely she was the most attractive member of our soil survey party. Louis was impressed with the

quality of the fieldwork so we had a very good working relationship. Later in the survey Neil left for about one year to classify and map soils on some of the islands in the South Pacific. When Neil came back he joined Randy Gilbertson, Tim Meyer, and Howard Gundlach to finish the fieldwork. After the Monroe County soil survey was completed I had various assignments such as being a member of the soil survey party in Chippewa County and compiling data for Conservation needs plots throughout a multi-county area in western Wisconsin. I believe it was near the end of the Monroe survey that Kling retired and John Brubacher became State Soil Scientist. Also, Neil transferred to the Forest Service and worked in many places throughout the states and Alaska.

In the mid 1980's I was appointed party leader of the Jackson County soil survey. This was a unique experience for me as I started the survey from the beginning with the responsibility of developing the initial legend, thus with some hope of avoiding some correlation or quality assurance problems near the end of the survey. Soil scientists Duane Simonson, Roger Dahl, and Dale Jakel came in over a two-year period to help accelerate the fieldwork. During the map compilation Duane found some problems, especially with some soils that were mapped in various positions as moderately deep over weakly cemented sandstone bedrock. Field checking and collecting of transect data indicated there were inclusions of deep and very deep soils. Many profiles of these deep and very deep soils were described and set up as separate series. Then, depending mainly on their position on the landscape, they were mapped either as complexes or separate map units, thus the quality of the soil survey was maintained. Toward the end of the soil survey in Jackson County many of the soil scientists were assigned to Clark County to accelerate the soil mapping of the cropland for the Food Securities Act. There were seventeen soil scientists assigned to Clark County in the summer of 1989 under the able leadership of Howard Lorenz. When that was completed, Howard Lorenz, Richard Johannes and Tim Meyer assisted me in the soil mapping in eastern Jackson County. During this period, Howard was transferred to District Conservationist in Marinette and Duane was promoted to Party Leader in Clark County. After the fieldwork of Jackson County was completed in 1991 I helped soil map the Clark County forest and then prepare the Clark County Soil Survey report. In April of 1992, after 34 years of service, I retired when SCS offered a buyout. I believe it was during the early part of the Jackson County survey that George Hudelson, State Correlator, retired and was replaced by Howard Gundlach.

After retiring I did soil on-site evaluations for private septic systems, very detailed transect soil mapping for intensive crop management, and collected and interpreted soil data as an expert witness in a court case. I also taught soil sessions at Treehaven, a summer school mainly in the field, for students in Natural Resource studies at the University of Wisconsin Stevens Point.

Everyone has to make career choices. Even though I worked in numerous counties, I moved only once after my children started school. We decided to stay in Neillsville, Wisconsin because my family liked the rural setting with a strong work ethic, excellent schools, good local medical facilities plus nationally renowned Marshfield Clinic only a 30 minute drive away, active church programs and 133,000 acres of county forest for hiking, solitude and hunting.

Being an outdoor person, I really enjoyed soil survey work. During the beautiful summer days I couldn't believe someone was paying me to be out there. It was an interesting learning experience with each borehole. In my formative years, just after the dust bowl era, we learned in school, in Boy Scouts, even in churches and local media, and especially from Aldo Leopold and his land ethic about the importance of our natural resources, especially soil, as the basic

part of the ecosystem. Soil erosion concerned me as a youngster, so working with soils and helping conserve them seemed to be a very worthwhile thing to do. I am a bit discouraged that generally so little progress has been made and so much more soil and water conservation practices are still needed on the land. Now in retirement, I walk almost daily in the field and forests, usually with my wonderful dog Bonnie, but alas no one pays me but really no one has to. I have already been paid.

Written by John Langton, age 75, December 2006

Joseph Steingraeber, SCS Soil Scientist

Following is an email received by Pat Leavenworth, NRCS State Conservationist, from Mark Steingraeber, son of Joseph Steingraeber, former SCS soil scientist

Hello Pat,

I meant to introduce myself to you at the USDA-Trout Unlimited-WI-MN-IL-IA Driftless Area Proclamation in La Crosse last month. My name is Mark Steingraeber and I am a fishery biologist with the U.S. fish and Wildlife Service in Onalaska. Our office has the lead for the Drifltess Area initiative in our agency and we look forward to many cooperative and successful partnerships in restoring the quality of this unique landscape.

I have to relate to you that I feel I have a special connection to this work, as my late-father Joe "cut his teeth" so to speak as a professional soil scientist after graduating from the UW-Madison (class of 1938) by working on the Coon Creek Watershed Restoration project. I couldn't help but feel the presence of my father and his generation of SCS colleagues at the Radisson that morning and particularly on the watershed tours that afternoon. As I grew up, we always had an old SCS poster in our basement stating "Let's make one thing clear ... water"; I hope it gets clearer and clearer throughout the Driftless area in years to come, especially after the soaking rains we've had during the past week.

I also recently learned that the WI NRCS office will be celebrating the completion of soils mapping for all Wisconsin counties in 2006. My father spent most of his career in the Waukesha SCS office on Prairie Avenue where he helped to map most of SE Wisconsin during the 1950s-1970s. Many is the time that I watched my father lace up his boots in the morning, drive an old Plymouth station wagon to Sheboygan County, and return hot, tired, and dirty in the evening to unlace his boots and for me to retrieve him a cold beer from the refrigerator before dinner. Attached FYI is an image of my father as a young man (in rather dapper dress) lacing up his boots for a day of field work in 1938. While hiking throughout SE WI to map the soils, he would learn where the wild asparagus and morels grew, as well the showy lady slippers, and sites where Native American projectile points were not uncommon ... and later return to these special sites on the weekend with his family to share these rare natural and cultural jewels. As you and your colleagues celebrate a milestone event at the Capitol tomorrow, know that your departed, infirmed, and aging colleagues and their families join with you in recognizing your agency's collective accomplishment for the Badger State.

Sincerely,

Mark Steingraeber, Fishery Biologist, U.S. Fish and Wildlife Service
Fishery Resources Office, 555 Lester Avenue, Onalaska, WI

Joe Steingraeber was one of the early soil scientists working in Wisconsin.

Soil Scientists' Stories and Tidbits

Stories from Howard Lorenz

- In Marinette County, it was my policy to try to talk to landowners before we would go onto an individual's land to make the soil survey. One day I knocked on the door of a farmhouse and a woman's voice from inside told me to come in, so I did. As I opened the door this middle aged woman came walking out of another room wearing nothing but a grin. "Whoops," she said, "I thought you were my lady friend who I was going to go shopping with." I don't know who was redder, she or I.

- While working on the soil survey in Marinette County I came up to a pasture with an electric fence around the perimeter. The area was rather large in size so I had to cross the fence to make some borings to find out what types of soil were present. I could have crawled under the fence but I decided to push the electric fence wire down with my cardboard map board. Bad idea, as I got one leg over the wire it slipped out from under the board and came up and hit my leg just inside my knee. At that point I was getting electrical shocks and was unable to get off the wire. It now felt that my heart was being supercharged and my leg was being fried. My mind was still functioning so I laid my bucket auger across the wire to ground it and was able to get off the wire and fall to the ground. It must have been 15 minutes before I could get up and walk back to the car. The next day the inside of my leg had turned black and blue and you could see the outline of the blood vessel running up the inside of my leg. At this point I went to the emergency room at the hospital and the doctor said I had secondary electrical shock, although I believe it felt much more life threatening than that.

- While mapping soils in Brown County I also had another electric fence incident that wasn't quite as bad. I came up to the edge of a field that I had just walked through and encountered another electric fence. This time I crawled under the fence on my belly and when I was about halfway under the fence a grass snake popped up and started showing me its tongue about 3 inches from my face. This is not a threatening snake but I reacted by trying to get up and as I did this my back hit the electric wire and I bounced up and down about 3 times getting shocked each time before I decided that all I had to do was to continue to crawl out. Imagine if this was a "real" snake.

- When mapping in the county forest land in Marinette County we would usually drive our pickup trucks down the old logging roads until we couldn't drive any farther, then we would use the 4-wheel off-road vehicle to continue further into the forest. One day I drove about 5 miles on one of these roads and got the truck stuck in a wet area. After unsuccessfully trying for about 4 hours to get the truck out, by using a jack and by putting branches under the wheels so I could drive out, I finally decided to use the 4-wheeler to go back to a farm about 5 miles or more away and try to get some help. After telling the landowner what my problem was he willingly got his tractor and gave me a ride on the fender of the tractor to the site where he was able to pull me out.

- While working on the soil survey in Outagamie County I had a rather unusual experience that my wife never forgave me for. In February 1971 I got married, and later in early April, I was soil mapping in the county. It was wet, cold and sloppy one day and I remember boring quite a few holes that day. Each time I bored a hole my hands were wet and dirty so I would wipe them off with dead grass or leaves. Near the end of the day I went back to the car and was going to go back to the office. After getting situated in the car I noticed that my wedding ring was missing from my finger, panic time! I figured that I must have pulled the ring from my finger while cleaning my hands at one of the holes that I dug. I walked back to most of the sites where I bored a hole but never found the ring. I guess this is something like finding a needle in a haystack. When I got home I told my wife what had happened, but she never did believe me, especially so early in our marriage.

- Late one afternoon, after going home for the day, I received a phone call from Ron Luethe, who mapped for a short time in Marinette County. He told me that he had gotten his truck stuck in a wet area, walked back to a bar and called his wife to come and get him so he could go home that night. He said he left the truck in the woods and would need some help to get the vehicle out the next day. Early the next morning, after we all got to work, we got everything together that we would need to get the truck out. After driving for about an hour to get to the logging road where he was stuck, he said it would be best to park our vehicles at the beginning of the road and walk to where his truck was. We agreed and gathered up all the ropes, chains and other things that we would need and started up the road. After we walked down a very poor road, that was narrow and wet for about half a mile or so, I asked how far it was to his vehicle. He said it was just ahead. So "just about ahead" for another mile or so we finally got to the vehicle. It looked more like a boat landing than a logging road. In about a half an hour or so we were able to get the truck unstuck. The trip back to our vehicles was much better because we were able to ride in the back of his pickup.

- While mapping in Clark County in early November I was walking through a wetland area that consisted of cattails and alder brush. I found a rather well used trail so I decided to walk down this trail. As I walked along I was thinking to myself what a good area this would be for deer hunting especially with a well used deer trail like this. As I looked ahead I saw what appeared to be a muskrat house so I walked up to it and walked around looking at it. On the opposite side there was a opening so I crouched down and tried to look inside and all of a sudden a black bear lifted it's head and looked me right into my face, about 18 inches away. I dropped my map board, bucket auger and tile spade and started running. I looked back to see if the bear had followed me but it didn't. I sat around for a few minutes and slowly went back and retrieved my equipment. I told the DNR about this bear den but it was unoccupied when we went back to see if the bear was still there.

Stories from Kim Goerg

- In 1981 Dave Omernik and I teamed up to travel to a remote area of northeastern Langlade County. I dropped him off several miles away from my starting point early one morning. After a long day of mapping I returned to the old green Dodge step-side pickup with the fiberglass cover only to find I no longer had my keys. Frantically I searched everywhere I could to locate those keys. Without any means to contact Dave about the situation, I finally resorted to walking. About a half mile down the road I saw Dave walking toward me and fortunately he had taken the second set of keys. It was a very long day to say the least and incidentally my keys were right where I had left them - inside the truck box!

- In 1983 Dave Omernik and I teamed up for winter mapping bogs in northeastern Langlade County. The night before sleet covered the roads, but it was a nice day to head out to the field. I was driving a new Jeep with a fiberglass top which was a little top heavy. While attempting to slow down at an approaching intersection I turned to Dave and stated that I was no longer in control of the vehicle. He then clutched the passenger side handrail on the dash as we proceeded to do a couple of 360 degree spins. As the vehicle almost came to a complete stop the rear tire hit a patch of gravel along the edge of the road. At that point the remaining momentum tipped the vehicle slowly over in the snow covered ditch. With Dave and I strapped in our seats upside down, I looked over at him and asked him what I should do now. His reply was, "You can start by turning off the engine!" A few hours later after getting a wrecker to turn the jeep over and bring it back to the pavement, we proceeded down the road for a productive day of mapping.

- In 1985 while mapping in the wild lands of northwestern Oneida County, I stopped my ATV on a logging trail to check out a wetland a 100 yards or so away. There was no need to take the map board or compass along for such a short trek and besides I was leaving the ATV idling. It was an overcast day and a couple of holes later I realized I had no idea which way was out and could not hear the ATV running. After about an hour of wandering through the aspen pucker brush I heard the most joyous sound- my ATV! That logging trail on which that ATV sat was the only road in the area for miles in any direction.

- In January of 1987 I was on mapping detail in northeastern Florida. It had been around freezing the night before my first day in the field, so my training partner, who was a resident of Florida, told me there was no need to wear snake chaps. He stated that I wouldn't see a rattlesnake until maybe March. We headed down a set of logging skidder tracks into an area of tall grass and palmetto shrubbery. As I planted the seven-foot bucket auger in the wet sand, my partner’s eyes got about as big as silver dollars as he looked back over my shoulder. A millisecond later he yelled "Snake" and I tried to climb to the top of that auger. About ten feet down the trail we had just walked was a five foot rattlesnake. Apparently we had walked on either side of that creature and because it was so cold the night before the snake was not active enough to warn us as we approached. That snake skin now occupies a hallowed spot on my den wall!

- Late one Friday afternoon in northwestern Douglas County I had to get just a couple more holes dug to finish up a soils map. It was a beautiful day, but I could occasionally hear

thunder out over Lake Superior. I was on a gated road that ran down the top of a long ridge and I was not going to walk over a mile back over the same terrain next week to finish the job. After an hour or so things began to get interesting. The winds came up out of nowhere and lightning began to strike trees on both sides of the ridge as I hurriedly made my way back to the truck. About half way back the hair on my arms started to stand up which is a very bad thing. I dropped my spade and budget auger and got on my hands and knees inside the tree line. I crawled the remaining distance back to the vehicle and was never so happy to get inside a truck as I was that day. My tools didn't get retrieved until the next Monday.

Story from Joe Boelter

- The following happened while working in St. Croix County. Dale Jakel and I were traveling together on our way to write a soil description. I stood on a one- strand barbed wire fence while Dale drove the Gov. truck over it to get into the field. The back tires spun a little and snapped the wire I was standing on and it ripped my clothing all to pieces. Good thing it didn't hit me in the face. I had cuts in a lot of places, but it could have been worse. It wasn't funny then, but now that I think about it, I start laughing. Another dumb move on my part.

Stories from Tim Meyer

- **Mapping in Alaska** - Many Wisconsin soil scientists were offered mapping details to other states. Most of these were in the winter when we were unable to do much fieldwork. There were winter details to states where mapping was routinely done in January, February and March, including Florida, Texas and Washington. A few mapping details were available in the summer as well. These were to states, such as Alaska, that had such a short field season, that it didn't justify having a large field soil scientist staff. It was more efficient to bring in detailees.

  In 1986, Kim Goerg and I were sent on a detail to the Kantishna Area Soil Survey in the Interior of Alaska. We arrived about July 4th and the soils were still frozen in most places and even in areas of non-permafrost. We were stationed at Manley Hot Springs which was 160 miles west of Fairbanks on the Elliot Highway. Only the first 28 miles of this road was paved. It was a small fishing village with about 85 residents. It was located at the end of the Elliot Highway which is the end of the road. We were flown out about 30 miles to mapping areas by a Bell Jet helicopter each day and we worked in teams two, a soil scientist and a vegetation specialist. The soil scientist was responsible for soils descriptions and maps, radio, and safety/first aid equipment. We had a radio repeater set on a mountain top and usually had pretty good radio reception with other teams, helicopter, and to home base at Manley Hot Springs. The vegetation specialist (usually Soil or Range Conservationists or Soil Con. Techs) was responsible for vegetation data and protection. They carried a Remington 870 shotgun with buckshot for protection against bear and moose. We all carried pepper spray.

We never had a problem with bears or moose although we saw them every day. Mosquitoes were a constant menace that we learned to deal with by wearing headnets and bug jackets at all times in the field. Many times our pants legs were totally coated with mosquitoes that looked like a coating of fur. The two helicopter pilots we worked with both had extensive experience in the military. Bob was a Vietnam pilot and Mike had been in the Coast Guard. Both had flown in all kinds of adverse weather and tough flying conditions.

Some of the most memorable experiences from Alaska included the helicopter and the pilots. Kim Goerg and I flew out with pilot Bob to fish grayling one night at 11:30 PM. We landed on a gravel bar of some unnamed river and caught grayling on nearly every cast. We brought back enough for a fish dinner the following evening.

Another time Bob thought we should experience the method of how you can jump start the helicopter by auto-rotating to the ground with the engines killed. It was exciting to say the least but Bob was a great pilot. He also was considerate by auto-rotating over the raging Tanana River instead of over land!

One day when the Range Conservationist from Wyoming and I were out working a large weather front blew in with lots of rain and fading visibility. We were a long way from our planned pick up spot but thought the weather might be a concern. We were able to contact the helicopter pilot back at Manly Hot Springs where the sun was still shining. We requested an immediate pickup. We were in a very large black spruce swamp and were having trouble finding a close-by suitable pick up spot on the aerial photograph. We talked Mike in close to our location and could hear the helicopter but couldn't see it and he couldn't see us. We finally had to light a flare. Mike spotted us after awhile but after flying the surrounding landscape said there were no openings for a mile or more. The weather was getting worse so he told us to work on chopping down as many small black spruce as possible so he could at least get down close to the ground. While we worked on the helispot Mike went and picked up another team and dropped them on a lake shore. We had one small ax or hatchet and a tile spade to clear our helispot. I was using the tile spade and somehow hooked my wedding ring on the spade while chopping and it ripped open my ring finger. I had to stop and wrap my handkerchief around it help stop the bleeding while I continued to chop. We had cleared just a small area when Mike came back with the helicopter. He told us to back off the area and he would try to get low enough to let us jump up on the helicopter skids. After pruning a few black spruce tips we heard him on the radio telling us to jump up, grab the skids and pull ourselves up into the helicopter! I was the heaviest so I had to go first. When I grabbed the skid I thought the helicopter was going to roll right over and crash to the ground but Mike steadied it up and I managed to crawl in to the cockpit and get way over to the opposite side. The Range Conservationist was much lighter than I and came in pretty smoothly. We were glad to get out of there and not have to spend the night in a black spruce swamp.

Kim and I left Central Alaska to return to Wisconsin in late August and it had already snowed three times and we had frost in the ground again. We returned with shed moose and caribou antlers, gold pans, clothes and mukluks sewn by the native people.

- **Mapping in Monroe and Juneau Counties -** It was always interesting mapping near Fort McCoy in Monroe County, Volk Field near Camp Douglas and Hardwood Range near Finley in Juneau County. I was lucky enough to have mapped in or near all three.

  As a world-class Total Force Training Center, Fort McCoy's primary responsibility is providing quality training facilities for reserve- and active-component military forces. Fort McCoy also fulfills the role of one of 15 Army Power-Projection Platforms. Fort McCoy is a ready and capable mobilization site, equipped to prepare and deploy U.S. Army Reserve and Army National Guard units for any contingency.

  Volk Field Air National Guard Base (ANGB) is a joint facility with the Wisconsin Air National Guard supporting the Combat Readiness Training Center and the 128th Air Control Squadron. Additionally, Volk Field CRTC personnel manage the nearby Hardwood Gunnery Range. Hardwood Air-to-Ground Weapons Range (R-6904), near Finley, WI, is one of fifteen Air National Guard (ANG) ranges located throughout the United States.

  A mapping day in or near these facilities always involved getting clearance for entry, knowing the days of active range activities, and being prepared for explosions, jets screaming overhead, or helicopters suddenly appearing over the ridgetop and roaring down the valley at tree top level. Inspecting artifacts was of course, verboten, but I would guess that most soil scientists that worked in these areas have souvenirs from the 20 and 40 mm wing cannons. It was a little unnerving to realize you were working several miles away and in a "safe" down range area of Hardwood even though all the trees around you were shredded from the cannons.

Story from Chanc Vogel

- One day while I was out soil mapping in Richland County, I had an interesting encounter (one of many) with a landowner. I stopped at the landowner's home to ask for access to his property. He was outside working on his car. I noticed that he was a very old man. I had a note card for the landowners that specifically described what I was doing out there, since I can't hear and talk. He had a hard time reading it, so he went to get his zooming magnifier glass since he was visually impaired. Other days when I was out in the field, some of the landowners couldn't believe or understand that I am hearing impaired after I told them. Some of them just kept verbally talking. At one occasion, a female landowner got nervous and thought I was going to attack her before she realized that this was a misunderstanding. However, most of the landowners are very nice and friendly anyway. I never was denied access to private property while soil mapping. In Richland Co, a very friendly 85 year old gentleman asked me to come into his house to show me some old pictures and an article of a dam that was built on his property with assistance from SCS in 1950's. He showed me the pictures of his bucks shot on his property as well. He asked me if I wanted a Mountain Dew then I said sure. When he opened his refrigerator in the

kitchen it was full of numerous Mountain Dew cans! I guess Mountain Dew will make you live longer!

Story from Jeff Talsky

- One spring, after a long winter sitting around in the office, Keith Anderson and I went out to map some of the bigger islands on Long Lake in Washburn County. With high spirits, the sun shinning, and the wind at our backs we paddled our canoe several miles, skipping across the wave, hopping off at various Islands and hard to reach lakeshore areas. The weather was pleasant. The lake air was refreshing. The trees were still without leaves so the scenic views were abundant. It was terrific; if only soil mapping always was this enjoyable. Keith thought that it was too bad we hadn't thought to take a camcorder with us, what a great recruitment video this would make.

  Eventually, it was time to head back. Well, bucket-auguring a score or so of holes (after all that time in the office), sure does wear a middle-aged soil scientist down. The wind that had been at our backs was now blowing against us, at an angle that kept pushing us off course. The sun had lost its ability to warm us and now low in the sky, was in our eyes, making it hard to see the boat landing. We no longer were skipping across waves, but crashing into them, being doused by water that had been ice a week or so before.

  We were ready to have our stunt doubles do the rest of the recruitment video. Only this wasn't a video and there were no stunt doubles. After an hour and a half of miserable paddling we arrived at the dock, cold wet and exhausted. Of course being soil scientists, we made plans to go out island hopping the next day. Nearing retirement, I now look back and savor the memories of the journey back, as well as, the excursion out.

Story from Terry Kroll

- **Apostle Island Mapping** The "most interesting day in the field" happened on Sand Island when Jesse Turk and myself had been dropped off by the Park Service boat on the remote end of the island, camped the night, and woke up to raging surf pounding our pick-up site with conditions predicted to worsen the next day. This would mean staying through the weekend with no more supplies. After a two-way radio conversation with our Park Service friends, we decided on a several-hour hike across the thickest vegetation on the island to a more-protected shore for our "rescue".

Story from Roger Dahl

- Lunch is always my favorite time of day, especially when it's one of those beautiful fall days in the north woods. It gives a person a few minutes to sit back and relax. One day while working in Sawyer County, I drove back into the woods on a narrow trail to eat my lunch. I drove along and then parked about two feet from a log left over from a logging operation. After eating my banana, I threw the peel out the window since the peel is organic. Then I ate an apple and did the same thing with the core, except this time it went

on the other side of the truck. Now, since it was one of those beautiful days and I had about ten minutes of my lunch break left, I sat back in the truck and shut my eyes and just listened to the radio. After about five minutes I had the feeling that someone or something was looking at me. Sure enough, here was a young black bear with his front paws up on the log looking in the passenger side window. He must have found my apple core and was just asking for a little more of my lunch. When he saw there was nothing left, he turned around and wandered away. I guess he decided lunch was over. After he left, I continued mapping for the rest of the day. Maybe he found the banana peel later that afternoon. Mapping in Sawyer County was always interesting, as you never knew what you would see, whether it was people in strange places way back in the woods or wildlife.

- In the summer of 1989 in Clark County there were seventeen soil scientists mapping. We moved over the landscape pretty fast. It was hard for the project leader to keep everyone informed on landowner information. On one particular day I was going across an 80-acre parcel of sparse hay land. Unknown to me, the landowner was not at all friendly toward government employees. No one informed me of this even though they stayed away from his home farm, which was located a mile away. Anyway, as I was going through his hayfield he drove out to me on his tractor. When he jumped out of the cab I realized this was a serious situation. I am not a small person, but as the next few minutes progressed, I knew that I wasn't likely to get up should this individual decide to hit me. He weighed about 350 pounds. I tried to tell him what I was doing, but when I would say something he would answer me with words I am not accustomed to hearing. He was so enraged that his voice was actually squeaking and every second or third word would be an unmentionable. I had to be careful and refrain from chuckling at the way he sounded. After what seemed to be ten minutes of verbal abuse, he said he should get the 30-30 out of the tractor and call the sheriff. I was ready to be on my way, but I asked if he wanted me to stay and talk to an officer. This was a big mistake as it led into another 5 minutes of cussing. At this point he finally decided to leave. His tractor was on a good twelve percent slope. He cranked the wheels around very sharply as the throttle went down. I wondered if the tractor had happened to tip over what I would have done. After receiving the verbal onslaught of all time, I might have just walked away and not checked on his condition. All of this happens in a day of soil mapping.

Story from Angie Elg

- I was mapping east of Rib Lake in Taylor Co. and I stopped to inform this guy mowing his lawn that I was soil mapping in the area. When I walked up to him I realized he was only wearing a long shirt and I mean ONLY!!! When I saw his bare butt sitting on that black plastic lawnmower seat I stuttered out a few words and I was gone in a flash!!!!

- Joe Boelter and I were doing descriptions in the Taylor Co. forest and of course nature called. So I headed up over the hill into a thick bunch of balsams. Everything was progressing just fine until I heard something walking around. I thought what the heck and stood up! The bear stood up at the same time about 30 feet away, and we eyed each other. I yelled and shook my fist and the bear took off like a shot!

Story from John Campbell

- I started my career as a soil scientist in Calumet and Manitowoc Counties in mid-November of 1974. This was a Project that involved 2 counties from one office. Party members were Marvin Suhr (now retired from Wyoming staff), Kim Kidney (somewhere out west with USFS), Larry Natzke (now Area SS out of Altoona, Wl), Ken Lubich (now in Washington, DC as our 2nd in command for soil survey), and our "party leader" Auggie Otter. Because of the large staff and the small quarters, I had to be in with the local District Conservationist, Norman Schmeichel and Technician John Kakuk. I worked on Conservation Farm Plans with Norman until soil mapping started in the early spring. Some of the soils staff had moved out to other locations around the state, including Larry and Ken. With their departure, I was able to move into the soil survey room. Auggie helped me get started in the art of mapping. After what seemed a week, Auggie decided that I was ready to take the next step on my own. I was assigned a map and told to get started. Auggie stressed that landowner contacts were quite important. My first map was near the Collins Marsh Wildlife Area. After driving into one of the very first driveways to obtain permission to map, I got out of the vehicle and rapped on the door. A hot, under-the-collar landowner carrying a 12-gauge shotgun met me at the door. Boy, did my eyes get big! I tried to explain what I was there for, but the landowner had seen me coming up the driveway and noticed the government plates on the truck. He told me to "Just leave and if you don't, I may just have to use this". As I backed up from the doorway, the man's older son came from a nearby storage shed and also told me to leave, while he tried calming down his father. I backed up to my truck with an eye on the gun-toting landowner. I returned to the office after this incident and told Auggie what had taken place. Auggie discussed this with the local Land Conservationist and Norman. They in turn contacted the local town board chairman and asked him if he would go talk to this landowner. I later learned that what had set off the landowner was the government truck, and the fact that the WDNR had condemned some of his land for the Collins Marsh Wildlife Area. Two days later things were smoothed over enough for me to continue the soil mapping. I made sure I kept an eye on the landowner's house until I was finished walking over the property.

Poetry of Soil

The Soil Scientist

In the beginning, God made the heavens and earth,
He designed them for us, for He knew our worth;
All was perfect and all was okay,
Till Adam and Eve fell that day.

Since that time, it has been upon man,
To steward the earth, to work the land;
But the land got tired and needed a rest,
So man got wise and devised a test.

Alas, he found not all soil was the same,
But what can we do to figure this game;
All through the years, we've hit and missed,
So the Lord provided the soil scientist.

He came on the scene a century ago,
Mapping soils anywhere the four winds blow;
Not knowing what he'd find over the next hill,
But blazing forward always ready to drill.

He's a lone wolf but rarely lonely,
Sharpshooter in hand, his one and only;
Discovering creation one layer at a time,
Daily facing dust, sweat, boredom, and grime.

Pushing forward, at times not sure why,
Then thinking of goals, he begins to cry;
It seems as though he'll never get done,
One day at a time, he follows the sun.

But then he realizes, as he tops a knoll,
Acres are important, but not the main goal;
He follows a calling that few understand,
To discover for man the treasures of land.

Most will never see the hours of toil,
That he invests into mapping our soil;
The fruit of his labor he may never see,
Lives are being helped; his purpose and destiny.

So much is changing with computers and NASIS,
Even publication is beyond the speed of molasses;
PEDON, SSURGO, and of course digitizing,
Help to make our future more energizing.

But there lies one certainty amongst all this change,
You'll find him in field, forest, swamp, and range;
He'll be needed forever, though sometimes ignored,
Till a conservation team member needs a hole bored.

As our second century gets underway,
Of one thing for sure he is proud to say;
I've been part of a winning team,
Even Hugh Hammond Bennett would give us a gleam.

When his time on earth is finished and done,
His reflection of life's race that he ran and won;
Will likely include a request to roam,
For a visit to the soil on his way home.

---Jeff Olson
Soil Scientist
NRCS
Mena, Arkansas

REQUIEM FOR A SOIL SURVEYOR

Through whirling mist he pondered the list,
The venerable old man at the GATE.
He furrowed his brow and wondered just how
He could tell this youth of his fate.

He was a nondescript lad, not good but not bad,
Ten years with the Soil Survey.
His untimely demise was the ultimate price
Of screw augers and intractable clay.

He moved confidently toward his eternal reward
To the golden city inside.
"Stop!", he was told as the gate was closed,
"Your entrance herein is denied".

"Because you have broken the trust, it's decreed you now must
"Wander aimlessly in the realm below.
"Your supervisors have agreed from your SOPs[1]
"That your punishment be eternal woe".

"You've made sloppy reports and been guilty of all sorts
"Of errors on lands surveyed.
"And your acreage thus far is well below par,
"Your final reviews all delayed".

"You've complained of the shipment of outdated equipment,
"Heavens knows GSA does its best,
"And you've asked for new spades with 16-inch blades,
"When your old ones have ten inches left".

"In unholy rages you've blasted the sages,
"Correlators in soil, classification,
"Accusing quite a few of contributing to
"Taxonomic emasculation".

"You've been late to work and are known to shirk
"Tasks assigned by the powers,
"And have dragged your feet when asked to meet
"A quota of acres or hours".

"You erred in your belief that soil descriptions were brief,
"When you took over an hour to write them.
"Costly augers you've bent, and new shovels you've rent,
"And so on infinitum".

The lad remained quiet, refusing to deny it
When told his performance fell short.
"I'll admit", he said, "to all you've read,
"But permit me one short retort".

"For ten mapping seasons I've nursed cuts and lesions
"From barbed wire, sharp snags and thorns,
"Suffered dislocated disks and run innumerable risks
"Of being impaled on a brahman's horns".

"I've been muddy and wet, eyes stinging with sweat
"In peat bogs on depressional lands.
"I've been dusty and dry, mapping white alkali
"Or trudging through desert sands".

"Ticks, like ripe cherries, I've plucked like berries,
"Then suffered cutaneous infections,
"And I've clawed quite lively at poison ivy
"In posterior anatomical sections".

"My blood has been drained thrice over again
"By mosquitoes in their sanguine feasts,
"And horse and deer flies have skillfully devised
"Bombardments that never cease".

"With surgical skill these wee beasts have drilled
"Every part of my physical anatomy.
"They've made mincemeat of my back in squadron attacks
"Like fighters from the air academy".

"Mashed fingers, stubbed toes, battered knees and elbows,
"Scraped shins and nerve ends frayed,
"Combined with deadening fatigue have placed me in league
"With the victims of Francois de Sade".

The sage stroked his beard, "It's just as I feared,
"They've failed to see your true worth.
"We open the gate wide and welcome you inside,
"You've had your hell there on earth",

"Your celestial mansion I do hereby sanction
"To occupy a high nimbus glade.
"Your door bears the seal of your heraldic shield,
"Crossed augers and a sharpshooter spade".

"Air photo covered walls, soil monolith columned halls,
"Bejeweled, resplendent and ornate,
"With a desk of pure gold for your new extension role
"As assistant to the keeper of the GATE".

"And your reward is just, full worthy I trust
"To compensate for your earthly woe...
"Preparing SOPs as often as you please
"On that supervisory bunch down below".

Paul H. Carroll, Soil Correlator, Madison, Wisconsin

[1]Standards of Performance

Ode to Jim Barnes

We celebrate today the career of a guy
Who as a soil scientist one would think he'd be shy
Dr. James Barnes is anything but quiet.
With his charged personality, most think he's a riot!

With silver spoons are born poets and kings of trade.
In Jim's mouth they found a sharp shooter spade!
For words some say dada or doggy at first
"Typic dystrochrept!" was Jim's initial outburst.

In his Inceptisol years Jim would spend days
Making strange things with montmorillonite clays.
Not far from the soil was Jim likely to be.
He probably met Margaret on a psamment by the sea.

For 34 years Jim did toil
To dig, interpret and map the soil.
He also would reach out to the next generation.
For Jim, science fairs were a kind of vacation.
The only thing with his free time Jim liked to do better,
Was to cheer on his Packers in his hat of gold cheddar!

Retired, our Jim won't be far from the store
If it means promoting the soil some more.
Jim's golden years are bound to rate
A Munsell 10YR 8/8!

Jim, as you now embark on this next life phase,
We won't wonder what you will do with your days.
We do hope you'll pack them full of fun things to do
With friends, family, and Margaret too!

Thank you Jim, for all that you've done.
For the miles you walked through bugs, rain and sun
For the critical cause of conservation
And the future of those who will inherit our Nation!

Pat Leavenworth, State Conservationist
January 14, 2006

Ode to a Soils Aficionado

There once was a man whose life was bound
To love of a substance that makes up the ground
That many in the Nation who use land take for granted
And on which detached city folk often become transplanted.

On the surface horizon he might first appear unclassifiable.
But underneath he is a prime guy—soft, light and friable.
With these qualities he has constantly risen to the occasion
And for the cause of soils he is the epitome of persuasion.
So much so that he has turned countless minds to the cause
Of making certain that soil takes center stage in state resource laws.

Some may wonder why Dave is this force for our soil
But most who know him knew the hours he would toil
To do his job well, but also reach out to the young mind
And open eyes to which the benefits of soils were once blind.

Like the sandstone in the Driftless Area of our state
Dave's been a backbone of soils data that is really first rate.
He flew in like the loess from the Mississippi bottoms centuries ago
Producing and improving his soils information show.
For the cause he goes deeper than this region's terrace sands
And his work has made a difference in how we use our lands.
Ubiquitous as this area's Dubuque silt loam,
Dave taught many the right way wherever he'd roam.

And so Mr. Omernik, as you hang up your auger and spade
And travel your retirement transect to the County of Langlade,
I wish you and Jean the best as you appropriately make your new home
In the land of our state soil, the Antigo Silt Loam.

Pat Leavenworth, State Conservationist
April, 2003

Ode to Howard

There once was a gent named Sir Howard G.
Who in ‘67 made soil science his cup of tea
When UW Madison awarded him his BA degree.

SCS scooped him up seeing potential skill
And Howard’s dance with the raindrop began in Janesville.
There long days he would spend in minimal shade
Digging holes with auger and sharp shooter spade.

Legend has it that by the end of Howard’s career toil
He had moved a significant amount of soil.
So much that if you put all those years of digging in one place
It would fill over 319 cubicles of office space!!!

If skeptics wondered aloud at his career course
Howard would remind them that soil is our most important resource.
And that the state’s mix of firmament is its tour de force.
As said Jefferson: “It is upon soil that great civilizations are wrought.”
Our soil mix has made Wisconsin diverse in both industry and thought.

There is nothing about Wisconsin’s soil that Howard doesn’t know.
As a veritable soilclopedia, he’s a one man show.

In ’70 Sir Howard G. became a GS-9 in Green Lake
Still madly mapping away with no muscle ache.
Twas in Baraboo he landed his first role as Party Leader
And here he won the title of Master Proofreader.
Dr. G is renowned as the ultimate map work checker
They say that he could find a fly speck in pepper!
Each direct report soon learned not to be labeled a schlepper.

Such skills led to Howard’s assuming a new role
And a State Soil Correlator flag ran up his flagpole.
Here he took better care than a Smithsonian Conservator
Of all the soils information that came through his door.

A down to earth guy, Howard kept his cards on the table
Especially at noon with those who were able
To parlay their way through a game of Sheepshead
And close without incurring major bloodshed
Or being labeled a bubble, bone, or chucklehead!!

Sir Howard G is truly a Class I guy
Like some of the soils he would classify.
Level, deep, well drained and fertile of soul
A perfect subject for a song by Sir Francis Hole!

Perhaps not by chance Howard retired from his life long toil
At the end of 2006, Wisconsin's Year of Soil.

Some folks at this point would be long in the tooth
But like an Inceptisol, Mr. G is a fountain of youth.
Despite 40 years of digging holes in the earth
He has managed to give his field challenged self a miraculous rebirth!

Howard, Susan and the boys, we wish you all the best
Whether you are relaxing at home getting a much needed rest
Or on a psamment by the sea watching the sun set in the West.
At our place you will always be an honored guest.

We already miss your smiling kind face
And at our potlucks we have had to retire your place.
Thank you for all you have done for the resources of this state
Especially the land which you and your soil buddies helped to consecrate.

With High Regard,

Pat Leavenworth
March 31, 2007

ON A STRANGE RELIGION

The exact number of followers in this cult is unknown; however, it is believed that the number is not large as compared with some other cults. One of the first strange things about this sect, and this alone makes it unique among sects, is that its members can be found in virtually every county in the United States. Ordinarily, cults tend to be regional in character but then this is a strange cult. As a whole, its members seem to be of at least average intelligence and are not striking in appearance in any way. Their mode of dress is quite ordinary; it might even seem that they consciously dress to appear unobtrusive. They do carry about their persons some very strange objects. Might we call them fetishes? Knives, bottles containing acid or water, small magnifying lenses and other unique bits of paraphernalia are seen, but more about these later.

The general appearances of the rites they perform suggest some pagan worship. One might happen onto a group of these quaint folk in a pasture or field or forest, sometimes in remote fastnesses and even sometimes very near towns and dwellings. The rites are nearly unbelievable when first observed. It seems that a hole is in the ground, varying in diameter from a few inches to a few feet and in depth again from a few inches to a few feet, forms a kind of altar. Generally, this is roughly round in outline but oblong ones have been observed, particularly when the worshipers are searching for a sacred entity called Krotovina. At the beginning of the rites, one or two of the group (the group may be any size but seldom over 12) begin by digging the hole. High priests, called correlators, designate the spot at which the altar is to be made. This hole is made with talking, laughing and joking; however, when it comes time to remove the object of worship from the hole, the group usually falls silent and stands in reverent awe. This Deity is, of all things, a slab of earth about eight inches long, 4 inches wide and one foot or more deep. The greatest dimension is nearly always from the vertical. This is very gently removed from the hole and very gently laid nearby upon the ground. Quite frequently this is done by one of the high priests. Usually a few moments of respectfully silent awe follow the placing of the Deity. This holy object is called the Profile; however, sometimes these are preserved for future worship and are then called Monoliths.

After placing the Deity beside the altar and the moments of silent meditation, the worshipers fall upon this object of worship and literally tear it to pieces. They take bits of earth from this holy body and crush it in their hands. They prod it with knives, measure it with rules or tapes, treat it with acid, crush it and expectorate on it or wet it with water and rub it gently between their fingers. Is this saliva-soil combination some strange communion? It is at this stage of the rite that talking in tongues is observed or at least it seems that it is a talking in tongues for it is completely incomprehensible to the uninitiated. Some say that they understand each other but this seems unlikely to the casual observer. Sometimes they say names of rivers or towns or counties that may be hundreds, even thousands of miles away. From this it might seem that the beholding of this Deity brings on visions, for some of the worshipers have never been to the towns and counties they are heard to mention. Sometimes they seem to disagree about certain phases of the religious experience. Two might be on their knees, rubbing this moistened dirt between their fingers and be heard to say; 1st "loam" 2nd "nope, very fine sandy loam" 1st "that's not very fine sand, that's angular silts."

Then at times it seems as if they're talking in a strange indeterminate geometry, as one might be heard to say "weak subangular blocky" or "strongly prismatic". And at times it seems that

architecture has contributed something as one hears something about “strong columnar structure.” Then they can be heard talking in algebra, or so it seems, when they talk of A1, Bs , Oi, or Ck. And sometimes something might be said that resembles Russian, German, Latin or Greek (it probably wouldn’t be recognized by Russians, Germans, Latins or Greeks, however). One of the high priests was heard to frequently say something that resembled “mollic epipedon.” This incantation seems to have some particularly reverent significance, as the lesser members always seemed to gaze upon him with awe when the time came when these words could be used.

The high priests seem to be prophesying the coming of some incomprehensible entity that is already worshiped by lesser members even though they don’t understand it, or even know who or what or how it is or what it will do when it arrives. It is called Seventh Approximation.

After Profile is treated, spat upon, gouged, crushed and discussed, the high priests begin questioning one who is called Party Chief and they may talk about this thing for from 15 minutes to 4 hours and it seems as if they are always talking about something that It (Profile) isn’t. The true religious nature of this group is proven by its mystic characteristics. The mystery being that the high priests do not know what It is but they always know what It isn’t. Lesser members who haven’t yet attained the mystical insight of the High Priests or even of the Party Chief usually know what It is but not what It isn’t.

Following the discussion of what It isn’t is a short social period in which members talk about other members (not present, of course), of how hard it is to get funds from administrators, the relative merits of various types of spades and of hunting or fishing trips.

The hole is always filled but this cannot be done until sanctioned by one of the high priests. This is done quite subtly. The lesser members, who usually do the filling, may stand for some time waiting for the “that’s all” a nod of the head or the high priest may sanction it by kicking a clod into the hole. Lesser members never begin filling an unsanctioned hole. Once begun, the filling is completed with vigorous dispatch, as many as half-dozen may gather round and shovel and kick dirt into the hole.

It might be mentioned that, as in all religious groups there are usually one or two non-believers. They usually stand around telling jokes at the most inappropriate times, sometimes openly heckling the worshipers and sometimes picking up bits of plants and looking at them with an air of boredom or, rarely, interest. Sometimes cows and what cows eat and other mundane things are talked about.

By Clay Stephens
Range Conservationist, Bureau of Indian Affairs
Blackfeet Reservation, Cut Bank, Montana

THE SOILS MAN

The soils man we honor today is the most unusual cuss.
He never gets caught out in the rain and he doesn't care for dust.
You never see him out in the dew, his boots – they might get wet.
But hot weather he hates the most for he doesn't like to sweat.

So when the dew is off the grass and the weather is exactly right.
You may see him in the field – a most unusual site.
But now he's going towards a woods, his hands they clutch a map.
He's heading for a shady spot to take a quiet nap.

And when it's time to come back home, he jumps up fresh and lively,
Only to discover that he was sleeping in poison ivy!
His hands and neck they begin to itch – there are blotches on his face.
You ask him where he found the stuff – he says, "It's every place!"

He claims he has the problem solved – that it is no big deal,
For now he does his surveying from behind the steering wheel.
The days are spent along the road with photos on the seat.
He's turning out his share of maps – the lines are clean and neat.

But when you check up on his work, it's never his mistake.
For he will always tell you it was mapped by Bill or Jake.
So when we had him cornered and were giving him the word,
He only thumbed his nose at us and said, "I've been transferred".

Author Anonymous

THE SAGA of TIMOTHY MCGEE

By Paul H. Carroll

Harken to this story, a, tale of lost glory,
Exactly as it was told to me,
Of the meteoric rise and ultimate demise
Of the remarkable Timothy McGee.

From the day of his birth, Tim dug in the earth
'Til his skill equaled that of a mole.
He had learned to sink, in less than a wink,
A magnificent six foot hole.

To enhance his fame, he finally came
Into the ranks of professional soils men.
"It'll be simple" he said, "to earn my bread
Where I can do the work of ten".

True to his word, or so I have heard,
He worked circles around the rest.
Huge multitudes tried to puncture his pride,
But eventually they all acquiesced.

At the break of each day in the usual way
Tim would make these boastful demands,
"Shod me with blades of sixteen-inch spades
And place an auger in each of my hands".

Making holes at each hop, augers spinning like tops,
He'd traverse fields in less than a minute.
With his computerized brain, it proved no great strain
To record all the data that came in it.

Each notable feat served his growing conceit
That thrived on the plaudits of men.
He boasted to all by issuing this call,
"Whatever the challenge, I'll win".

Though they may not elect, the vain can expect
Nemis' retributive frown.
Tim's came one morning with no warning
When his augers refused to go down.

Tim saw the need for greater strength and more speed,
Thinking it would then be a cinch.
Augers whirred and smoked, shovels twisted and broke,
But the obstacle gave not an inch.

Tim worked all that night ‘neath the flickering light
Of sparks that were struck from the steel
Of the bits and blades of his augers and spades,
Yet the barrier still did not yield.

At dawn the next morn’, weary, tattered, and torn,
Stood the shell of a once mighty man.
His proud career nipped, admittedly whipped
By a dried out FRAGIPAN.

Uttering not a sound, this man of renown,
Quietly left. Where to? No one knows.
Though most agree that Timothy may be
With Paul Bunyon in the Artic snows.

Shovels broken and rent, auger twisted and bent
Are still scattered o’er the land,
Lying in full view as witnesses to
The induration of fragipan.

Wisconsin Society of Professional Soil Scientists

30 Years and Counting

From the archives – Leroy G. Jansky

On June 25, 1971, the Wisconsin Society of Professional Soil Scientists was organized and their constitution and by-laws were adopted on April 28, 1972. The major objectives outlined at the society's inception are as follows:

- To advance the profession of applied soil science.
- To improve and maintain the stature of the applied soil scientist.
- Foster broader recognition of the need, use, and application of applied soil science in government, various commissions, and especially the private business sector.
- Cooperate with and counsel colleges and universities in adjusting curricula to the changing needs of the applied soil scientist.
- Function as a communication medium between professional soil scientists, allied disciplines and professional organizations.
- Cooperate with other disciplines and professional organizations to advance causes of mutual interest and concern.
- Work toward state registration and certification of soil scientists.
- Foster good land use and environmental programs through the use of soil resource information.

After carefully reading through this 30 year old document I soon realized that this society's mission is still valid, and on track. It's great to know that our objectives and our purpose are still as valid now as 30 years ago. In addition, it is satisfying to know that we have accomplished one of our initial objectives by getting a professional soil scientist registration program in Wisconsin.
Our organization worked for recognition of soil scientists by the state and accomplished the task. We need to continue to work on all of the objectives stated above in order to better serve our members and ourselves, the public, and to better the environment.

INTRODUCTION TO THE HISTORY OF THE WISCONSIN SOCIETY OF PROFESSIONAL SOIL SCIENTISTS

For many years, the soil scientists in Wisconsin felt there was a need for an organization that would serve their specific interests, both as a group and as individuals. Some of these interests were the promotion of the soil science profession, certification or registration of soil scientists, technical training, and professional and social communications and meetings.

Early in 1971, Delbert Thomas and Gordon Wing took the initiative to send inquiries to their fellow soil scientists. People were asked to express their interest in forming an organization of soil scientists. The response supporting such an organization was very favorable. On May 25, 1971, thirty-five soil scientists from the Soil Conservation Service, Forest Service, Wisconsin Department of Health, and Wisconsin Universities met after an SCSA meeting. Under the leadership of Del and Gordie and with the interest and support of many other soil scientists, the Organization of Wisconsin Soil Scientists was formed.

The name was later changed to the Wisconsin Society of Professional Soil Scientists.

WISCONSIN SOCIETY OF PROFESSIONAL SOIL SCIENTISTS - 1971

On May 25, 1971 following the summer SCSA meeting at Fond du Lac, Wisconsin, 35 soil scientists assembled and formed the Organization of Wisconsin Soil Scientists. Interim dues of $2.00 were collected.

Interim officers were Del Thomas, President; Ernie Link, Vice-President; and Gordon Wing, Secretary-Treasurer. Harvey Strelow, Auggie Otter and Bob Slota along with the interim officers comprised the organizational committee. Appointed to the membership committee were Phil McColley, Sherm Radtke and Paul Carroll.

This organization was oriented toward addressing the interests and concerns of practicing soil scientists.

During the latter part of 1971 much effort was directed toward naming the Society, developing drafts of Constitution and By-laws and developing aims and goals for the Society.

It was during the latter part of 1971 or early 1972 that the organization adopted the name Wisconsin Society of Professional Soil Scientists. Also during this period Ernie Link designed and ordered a supply of WSPSS letterheads.

WISCONSIN SOCIETY OF PROFESSIONAL SOIL SCIENTISTS -1972

On March 24, officers and several other soil scientists met in Madison to begin drafting the Constitution and By-laws for consideration by the members.

The first formal meeting of the Wisconsin Society of Professional Soil Scientists was held at the Debot Center, University of Wisconsin, Stevens Point, on April 28. This was primarily an organizational meeting to develop the Constitution and By-laws and elect a 5-man Board of Directors and officers.

The members at this meeting adopted the Constitution and By-laws.

Elected to the Board of Directors and lengths of their terms were: Ernie Link, 1 year; Dale Parker and Auggie Otter, 2 years; Milo Harpstead and Del Thomas, 3 years. The Board of Directors met briefly following the meeting and elected Del Thomas, President; Auggie Otter, Vice-President' and Milo Harpstead, Secretary-Treasurer.

At this meeting the consensus of the membership was that they wanted the officers elected by the membership and not by the Board of Directors.

Several news articles were developed and released following this meeting.

In accordance with the By-laws, the first annual meeting of the WSPSS was at the Holiday Inn, Stevens Point, on October 21, 1972. The banquet speaker was Harland Clinkinbeard, Executive Director of the Southeast Regional Planning Commission. The treasurer's report at this time showed a balance of $22.47.

Gerhardt Lee and Dale Parker reported they had met with the Executive Board of the Soil Science Society of America to discuss common concerns and explore the possibility of affiliation. SSSA expressed an interest in adjusting their By-laws in order that they might serve as an "umbrella" organization to groups such as WSPSS.

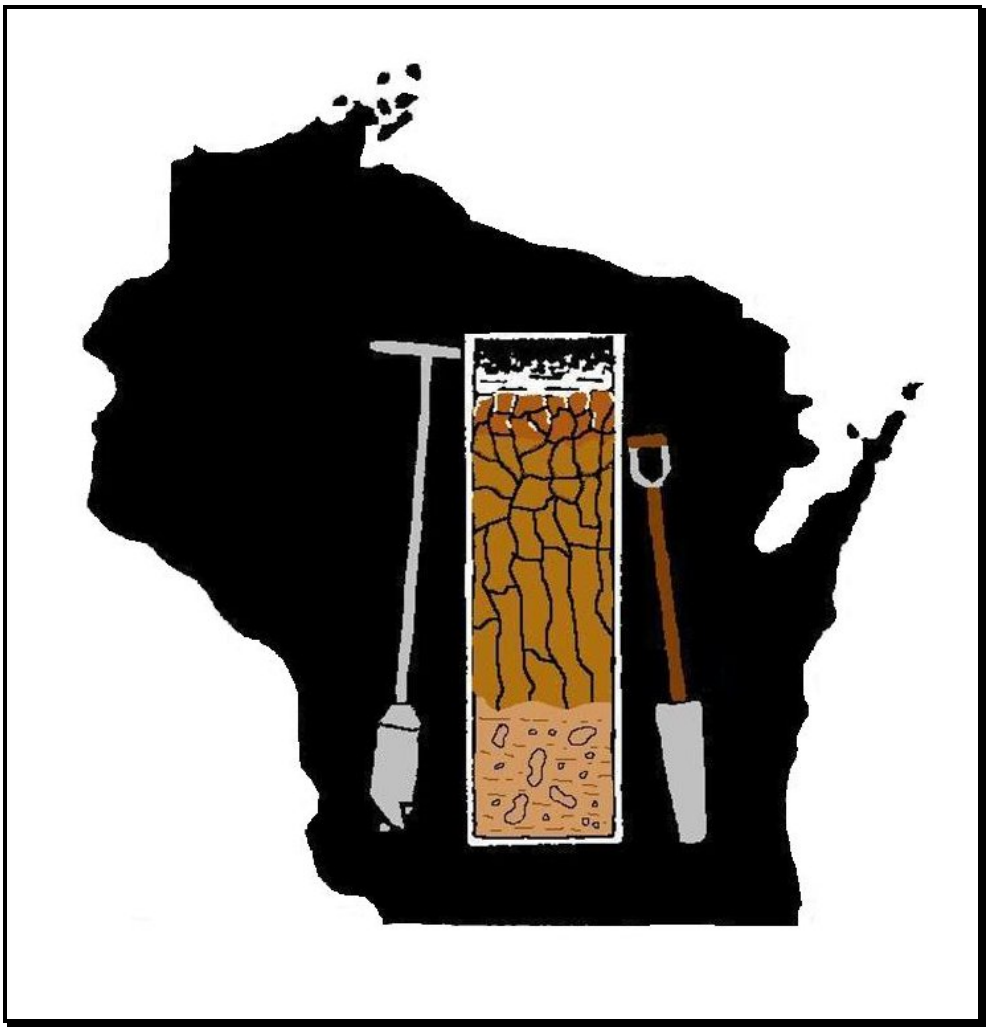
In these early stages Dale Parker and Jim Bowles were among those furnishing leadership in exploring certification or registration of soil scientists.

Harland Clinkinbeard, and William DeYoung, SCS State Soil Scientists, retired, were awarded the first honorary memberships.

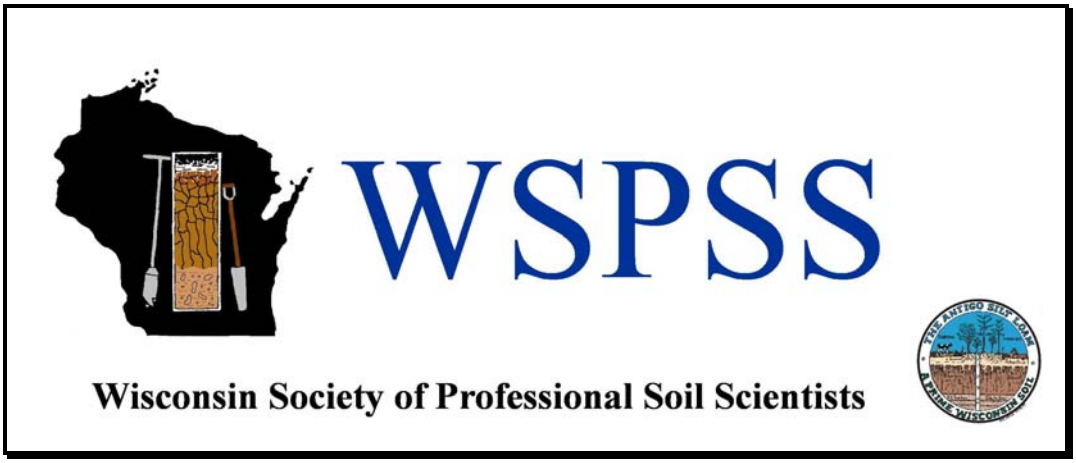
For purpose of clarity the membership voted to have officers and board members elected at the October meeting and have their full terms begin on January 1, 1973.

A committee consisting of Orville Haszel, William Fiala and Gerhard Lee was appointed for the purpose of developing an informational brochure on what the soil scientists does.

Original WSPSS Logo



Current WSPSS Logo in color



The WSPSS Banner in color

BYLAWS OF THE WISCONSIN SOCIETY OF PROFESSIONAL SOIL SCIENTISTS
Adopted April 28, 1972

Amended April 7, 1973; April 23, 1977; April 27, 1979; October 17, 1981; May 21, 1982; May 2, 1986; April 24, 1987; June 12, 1988; October 1989; November 1, 1996, and May 18, 2001.

Article I. Name

Section 1.01 - Wisconsin Society of Professional Soil Scientists, hereafter to be known as the Society in this document.

Article II. Membership

Section 2.01 - The Society shall have three (3) classes of members designated as regular members, student members, and associate members. Associate members shall have all rights and privileges as members except those of voting and holding office.

Section 2.02 - Eligibility and qualifications for members. Eligibility for membership consists of a Bachelor of Science degree in Soil Science or other title with equivalent credits to qualify for the position of Soil Scientist as specified in the Federal Civil Service announcements with the approval of the Board of Directors, hereafter to be known as the Board in this document.

Students or others interested in the aims and goals of the Society may become associate members upon approval of the Board.

Article III. Dues and Fees

Section 3.01 - Dues for regular members shall be $15.00 per annum; associate members $5.00 per annum; student members $2.00 per annum. Changes in dues shall be at the recommendation of the Board and ratified by a majority vote of those voting at a regular meeting. Membership shall be from January 1 to December 31. A member shall be considered delinquent and dropped from membership if dues are not received by the Treasurer by February 15 of the year.

Article IV. Meetings

Section 4. - The annual meeting of the Society shall be held within 30 days of October 15, at an hour, date, and place designated by the Board. Members shall be notified of the date, hour, and place of the annual meeting by the Board at least 30 days prior to the meeting.

Special meetings shall be called by the Board or by petition of 25 percent of the members to the Board. Members shall be notified of the date, hour, place, and purpose of the meeting at least ten (10) days in advance of the date.

Section 4.02 - A quorum for conducting regular business of the Society shall consist of the duly paid members present.

Article V. Administration

Section 5.01 - The Board shall consist of five (5) members.

Section 5.02 - The affairs of the Society shall be governed by the Board.

Section 5.03 - Officers of the Society shall be Past-President, President, President-Elect, Secretary, and Treasurer. The five officers shall comprise the Board. The President-Elect shall serve a one-year term, then automatically become President for a one year term and then Past-President for a one year term. Term of office for the Secretary and Treasurer shall be for two (2) years.

Section 5.04 - Election of officers shall be by mail ballot during November or December of each year. Term of office shall begin January 1. Any vacancies on the Board shall be

filled by a majority vote of the remaining Board members. The newly elected officer shall serve out the remainder of the year in which the vacancy occurred, and if necessary, the remainder of the vacancy shall be filled by the annual membership vote.

Section 5.05 - Any regular member in good standing, who has held membership for one year, is eligible for election as an officer.

Section 5.06 - Candidates for office shall be selected by a nominating committee that is appointed by the Board. There shall be at least two (2) candidates nominated by the nominating committee for each position.

Section 5.07 - Duties of the Officers. The President shall be Chairperson of the Board, be responsible for planning the program of the annual meeting, preside at meetings, promote cooperation with other groups with common aims, and perform such other duties as usually pertain to the office. The Past-President shall perform the duties of an absent President and shall succeed to the Presidency in case the office is vacated. The Secretary shall keep notes and records of all meetings and transactions. The Treasurer shall collect all dues and fees, be custodian of all funds belonging to the Society, and upon written statement of indebtedness and countersigned by the President, may withdraw funds from the treasury for payment of financial obligations incurred by the Society.

Article VI. Committees

Section 6.01 - The President may appoint special committees for tasks related to the affairs of furthering the aims of the Society. Such appointments shall be on a year to year basis.

Article VII. Amendments

Section 7.01 - The Bylaws of this Society may be, amended, added to, or repealed in either of two ways: first, by vote of the majority of the members present in person, or by proxy at any meeting of the members, providing notice of the proposed change is given in the notice of the meeting at which such action is to be taken; second, by a mail ballot vote of the majority of those voting, provided all members have been notified of the proposed changes.

Article VIII. Outstanding Service Award

Section 8.01 - The Society may formally recognize both members and non-members with an Outstanding Service Award for performing activities which further the purposes of the Society. This award will be granted based on a nomination by the Board and approval by a majority of the members at an annual or special meeting.

RULES OF ORDER

The rules contained in Roberts Rules of Order shall govern in all cases to which they are applicable, and in which they are not inconsistent with the rules of the Constitution or Bylaws of the Society.

Officers of the Wisconsin Society of Professional Soil Scientists (WSPSS)

1971	President	Delbert D. Thomas
	Vice-President	Ernest Link
	Sec-Treas	Gordon Wing
	Member	Harvey Strelow
	Member	Augustine J. Otter
	Member	Bob Slota
1972	President	Delbert D. Thomas
	Vice-President	Augustine J. Otter
	Sec-Treas	Dr. Milo Harpstead
	Member	Dr. Dale E. Parker
	Member	Ernest Link
1973	President	Delbert D. Thomas
	Vice-President	Augustine J. Otter
	Sec-Treas	Dr. Milo Harpstead
	Member	Dr. Dale E. Parker
	Member	Ernest Link
1974	President	Augustine J. Otter
	Vice-President	Dr. Dale E. Parker
	Sec-Treas	Dr. Milo Harpstead
	Member	Orville Haszel
	Member	Delbert D. Thomas
1975	President	Orville Haszel
	Vice-President	Robert Bartelme
	Sec-Treas	Dr. Milo Harpstead
	Member	Dr. G.B. Lee
	Member	Delbert D. Thomas
1976	President	Peter Lindgren
	Vice-President	Robert Bartelme
	Sec-Treas	Dr. Milo Harpstead
	Member	Dr. G.B. Lee
	Member	Orville Haszel
1977	President	Robert Bartelme
	Vice-President	William Fiala
	Sec-Treas	Dr. Milo Harpstead
	Member	Dr. G.B. Lee
	Member	Peter Lindgren
1978	President	William Fiala
	Vice-President	Peter Lindgren
	Sec-Treas	Dr. Milo Harpstead
	Member	Steve Shimek/James Bowles
	Member	Kim A. Kidney
1979	President	Kim A. Kidney
	Vice-President	Steve Frings
	Sec-Treas	Dr. James Bowles
	Member	William Fiala
	Member	Merchant/H. Krueger
1980	President	Steve Frings
	Vice-President	A. J. Klingelhoets
	Sec-Treas	Dr. James Bowles
	Member	Kim A. Kidney
	Member	Harold O. Krueger
1981	President	Dave Buss
	Vice-President	Dale Jakel
	Sec-Treas	A. J. Klingelhoets
	Member	Steve Frings
	Member	Harold O. Krueger
1982	President	Dave Omernik
	Vice-President	Dale Jakel
	Sec-Treas	A. J. Klingelhoets
	Member	Fred Smieth
	Member	Dave Buss
1983	President	Dave Omernik
	Vice-President	George Hudleson
	Sec-Treas	Edmund Drozd
	Member	Fred Smieth
	Member	Dale Jakel
1984	President	George Hudleson
	Vice-President	Fred Smieth
	Sec-Treas	Frank L. Anderson
	Member	Dave Omernik
	Member	Kenneth Lubich (?)
1985	President	John Brubacher
	Vice-President	Kenneth Lubich
	Sec-Treas	Frank L. Anderson
	Member	Sam Rockweiler
	Member	George Hudleson
1986	President	Sam Rockweiler

	Vice-President	Kenneth Lubich
	Sec-Treas	Jane Hansen
	Member	John Brubacher
	Member	Frank L. Anderson
1987	President	John Cain
	Vice-President	Jane Hansen
	Sec-Treas	Steve Kleuss
	Member	Sam Rockweiler
	Member	John Brubacher
1988	President	Jane Hansen
	Vice-President	Steve Kleuss
	Sec-Treas	Clarence Milfred
	Member	John Cain
	Member	Larry Natzke
1989	President	Steve Kleuss
	President-elect	Kim Goerg
	Past-president	Jane Hansen
	Secretary	John Cain
	Treasurer	Clarence Milfred
1990	President	Kim Goerg
	President-elect	Kenneth Lubich
	Past-president	Steve Kleuss
	Secretary	Leroy G. Jansky
	Treasurer	Clarence Milfred
1991	President	Kenneth Lubich
	President-elect	Jim Barnes
	Past-president	Kim Goerg
	Secretary	Leroy G. Jansky
	Treasurer	Donna Ferren
1992	President	Jim Barnes
	President-elect	Randy Gilbertson
	Past-president	Kenneth Lubich
	Secretary	Leroy G. Jansky
	Treasurer	Donna Ferren
1993	President	Randy Gilbertson
	President-elect	Carl Wacker
	Past-president	Jim Barnes
	Secretary	Leroy G. Jansky
	Treasurer	Tim Meyer
1994	President	Carl Wacker
	President-elect	Howard Lorenz
	Past-president	Randy Gilbertson
	Secretary	Leroy G. Jansky
	Treasurer	Tim Meyer
1995	President	Howard Lorenz
	President-elect	Duane Simonson
	Past-president	Carl Wacker
	Secretary	Leroy G. Jansky
	Treasurer	Roger Dahl
1996	President	Duane Simonson
	President-elect	John Campbell
	Past-president	Howard Lorenz
	Secretary	Leroy G. Jansky
	Treasurer	Roger Dahl
1997	President	John Campbell
	President-elect	John Cain
	Past-president	Duane Simonson
	Secretary	Leroy G. Jansky
	Treasurer	Roger Dahl
1998	President	John Cain
	President-elect	Donna Ferren Guy
	Past-president	John Campbell
	Secretary	Leroy G. Jansky
	Treasurer	Roger Dahl
1999	President	Donna Ferren Guy
	President-elect	Steve Frings
	Past-president	John Cain
	Secretary	Leroy G. Jansky
	Treasurer	Roger Dahl
2000	President	Steve Frings
	President-elect	Leroy G. Jansky
	Past-president	Donna Ferren Guy
	Secretary	Deanna Anderson
	Treasurer	Roger Dahl
2001	President	Leroy G. Jansky
	President-elect	Gary Starzinski
	Past-president	Steve Frings
	Secretary	Deanna Anderson
	Treasurer	Roger Dahl
2002	President	Gary Starzinski
	President-elect	Ross Fugill
	Past-president	Leroy G. Jansky
	Secretary	Deanna Anderson
	Treasurer	Roger Dahl
2003	President	Ross Fugill

	President-elect	Tim Miland
	Past-president	Gary Starzinski
	Secretary	Deanna Anderson
	Treasurer	Roger Dahl
2004	President	Tim Miland
	President-elect	Matt Janzen
	Past-president	Ross Fugill
	Secretary	Jane Anklam
	Treasurer	Roger Dahl

2005	President	Matt Janzen
	President-elect	Mark Krupinski
	Past-president	Tim Miland
	Secretary	Jane Anklam
	Treasurer	Roger Dahl
2006	President	Mark Krupinski
	President-elect	John Campbell
	Past-president	Matt Janzen
	Secretary	Kathryn DesForge
	Treasurer	Roger Dahl

First WSPSS officers: (left to right) Secretary-Treasurer Gordon Wing, President Delbert D. Thomas, and Vice-President Ernest Link.

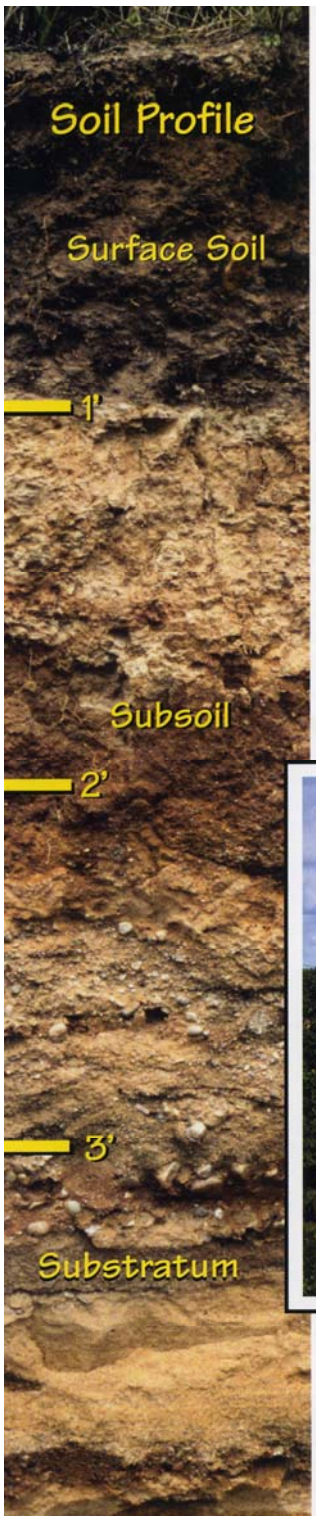
Group Picture from the first WSPSS Meeting in 1971

Individuals who served as President of WSPSS during the period 1971-1978. Left to right (standing): Delbert Thomas (from 1971-1973), Auggie Otter (1974), Orville Haszell (1975), Robert Bartelme (1977). Seated: Pete Lindgren (1976) and William Fiala (1978).

WSPSS members. Marinette County meeting, 1993

Front row (left to right): John Campbell, Orville Haszel, Leroy Jansky, Larry Natzke, Jim Martzke, Jane Anklam. Back row (left to right): Donna Ferren Guy, Sam Hagedorn, Ed Drozd, Keith Anderson, Bill Fiala, Duane Simonson, Mike Koehler, Jim Barnes, Tim Meyer, Dale Parker, Sam Rockweiler, Randy Gilbertson, Delbert Thomas, G. B. Lee, Dean Retzlaff.

Wisconsin State Soil – Antigo Silt Loam



Antigo Silt Loam
Wisconsin State Soil

Antigo Silt Loam was first identified near the city of Antigo during the Langlade County soil survey project, and was named after the nearby city. This historical marker is located northeast of Antigo on Highway 52. Antigo Silt Loam was named the official State Soil of Wisconsin by the State Legislature in 1983, a declaration reminding us of the importance of our soil resources. Antigo soil represents the more than 800 different types of soil in Wisconsin.

Antigo is one of the most productive agricultural soils in north central Wisconsin. Many areas are used for growing corn, small grains, and hay. In some places, potatoes or snap beans are important crops. Other areas are used for pastureland or timber production. The map indicates the region where areas of Antigo soil occur.

The Antigo Silt Loam logo was created by Francis Hole, former UW Professor of Soil Science. On the surface, three important Antigo soil uses are depicted. Below the land surface is an expanded scale representation of the main soil layers or horizons.

Formation of Antigo

About 11,000 years ago, near the end of the last Ice Age, glacial meltwaters deposited the sand and gravel outwash that forms the lower subsoil and substratum of the Antigo soil. Strong winds and glacial meltwaters then deposited 2 to 3 feet of silty loess and loamy outwash on top of the sand and gravel. Soil development, under northern hardwood forests, produced an organic enriched surface layer and a clay enriched subsoil.

A Prime Agricultural Soil

Antigo occurs mostly on nearly level ground, suitable for agriculture. The organic enriched surface layer provides an excellent seedbed and good tilth. The silty upper layers hold plenty of nutrients and water for plant growth. The underlying sand and gravel layers allow for good drainage. These factors, combined with a favorable climate, make Antigo a Prime Farmland soil, one of the most productive agricultural soils in north central Wisconsin.

For more information on soils:

USDA-Natural Resources Conservation Service:
www.wi.nrcs.usda.gov

Soil education site:
www.statlab.iastate.edu/soils/nssc/educ/Edpage.html

Conserving the Resource

Soil quality is a good indicator of a healthy ecosystem. The soil stores water for use by plants and filters our ground water and surface water. We depend on the soil to provide us with food and fiber. Soils play a major role in recycling carbon and nitrogen. Without soils neither we or the ecosystems in which we live could exist. The quality of our soil resources directly affects our quality of life. Good conservation practices allow us to use the soil while protecting the environment and keeping the soil healthy for future generations.

NRCS helps landowners conserve, protect, and improve the soils and other natural resources on private lands.

WSPSS promotes the advancement of soil science knowledge and education, protection of our soil resources, and the application of soil science in resource conservation and management.

U.S. Department of Agriculture

NRCS Natural Resources Conservation Service

Wisconsin Society of Professional Soil Scientists

WSPSS

May 2002

Wisconsin

STATE OF WISCONSIN

1983 Senate Bill 89

Date of enactment: September 9, 1983
Date of publication*: September 14, 1983

1983 Wisconsin Act 33

AN ACT to amend 1.10 of the statutes, relating to designating the Antigo silt loam as the state soil.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION 1. 1.10 of the statutes is amended to read:

1.10 State song and state symbols. The Wisconsin state song is "On, Wisconsin", music written by W. T. Purdy, the words to which are as follows: "On, Wisconsin! On, Wisconsin! Grand old badger state! We, thy loyal sons and daughters, Hail thee, good and great. On, Wisconsin! On, Wisconsin! Champion of the right, 'Forward', our motto--God will give thee might!". The state symbols are as follows: The mourning dove (zenaidura macroura corolinensis linnaus) is the symbol of peace; the Wisconsin state tree is the sugar maple (acer saccharum); the Wisconsin state flower is the wood violet (viola papilionacea); the Wisconsin state bird is the robin (turdus migratorius); the Wisconsin state fish is the muskellunge (Esox masquinongy masquinongy Mitchell); the Wisconsin state animal is the badger (taxidea taxus); the Wisconsin domestic animal is the dairy cow (bos taurus); the Wisconsin wildlife animal is the white-tailed deer (odocoileus virginianus); the Wisconsin state insect is the honey bee (apis mellifera); the Wisconsin state mineral is the galena (lead sulphide) ~~and~~; the Wisconsin state rock is the red granite; and the Wisconsin state soil is the Antigo silt loam (typic glossoboralf). The Wisconsin Blue Book shall include the information contained in this section concerning the state song, tree, flower, bird, fish, animal, domestic animal, wildlife animal, insect, mineral ~~and~~, rock and soil.

* Section 991.11, WISCONSIN STATUTES 1981-82: **Effective date of acts.** "Every act and every portion of an act enacted by the legislature over the governor's veto which does not expressly prescribe the time when it takes effect shall take effect on the day after its date of publication as designated" by the secretary of state [the date of publication must be within 10 working days from the date of enactment].

THE ANTIGO SILT LOAM

By Francis D. Hole
Emeritus Professor of Soil Science And Geography
Wisconsin Geological and Natural History Survey

Introduction

During the legislative session of 1983 a bill (S89)[1] was passed that named the Antigo silt loam as the official Wisconsin state soil. The state of Nebraska had taken a similar step in 1979 when its legislature designated the Holdrege silt loam as the symbol of the soil resource. The process was gradual in Wisconsin, taking seven years (1976-1983) for petitions from hundreds of school children and college students, and letters from specialists and conservation groups to convince state legislators that the soil resource should be recognized in this way. University of Wisconsin (Madison) students arranged to have an Antigo silt loam logo[2] put on a T-shirt with words to the Antigo silt loam song on the back. An Antigo silt loam puppet show was presented to dramatize the importance of soil to the state.

The soil supports life

Soils of Wisconsin, covering 35 million acres, support the life of millions of plants, animals and human beings. These soils store and release water and nutrients for growth of forests, prairies, farm crops, lawn grass, flowers and vegetables. Animals and people depend on plants. Buildings and pavements rest on soil. Men, women and children do a lot of walking on soil. Soil is also indispensable as a purifier of liquid wastes and a disposal medium of solid waste.

One of the first soil animals that we notice in the spring is the earthworm. It makes crumb-like casts of dark soil that we see along the edges of paths and roadways when April showers come. On forest floors the worms make small clumps of dead leaves called earthworm middens. In summer we notice ant mounds, some no bigger than a thumb, and others more than a foot across. The earthworm and the ant tirelessly loosen and enrich the soil. Soil contains thousands of important forms of life.

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[1] Senator Clifford Krueger (R) and Senator Fred Risser (D) were instrumental in introducing legislation concerning a Wisconsin State Soil. Senate Bill 89, designating the Antigo silt loam, passed the Senate on April 19, 1983 with a vote of 27 to 3, and the Assembly vote on June 1, 1983 was 67-30. Governor Anthony Earl signed the bill on September 9, 1983.

[2] This appears inside the front cover of the 1983-1984 Blue Book.

More than 500 kinds of soil in Wisconsin

Early farmers in Wisconsin noticed differences between soils. For example, settlers in northwestern Dane County named the village of Black Earth for the dark and productive soil at the site. Immigrants learned quickly that red clays in eastern and northwestern areas are sticky when wet, that sands in central and northern counties feel gritty and are droughty, and that silt loams covering nearly half of the state are soft like flour, and that loams are mixtures of the other materials (Figure 1). In the naming of certain places and of

bodies of water, pioneers used soil terms, including: Clay, Clay Banks, Red Banks, Stony Beach, Sand Bay, Mud Lake, Peat Lake, Muck Lake.

The first soil maps in Wisconsin were made in the late 1800's to show location and acreage of soils of differing productivity. Soil surveyors dug study pits and observed that each kind of soil has a special set of layers called horizons (Figure 2, and Appendix). By 1979 a key to the soils of the state, issued by the Soil Conservation Service, listed 532 different kinds of soils, all named after places. Eight Wisconsin counties had soils named after them: Dodge, Kewaunee, Marathon, Oconto, Ozaukee, Trempealeau, Vilas and Winnebago. Most soils are named after villages and cities located in this or other states of the Midwest. The name of Antigo, a city in Langlade County, seventy miles northwest of Green Bay, is taken from an Indian word meaning "where the evergreens grow". The Antigo silt loam was named for this city because a special kind of soil of Wisconsin was first studied near there.

In speaking about a soil we not only use a place name, such as Antigo, but also a textural term, such as silt loam. Antigo silt loam is a soil common across north-central Wisconsin. The word loam means a mixture of sand (that feels gritty), silt (that feels smooth), and clay (that feels sticky when wet). If a soil is mostly sand we call it a sandy loam or even just sand. If the soil feels flour-like, we call it silt loam. If it has enough clay to make it quite sticky, we call it clay loam. Sandy soils are very droughty in dry seasons, but silty and clayey soils are not because they can store much water for plant roots to use.

Why the Antigo silt loam was selected

Just as only one of many kinds of trees in Wisconsin was selected to be the state tree (the sugar maple: Acer saccharum), one of the many kinds of soils was chosen to be the state soil. The Antigo silt loam (Typic Glossoboralf) was a good choice because: (1) it is named after a Wisconsin place (unlike the Tama and Dubuque soils, for example); (2) it is found chiefly in Wisconsin; (3) it is versatile, serving dairying, forestry and potato production; (4) it represents, with respect to its floury texture, the many silty soils that cover nearly half of the state; (5) it is located north centrally, scattered across twelve counties[3]; (6) it is well above average in productivity; (7) it is intermediate in texture, lying between the extremes of clay and sand; (8) it is usually well managed and carefully protected from erosion by water and wind.

[3] Barron, Langlade, Lincoln, Menominee, Oconto, Polk, Rusk, St. Croix, Sawyer, Shawano, Taylor, Washburn. (see Hole, 1976: Figs. 12-2, F-6, F-17, F-25, F-26).

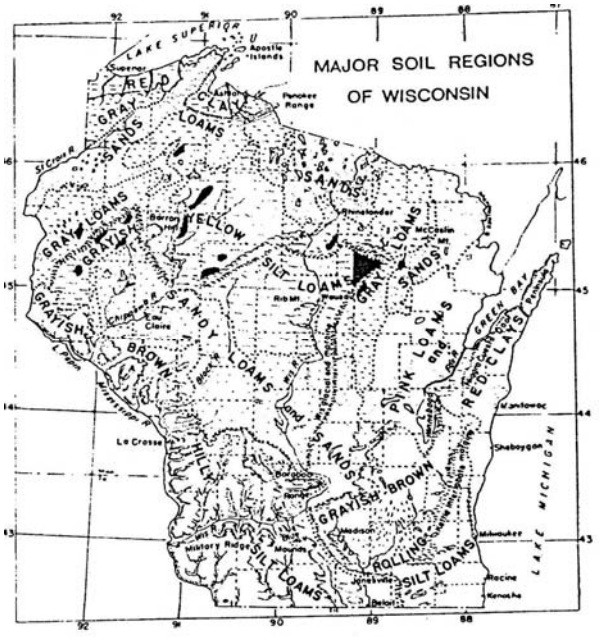

Figure 1. Major patches (shown in black) of soil landscapes in which the Antigo Silt Loam is present, in North Central Wisconsin.

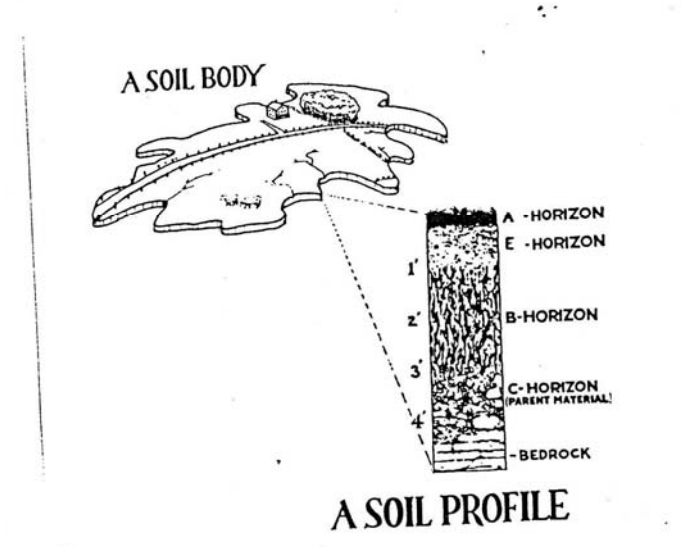

Figure 2. Diagram showing sketches of (1) a typical soil body (about ¼ mile long), and (2) an enlarged cross-section ("soil profile"), with distinctive layers ("soil horizons").

Characteristics of the Antigo silt loam

This productive soil has six distinct layers (horizons): forest floor, surface soil, subsurface soil, two subsoil layers, and substratum (the O-A-E-B-C soil horizons). These soil horizons are sketched in the central lower panel of Figure 3 that shows: (1) forest floor leaf litter and humus (O1 and O2 horizons); (2) a dark surface silt loam (A); (3) a pale subsurface silt loam (E), which tongues down into the subsoil (B); (4) a yellowish brown

silty subsoil (Bt1); (5) a dark brown sandy loam subsoil (2Bt2), and (6) stratified sand and gravel (2C). This soil is formed in three principal materials: forest leaf litter, a two- to three-foot layer of silty (flour-like) material, and underlying sand and gravel beds. The last of the three is considered to be the second distinct geological mineral layer, and horizons formed from it are numbered "2", as in 2Bt and 2C.

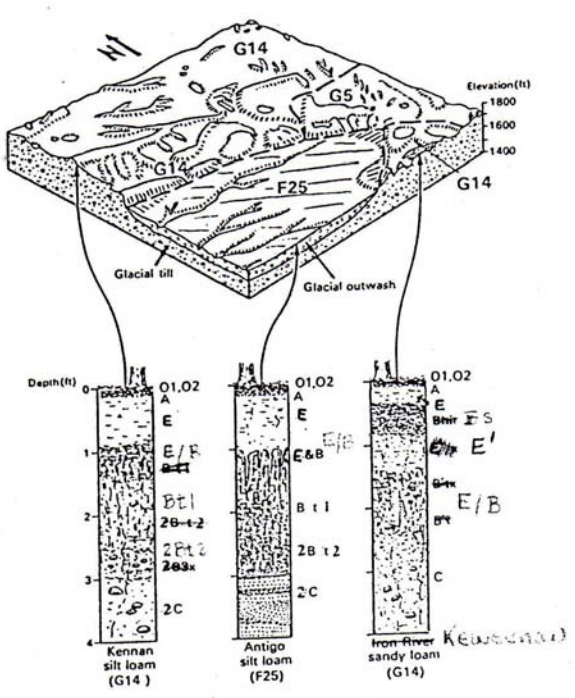

Figure 3. Block diagram of a portion of Langlade County, showing much of the plain near the city of Antigo, and bordering moraines. Enlarged soil profiles represent three typical soils, including Antigo Silt Loam.

How the Antigo silt loam formed

The history of the formation of this soil involves the ice age, also known as the glacial epoch. About eleven thousand years ago a glacier that was about a mile thick was melting in much of Wisconsin as a result of a climatic warming. Melt waters flowed off the ice, picking up sand and gravel which were deposited as nearly level patches near the present sites of the cities of Antigo and Rice Lake and many other places in North-Central Wisconsin. As the glacier disappeared, fresh land was exposed where ice had stood for centuries. Winds swept across the new ground, season after season, and blew clouds of dust (called loess) that settled to form a silty blanket two to three feet (0.7 to 0.9 meters) thick over the sand and gravel. Forests grew on these materials for ten thousand years. Leaves and other forest debris (O1 and O2 horizons) were mixed by worms into the surface soil, forming the dark A horizon. Rainwater washed organic acids downward from the A horizon, bleaching the subsurface horizon (E) and depositing clay and some humus in the subsoil horizons, both silty (Bt1) and sandy (2Bt2). Below that are the sand and gravel beds, looking much as they were when deposited 10,000 years ago, except that they are now stained brown. There is a reservoir of ground water about 15 feet (4.5 meters) farther down, from which potato growers pump irrigation water.

Classification of the Antigo silt loam

This soil has been called a yellow silt loam (Figure 1). Patches of it occur among the gray loams. The total area of bodies of Antigo silt loam amounts to about 150,000 acres (61,000 hectares).

Modern soil classification terminology is informative. Soils are grouped into "series", series into families, these into subgroups, great groups, suborders and orders. Antigo, a soil series, is classified in the fine-silty over sandy or sandy skeletal, mixed family, or coarse-loamy mixed family, because the soil contains a concentration of silt and clay with some sand in the upper part, and sand and gravel below; and because there is a mixture of minerals (quartz, feldspar, mica, and so on), giving the soil a favorable reserve of plant nutrients. The subgroup is Typic because the Antigo soil is typical of soils in North Central Wisconsin. The great group, suborder and order are merged in the term Glossoboralfs. Glosso (the great group term) means "tongues", in reference to the tonguing of the E horizon into the Bt1 horizon (Figures 3 and 4). Bor (the suborder term) refers to the cool climate of the area. Alf (the order term) refers to the fact that the clay with aluminum (Al) and iron (Fe) has been washed by rainwater down into the Bt horizon (t stands for the German word, Der Ton, meaning clay). To this long technical name of the soil, that reads like a telegram, we can add, as prefix, the common name, Antigo silt loam, as shown below.

COMMON NAME	←----------TECHNICAL NAME----------→
Antigo	Fine-silty over sandy or sandy-skeletal, mixed Typic Glossoboralf

How the Antigo silt loam functions under various uses

The Antigo silt loam is used for forestry, wildlife and recreation; field and vegetable crops (corn, oats, hay, potatoes, snap beans), pasture, gardens, lawns; as a support for roads and structures (houses, barns, entire villages); as a medium in which utility lines are buried; as a source of irrigation water; as a source of sand and gravel. This soil functions to absorb, store and transmit water, plant nutrients and wastes in special ways, making it distinctly different from sands, clays, peats and, of course, solid rock. In the Appendix are tables of results of laboratory analyses of the various soil horizons. The data may be used to explain the behavior of the soil and to plan its proper management.

This soil contains in the upper two feet (60 cm) about 70% by weight of the flour-like material called silt. This is finer than sand and coarser than clay. When dry and exposed to wind, silty soil may blow. During a light rain a crust tends to form on exposed soil. After drying, the crust gives some protection against wind erosion. On a dry summer day one may see clouds of dust rising behind vehicles and implements as they move across fields, shattering the fragile crust. Where the land is sloping, unprotected silty soil washes easily during heavy rains. The steeper the slope, the greater the danger of erosion. Fortunately, much of the Antigo soil is nearly level, and most landowners keep this soil covered with vegetation (trees, grass, crops) or mulch and do not let it erode.

It may seem strange that the Antigo silt loam, which formed on nearly level outwash plains, should in places have slopes as steep as 25% (the ground slopes down or up 25 feet

per hundred feet of horizontal distance). This came about by the burial of chunks of glacial ice in the outwash sand and gravel 10,000 years or so ago, and subsequent slow melting of the ice to leave permanent collapse pits (called “kettles”). Some of these are larger than a house. Very large kettles may contain lakes today.

Content of clay (the very finest soil particles) amounts to about 10% by weight in the first foot (15 cm) of soil, and as much as 20% in the second foot. Clay has the capacity to shrink as it dries, causing cracks in the soil. On rewetting, clay swells and the cracks close. This shrink-swell action causes heaving of the soil during the growing season. In the cold season, repeated formation and melting of ice lenses in both silt and clay accentuate the heaving. This action may gradually break sidewalks and pavements, and can loosen weak basement walls. Such hazard is usually avoided by placement of compacted sand and gravel under pavements and next to basement walls.

The natural sand and gravel layers (2C horizon) below the silty soil are so porous that this soil is unsuitable for disposal of wastes, the liquid part of which might flow quickly to a well and contaminate drinking water. This is also not a soil on which to construct a pond, because water tends to drain easily into the sand and gravel below.

Quality of the Antigo Silt loam

The Antigo silt loam is not the most productive nor the least productive soil in the state. It is an above-average soil for forestry, agriculture, wildlife and recreation (camping, hunting, hiking, fishing).

Beautiful forests of hardwoods and conifers grow most extensively on the Antigo silt loam in Menominee County, a tribal Indian preserve. Under trees, the surface soil (A horizon) is well worked by soil animals into a fluffy, porous mass that quickly absorbs water during a period of rain or snowmelt. The natural forest litter of leaves and twigs is a mulch that protects the soil. The site index for common hardwood trees (maple, basswood, red oak) is about 70, which means that at 50 years of age the trees are usually 70 feet tall. Estimated annual growth or yield per acre of mature trees is, in board-feet-per-acre: northern hardwoods, 200-250; hemlock-hardwoods, 160-220; white pine, 300-600; red pine, 475-575 (Milfred, Olson and Hole, 1976). Browsing by deer destroys seedlings of hemlock, yew, basswood, maple, yellow birch and white cedar, making long-term forestry difficult.

Wildlife productivity on the Antigo silt loam in Menominee County is good in summer for deer (which usually winter on wetland soils in adjacent lowlands), and medium for grouse. In 1960, when Indians were free to hunt deer throughout the year on the reservation, there were only about four deer per square mile, which allowed the forest to regenerate. Surrounding counties, where hunting was and still is restricted, may have as many as 50 deer per square mile, and little or no natural reproduction of native forest, because deer eat the very young trees. Nearly 150 species of birds have been recorded in summer in Menominee County, and the following animals have been observed: black bear, bobcat, red fox, coyote, gray squirrel, otter, beaver, porcupine, and snow hare.

Crop yields, even without irrigation, are good on Antigo silt loam, as indicated by the following figures: 90 bushels of corn and 14 tons of silage per acre; 4 tons of grass-legume hay per acre; 80 bushels of oats; 27,500 pounds of potatoes. The yield of potatoes is increased by irrigation to 45,000 pounds per acre. The silty soil (upper two feet) can store

considerable amounts of water for plant use (about 18% by volume), but the gravelly substratum above the water table (2C horizon) stores almost no water. This is the reason for overhead spraying of water during dry periods on potato fields. Farmland on Antigo silt loam stands out to the observer as quite productive, as compared to the very different sandier and stonier soils of surrounding hills in forest and pasture.

The Antigo silt loam logo, song and puppet play

The author prepared an Antigo silt loam logo, song and puppet play to help people to learn about this soil and to enjoy it.

The logo[4] (Figure 4) labels this soil as a prime Wisconsin soil. Although it is found in just 12 counties, potatoes from it have been sold at some time in every part of the state. In the lower part of the disk are the A, B and C horizons that make up the soil profile and a four-foot tape measure gives scale. At a greater distance, in the upper part of the disk, we see a cow in a pasture, a forest, and two sacks of potatoes on a field.

The tune of the Antigo silt loam song was adapted from a phrase of violin music (in the Chaconne) by J. S. Bach. The following five verses consist of two introductory ones with a regional emphasis, the central, main verse, and then two final verses, one about gardening, and one about peace.

University of Wisconsin (Madison) Arboretum guides Sue Bridson and Nancy Dott, and Madison Memorial High School students Becky Mead and Karen Rude put on performances of three five-minute puppet plays, using puppets made by Sue Bridson: Bucky Badger, Terra Loam (voice of the soil), and Erosion. The plays were presented to interested classes and other groups, including two Legislative Committees. Young people from 4-H groups gave the plays at the State Fair in 1982. The scripts of the plays, as given in the Appendix, are slightly revised to acknowledge the designation of the state soil, Antigo silt loam.

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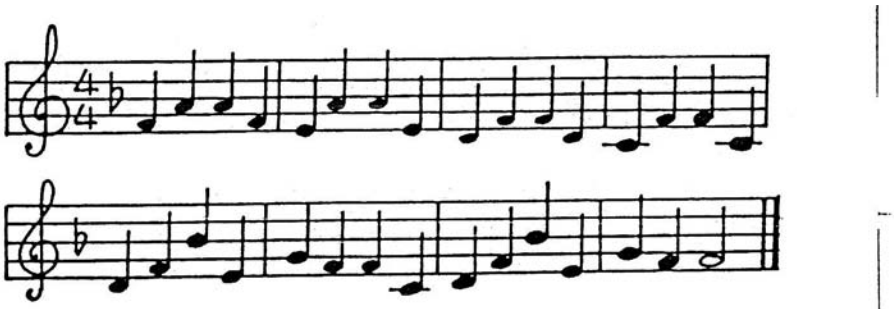
[4] T-shirts with the logo on the front and the third verse of the song on the back have been manufactured in Madison, Wisconsin. The addresses of producers can be obtained through the Geological and Natural History Survey, University of Wisconsin, 1815 University Avenue, Madison, Wisconsin, 53706, and other sources.

Figure 4. The original Antigo Silt Loam logo, by Francis Hole. Below is a close view of a road cut showing the soil horizons. Above is a somewhat distant view of a dairy cow in a pasture, a forest, and potato sacks on a field.

The Antigo Silt Loam Song

By Francis D. Hole



1. Great Lakes Region, fertile land:
   Glaciers spread both clay and sand;
   Winds blew silt, then forests grew,
   Giving soils their brownish hue.

2. Great Lakes Region, fertile land:
   You strengthen us in heart and hand;
   Each slope, each flower, each wild bird call
   Proclaims a unity in all.

3. Antigo, a soil to know!
   Wisconsin's crops and livestock grow,
   And forests, too, on Antigo;
   And forests, too, on Antigo.

4. Plant a seed and pull a weed;
   The soil will give us all we need,
   And plenty more so birds may feed;
   And plenty more, so birds may feed.

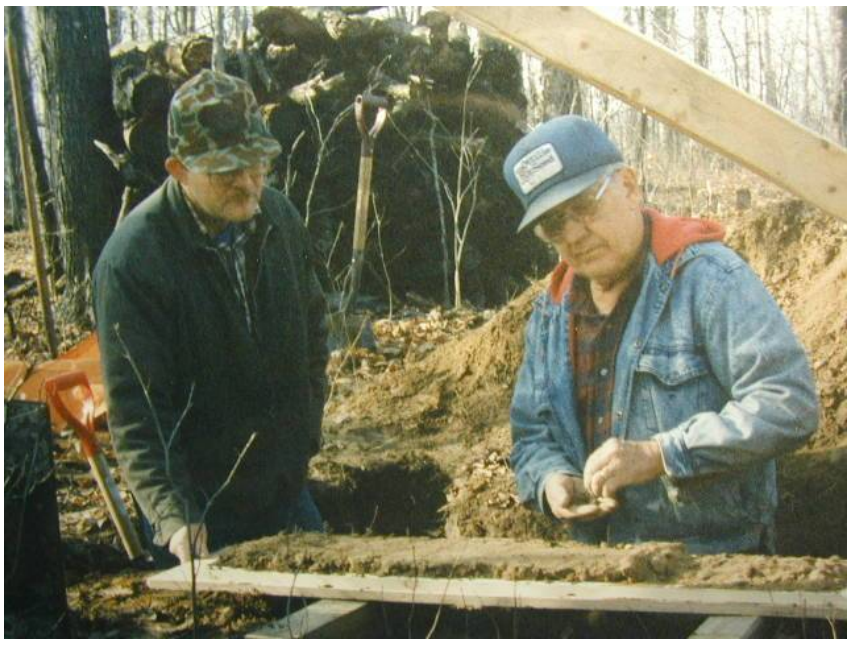
5. Of all the crops, true peace is tops;
   Its soil is love that never stops;
   It blesses sand and water drops;
   It blesses sand and water drops.

Antigo Monolith Makes Its Way to Smithsonian

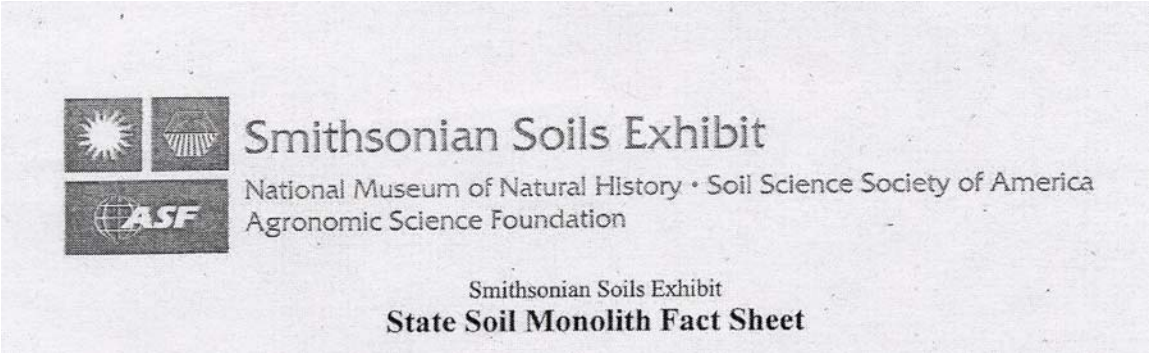
The National Cooperative Soil Survey Centennial was held in 1999. As part of the Centennial observance, every state was asked to send two monoliths of their state soil for a display in Washington DC. In Wisconsin, a team of soil scientists was selected and assigned the task of collecting the profiles from Langlade County. The team members included; Milo Harpstead, Jim Barnes, Joe Boelter, Angie Elg, and John Campbell. The profiles were collected and taken to Milo Harpstead's farm where they were preserved and seated in their trays. The trays were then taken to the local soil survey/digitizing office where the trays were varnished and dressed up. They were then diligently packaged up by the DU staff and sent to Washington DC. They made it in fine shape. Retired soil scientist Dale Jakel and his wife Rita represented Wisconsin at the centennial celebration on the Mall in Washington DC.

Smithsonian Soils Exhibit

Kevin Mc Sweeny, Director, School of Natural Resources, University of Wisconsin-Madison was on the National Committee for this project. He came to the Wisconsin Society of Professional Soil Scientists (WSPSS) and asked them to form a committee to raise the $10,000 so the Wisconsin's state soil could be included in this display. A committee of volunteers was formed from the WSPSS membership to take on this charge. Committee members included Tim Meyer, Tim Miland, Jane Anklam, Jim Barnes, and others. The committee through hard work and letter writing was able to raise the money with the generosity of Wisconsin donors.



John Campbell and Milo Harpstead, former UW-Stevens Point professor, work on the Antigo state soil monolith.



Soil Monoliths. Monoliths representing soils from each state of the U.S. will be featured in the Smithsonian Soils Exhibit at the National Museum of Natural History in Washington DC. Each soil will be labeled with the soil name, the state or area where it originated, a brief description, as well as recognizing the monolith sponsors. The monoliths will give the museum's 6-9 million annual visitors an overview of the breadth of soils in the U.S, while encouraging them to learn more about the soil in their home area.

Interactive Exhibit. Plans call for the exhibit to include an interactive educational section, as well as related educational campaign to educators and informational on the World Wide Web. This interactive museum exhibit display might include computer activities, video, an underground soil experience, and is expected to be on display for two or more years. The educational campaign includes development of science and careers information aimed at educators and librarians. State soils monolith name and pictures will be incorporated in this education information.

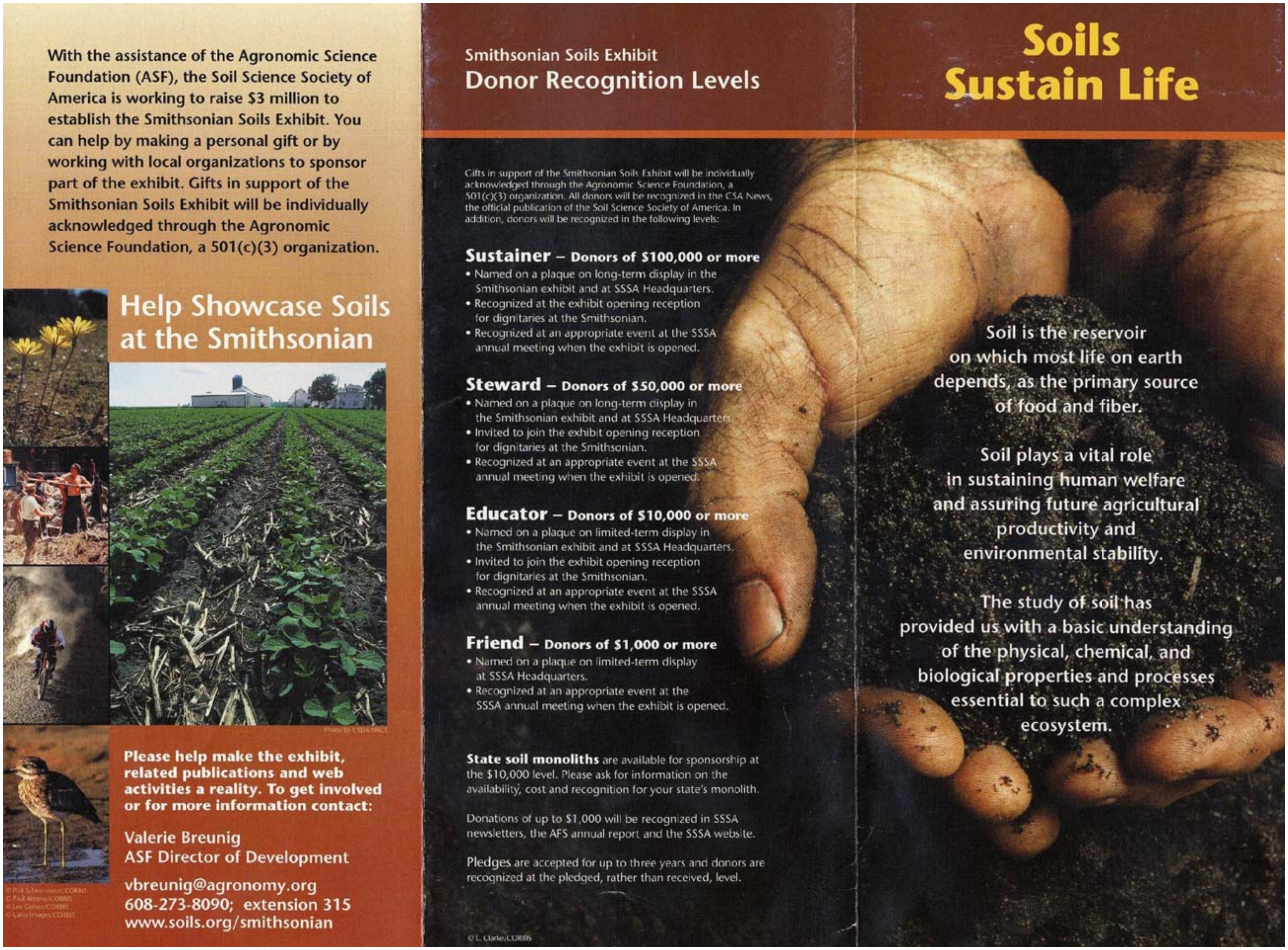
Time Line. The completed exhibit is slated to open in early 2006. The state soil monoliths are considered a "permanent" museum collection and will remain on display after the interactive sections are loaned out to local museums or retired. Therefore, these monoliths will continue to be seen by the museums 6-9 million annual visitor for many years.

Sponsorship. Each state soil association is asked to appoint a committee or liaison to explore funding from state/local sources that could together sponsor their state monolith at the $10,000 level. Gifts to the project are fully tax deductible and can be pledged over three years.

Recognition. Sponsors will be recognized with signage on the monolith they sponsor and in professional print materials. Multiple names will fit on the monolith signs: exact letter and signage size to be determined. See "Donor Recognition Levels "for a complete list of sponsor recognition. These sponsorship funds will support overall exhibits development expenses.

For More. The Smithsonian Soils Exhibit is a project of the Smithsonian Institution, many volunteer and the Soil Science Society of America (SSSA). Project support is directed through the Agronomic Science Foundation (ASF), the 501(c)(3) philanthropic arm of SSSA. For more information, contact SSSA at 677 South Segoe Rd, Madison, WI 53711 608/273-8080 or vbreunig@a-s-f.org.

Smithsonian Soils Brochure



With the assistance of the Agronomic Science Foundation (ASF), the Soil Science Society of America is working to raise $3 million to establish the Smithsonian Soils Exhibit. You can help by making a personal gift or by working with local organizations to sponsor part of the exhibit. Gifts in support of the Smithsonian Soils Exhibit will be individually acknowledged through the Agronomic Science Foundation, a 501(c)(3) organization.

Help Showcase Soils at the Smithsonian

Photo by USDA NRCS

Please help make the exhibit, related publications and web activities a reality. To get involved or for more information contact:

Valerie Breunig
ASF Director of Development

vbreunig@agronomy.org
608-273-8090; extension 315
www.soils.org/smithsonian

Smithsonian Soils Exhibit

Donor Recognition Levels

Gifts in support of the Smithsonian Soils Exhibit will be individually acknowledged through the Agronomic Science Foundation, a 501(c)(3) organization. All donors will be recognized in the CSA News, the official publication of the Soil Science Society of America. In addition, donors will be recognized in the following levels:

Sustainer – Donors of $100,000 or more
- Named on a plaque on long-term display in the Smithsonian exhibit and at SSSA Headquarters.
- Recognized at the exhibit opening reception for dignitaries at the Smithsonian.
- Recognized at an appropriate event at the SSSA annual meeting when the exhibit is opened.

Steward – Donors of $50,000 or more
- Named on a plaque on long-term display in the Smithsonian exhibit and at SSSA Headquarters.
- Invited to join the exhibit opening reception for dignitaries at the Smithsonian.
- Recognized at an appropriate event at the SSSA annual meeting when the exhibit is opened.

Educator – Donors of $10,000 or more
- Named on a plaque on limited-term display in the Smithsonian exhibit and at SSSA Headquarters.
- Invited to join the exhibit opening reception for dignitaries at the Smithsonian.
- Recognized at an appropriate event at the SSSA annual meeting when the exhibit is opened.

Friend – Donors of $1,000 or more
- Named on a plaque on limited-term display at SSSA Headquarters.
- Recognized at an appropriate event at the SSSA annual meeting when the exhibit is opened.

State soil monoliths are available for sponsorship at the $10,000 level. Please ask for information on the availability, cost and recognition for your state's monolith.

Donations of up to $1,000 will be recognized in SSSA newsletters, the AFS annual report and the SSSA website.

Pledges are accepted for up to three years and donors are recognized at the pledged, rather than received, level.

© L. Clarke/CORBIS

Soils Sustain Life

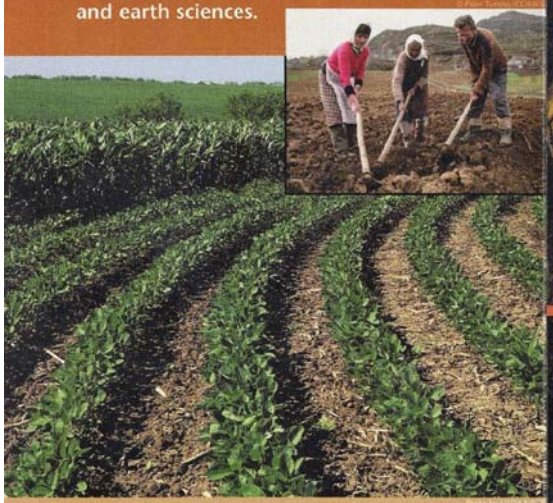
Soil is the reservoir on which most life on earth depends, as the primary source of food and fiber.

Soil plays a vital role in sustaining human welfare and assuring future agricultural productivity and environmental stability.

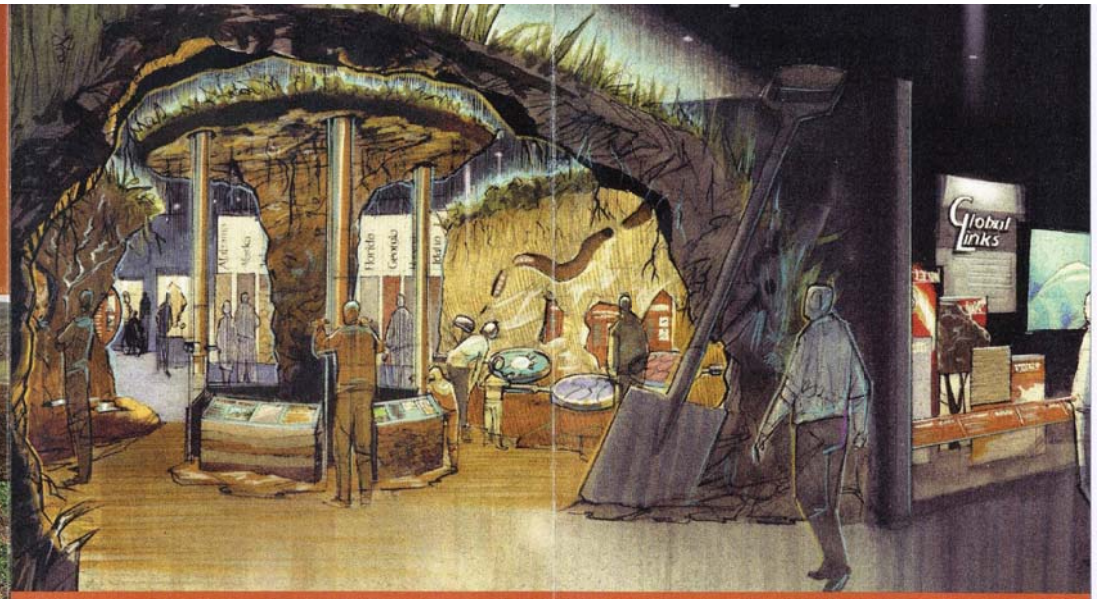
The study of soil has provided us with a basic understanding of the physical, chemical, and biological properties and processes essential to such a complex ecosystem.

Smithsonian Soils Exhibit

Never before has there been such an opportunity to advance the understanding of soil. This exhibit will help move forward our journey to sustain the Earth and its people by educating visitors to the Smithsonian on the importance of soil and earth sciences.



The Soil Science Society of America (SSSA) is working with the Smithsonian Institution to plan a soils exhibit as part of their Global Links Gallery at the National Museum of Natural History in Washington, D.C. The exhibit will include a display of state soil monoliths and an educational, interactive section to help the Museum's 6–9 million visitors understand how soil is intricately linked to the health of humanity, the environment, and the planet. Related publications and web activities will reach millions of additional people.



Smithsonian
National Museum of Natural History

Global Links

The Global Links Gallery is the core of the National Museum of Natural History's ***Forces of Change*** earth system science program and has been sponsored by the National Aeronautics and Space Administration.

Global Links combines the Museum's renowned research and collections with space-based and other scientific observations to tell a series of earth system science stories. In addition to the soils exhibit, the following exhibit stories will advance public understanding of how the Earth works as a system.

El Niño's Powerful Reach is currently on display and explores the science, long history, and worldwide impact of this recurring phenomenon.

Air: More Than Meets the Eye will demonstrate the important role of the atmosphere in shaping peoples' lives.

Frozen in Time will demonstrate the role that Arctic sea ice plays in shaping global climate throughout time.

The exhibit design, technology, and media will be made available to other museums, which can adapt all or parts of the exhibit for their purposes.

Soil Science Society of America

ASF

Joe Boelter, Angie Elg, and Jim Barnes with the completed Antigo Silt Loam monoliths.

Soil Survey Legend Used for Conservation Planning

Soil scientists, in the making of soil surveys, have used three distinctly different kinds of map symbols. During the late 1930's and early 1940's, a state soil type legend was used. During the 1940's the state adopted a national code symbol system. These systems had the advantage, whereby; a field soil scientist could easily map almost anything observed on the landscape. The result was often several hundred to more than a thousand different kinds of individual map units that were not joined or correlated and made publication of the map data on a county basis most difficult. A large acreage of soils in the state were mapped using this legend. Much of that acreage was on a farm-to-farm request basis with the soil information being used by soil conservationists and other agency personnel in resource planning.

Wisconsin developed a state soil legend, called the "Wisconsin Detail Legend," in 1941. This soil legend was used to map soils when new Soil Conservation Districts formed. Soil surveys were an important part of determining land conservation treatment needs on farms. Aerial photo coverage was available over nearly all of Wisconsin. The Soil Conservation field offices were supplied with two sets of stereo coverage photographs. The eight-inch to-the-mile photos were used by the Work Unit Conservationist (WUC) for developing a conservation plan with the landowner or operator. The four-inch to-the-mile photos were used by the soil scientist for recording field mapping. When the WUC received a request for a conservation plan he would outline the boundaries of the farm on the back of the 4" aerial photos. The Soil Scientist would obtained the photos and proceed to make the soil map. When completed it became part of the landowner's conservation plan.

Examples of map symbols and soil names in the 1941 "Wisconsin Detail Legend:"

1A	Genesee silt loams
23D	Judson silt loams
30G	Dubuque silt loams deep phase
83J	Gale fine sandy loam
136C	Curran silt loam
213C	Ettrick silt loam

- 2 -

SLOPE GROUPS:

A. 0 - 2%
B. 2 - 6%
C. 6 - 10%
D. 10 - 15%
E. 15 - 20%
F. 20 - 30%
G. 30% +

Letters and dominant slope for all classes except A where letter will suffice.

Comples slope groups for hummocky topography:

M. 0 - 7 %
N. 7 - 15%
P. 15 - 30%
R. 30% +

If floods on well drained first bottom soils constitute a major hazard, such areas should be indicated by overscoring the type number, thus:

$\overline{5}$, $\overline{10}$, etc.

Areas of peat and muck that have been sufficiently drained to change their capability to be shown by overscoring the number, thus:

$\overline{L8}$ etc.

Erosion, gullies, streams, land use, wind ersoion, etc., to be handled according to system outlined in S.C.S. Handbook, Misc. Pub. #352.

Arrangement of symbols:

$\frac{\text{Soil}}{\text{Slope - Erosion}}$ or Soil - Slope - Erosion

LAND USE:

L - cultivated
P - pasture
X - idle
F - woodland
Fl - woodland pasture

Land use to be shown separate from soil type and erosion symbol. Land use symbols to be shown by red letters.

Roads and soil boundaries may carry land use but roads should not be used as soil type boundaries.

Copied from original legend dated April 21, 1941.

T. C. Bass
Major Party Chief

An example of a Soil Survey Map Legend used in Richland County in 1941

The Wisconsin interpretation for the "National Coding Legend" was issued to the field in early 1951. This legend was based on interpretation of the functional characteristics of the soil profile. The field map unit had a series of numbers and capital letters to identify the soil properties, for example, 3M47Z. The 3 indicated moderately deep, the M indicated silt loam surface, the 4 indicated moderate permeability, the 7 designated the substratum permeability, and the Z designated gravel. The fractional and straight-line symbol was used. The outlining of the different land uses was discontinued. Other associated soil properties such as thickness of surface soil, depth to water table, degree of flooding, were shown as "floating" symbols. Only a small number of counties where published using this system.

Examples of soil symbols and names used in the "National Coding Legend." From the 1956 Soil Survey of Grant County

FDsLe	Sparta ls	UDsVg	Tama sil
FLsMg	Medary sil/c	VDsLg	Sogn sil
FDslMe	Dakota sl	VLsMg	Dubuque sil
UDsVs	Cashton sil	ULsVg	Fayette sil

Soil surveys in SCS field offices were made on an individual Soil and Water Conservation District basis by soil scientists. Often a SCS office would have soil surveys made over a span of many years where several different soil legends were used. A conversion legend was developed to assist SCS field offices in use of soil maps and to be able to compare the soils of the older soil legends to the more recent ones. The use of the National Code Map symbols was phased out beginning in 1971. Use of National Code Mapping was not supported by Dr. Kellogg and soils staff in Washington, D.C.

Soil scientists in the 1960’s went to a simplified numerical system representing the soil map unit, the slope, and the erosion class which were used on field photos. An example would be 254D2 - Norden silt loam, 12 to 20 percent slopes, eroded. Then the numbers for the map unit where converted to alphabetic symbols for publication during the map compilation phase. An example of this would be NlD2 - Norden silt loam, 12 to 20 percent slopes, eroded. The conversion from field numbers to publication symbols continued until the publication of Pepin County in 1997 which was published with numbers.

Soil and Land Judging Contests - Wisconsin

This section was prepared by Professor Dr. Roger Higgs, retired UW-Platteville professor.

Wisconsin Collegiate Soils Contest - 1967-2002

Wisconsin, unique among all states, hosted 37 collegiate soils contests from May 1967 until September 2002. No other state has held such a competition. The contest was rotated annually among UW-Platteville, UW-River Falls, UW-Stevens Point and UW-Madison in that order. The official judges for the contests were NRCS Soil Scientists from either the state office or area offices. The professional sponsors of the contests included the Soil & Water Conservation Society of America, American Society of Agronomy, the Wisconsin Society of Professional Soil Scientists, student SWCS Chapters and Student ASA Chapters. The contest rules and scorecard were those used in collegiate soils contests sponsored by the Student Activity Section, American Society of Agronomy. The first interstate regional soils contest was in the Southeastern States in 1956. The first national contest was in Tennessee in 1961.

The contest began in May 1967 at UW-Platteville and was last held September 28, 2002 at UW-Stevens Point. The contest was held in the late spring annually until 1983. Both a spring and fall contest were held in 1983. Thereafter, the contest was held the last Saturday of September. One thousand students participated over the 37 years. The contest never had a printed formal administrative guide. Each university assumed its responsibility when their turn came to be the host. The major responsibility fell upon the team coaches at the respective universities. These professors and coaches were as follows: UW-River Falls – Al Beaver, Roger Swanson, Jim Richardson and Larry Myers; UW-Stevens Point – Jim Bowles, Milo Harpstead, Clarence Milfred and Steve Levine; UW-Madison – Clarence Milfred, Al Beaver and Fred Madison; UW-Platteville – Roger Higgs and Ken Kilian. The contest was discontinued after 2002 because of university budge/personnel crunches and the simultaneous retirement of Larry Myers, Fred Madison and Roger Higgs.

Normally, contests were held near the host campus, but other sites included Horicon, Pigeon Lake, Treehaven, Eau Claire and Wyalusing. Schools had one to four teams each in a contest. Normally, contests included practice sites and four contest pits. In recent years, group judging of two pits was included as part of the team score. In 1986, the University of Minnesota participated at Pigeon Lake. In 1999, UW-Green Bay participated at UW-Stevens Point. Michigan Tech competed in 1980 and 1983. Iowa State participated in 1980.

The first contest in May 1967 at UW-Platteville had two divisions: (1) Fosh/Soph and (2) Jr./Sr. divisions. UW-Platteville won the Fosh/Soph division and UW-River Falls won the Jr./Sr. division. The division idea was dropped by 1968 when the contest moved to UW-River Falls. UW-Stevens Point hosted in 1969 and UW-Madison hosted in 1970. The rotation was adhered to except in 1978 and 1992 when UW-Madison did not host.

First place in the annual contest was achieved six times by UW-River Falls, one time by UW-Stevens Point and 31 times by UW-Platteville.

Many of the one thousand Wisconsin college students who judged soil from 1967-2002 chose careers in conservation or soil science. They can be found in the NRCS and other agencies throughout Wisconsin and the United States. Many careers were sparked by this enjoyable and educational activity. Many friends were formed in the process. Some students competed over two or three years so they got to see a wide range of Wisconsin soils. This experience is very hard to duplicate.

NATIONAL AND REGIONAL COLLEGIATE SOILS PARTICIPATION 1967-2006

Wisconsin universities have a rich history in participation in regional (interstate) and national soils competition since October 1967. Four Wisconsin universities began soils competition in May 1967, in the first annual Wisconsin Collegiate Soils Contest held at UW-Platteville. Competing were UW-Madison, UW-Platteville, UW-River Falls and UW-Stevens Point. Three of these universities (UW-Platteville, UW-River Falls and UW-Stevens Point) competed in their first Region III, American Society of Agronomy Collegiate Soils Contest at Purdue in October 1967. The Region III (five state) Contest began in 1958 and the National ASA Contest began in 1961.

Over the years since 1973, all four Wisconsin universities have participated and competed well in the National ASA competition. National competition was contingent upon placing in the top three in stiff regional competition. The ASA regional is a fall contest and the ASA national is in the spring. Additionally, since approximately 1980 these four universities have all participated in many of the April national NACTA (National Association College Teachers of Agriculture) soils contest. In fact, UW-Platteville, UW-River Falls and UW-Stevens Point have won this contest on many occasions. The NACTA contest has been hosted by UW-Platteville and UW-River Falls.

Approximately 50 universities participate in seven soils regions in the ASA Soils Contest. Since 1967, participation in Regional III soils contest by Wisconsin schools has been by UW-Platteville (40 contests); UW-Stevens Point (36 contests); UW-River Falls (33 contests) and UW-Madison (24 contests). Wisconsin schools have captured first place 25 times in the 50-year history of the regional contest. UW-Platteville is credited with 22 first place finishes (Purdue also has 22), UW-River Falls – two first place finishes and UW-Stevens Point – one first place finish. Wisconsin schools have hosted the regional 13 times; UW-Madison in 1962, 1966, 1971, 1976 and 2001: UW-Stevens Point in 1986, 1996 and 2003; UW-Platteville in 1994, 1999 and 2006: UW-River Falls in 1991 and 1997. Wisconsin has hosted national ASA contests in 1964 and 1997. NRCS soils scientists have always been official judges for these regional and national contest. NRCS Soil Conservationists have helped in site arrangements.

All four Wisconsin schools have qualified on many occasions for the National ASA Soils Contest. UW-Platteville has qualified continuously since 1973 and has placed first in eleven National ASA Contests. Auburn and Texas Tech have each won five national titles and Purdue has won four titles.

The four Wisconsin universities now compete in one to three contests per year. In review these contest are (1) Region III ASA, (2) National ASA and (3) NACTA. To some extent the NACTA competition has now supplanted the interstate Wisconsin contest which was held from 1967-2002.

The Wisconsin story in collegiate soils competition and soils education is one in which there has been unique cooperation among three groups: (1) universities, (2) NRCS and (3) professional societies. The future would be well served if this cooperation continues for the good of soil science.

TRI-STATE HIGH SCHOOL LAND JUDGING
- Forty Years 1967-2006 –

About 12,000 high school students have participated to date in the forty-year history of the Tri-State Land Judging Contest sponsored by the Argonomy-Soil Conservation Club (ASA-SWCS) at the University of Wisconsin-Platteville from 1967 through 2006. The contest has always been conducted with the help of NRCS soil scientists and soil conservationists. They helped in site selection, site judging and contest critique. The contest began in the spring of 1967 when Les Goke, SCS conservationist in Lafayette County asked the SWCS Student Chapter at UW-Platteville if the student group would assume the role of hosting the land judging contest. The soil conservationists had been conducting an area contest for several previous years. (A few years later the area soil conservationists organized a fall contest in southwest Wisconsin.)

In 1967, several teams competed with New Glarus placing first, Monroe - second and Cuba City – third. The contest continued annually in the spring and grew to a maximum of 440 students in 1997. No limit was ever placed upon the number of teams which could be entered by a high school, although only five would count for the record. Thus, many schools entered an entire class or classes or their FFA Chapter. Twenty individual winners were normally recognized with trophies and ribbons. Many times freshmen or underclassman were winners. The intent of the contest was to provide soil education and awareness. This is an important understanding in the rolling hills of southwest Wisconsin. Typically, after a contest NRCS personnel critiqued the land judging sites which they judged and they also discussed conservation practices. NRCS area personnel who have helped judge and critique have included: Dave Omernick (soil scientist); Mike Lieurance, Kevin Lange, Jim Tew (Grant County conservationists); Dan Cotter, Les Goke (Lafayette County); Rick Lange (Crawford County) and Doug Knox (Iowa County). Dr. Roger Higgs, Dr. Kenneth Kilian and Dr. Chris Baxter – ASA-SWCS Club advisors – helped coordinate the contests.

Normally, 250-400 students from 15-25 schools compete in a contest. The contest has four soil pits and follows the Wisconsin High School Land Judging scorecard. The Tri-State Land Judging Contest invites schools from Wisconsin, northern Illinois and eastern Iowa. Several Illinois and Iowa schools have placed in the top ten, but no school outside of Wisconsin has won. The contest has been described by some as the largest land judging contest in the U.S., even eclipsing the Wisconsin state contest and the Oklahoma national contest in size.

The Tri-State contest has been integral over the years in southwestern Wisconsin becoming the "hot bed" of high school land judging in Wisconsin. One school, Cuba City, won the Oklahoma High School national contest in 1986.

Fifteen high schools have placed first in the forty years of the contest. Champions have included Cuba City (13), Cassville (7), Fall River (5), Darlington (2), River Ridge (2), Royall (2), New Glarus (2), Potosi (2), Iowa-Grant, Belmont, Poynette, Shullsburg, Benton, Lancaster and Janesville Craig. There were first place ties in 1976 and 1977.

Including Ken Allen (Monroe), Carlton Austin (Fennimore), Dean Disher (New Lisben), Pete Drone (River Ridge), Ken Elliott (Royall), John Emmons (Monroe), John Heinberg (Cashton), Jeff Hodgson (Belmont), Dave Leahy (Shullsburg), Glen Lindner (Pecatonica), Richard Meske (South Wayne), "Pop" Orlein (Lanscaster), Charles Rasmussen (Lancaster), Diane Runde (Janesville Craig), Jerry Sherwin (Cuba City), Bob Voss (Monticello), Dennis Uppena (Cassville), Mike Uppena (Potosi) and Pat Zimmer (Whitewater).

The SWCS Student Chapter at UW-Platteville has been recognized twice by the International Soil & Water Conservation Society for sponsoring this activity. The awards made in the 1990's were the Hornaday Educaton Award and the Outstanding Student Activity Award.

There is no doubt that this land judging activity for 12,000 students positively aided conservation practices and attitudes in the tri-state region and Wisconsin. Many of the teams which participate in this contest traditionally place in the top five in the Wisconsin State Contest and represent Wisconsin in the Oklahoma national contest.

The Wisconsin Soil Study and Land Evaluation Materials for Competitions were revised in 2006 through the efforts of Rick Lange, District Conservationist in Prairie du Chien and Duane Simonson, Area Resource Soil Scientist in Richland Center. In keeping up with the internet age, all materials are maintained on the NRCS website, with a virtual soil pit for practice judging. The historic Soil Study and Evaluation Guide Scorecard is shown below.

PART I
SOIL STUDY AND EVALUATION GUIDE

Team No. _____

Contestant No. _____ **Potential Score 50**

SITE

Position in Landscape (5 points)

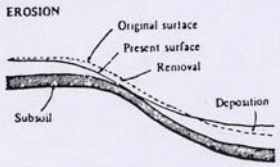
- **Upland**
  - Nearly Level Hilltop ☐
  - Sloping Hillside ☐
  - Depression in Uplands ☐
- **Stream Bottom or Bench**
  - Nearly Level ☐
  - Sloping ☐
  - Depressional ☐

Slope (5 points)

- **Nearly Level** 0-2% ☐
- **Gently Sloping** 2-6% ☐
- **Moderately Sloping** 6-12% ☐
- **Strongly Sloping** 12-20% ☐
- **Steep** 20-30% ☐
- **Very Steep** 30% or greater ☐

Type and Degree of Erosion (5 points)

	Removal By	
None to Slight Over 75% of the original surface soil remains	Water	☐
	Wind	☐
Moderate 25 to 75% of the surface soil remains (some mixing of subsoil with surface layer)	Water	☐
	Wind	☐
Severe Less than 25% of the surface soil remains (Plowlayer mostly subsoil material)	Water	☐
	Wind	☐
	Deposits By	
Favorable Deposition	Water	☐
	Wind	☐
Unfavorable Deposition	Water	☐
	Wind	☐



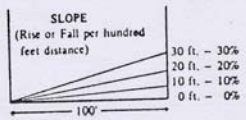
SURFACE SOIL

Texture (5 points)

- **Coarse** Sands and Loamy sands ☐
- **Moderately Coarse** Sandy loam and Fine sandy loam ☐
- **Medium** Loam, Silt loam, Very fine sandy loam ☐
- **Moderately Fine** Clay loam, Sandy clay loam, Silty clay loam ☐
- **Fine** Sandy clay, Silty clay and Clay ☐
- **Organic** Peat and Muck ☐

Structure (5 points)

- **Loose** Single grained ☐
- **Granular** Fragments small, Mostly rounded ☐
- **Blocky** Fragments irregular, Some sharp corners ☐
- **Platy** Fragments flat and thin ☐
- **Cloddy** Fragments large and irregular ☐



SUBSOIL (thickest or most prominent layer below surface soil) - Answer regardless of soil depth

Texture (5 points)

- **Coarse** Sands and Loamy sands ☐
- **Moderately Coarse** Sandy loam and Fine sandy loam ☐
- **Medium** Loam, Silt loam, Very fine sandy loam ☐
- **Moderately fine** Clay loam, Sandy clay loam, Silty clay loam ☐
- **Fine** Sandy clay, Silty clay and Clay ☐
- **Organic** Peat and Muck ☐

Structure (5 points)

- **Loose** Single grained ☐
- **Blocky** Fragments irregular, Some sharp corners ☐
- **Platy** Fragments flat and thin ☐
- **Prismatic** Fragments long, Generally six-sided ☐
- **Massive** Lacking structure ☐

Natural Drainage (5 points)

- **Well** No mottles above 3 feet ☐
- **Moderately Well** Mottles between 2 and 3 feet ☐
- **Somewhat Poorly** Mottles above 2 feet ☐
- **Poorly** Mottling and gray colors above 2 feet (organic soils are naturally poorly drained) ☐

Surface Soil And Subsoil

Depth of Soil Favorable for Roots (5 points)

- **Over 40 inches** ☐
- **20 to 40 inches** ☐
- **12 to 20 inches** ☐
- **Less than 12 inches** ☐

Root growth of crops may be limited by:
sand gravel layers
bedrock
watertable
soil pans
marl

Soil Test Report

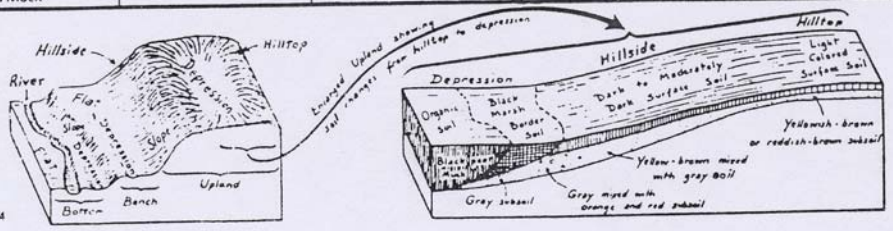
Fertilizer and Soil Amendments (5 points)

- **Lime** ☐
- **Nitrogen** ☐
- **Phosphate** ☐
- **Potash** ☐

— or —

- **No fertilizer/soil amendments needed** ☐

NOTE: CHECK ALL NEEDED AMENDMENTS (may be more than one box checked)



Revised 1/84

PARTS II, III, IV
SOIL STUDY AND EVALUATION GUIDE

PART II
Potential Score 16 Points
(2 Points Per Correct Answer)

SOIL LIMITATIONS: Mark all limiting characteristics with an (X). Mark all characteristics not limiting with an (O). Each characteristic must have either an (X) or an (O).

1. _____ No major limitations (**CLASS I LAND**)
2. _____ Soil subject to water erosion
3. _____ Soil subject to wind erosion
4. _____ Subject to occasional overflow/flooding
5. _____ Surface drainage restricted
6. _____ Subsoil drainage restricted/high water table
7. _____ Low moisture storage capacity
8. _____ Stoniness

PART III
Potential Score 10 Points
5 Points - Answer One Class Off

Note: Where CLASS V is not a potential answer (slope exceeds 6%) CLASS IV - CLASS VI shall be considered one class off. (O) points scored if CLASS V marked.

CROPPING SYSTEMS AND CAPABILITY CLASSIFICATION: Mark one as the most intensive long-time use for this land when needed conservation practices are applied.

_____ **CLASS I:** May be safely used for intensive cropping such as continuous row crops.

_____ **CLASS II:** Requires general soil conserving cropping systems.

_____ **CLASS III:** Requires specific practices and conservation measures for cultivated crops.

_____ **CLASS IV:** Requires intensive soil conserving systems and practices for cultivated crops.

_____ **CLASS V:** Develop permanent timber or pasture without special conservation practices.

_____ **CLASS VI:** Develop permanent pasture or timber. Use conservation practices.

_____ **CLASS VII:** Use very carefully for pasture. Improve for timber production. Needs careful conservation.

_____ **CLASS VIII:** Reserve for wildlife production.

PART IV
Potential Score 24 Points
(2 Points Per Correct Answer)

CONSERVATION PRACTICES: Mark all needed practices including alternatives for most intensive long-time use for this land with an (X); mark all practices not needed with an (O). Each practice must have either an (X) or an (O).

1. _____ Lime and fertilize according to soil test
2. _____ Use conservation tillage and/or plant cover crop
3. _____ Contour strip cropping
4. _____ Construct or maintain terraces or diversions
5. _____ Construct or maintain grassed waterways
6. _____ Improve surface drainage or subsoil drainage
7. _____ Renovate or otherwise improve pasture
8. _____ Eliminate or control grazing
9. _____ Improve timber stand or plant adapted trees
10. _____ Establish windbreaks or shelterbelts
11. _____ Protect stream banks or lakeshore
12. _____ Improve wildlife habitat

Student _____

School _____

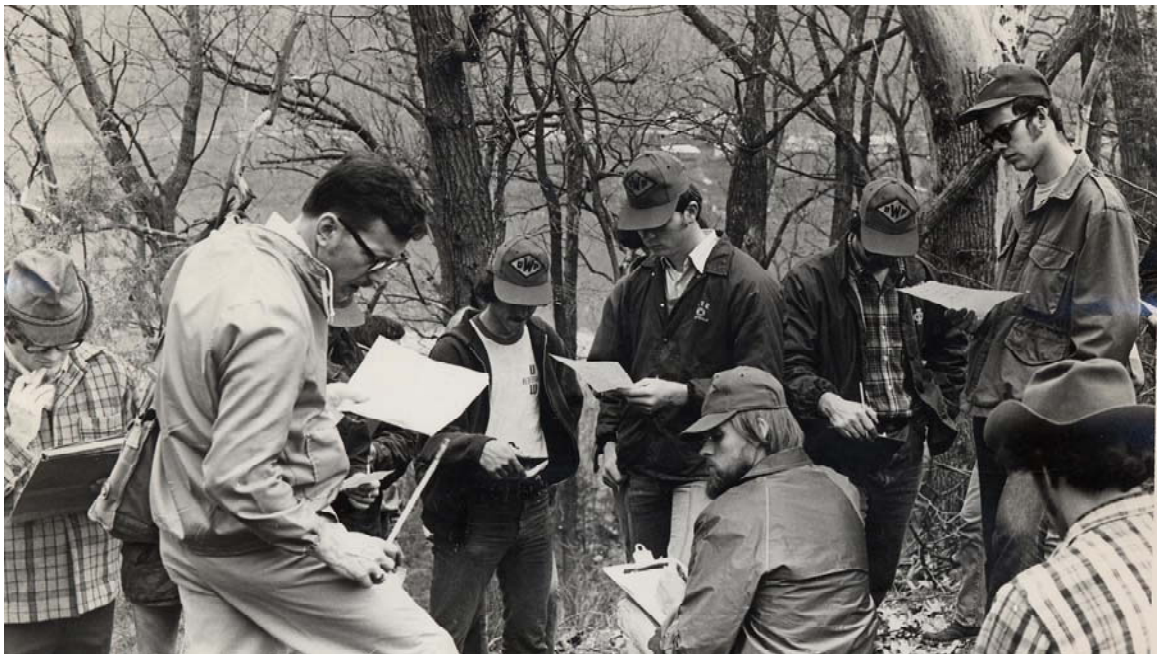
SCORE Part I _____

Part II _____

Part III _____

Part IV _____

TOTAL _____



George Hudelson (foreground), former NRCS State Correlator, critiquing soil sites at the 1975 Wisconsin Collegiate Soils Contest near Potosi, Wis. On left, Jim Richardson, UW-River Falls, professor /coach. UW-Stevens Point placed first in the contest hosted by UW-Platteville.

Fall 1973 UW-Platteville collegiate soils team after the regional contest at the University of Illinois. Pictured in the rear on the right are future long-time Wisconsin NRCS employees John Campbell (soil scientist) and Roger Allan (soil conservationist).

1976 National Champion UW-Platteville Collegiate Soils Team. Pictured Ray Riley (left), Mark Buelke, Roger Dahl, Dr. Ken Kilian, Dr. Roger Higgs, and Roland Fischer. Buelke and Dahl have been long-time NRCS employees in Wisconsin. Kilian and Higgs both taught Soil & Crops Science at UW-Platteville for 37 years.

1986 Tri-State Land Judging officials at the contest site east of Hazel Green. Mike Lieruance (NRCS, Lancaster), Mark Rodwell (student contest chair), Dave Omernik (NRCS Soil Scientist, Richland Center), and Pete Finley (NRCS Conservationist).

1997 Tri-State Land Judging Contest on the Robert Leifker farm near Cuba City. Pit monitor, Al Domnick (center) is shown collecting scorecards as the students finish.

High school land judgers examining the soil profile. Contest was held near Milltown, Wis.

Making the Soil Survey

The soil scientist went into each county to learn what types of soil were present on the landscape. As they worked across each farm or forest, they observed the steepness, length and shape of slopes, the general pattern of drainage, and kind of bedrock. They dug many small holes to study the soil profile, which is the sequence of natural layers, or horizons, in the soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity. The study of the soil profile also revealed the depth to water table in the lower landscape positions and the depths to bedrock and gravelly material, which can restrict plant root growth.

The soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enabled them to identify soils. Also, during the survey some samples of the different soil profiles were collected for laboratory analyses to verify and support their field decisions. After describing the soils in the county or survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile.

Individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kind of soil in an area and to determine the boundaries.

Soil descriptions and transects of soil mapping units were made to describe and document the soils mapped by soil scientists. This soil description information was recorded on a standard form SCS-232A, B, or C, for many years. In the late 1990's a pedon program to electronically record soil descriptions was available for use by field soil scientist. "A Field Guide for Describing Soils" was published in 1999, by the National Soil Survey Center. This Field Guide summarizes and illustrates much of the information that accumulated during the prior 50 years.

After soil scientists locate and identify the significantly different units of soil in the county or survey area, they draw the boundaries of these soil units on aerial photographs and identify each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately. After all the map unit delineations have been made, the aerial photographs are then called soil maps. On

completion of the soil maps, the field soil survey for that county or survey area is completed.

--by Donna Ferren
and Larry Natzke

Various types of stereoscopes used in developing soil survey maps.

Instruments used to measure slope percentage. (top) Abney Level, and (bottom) Clinometer.

Aerial Photography Used In Soil Survey Field Mapping

The first aerial photographs used by Soil Conservation Service soil scientists in field mapping were 1938 photos at a scale of 4 inches to one mile or 1:15,840. This photography was used by SCS soil scientists to do individual farm request mapping and project mapping. Copies of the same aerial photography at a scale of 8 inches to a mile or 1:880 was used by SCS soil conservationists as a base map in working with cooperators in preparing resources or what was commonly called conservation plans of individual land operators.

These photos were high quality in terms of detail and contrast. The photography was widely adapted to a wide range of temperatures and moisture conditions. This resulted in a good map base. It was easy to ink over the penciled soil boundary lines placed on the aerial photography in the field by the soil scientists. This photography was on a non-controlled base thus problems occurred in joining and later in digitizing due to displacement of land features.

Much of this request soil mapping was done on a farm-to-farm basis. Usually, on the back of the aerial photo, the soil mapped area was outlined and the date, name of soil scientist

doing the work, the acres mapped, name of land owner, and other soil map information was recorded. This soil map information showing the land area of the district cooperators was reproduced for the cooperator's plan and for the district's copy of the plan. File copies and original soil maps were retained in SCS field offices for district use. These "individual farm by farm soil maps" were not correlated or published.

In 1954, following the consolidation to the SCS of all soil survey mapping of private lands, some of this older soil mapping in a few counties such as Trempealeau County, where the area was 100 percent mapped, or almost 100 percent mapped, was reviewed for consistency, correlated, and published. The original soil maps completed were inked, often using a quill pen. There were definite instructions on what features to ink and what color of ink to use for the variety of kinds of information on the map. For instance all "join map numbers" were inked in green, all drainage in blue ink, and special symbols were recorded in red ink, etc.

Procedure for publication involved cartographic transcribing of all soil map information on the 4 inches to the mile to the mosaic control base map. The soil map information was physically transferred to a semi-controlled base map and a series of overlays were prepared for use in publication through the Government Printing Office.

Publication procedures included the cartographic transcribing of 4 inches to the mile soil map information to a mosaic controlled base map. This process was very costly and time consuming. Starting in the early 1970's high flight aerial photography was used as the base map for publication. This high flight photography worked well for base maps where local relief was less than 300 feet. Where relief exceeded 300 feet, the base map was prepared by the expensive, time consuming, mosaic process.

The aerial flying was contracted through the SCS National Cartographic Unit. Problems were incurred when working with the contractor to get the aerial photography taken under optimum conditions to get quality aerial photographs. Some of the variables which effect the quality of the photos were 1) cloudiness – flying time was restricted to cloud-free days, however, often flying was done when there was partial cloud cover; 2) leaf-off flying was desired in early spring or late fall when tree vegetation was at a minimum; and 3) heavy rains. If there were heavy rains a day or so before flying time then the moist surface colors were commonly dark and subsequent photos taken were too dark and did not show the obvious soil patterns desired by the field soil scientists.

The photo quality was also affected by the reproduction of the original negative taken by the contractor as the negative went through the cartographic reproduction process. Often the final photo used by the field soil scientist was a third generation reproduction and the contrast of photo tone was poor. In some counties, due to size, changes in weather conditions during the flying time, contractor not staying on flight lines and missing physical land areas, photos were flown at different times, often even in different years.

Agriculture Stabilization Conservation Service (ASCS) periodically flew aerial photography in all Wisconsin counties having a significant amount of cropland for use in

program application. Copies of this aerial photography were often ordered for those specific years that showed good soil mapping tones. This photography was usually taken to the field and used as a reference source in preparing the soil map. In many areas the ASCS photographs were taken when the crops were at their maximum growth and their use for soil mapping was limited.

ASCS also took aerial slides of each section of land (mostly cropland) for several years. Soil scientists sometimes used these colored slides as a reference source. In some instances where slides were available for the same area for several years, they were most helpful in evaluation of wetness trends and other soil features.

In the 1970's, high altitude photography (NHAP) was flown and enabled the soil scientist to have photography that covered a greater physical area on which to map . It was the same photo that was used to publish the soil map. This made compilation of the soil lines for publication somewhat easier. Infrared photos were obtained for some counties in addition to the black and white.

Since the late 80's, low altitude color photography has been available for use in soil surveys to assist in photo interpretation and soil investigations. Black and white National Aerial Photograph Program (NAPP) high flight photography was flown in the 90's for use as the base map for soil survey. This flight was also used to develop digital orthophotography that was used as the base map to digitize the soil polygons onto. A by-product in the development of the orthophotography is Digital Elevation Models (DEM's). These are used with computer software to aid in placement of slope separations, augmenting the use of stereoscopes. The newest technology in aerial photography is LiDar, a very high resolution photography. LiDar, along with high resolution DEM's will provide the base maps for future soil survey upgrade work in Wisconsin.

--by Donna Ferren
and Larry Natzke

General Soil Maps of the State - *Brief History*

The first general soil map of the state of Wisconsin was titled “A Generalized Soil Map of the State of Wisconsin” published by the Wisconsin Geological and Natural History Survey (WGNHS) in1882.

The next general soil map was from a1925 publication “A Brief Outline of the Geology, Physical Geography, Geography, and Industries of Wisconsin” by W.O. Hotchkiss and E.F Bean (WGNHS). This map is shown in Figure 12, Soils of Wisconsin.

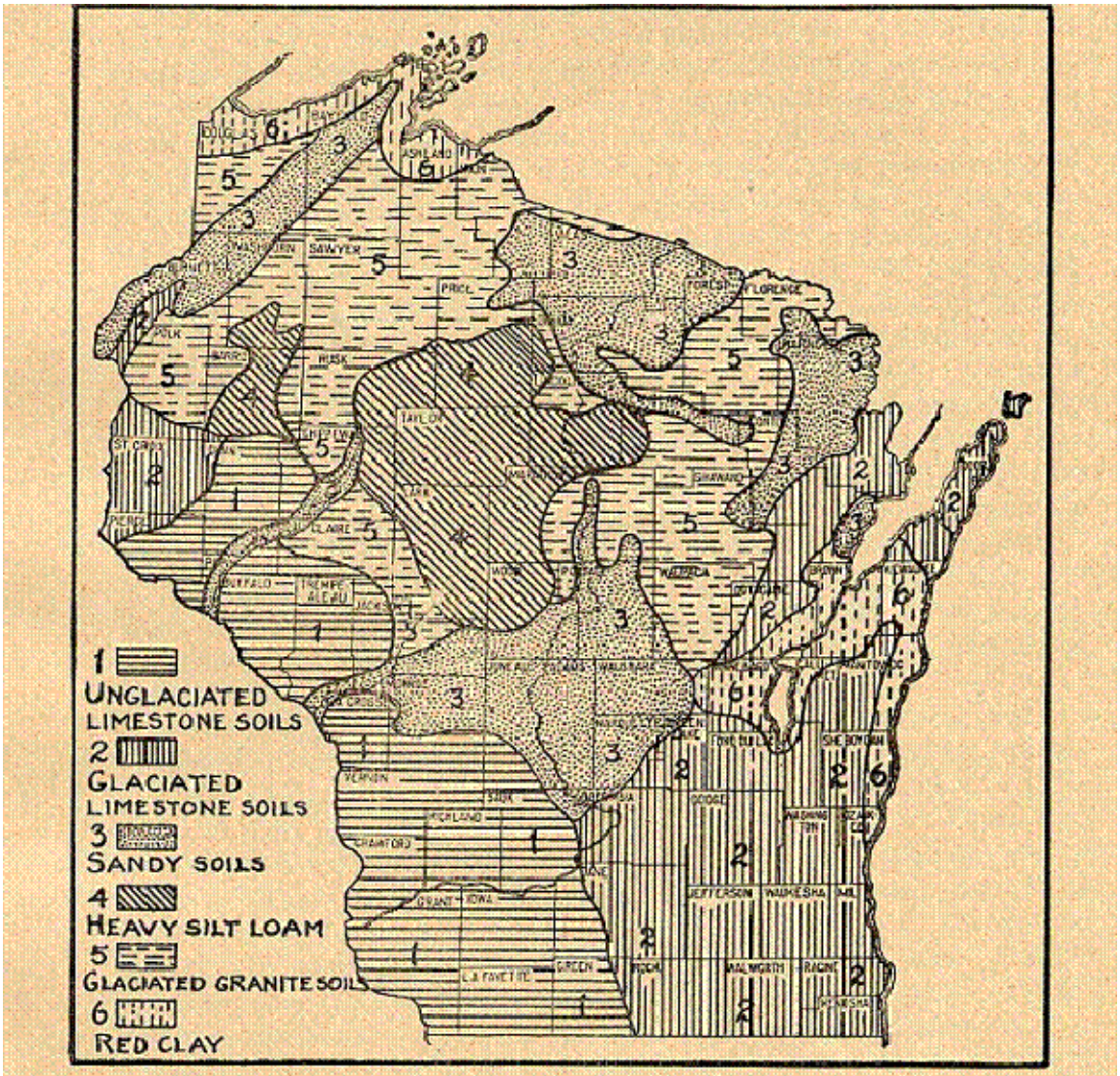


Fig. 12.—Soils of Wisconsin.

Soil

The soils of Wisconsin are her greatest asset. The variations in soil and topography made possible an agriculture which does not have all its eggs in one basket.

The early concepts of soil classification in Wisconsin were published in Bulletin No.79, "Introduction to the Soils of Wisconsin" by Francis D. Hole and Gerhard B. Lee, Soil Survey Division, Wisconsin Geological and Natural History Survey in cooperation with the Soils Department, Wisconsin College of Agriculture in 1955. This bulletin shows how Wisconsin soils may be classified under nine general soil groupings (Figure 1). It includes a generalized soil key by region down to the series level and a cross section of the parent material and landscapes in which the series are located (Figure 2.)

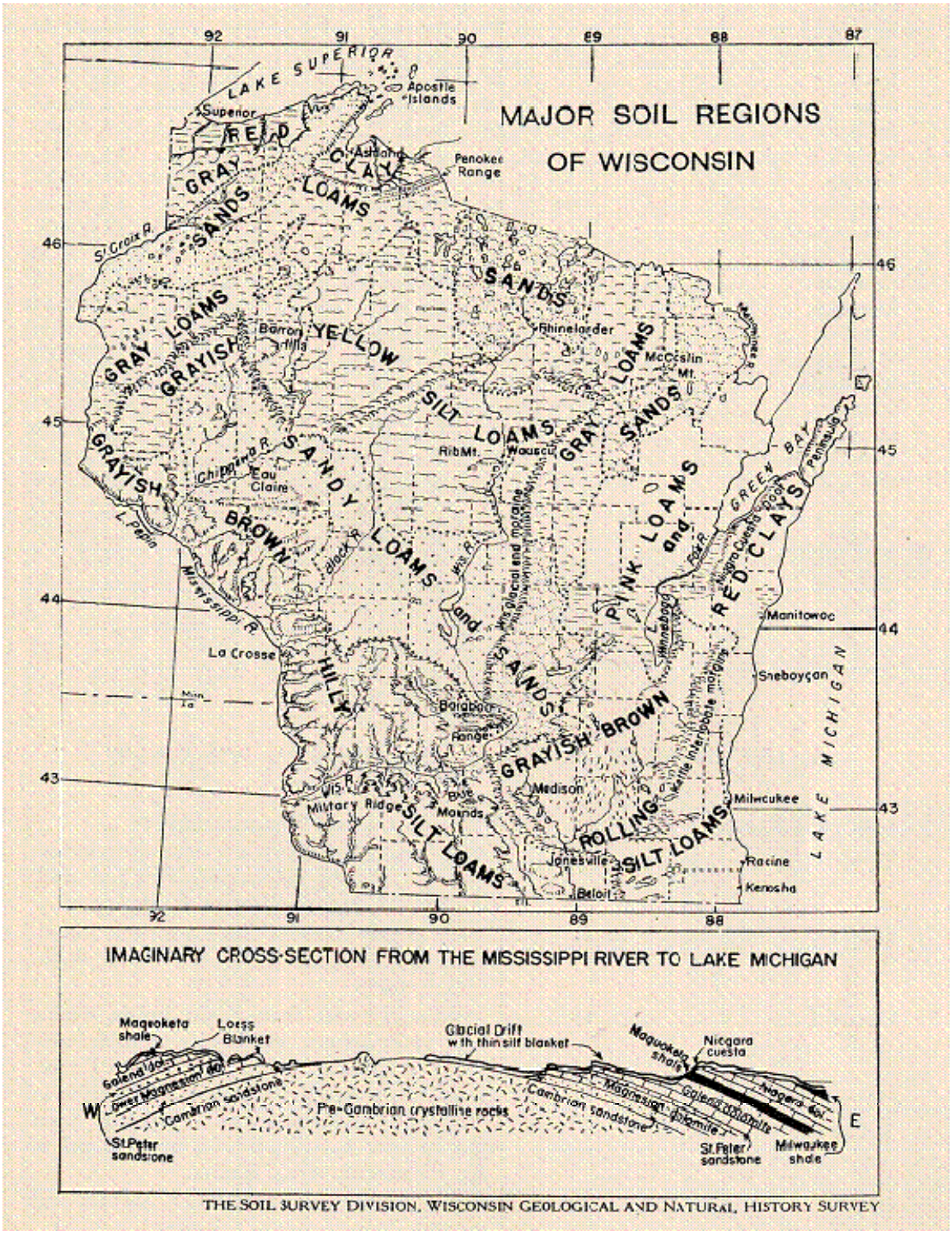


Figure1

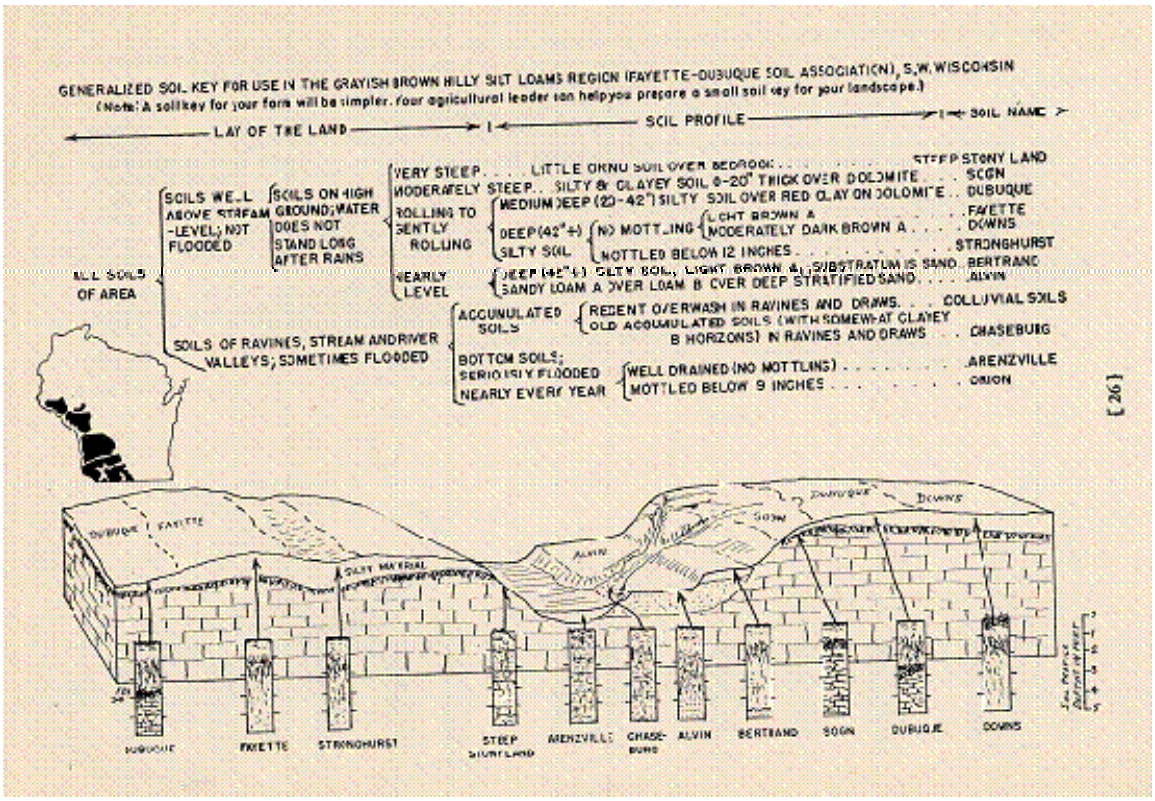


Figure 2
This bulletin also contains an excellent series of soil-geology block diagrams showing the relationship of soils to landscapes.

In 1964 a general soil map from “The Soils of Wisconsin” was published by the UW Dept of Soils, College of Agriculture, Wisconsin Geological and Natural History Survey and the State Soil and Water Conservation Committee as part of the Wisconsin Blue book (Figure A, B).

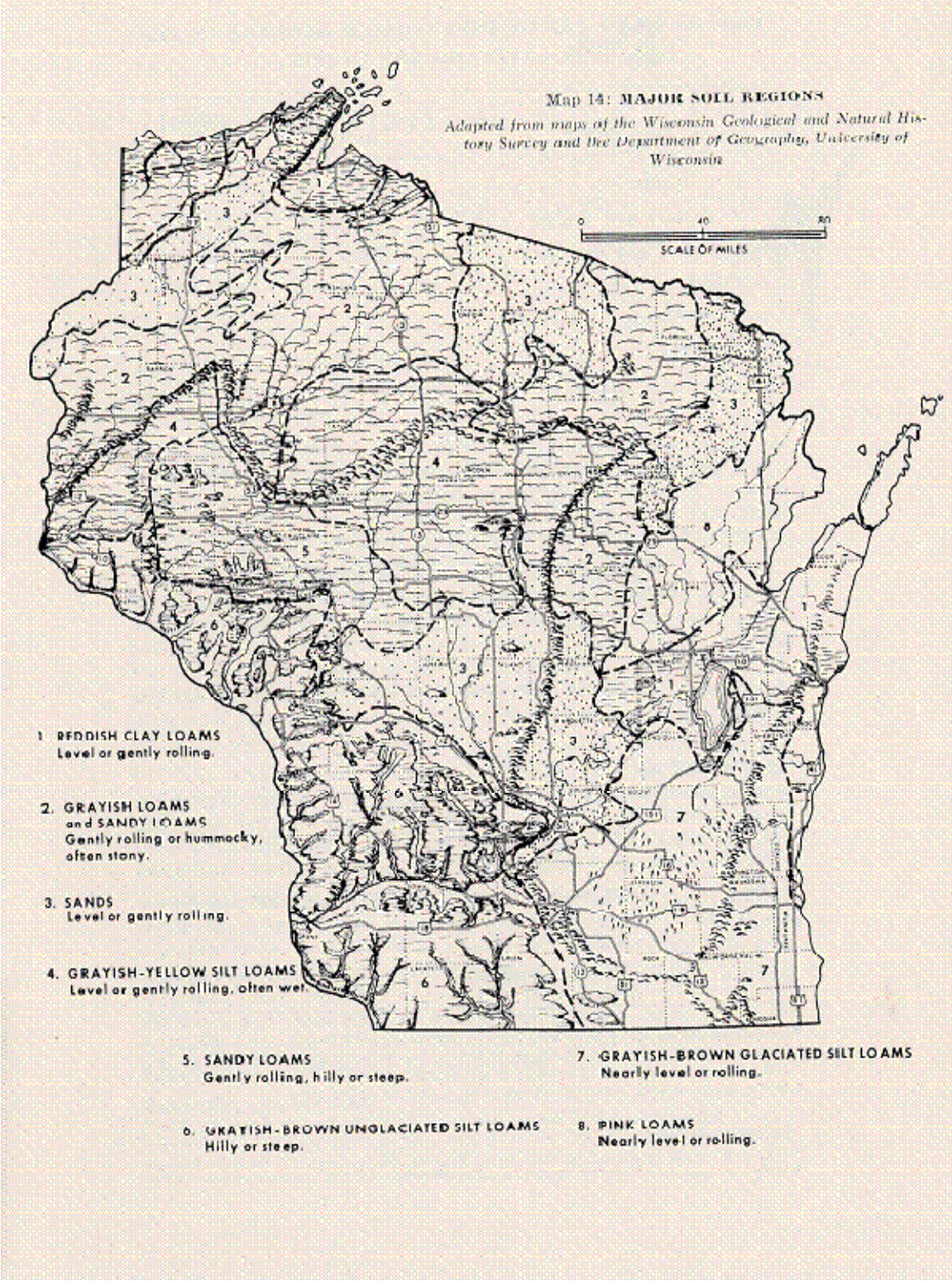

Map 14: MAJOR SOIL REGIONS
Adapted from maps of the Wisconsin Geological and Natural History Survey and the Department of Geography, University of Wisconsin
0
40
80
SCALE OF MILES
1 REDDISH CLAY LOAMS
Level or gently rolling.
2. GRAYISH LOAMS
and SANDY LOAMS
Gently rolling or hummocky, often stony.
3. SANDS
Level or gently rolling.
4. GRAYISH-YELLOW SILT LOAMS
Level or gently rolling, often wet.
5. SANDY LOAMS
Gently rolling, hilly or steep.
6. GRAYISH-BROWN UNGLACIATED SILT LOAMS
Hilly or steep.
7. GRAYISH-BROWN GLACIATED SILT LOAMS
Nearly level or rolling.
8. PINK LOAMS
Nearly level or rolling.

Figure A

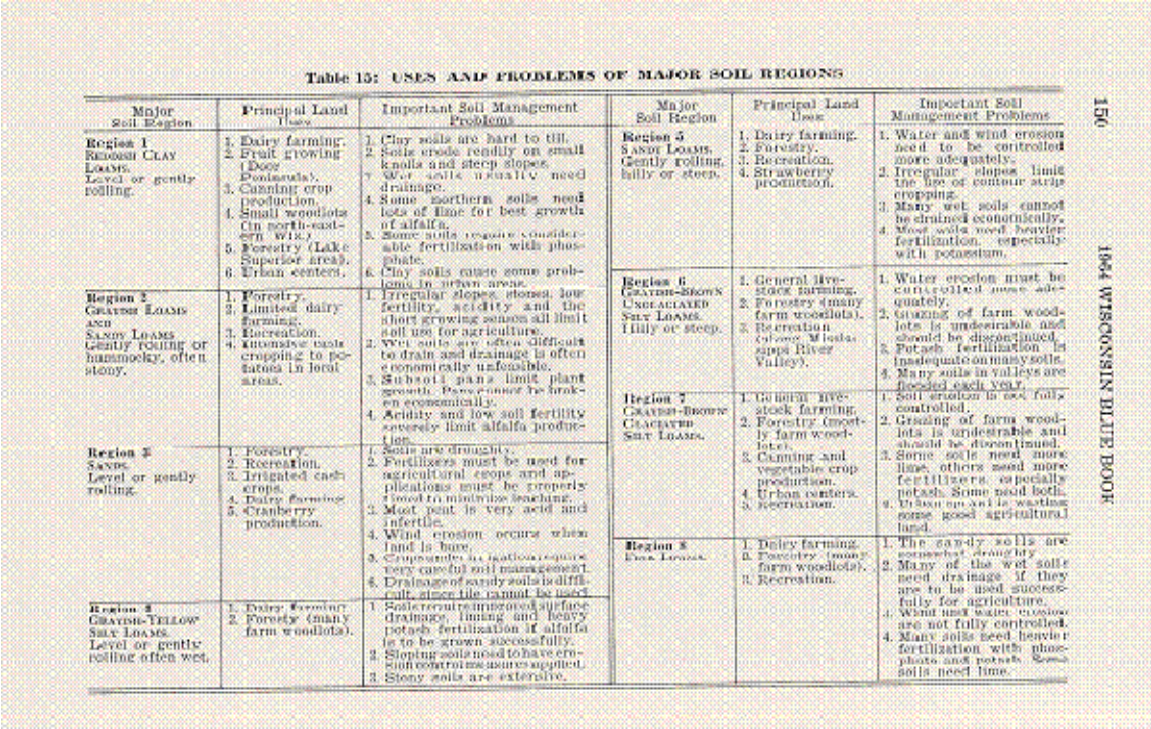


Table 15: USES AND PROBLEMS OF MAJOR SOIL REGIONS

Major Soil Region	Principal Land Uses	Important Soil Management Problems
Region 1 REDDISH CLAY LOAMS. Level or gently rolling.	1. Dairy farming. 2. Fruit growing (Door Peninsula). 3. Canning crop production. 4. Small woodlots (in north-eastern Wis.) 5. Forestry (Lake Superior area). 6. Urban centers.	1. Clay soils are hard to till. 2. Soils erode readily on small knolls and steep slopes. 3. Wet soils usually need drainage. 4. Some northern soils need lots of lime for best growth of alfalfa. 5. Some soils require considerable fertilization with phosphate. 6. Clay soils cause some problems in urban areas.
Region 2 GRAYISH LOAMS AND SANDY LOAMS. Gently rolling or hummocky, often stony.	1. Forestry. 2. Limited dairy farming. 3. Recreation. 4. Intensive cash cropping to potatoes in local areas.	1. Irregular slopes, stoniness, low fertility, acidity and the short growing season all limit soil use for agriculture. 2. Wet soils are often difficult to drain and drainage is often economically unfeasible. 3. Subsoil pans limit plant growth. Pans must be broken economically. 4. Acidity and low soil fertility severely limit alfalfa production.
Region 3 SANDS. Level or gently rolling.	1. Forestry. 2. Recreation. 3. Irrigated cash crops. 4. Dairy farming. 5. Cranberry production.	1. Soils are droughty. 2. Fertilizers must be used for agricultural crops and applications must be properly timed to minimize leaching. 3. Most peat is very acid and infertile. 4. Wind erosion occurs when land is bare. 5. Expensive irrigation requires very careful soil management. 6. Drainage of sandy soils is difficult, since tile cannot be used.
Region 4 GRAYISH-YELLOW SILT LOAMS. Level or gently rolling often wet.	1. Dairy farming. 2. Forestry (many farm woodlots).	1. Soils are immature, poor surface drainage, liming and heavy potash fertilization if alfalfa is to be grown successfully. 2. Sloping soils need to have erosion control measures applied. 3. Stony soils are extensive.
Region 5 SANDY LOAMS. Gently rolling, hilly or steep.	1. Dairy farming. 2. Forestry. 3. Recreation. 4. Strawberry production.	1. Water and wind erosion need to be controlled more adequately. 2. Irregular slopes limit the use of contour strip cropping. 3. Many wet soils cannot be drained economically. 4. Most soils need heavier fertilization, especially with potassium.
Region 6 GRAYISH-BROWN UNGLACIATED SILT LOAMS. Hilly or steep.	1. General livestock farming. 2. Forestry (many farm woodlots). 3. Recreation (along Mississippi River Valley).	1. Water erosion must be controlled more adequately. 2. Grazing of farm woodlots is undesirable and should be discontinued. 3. Potash fertilization is inadequate on many soils. 4. Many soils in valleys are flooded each year.
Region 7 GRAYISH-BROWN GLACIATED SILT LOAMS.	1. General livestock farming. 2. Forestry (mostly farm woodlots). 3. Canning and vegetable crop production. 4. Urban centers. 5. Recreation.	1. Soil erosion is not fully controlled. 2. Grazing of farm woodlots is undesirable and should be discontinued. 3. Some soils need more lime, others need more fertilizers, especially potash. Some need both. 4. Urban growth is wasting some good agricultural land.
Region 8 [illegible]	1. Dairy farming. 2. Forestry (many farm woodlots). 3. Recreation.	1. The sandy soils are somewhat droughty. 2. Many of the wet soils need drainage if they are to be used successfully for agriculture. 3. Wind and water erosion are not fully controlled. 4. Many soils need heavier fertilization with phosphate and potash. Some soils need lime.

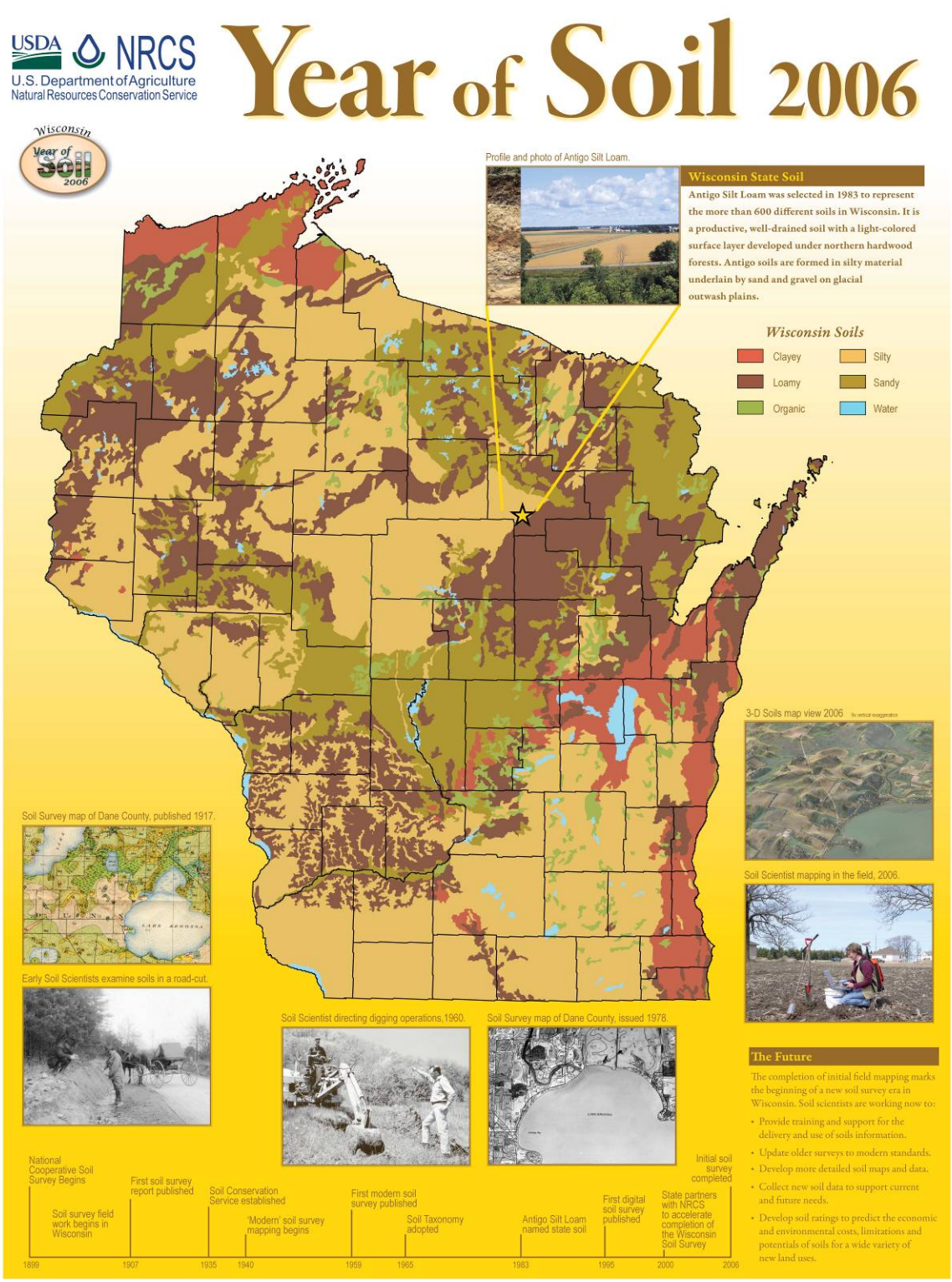
150 1964 WISCONSIN BLUE BOOK

Figure B

A 1968 “Soils of Wisconsin General Soil Map”, by F. D. Hole, etal, was published by University of Wisconsin Extension and WGNHS in cooperation with UW Dept of Soil Science and Soil Conservation Service at a scale of 1:710,000.
This map was updated and simplified in 1993 by Howard Gundlach, Natural Resource Conservation Service, and Fred Madison, WGNHS, and published on 8.5x11 inch paper at a scale of about 1:3,000,000.
The Soil Conservation Service prepared a general soil map from the State Soil Geographic Base (STATSGO) in the 1990’s for internal use only. It was later digitized and is now available for public use. It may be downloaded from the Wisconsin Natural Resources Conservation Service web site.

--by Donna Ferren and Larry Natzke

General Soils map produced for Year of Soil poster, 2006



Soil Survey Field Equipment

Field equipment used to observe the soil profile characteristics has remained about the same as in the early 1950's. This includes a sharpshooter spade and bucket type auger, or a 1 inch screw auger. The soil hand probe, as we know it today, was introduced into Wisconsin in the summer of 1950. The bucket auger remained the same until a ratchet handle was made available in the early 1990's that made use of the soil auger a bit easier. In recent years, the screw auger has been largely replaced by a new type of auger known as the backsaver probe. This probe is pushed into the ground by use of a foot pedal.

A hydraulic powered soil probe mounted on a vehicle was introduced into Wisconsin in the 1960's. The probes were mounted on regular pickups, using the truck engine to operate the hydraulics of the probe. Presently gasoline engine powered hydraulic probes mounted on trailers are used. The two inch probe is standard equipment on the power probe and provides a better view of the soil profile.

Soil scientists used a few two-wheeled motor bikes, but more extensively ATVs during the 1980's, in the northern parts of the state as transportation while mapping. Small inclined ramps were used to load the ATVs into the back of pickups. Using the ATVs, the soil scientists could get to remote, inaccessible areas easier and quicker. The ATVs were adapted to carry a hand probe or soil auger and the aerial photograph on which the soil mapping was recorded. The first ATVs were 3 wheelers, but in 1989 were changed to 4 wheelers due to safety concerns. Later, 4 wheel drive ATVs were used for easier access to remote areas.

Several of the soil survey offices had a small lab with equipment and space to run special soil analysis. Some of the common analyses done were particle size and pH.

The day-to-day normal field equipment included soil augers, various kinds of hand probes, spades known as "sharpshooters," Munsell color book, large knife, hand lens, a pocket stereoscope to check joins between maps and to see a 3 dimensional view of the landscape, abney level or clinometers to measure percent slope, picks, shovels, weak acid to determine if soil was calcareous, an aerial photograph on which to map, and field notebooks on which to record notes about the soils observed. Various soil series write-ups, soil taxonomy and other technical documents needed as reference during the field work may also be carried. Due to the nature of the soils, such as stones, the use of a hand probe was limited in some areas.

In 1994 the Precision Lightweight Receiver (PLGR) was introduced to the state for improved accuracy of recording locations for pedon descriptions using Global Positioning System (GPS). In 2000, Garmin GPS units replaced the PLGR, as personal GPS units became available to the public.

Occasional deep borings are needed to study the underlying soil material and to understand soil landscape relationships. The Giddings power probe, with a rotary head, enabled soil scientists to take a soil core to a depth of 10 to 30 feet, depending on the nature of the soil

material. If the bedrock is shallow or there are stones in the soil material, use of the Giddings probe is restricted. Backhoes are used to look at soil material at depths of 5 to 20 feet.

Providing formal soils training to NRCS personnel and local farmers is part of a soil scientist's job. Soil monoliths, which are soil profiles attached to a board, are extensively used as a teaching and training aid in regards to the different kinds of soil profiles. The early soil monoliths were about 48 inches long and 6 inches wide and ½ to ¾ inch thick. A later version was made using the 2 inch core from the power probe. The monolith boards are 48 inches long and 4 inches in width. The soil profiles are glued to the mounting boards with vinylite resin. The exposed facing of the soil monolith shows the natural appearance of the different soil properties and characteristics.

--by Donna Ferren and Larry Natzke

Soil Scientists Tim Meyer and Don Taylor using a Giddings probe to investigate soils.

Dale Jakel doing some stereoscope work prior to field mapping.

Donna Ferren Guy determining slope percentages using a clinometer.

Albin Martinson and Donald Owens using a truck mounted hydraulic probe.

Keith Anderson sits on the hood of the infamous soil mapping machine, the Dodge Rampage.

Rich Johannes and Tim Meyer using the Munsell Soil Color charts in Clark County in 1991.

Larry Natzke using a bucket auger to examine soils.

Jon Hempel pulls the Ground Penetrating Radar unit while Jim Doolittle and Donna Ferren Guy follow behind.

John Campbell utilizing basic soil mapping equipment (spade, bucket auger, and aerial photo).

Soil Survey Laboratory Analysis and Investigations

Organized soil survey investigations and subsequent sampling for laboratory analysis began in the early 1950's to characterize the major soil properties. Investigation project plans were required. Extensive fieldwork was required by the field soil scientists to ensure that typical or modal soil sampling sites were selected. The State soils staff assisted in the final site selection in the early days, and a research soil scientist from the Soil Survey Laboratory in Lincoln generally assisted in the field sample collection work for each site. Normally, one-half to one day was required to dig the sampling pit and to remove the required number of soil samples. In some cases the field soil scientists needed only a few analyses of selected soil horizons for use in making field-mapping decisions. These kinds of samples were generally called partial samples or grab samples.

Backhoe equipment was used to excavate a sampling pit and enabled the soil scientists to describe a more detailed soil description. Soil sampling projects were normally scheduled several months in advance. On many sampling trips the weather was great; however, in some instances rain, snow, or cold wind made the sampling project a real challenge.

Normally, one sampling project was scheduled with the laboratory each year as part of a long-range investigation plan to have laboratory samples for all major soils in the state. In the later 1980's all of the other SCS soil laboratories were relocated to Lincoln to form one National Soil Survey Laboratory.

Not all soil sampling projects take place in nice weather. This sampling trip occurred after an unexpected snow fall in Iron County (Jesse Turk is in the pit).

Presently, a substantial volume of quality soil characterization laboratory data is available for many of the soils in the state. The University soil-testing laboratory ran analysis for soil correlation samples from many correlated survey areas in the 1980's.

Soil samples were collected from about 6 to 10 soils in each soil survey area for analysis by the soil testing laboratory of the Wisconsin Department of Transportation in the 1970's and 1980's. A large amount of data related to the engineering uses of soils has been collected through this project.

In most cases the soil samples were collected during the field season and sent to the laboratory to be analyzed during the winter months.

Ernest Link and Dr. Francis Hole, UW-Madison.

Often, special field studies were made to investigate how the soils were mapped and to study the natural occurrence of soils over a broad geographic distribution of several counties or between states. Field trips between Wisconsin and Michigan, such as one to study the Champion series, were examples of the National effort to produce a consistent quality National Cooperative Soil Survey Product.

-- by Donna Ferren and Larry Natzke

Dave Hoppe (USFS), Fred Simeth (NRCS), and Joe Jahnke (NRCS MO10 SDQS) examine a backhoe pit exposure prior to sampling.

Dean McMurtry works on soil samples and bulk density clods in Wood County.

Manuscripts for Soil Survey Publications

In the early days of soil survey, the properties of the soils were studied during the field mapping. Notes were gathered and detailed profile descriptions written. Laboratory samples were collected by the field soil scientists and by National Soil Survey Laboratory scientists. The data collected was used to make the final decisions about the map units in the soil survey at the final correlation.

After the final correlation was completed it would be the field soil scientist's job to prepare a manuscript describing the soils and their properties for the survey. Guidelines were usually set forth and could be followed for order and content of the manuscript. Specialists wrote specific sections of the manuscript from the State Office Staff or guest authors from cooperating agencies including the University of Wisconsin.

Until computers started coming into common use at the State Office level all of the writing and rewriting usually involved red-mark corrections and then having a secretary retype the manuscript In addition to the manuscript, tables of soil properties also needed to be typed, edited and retyped multiple times. With the retyping there was always a chance that errors could be reintroduced so careful proofreading was necessary. Many a secretary probably developed nightmares from the thought that the soil scientist was involved in a manuscript writing project. Most times the soil scientist who was writing the manuscript, usually the

project leader, would be moved to a new location before the manuscript was finished so the secretary at the new location got the experience.

As computers started making their way into use at the State Office, the later stages of the manuscript writing was typed into storage on these machines. The first innovation was the keypunch card reader. This machine stored the information by punching holes in pieces of card stock, with about 80 characters per card. This was replaced with the mag-card reader which used the keypunch that had to have new cards punched for each change. These were slowly replaced by mini-computers and terminals with central storage. The manuscripts could be stored and printed at the State Office and files were updated from red marked copies by the author and various other editors including the Assistant State Soil Scientist assigned to the project.

With the changes to computers for data storage came the computer produced property and interpretation tables. The information about each soil series and phase were stored in Ames, Iowa at Iowa State University on a mainframe computer. A set of instructions called the SOI-6 was used with SQL (Standard Query Language) to produce a set of property and interpretation records that were specific to the county. Usually these were further edited to produce the final tables for the soil survey. Another tool used by the manuscript writer was the SOI-16 which was a checklist of soil properties that needed to be cross-checked between different parts of the manuscript and tables. A new format was introduced for writing soil survey manuscripts which allowed easier cross-checking and set up the stage for computer generated manuscripts. The “semitabular”format listed the information about each soil instead of using complete sentences.

The advent of smaller, more powerful computers allowed more of the manuscript preparation to be done locally and also saved retyping of checklists, tables and the manuscript. New programs for handling soil information helped in organizing manuscripts. The State Soil Survey Database (SSSD) was used to download a statewide subset of soil properties and interpretations from the main storage in Ames. The records in SSSD were tailored to the counties and allowed limited local access to the data. Development also continued on a separate program which would store and manage detailed pedon descriptions.

The end of the century also saw the end of SSSD and the development of a new program called “NASIS”. This program combined the data used in SSSD and added more flexibility in managing the ever-growing amount of soil property and interpretation data. It would allow querying of the data, printing reports, printing manuscripts and exporting data to other users.

---Edited by Larry Natzke

Map Finishing and Digitizing

History of the Line Transfer Office

By James R. Barnes, Soil Scientist, Wisconsin,
USDA Natural Resources Conservation Service, November, 2006

The Line Transfer Office (LTO) was established in spring, 1992. Its purpose was to prepare published soil survey maps in Wisconsin in a form so they could be digitized. The Office was also to provide technical support to the Soil Survey Offices in Wisconsin.

The LTO had an initial staff of 3 Cartographic Aids and the Project Leader. They were about to begin to pave new ground for work that was just in its early stages nationwide. Very few guidelines on this type of map compilation were in existence at the time. This was the beginning of a new era. So the book on Line Transfer Guidelines was about to be written on a trial and error basis.

The LTO was in existence for a little over 10 years. In that period of time it went from a staff of 4 to a staff at one point numbering 8. Nearly 200 applications for positions were received over that period of time. There were 25 individuals who worked in the office over the years. The staff developed new transfer techniques on a routine basis. Over time, the office became an efficient and productive unit of high quality soil survey line work. The diverse staff was both respectful and cooperative of each other. That was the key to its success, as it was made up of young and older individuals, men and women, all with a wide range of talent, and all with one goal in mind - to be the best transfer office in the USA.

The LTO completed the line transfer of 37 counties in Wisconsin, plus the Virgin Islands. It assisted with the transfer work of parts of 5 additional counties. In addition, the unit did the traditional map finishing of 4 Wisconsin counties.

The following is a list of the members of the Line Transfer Office:

James R. Barnes
Josh Blankenheim
Tina Holup Bonack
Angie Elg
Debra Fox
Sheri L. Gaber
Kim Goerg
Kimberly Goodin
George Hargreaves
Suzanne Johnson
Shawn Kelly
Doug Kliment
Robert Kopanda
Lora Laspa
Carl Loving
Jody McKinney
Amy Nebel
Doug O'Callaghan
Douglas Prigge
Tanya Rasmussen
Ann Turk
Patricia Wallin
Joan Wells
Robert Wikel
Robert Winkler

History of SSURGO Digitizing In Wisconsin

By Mark Roloff, Cartographer, Wisconsin
USDA Natural Resources Conservation Service, November, 2006

The history of Soil Survey Geographic Database (SSURGO) digitizing for the Wisconsin Soil Surveys consists of two parts. The first part, from pre-1997, when Wisconsin only digitized its own soil surveys and post 1997, when Wisconsin became one of seven SSURGO digitizing centers in the country. These two periods are distinct, not only in what was being worked on but how it was being worked on.

Prior to June of 1997 the Wisconsin soils digitizing staff was only working on surveys from Wisconsin. At that time every state was responsible for submitting SSURGO data to the National Cartographic and Geospatial Center (NCGC) in Ft. Worth, Texas. In 1992 Wisconsin established the Rhinelander Compilation Office. Supervised by Project leader and Soil Scientist, James Barnes, the Rhinelander office produced recompiled soils data from existing Wisconsin published surveys. During recompilation, soil survey atlas sheets were enlarged from the publication scale, 1:24000, 1:20000, or 1:15840, to a scale of 1:12000. This was then printed on a polyester film media and referred to as a ratio film positive (RFP). A blank semi-transparent sheet of film was then punched registered to a hard copy print of a digital orthophoto quarter quad which had been printed at a scale of 1:12000. The embedded tic marks on the ortho photo were copied, in ink, to the blank sheet of film to maintain a spatial reference. Cartographic technicians would then align features from the RFP, to features on the ortho photo. The cartographic techs would then transfer the soil lines on the RFP to the blank sheet of film. Because the RFP were not geospatially correct the RFP's were constantly adjusted to align with the ortho photo. In doing this the soil lines were eventually redrawn to be spatially accurate. Special soil features were also transferred at the same time as the soil lines. Once all the soil lines and features were transferred, the soil labels were written in to the soil polygons. All work was then reviewed by James Barnes and edited as needed. The first completely recompiled survey to be sent to the Madison State Office for digitizing was Vilas County, in 1993. Over the next 10 years, the Rhinelander Compilation Office would produce 45 more Wisconsin surveys for SSURGO digitizing.

Previous to September 1994, starting in late 1992, Kent Peña was the only person working on soils digitizing in the Madison State Office. Armed with only a 386 UNIX machine, a Datatab digitizing tablet, and LTPlus software, the digitizing of Wisconsin soils got off to a slow and laborious start. Roughly one year later, with the acquisition of a SUN SPARC10 UNIX machine and better software in the form of LT4X, version 3.21, the foundation for the future of Wisconsin SSURGO production was laid.

In September of 1994, the Wisconsin State Office brought on to staff, six Americorp Volunteers. With half of the Americorp member's time allocated to soils digitizing, real progress was beginning to be made. On May 29, 1996, the Soil Survey of Lincoln County became the first SSURGO certified digital soil survey from Wisconsin to be made available to the public. There were four full time employees and one part time

student now working on the digitizing of the Wisconsin surveys, Cartographers, Kent Peña, Mark Roloff, and Maryam Mashayekhi, Soil Scientist, Howard Gundlach, and student Adolfo Diaz. Funding for these SSURGO projects was primarily provided with county by county cost share agreements and funds out of the overall NRCS state budget.

During this time the digital soils maps were created by scanning the recompiled quad or quarter quad soil maps from the Rhinelander Compilation Office, importing the raster scan into the software LT4X, creating vector polygons and labeling the polygons utilizing a digitizing tablet. Special soil feature line and point maps were also created from the soil scans at that time. The maps were then exported to a DLG file and imported into G.R.A.S.S. software. The DLG files were then processed further and exported to another DLG file that could be imported into the software ARC/INFO and converted to coverages. The data was again processed for errors and the finalized data was sent to NCGC for SSURGO review and certification and the eventual posting of the data to the public. The data was only available in DLG format, by quad or quarter quad. Due to the limitations of software and hardware at the time it would take several months to process an entire county to the point of the NCGC SSURGO review. It then might take several more months for NCGC to process the data, for it to be free of errors, and to meet the SSURGO standards for the data.

In 1996 in was determined by NHQ that more staff and resources was needed to expedite the SSURGO digitizing of soils for the entire country. With four years into the SSURGO initiative less than 100 surveys had been certified nationwide. It was evident not all states had the technical expertise to produce a digital soil dataset that would pass the rigorous SSURGO standards. To make matters worse, there was a growing backlog of surveys awaiting certification review at NCGC. In the fall of 1996, Ken Lubich, then State Soil Scientist, submitted a proposal for Wisconsin to become one of seven SSURGO digitizing and certification centers in the nation. To that point, Wisconsin had been only one of several states to have more than one SSURGO certified county, with a total of four counties completed and several other that were in SSURGO review at NCGC. The four counties were Lincoln, Oneida, Jefferson, and Jackson.

In January 1997 Wisconsin was selected as one of seven SSURGO digitizing and certification units, along with Richmond, Virginia, East Lansing, Michigan, Columbia, Missouri, Salina, Kansas, Temple, Texas, and Bozeman, Montana. In February the Wisconsin Digitizing Unit (WIDU) hired two additional staff. More funding was now coming to the Wisconsin Soils Department from NHQ to beef up the WIDU staff. The WIDU was assigned eight states that were to send them materials for SSURGO digitizing. Those states were Wisconsin, Minnesota, Iowa, New York, West Virginia, Vermont, New Hampshire and Maine. Over the next few months work began arriving from other states. Also new computers, digitizing tablets, and software were purchased. The WIDU started to advertise positions and by Memorial Day the WIDU had 17 fulltime people on staff. The staff consisted of seven regular NRCS staff, four people funded through an agreement with WLWCA, two collage students, and four high school students. Over the summer of 1997 the DU was operating with two shifts of eight hours each. Kent Peña and Mark Roloff served as team leaders and each had a staff of seven or

eight people. The teams would work from 6:00 AM to 2:30 PM or 2:30 PM to 11:00 PM. The teams would alternate schedules every two weeks. LT4X was still the primary software used to create the digital soil survey maps. GRASS had been fazed out of the process with LT4X's ability to write a DLG that could be imported directly into ARC/INFO. With Wisconsin becoming a National Digitizing Unit, it now had the capability to process and SSURGO certify digital soil surveys. By removing NCGC from the certification loop, the seven certification centers were able to SSURGO certify more soil surveys in the first full year of operation than had been certified over the last five. Within one year Wisconsin had five additional surveys SSURGO certified. Over the next couple of years the DU staff would fluctuate in staff size to correspond with the school year.

By the end of 1999, Wisconsin had 24 counties that were SSURGO certified and 10 more surveys that were currently in the digitizing process. The new millennium brought with it a watershed agreement between NRCS and the State of Wisconsin. The State of Wisconsin agreed to fund NRCS with $4.2 million to help accelerate the mapping of 10 initial surveys in the Northwest corner of the state and to have the remaining 38 surveys SSURGO certified by July of 2006. It had taken 8 years to get the first 24 surveys digitized and now NRCS had agreed to have the remaining 48 certified in the next 6 years.

In April of 2000 the Wisconsin Soils Department had a changing of the guard as Ken Lubich resigned as the State Soil Scientist and Digitizing Team Leader and took a position with the national staff as the National Digitizing and Map Finishing Coordinator. That summer Jon Hempel took over as the new State Soil Scientist and Kent Peña became the Digitizing Team Leader. As the WIDU evolved in personnel, so did the process by which the digital data was created.

While digital soil maps were still being created and processed using the compiled quad or quarter quad maps, new techniques were being used to produce digital soil maps faster and with equal quality. New software such as MAPLE SYRUP and Orthomapper™ were being used to bypass the hand recompilation of the old soil survey maps and produce digitally ortho rectified soil maps. Using these software could reduce the time needed to rectify existing soil surveys from several months to several weeks. To compare, it would take on average one week, for one person to recompile one quarter quad at a scale of 1:12000. Using digital rectification software an experienced person could rectify ten soil survey atlas sheets per day. As a result, over the course of one week, 50 sheets could be rectified. At a scale of 1:15840 that meant approximately 30 quarter quad equivalents could be ortho rectified. In addition to the advantage of faster rectification times, materials such as ratio film positives, punch registered film overlays, light tables needed to do the hand recompilation and the space needed to house all these items, could be replaced by one person at one computer. Other software such as 3DMapper™, further accelerated the production of digital, geospatially correct, soil maps. Using 3DMapper™ a soil scientist could create soils lines right on the computer screen and create a label layer to go with the soil lines.

The task of completing all the soil surveys of Wisconsin to SSURGO certified data sets was starting to pick up speed. By the end of fiscal year 2001, 34 surveys had been certified with 10 more currently being digitized. The WIDU had around 10 full time employees and 6 to 10 part time students at that time. The software used to create products continued to be LT4X and ARC/INFO and all the capturing of the data was with the use of a digitizing tablet.

By the beginning of 2003, Wisconsin had 45 surveys that were SSURGO certified. With a little more than three years remaining to fulfill the state agreement, there were still 27 surveys remaining. 2003 also saw a change in the software used to process the surveys. A new, more powerful, ESRI™ software called ARCGIS 8.3 and subsequent versions, were now available to the WIDU. By using this software the WIDU was able to eliminate all other software from the digitizing and labeling process. This greatly increased the efficiency of the WIDU. No longer were DLG files required to get the data into an ARC coverage format. No longer was a digitizing tablet needed to capture the data from the compiled overlays. With no more surveys in Wisconsin being hand compiled, the Rhinelander Compilation Office was closed. The remaining Wisconsin surveys were now electronically compiled and brought directly into ARCGIS. With all the changes that had taken place from 1992, the start of the Wisconsin SSURGO production, the inception of the National Digitizing Centers in 1997, and to the present, things had changed considerably. What once was a process of a year or longer to compile, digitize, and SSURGO certify a survey, now could be done in a few short months. 2003 also had the Wisconsin State Office, along with the WIDU move to a new location. Kent Peña had separated from the WIDU to become the State GIS coordinator, leaving Mark Roloff and Adolfo Diaz as co-team leaders of the WIDU. In 2004, Jon Hempel also left the soils staff to become the Director of the National Geospatial Development Center in Morgantown, West Virginia. In December of that year, Don Fehrenbacher became the third State Soil Scientist to lead the WIDU.

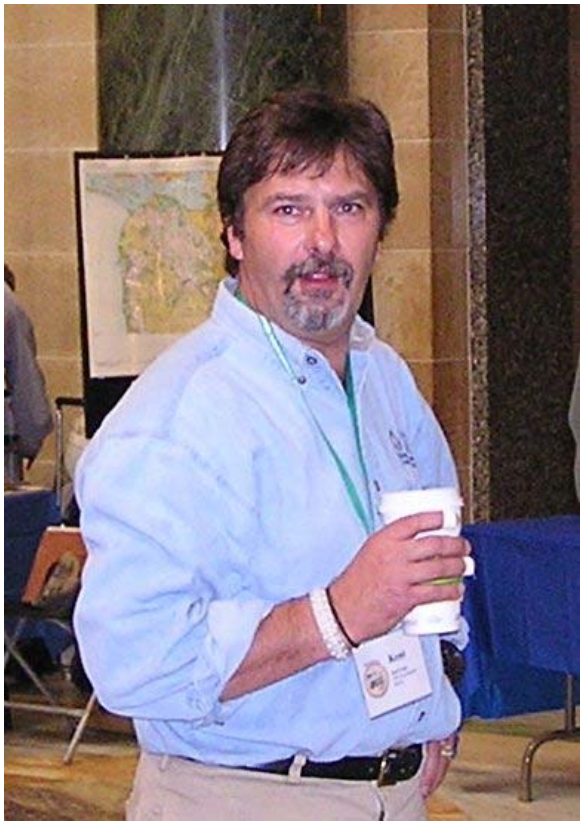
In early 2006, the Governor of Wisconsin declared 2006 the Year of Soil. A celebration at the Capitol was planned for later that spring. With the due date for the state agreement with NRCS to complete the SSURGO certification for all of Wisconsin surveys now less than six months away, time was running out. Six more surveys needed to be completed by June 30th. The WIDU now focused much of its time to the completion of Wisconsin. Soil scientists from around the state came to the WIDU to help complete the surveys. On May 15, 2006, the last Wisconsin soil survey, Sawyer County, was SSURGO certified. Almost ten years to the day had passed since the first survey was SSURGO certified. The very next day, the Year of Soil celebration was held at the State Capitol. Pat Leavenworth, the State Conservationist for Wisconsin, was able to proudly declare Wisconsin was 100% SSURGO certified.

With all of Wisconsin now SSURGO certified and the National SSURGO initiative due to be completed by the end of fiscal year ’07, the WIDU started to downsize in fiscal year ’06. Only five staff members remained with the WIDU as of the start of fiscal year ’07. Of those five, only three, Cartographers, Mark Roloff and Adolfo Diaz and Soil Scientist, Howard Gundlach were with the WIDU when the first Wisconsin survey was SSURGO

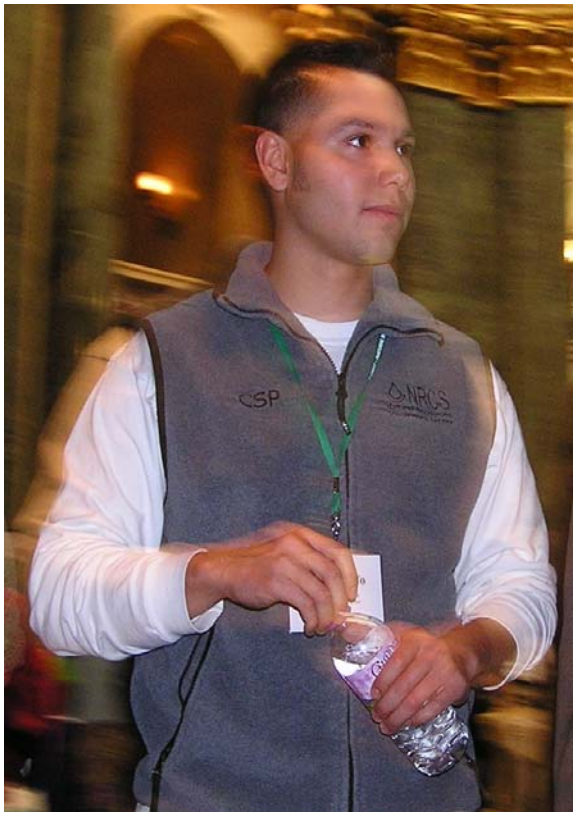
certified. Through the years, over 100 people had been employed by the WIDU, over 325 surveys from 13 states have been SSURGO certified, and millions of dollars had been added to the Wisconsin NRCS budget.

Individuals Who Worked in the Madison Digitizing Office

Kent B. Pena
Mark Forand
Mark L. Roloff Americorps
Maryam Mashayekhi Americorps
Julie Tranquilla Americorps
Paul Long Americorps
Luis Diaz Americorps
Antonio Esterich Americorps
Sandy Taylor 1994 (volunteer)
Elaine Springer 1994 (volunteer)
Matt Flickenger 1995
Perry Knight 1995
Afra Johnson 1995
Adolfo Diaz 1996
Amy Sippl (Jochem) 1997 WLWCA
Craig Surman 1997 WLWCA
Mike Sanchez 1997 WLWCA
Craig Stanpfel 1997 WLWCA
Arron Brault 1997
Anne Ebienrieter 1997
Jason Dremsa 1997
Jessie Sagger 1997
Karuna Sigiapatti 1997
Lynn Robbin Murphy 1997
Sonja Sullivin 1996
Matt Eddy
John Kelbeck (computer specialist)
Hiedi Woelful 1999 WLWCA
Corine Ripp 1999 WLWCA
Nathan Coller 1999 WLWCA
Steve Smith 2000
Sara Rigelman 1999
Cristie O'Brien 1999
Kate Whalen 2000
Kate Mojeska 2000
Chris Morse 2000
Eric Norris 2000
John Marks
Genisis Stienhorst
Derrick Johnson
Josh Suess
Chad Jacobson
Paul Kemp
Andria Droppo 1999
Mary Neuhaus
Trisha Wagner 1999
Tasha Berg 1999
Hector Covarubias 1999
David Gundlach 1999
Lisa Lubich 1996
Phil Nehmer 1996
Troy Neu 1996
Alice Quiroga 2000
Bryan Olsen 2001
Brian Emerson 2000
Chanc Vogel 1998
Shelby Anderson 2001 STEP
Tim Warren 2001 STEP
Zorimar Rivera 2001
Tyson Lowery 2001 STEP
Melanie Meyer 2001 STEP
Nina Geurkink 2001
Dante Gibbs 2001
Mari Danz 2001
Benjimin Spaier 2001 STEP
Kim Suffield 2001 STEP
Frances Culwell 2001 STEP
Jason Wagner 2001 STEP
Jamie York 2001 STEP
Joe Van Hulle 2002
Kayla Berry 2001 STEP
Tanya Depp 2001 STEP
Matt Giesfeldt 2002 STEP
Matt Eisentraut 2002 STEP
Pete Vivian(DVR)2002
Matt Lorenz(NRI)2002
John Forsyth(NRI)2002
Eric Kline 2002 VOL
Mike Miller 2002 STEP
Zach Nienow 2002 STEP
John Xiong 2002 Career Intern
Maria Johnston 2004
David Schaefer 2004
Paul Marcou 2004
Linda Harring 2004
Ana Tapsiena (Russian student) 2004
Alan Hunt 2004
Kris Koehler 2004
John Caine 1999
Barb Zeps (Richardson) 1996
Gretta Luedeke 1997
Kate Kelly 1997
Omar Vega 2004
Terry Schoepp 1996



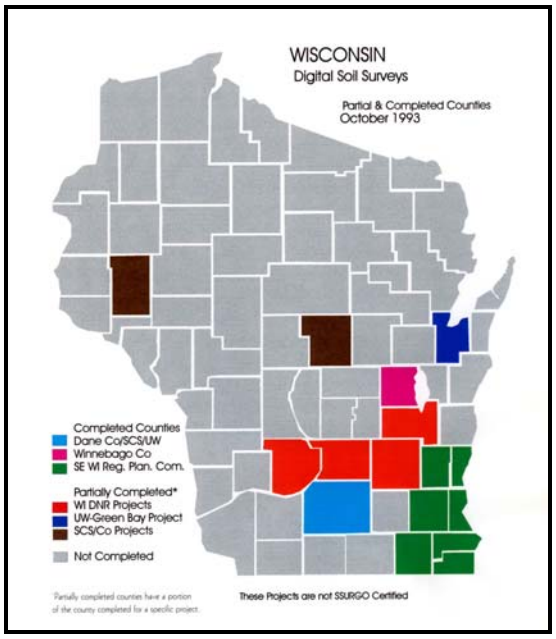
Kent Pena, GIS Coordinator

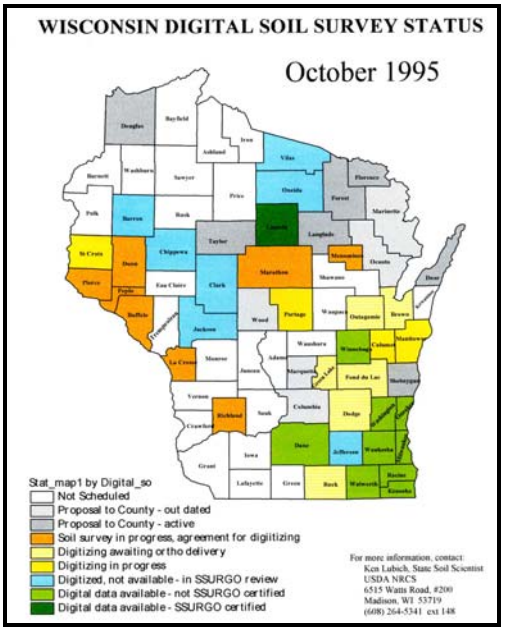


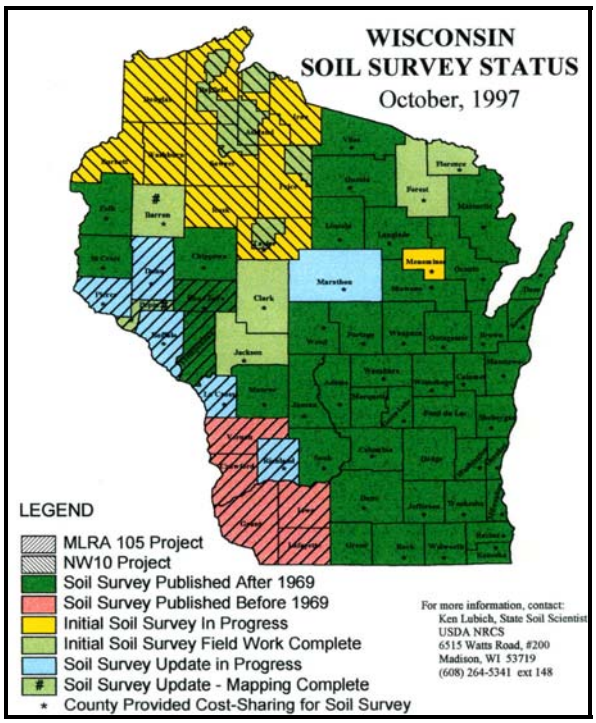
Adolfo Diaz,Cartographer

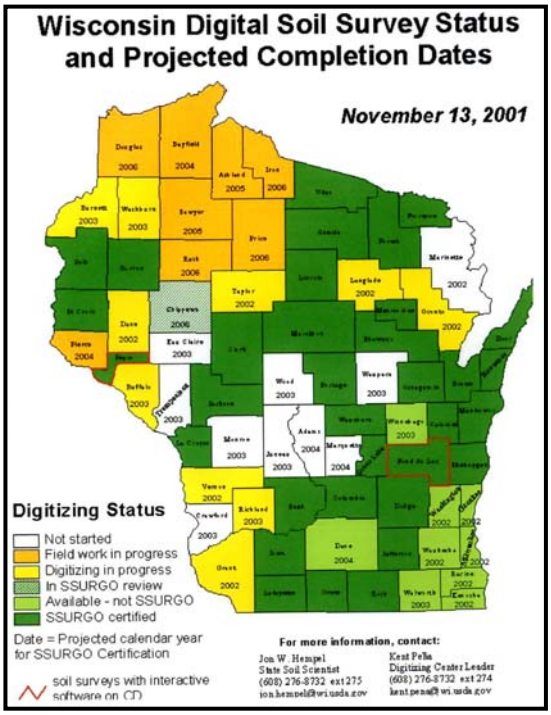
Mark Roloff, Cartographer

Status Maps Showing Various Stages of Digitizing Progress For Wisconsin









New Concepts – Soil Survey of the Future

Maintaining Soil Surveys by Major Land Resource Areas

Soil survey reports remain excellent sources of soil data but have become outdated in varying degrees as new information about soils is gathered and as demographics, technologies, environmental questions, and intensities of land use have changed. Incorporating the scientific knowledge developed during the last 30 years is needed to bring soil surveys to a common standard and to develop a coordinated database to support the greatly expanded use of and information needed from soil surveys.

Maintaining soil survey information is an ongoing activity. It is accomplished through continuous collection of data, regular reviews, evaluations, and additions to existing soil survey information.

Soil surveys are updated as part of maintenance projects that are conducted for a Major Land Resource Area or other region in order to improve the uniformity of the soil survey products in the area. Adjoining soil surveys of different ages frequently have map units and interpretations that do not join. Updating an individual soil survey by county does not always improve the join. Maintenance for a broad area presents an opportunity to bring all soil surveys within the area to a consistent level. Boundaries that are not resource-related, such as state and county survey area borders, no longer act as soil boundaries when surveys are updated on the basis of a broad resource area.

The Major Land Resource Area becomes the project soil survey area. The soil surveys of counties or other areas within the major land resource area are considered subsets of the soil survey for the major land resource area and are updated, maintained, published as subsets, or all of these.

In Wisconsin, an effort has begun to evaluate soil surveys by Major Land Resource Areas in 2006. The purpose of this evaluation is to:

1. Bring existing soil survey reports to a common standard.
2. Collect new soil property data and update interpretations to meet present needs.
3. Develop a coordinated soil survey database for use in informational display systems.

Through the evaluation process a plan is developed for maintaining a soil survey area. Many degrees of deficiencies and variability can exist in each soil survey. Revisions or supplements to the soil map can be divided into five categories:

1. Extensive revision
2. Partial revision
3. Limited revision
4. Supplemental soil mapping
5. Updating the photo base map

The correlation is amended, and the products of the soil survey are then digitized.

The process of maintaining soil surveys was stated as policy in the November, 1993 version of the National Soil Survey Handbook. The Handbook provides the standards, guidelines, definitions, policy, responsibilities, and procedures for conducting the Natural Resources Conservation Service part of the National Cooperative Soil Survey in the United States.

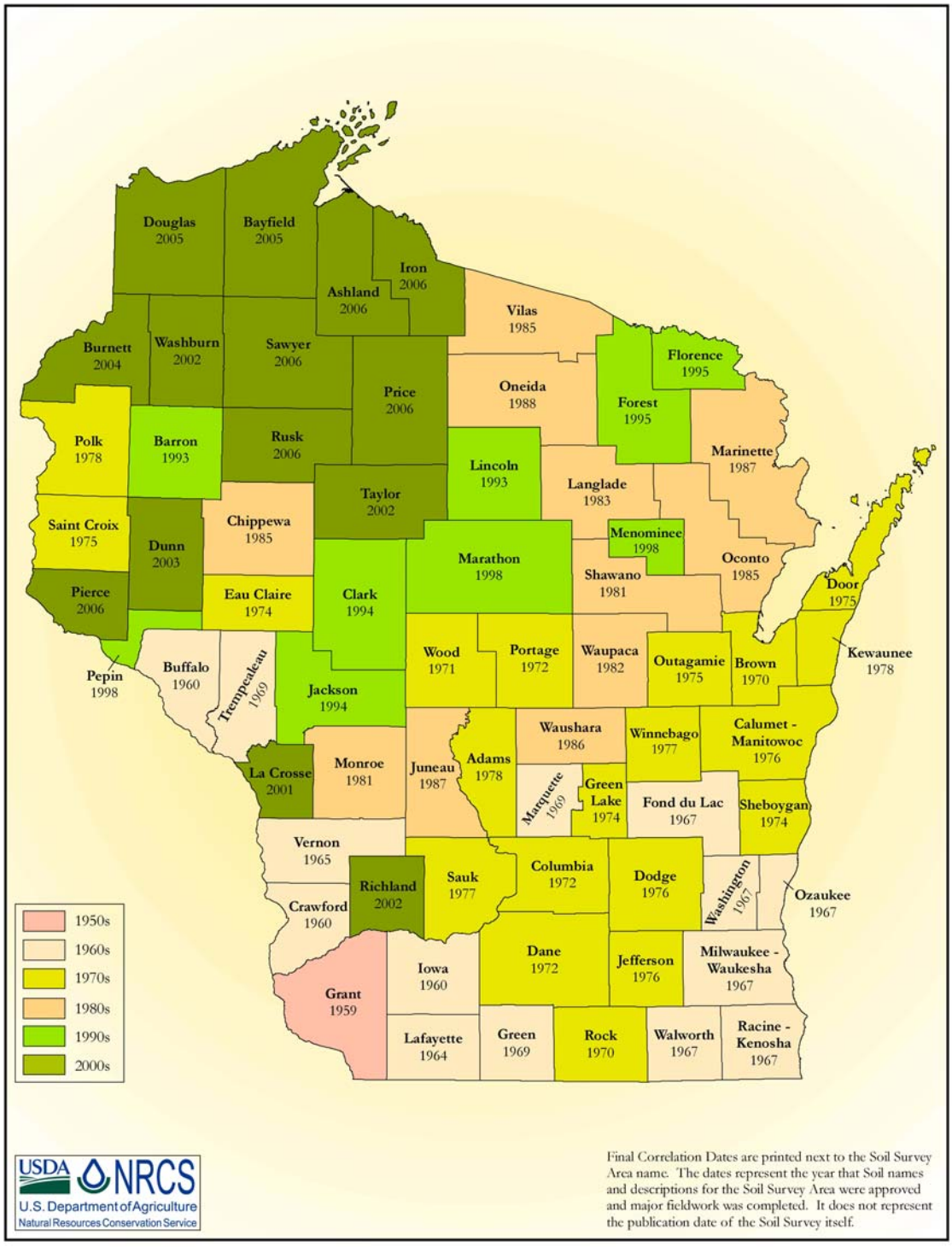
Soil Survey Status as of October 2006

The following map presents an overview of the current soil survey status in Wisconsin. There are 14 counties that have been completed in the period 2000-2006; 9 counties completed in the 1990's; 11 counties completed in the 1980's; 21 counties completed in the 1970's; 16 counties completed in the 1960's; and 1 county completed in the 1950's. Recent surveys in the northwestern part of the state were part of the NW10 project which is highlighted in another section of this report. Dunn and Pierce Counties were recent updates that were completed by the soil scientists working in the Altoona Office. La Crosse and Richland Counties were also recent updates completed by the soil scientists working out of the Richland Center Office. Six counties (Crawford, Grant, Green, Iowa, Lafayette, and Vernon) were re-correlated in 2005.

Currently, there are no plans to update any soil surveys on a county-by-county basis, but rather future updates will use an MLRA approach (see section on "Maintaining Soil Surveys by Major Land Resource Area).

This is the end of an era. Soil survey project staffs in the Natural Resources Conservation Service have been reassigned to MLRA project offices in three locations within the state (Altoona, Juneau, and Rhinelander) in order to provide maintenance and update of older surveys. The patchwork of surveys as demonstrated in the map below has served its purpose, but future efforts in updating soil surveys will be aimed at creating an updated "seamless" soil survey product for the state. Non-joins and map unit concepts that change along county lines are issues that have occurred due in part to the county-by-county approach of the past. These issues will be a high priority work item as we enter into the next phase of soil survey work for the state. It is anticipated that future soil survey projects will focus more on individual landforms and geomorphic surfaces, rather than a county-by-county approach that was used in the past.

Wisconsin Soil Survey Area Final Correlation Dates



History of Soil Information Systems

Soil scientists have always collected and maintained vast amounts of data. The data was stored on paper, on maps, in cardboard boxes, in scientist's heads, etc. Before the availability and use of computer technology, the soil survey manuscripts were commonly prepared by typing pencil drafts of the field soil scientist descriptions. Preparation of the long interpretive tables generally required a special long carriage typewriter. Preparation of the interpretive tables in the manuscripts for publication was time consuming and required input from soil scientists, resource specialists, and secretarial support.

In recent decades, computers and databases have become invaluable tools in preparing soil surveys and storing soil survey information. The State Soil Survey Database (SSSD) was developed to provide the capability to store and manage soil survey data for the State and for the publication of reports. The prototype was developed in Colorado and released in 1987 for use by the State soils staff.

SSSD was a relational database for soil survey data. The concept was to use database technology to link several natural data sets. The data sets included Map Unit Record (SOI-6), Soil Interpretation Record (SOI-5), Range, Plants, Climatic data, and other data elements as defined by the state. SSSD offered many benefits:

- SSSD software was easy to use
- Automated features accomplish most tasks
- Soils information was easy to access and store
- Data could be tailored for specific geographic areas
- Data was easy to maintain
- Soils data was quickly and efficiently provided

Important features of SSSD include:

- Menus provided direct, automated access to the soil survey data
- The data contained information on basic soil properties
- The data provided soil interpretive ratings on selected uses
- The data could be integrated and linked with other natural resource data sets
- The data could be added, deleted, or modified
- Standard reports were available
- Assisted and unassisted queries were optional features

The primary function of SSSD was to provide Soils Staff the ability to store, manage, and retrieve soil survey information of the state. From 1987 to 1994, SSSD was the mechanism for providing a State Database for the Computer Assisted Management and Planning Systems (CAMPS), which was operational in most SCS Field Offices throughout the United States. From 1994 to 1997, SSSD was the mechanism for providing a Soil Database for the Field Office Computing System (FOCS). The SSSD provided the initial soil survey information for the new National Soil Information System (NASIS) in 1996.

National Soil Information System (NASIS)

NASIS (the National Soil Information System) is a tool to help create and maintain soil surveys. It takes advantage of database technology to provide an automated means for storing all information about soil surveys. NASIS maintains the hierarchical structure of soil survey data, through the use of table-oriented editors, but allows for new flexibility in creating and maintaining soil survey data.

NASIS can meet needs from ongoing progressive soil surveys to MLRA updates and general soil maps for soil survey customers.

The major objectives for NASIS are:

To provide a dynamic and flexible system

1. For environmental evaluation model requirements, including water quality
2. Responsive to new data element needs

To support conservation assistance through improved data quality

1. Built-in algorithms for data population and validation
2. Facilitation of cross comparisons
3. Facilitation of correlation

To provide improved automated mapunit management

1. Correlate mapunits in an on-going survey
2. Join mapunits between survey areas
3. Share mapunits between projects (e.g., and MLRA survey and county subsets)
4. Maintain multiple mapunit legends (survey area, state, MLRA)
5. Maintain complete correlation records
6. Maintain complete mapunit data for mapunits correlated out of the survey area legend

NASIS and SSSD

NASIS not only replaced the State Soil Survey Database (SSSD) program, but goes significantly beyond SSSD's capabilities.

1. NASIS has an easy-to-use graphical interface that shields you from the complexities of the software.
2. NASIS uses an improved database and data model that allows you to more accurately model soil relationships.
3. NASIS encompasses major new concepts, such as RVs (Representative Values), horizons, separate area and legend data, and data mapunits.
4. NASIS includes a comprehensive online help system, allowing you to access documentation quickly and easily.

In making the change from SSSD to NASIS, you encountered two major new concepts: the relationship between legends and data mapunits recorded in the correlation table, and "**owned objects**." You also found some new terms for data you were already familiar with: in NASIS, inclusions are termed **components**, and layers become **horizons**. NASIS accommodates as many components and horizons as you need to document your mapunit composition. You are able to record representative values (**RV**s) for some data in NASIS, in addition to high and low values.

Legend and Data Mapunit Correlation

NASIS is intended to improve automated mapunit management in several ways:

1. Correlate mapunits in an on-going survey.
2. Join mapunits between survey areas.
3. Share mapunits between projects (for example, an MLRA survey and other subsets).
4. Maintain multiple mapunit legends (survey area, state, MLRA).
5. Maintain complete correlation records.
6. Maintain complete mapunit data for mapunits correlated out of the survey area legend.

To accomplish these aims, the "map unit" has been separated into two parts:

- the **legend**, which contains the mapunit symbol, mapunit name, type (consociation, complex), acres, and correlation notes; and
- the **data mapunit**, which includes mapunit composition, interpretation ratings, physical, chemical, and morphological properties, components, and horizons.

In SSSD, a map symbol is hard-linked to unique data in the database. In NASIS, a map symbol is part of a legend, which is linked through a **correlation table** to a data mapunit in the database. This allows different legend mapunits linked to the same data mapunit (i.e. with the same database data) to be joined exactly. The linkage capability provided by the correlation table between legends and data mapunits in NASIS replaces the functions of the MUUF, SSSD-MUIR, SOI-6, and parts of the SOI-5.

Because NASIS supports a many-to-many relationship between legends and data mapunits, several new ways to handle soil data are possible:

You may use multiple legends for single survey areas.
For example, a mapunit delineation could have two different symbols, one for the survey area, and one for a larger MLRA survey. In addition, if the delineation crossed a county line, a third legend might be used. You can think of this as a mapunit having several different "aliases". The correlation table will correctly connect the different legends with the same database data.

Information about additional (inactive) mapunit symbols is retained in the database.

Instead of deleting a mapunit symbol which is no longer being used, you may flag it as "additional." The data associated with the additional legend is attached to another legend. You may or may not want to use this data to represent that legend; if so, specify it as "representative." If, in the future, a different correlation scheme is desired, the database will still reflect the connection between the inactive legend and the data it was originally associated with.

Owned Objects in NASIS

In SSSD, only the Soil Dataset Manager could edit or delete data. In NASIS, every row in the main database tables ("object") may be "owned" by a separate group, as specified in the security table. The owner of an object has the authority to change the data as needed.

In NASIS, the major owned objects are Area Type, Legend, Data Mapunit, and Pedon. The first three objects are an extension from SSSD, and the Pedon object is an extension of the old PDP program. The Area Type object contains area and area text entry. The Legend object contains mapunit, correlation, and related tables. The Data Mapunit contains component, horizon, and repeating group tables. For example, the owner of a legend also owns the correlation of each legend mapunit to a data mapunit.

Cooperative Soil Survey Publication Program

An example of the soil survey published in the early 1900's and during the 2000's is presented. Lists of soil surveys published during the past one hundred years is given in three different presentations for the various time frames of the state soil survey program.

Wisconsin Soil Surveys Published 1900-2006 - Overview

This section gives an overview of the excellent success the state Cooperative Soil Survey Program has had in the publication of soil surveys. These published reports have made the vast accumulated knowledge of prepared soil maps, data, and interpretations available to the general public. During the period 1900 through 2006, there were 105 Wisconsin soil surveys published by the United States Department of Agriculture and 41 by the Wisconsin Geologic and Natural History Survey. In addition to these published soil surveys, numerous special soils reports were prepared for many users over the years.

A listing of all published soil surveys over this period of time shows that most counties have at least two published soil surveys. The counties with only one survey are Ashland, Burnett, Chippewa, Clark, Dodge, Douglas, Eau Claire, Forest, Iron, Lafayette, Lincoln, Manitowoc, Oconto, Ozaukee, Polk, Price, Rusk, Sawyer, Shawano, St.Croix, Taylor, Washburn, and Washington. There are several older reconnaissance soil surveys consisting of large geographic areas or an aggregate of several counties. Some counties, such as Adams, Barron, Bayfield, Dane, Door, Green, Green Lake, Iowa, Jackson, Jefferson, LaCrosse, Monroe, Outagamie, Portage, Rock, Sheboygan, Walworth, Waupaca, and Wood have three published soil surveys. Pierce County is the only county with four surveys. Most of the older soil surveys are out of print. Most of the soil surveys that are out of print are available in university libraries. The list of published soil surveys that follows this section shows the date each survey was published. The SSURGO digitizing project begun in the late 1900's has been completed, with a digitized soil survey for all Wisconsin counties.

General contents of published soil survey reports during 1900-1958
Size of report is about 6 by 9 inches. The major sections varied somewhat from those in surveys done from the 1900's to the late 1930's.

The major sections of soil surveys published during the 1910's were as follows:

- Description of the Area
- Climate
- Agriculture
- Soils (general description of each of the map units shown on the soil map; no detailed soil profile descriptions; generally, 20 or fewer different soils mapped).
- Folded colored soil map of the county attached to the written report.

These early reports were excellent in describing the general agriculture of the area, farming conditions and trends, and the physiography of the area.

The major sections of soil surveys published during the 1930's were as follows:

- County Surveyed (similar to General Nature of more recent reports)
- Climate
- Agriculture
- Soil Survey Methods and Definitions
- Soils and Crops (includes general soil description for each soil map unit; no detailed soil profile descriptions; commonly, 20 to 40 different soils mapped).
- Classification of Soil Types According to Productivity
- Morphology and Genesis of Soils
- Summary (an excellent overview of the agricultural conditions, landscapes, geology, kinds of soils, and general suitability of soils for the common crops of the area).

The soil map included in the survey published from 1900 through the 1930's was one large colored map at a scale of 1 inch to 1 mile or a scale of 1:63,360. The soil map showed each different soil or groups of soils in color on a large map commonly 30 by 30 inches in size for a 16-township county, such as Polk County. This map is bound in the back of the report.

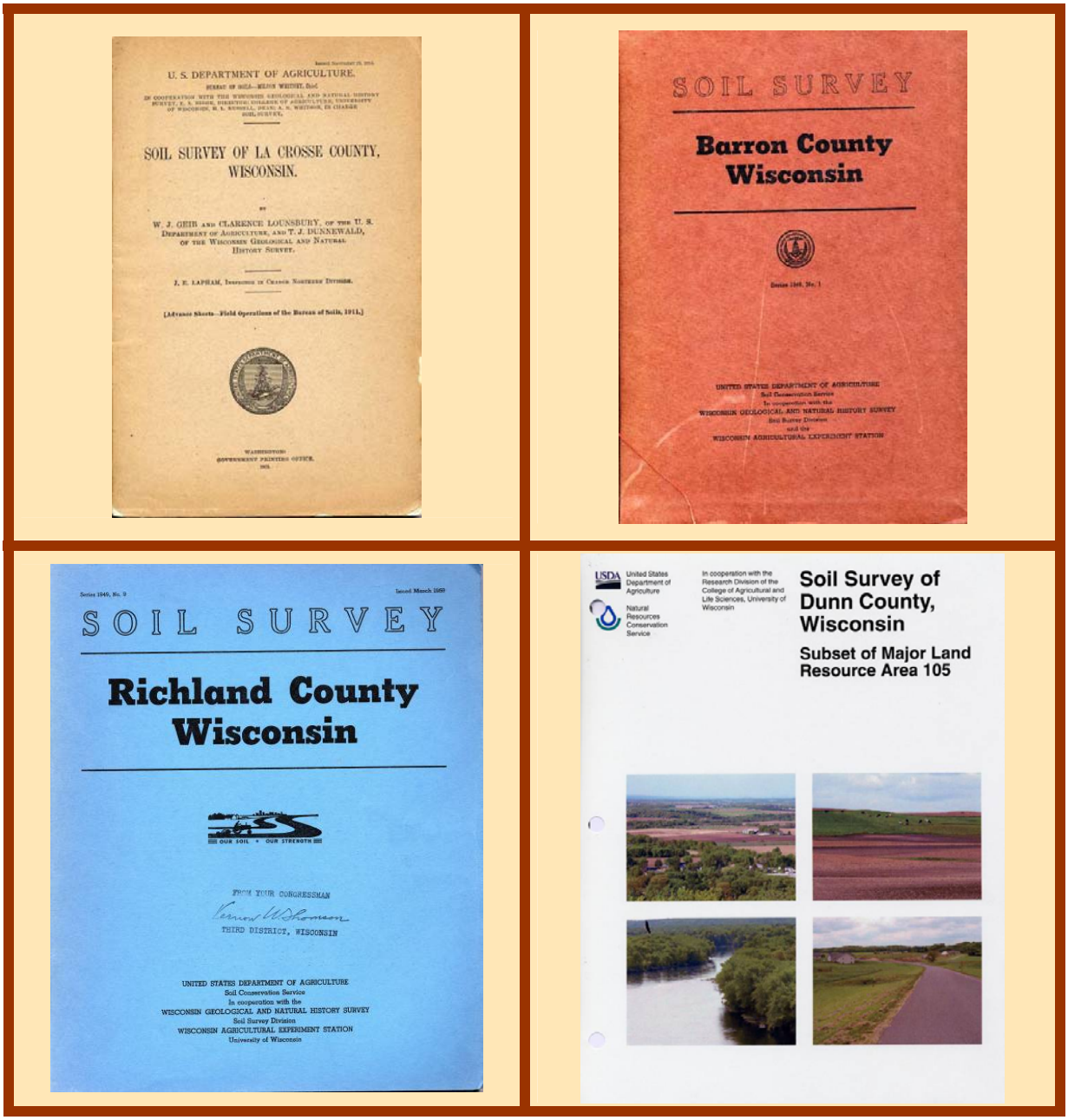
General contents of published soil survey reports during the 1950-1999 period
This size of report is about 9 by 10 ¾ inches. The major sections of the report are as follows:

- How to Use This Soil Survey
- Index to Map Units
- General Nature of the County
- General Soil Map Units
- Detailed Soil Map Units (Detailed profile soil descriptions given for each soil series in this section or the section on classification of the soils; generally, about 40 to 100 different soils mapped).
- Use and Management of the Soils
- Soil Properties
- Classification of the Soils
- Formation of the Soils
- Glossary
- Tables (Each soil survey contains about 15 to 20 different soil properties and interpretative tables).

The back of the report includes 1) a colored general soil map of the survey area, 2) a soil legend for the general soil map, 3) a conventional and special symbols legend, 4) a soil legend for the detailed soil maps, and 5) the detailed soil maps.

The soil maps have an aerial photography background and are generally 3.2 inches per mile or a scale of 1:20,000. Each map sheet at the 1:20,000 scale includes an area of 13 ½ square miles or sections.

Examples of Soil Survey Publication Formats

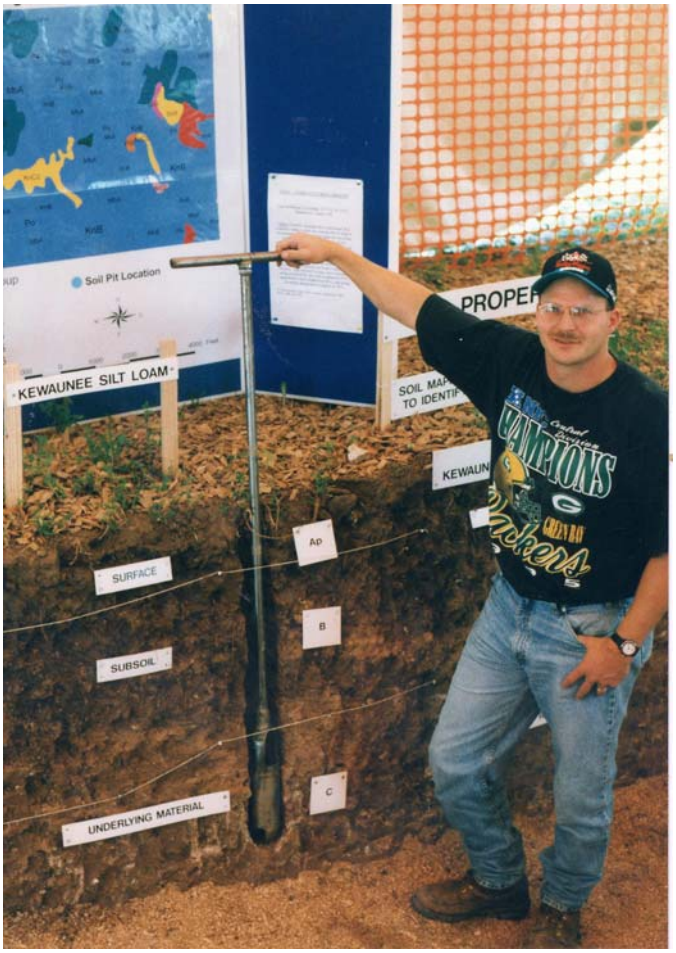


Examples of soil surveys from different periods: LaCrosse County, 1913 *(brown) these surveys were published in a 6" by 9" format;* Barron County, 1948, *Richland County, 1959 (blue); and Dunn County, 2005 (white). Surveys were then published on CD-ROM, and now are on-line via the internet.*

Bob Weihrouch takes some notes.

Dave Roberts using a bucket auger.

Phil Meyer working in Dane County.



Tim Miland at the Farm Technology Days Soil Pit.

Larry Arnold, from the NSSL – Lincoln, and Keith Anderson weighing rock fragments from a sampling site in Barron County.

Angie Elg prepares soil sample labels..

1987 Progress Review, Marinette County. Left to right: Bob Weihrouch, Terry Kroll, Howard Lorenz, Frank Anderson, Steve Payne, and Auggie Otter.

List of Soil Surveys Published 1900-2006

COUNTY	PUBLISHER	DATE
Adams	WGNHS	1924
	USDA-Bureau of Soils	1924
	USDA-SCS	1984
Ashland	USDA, NRCS	2006
Barron	WGNHS	1948
	USDA-SCS	1958
	USDA, NRCS	2001
Bayfield Area	WGNHS	1914
Bayfield	WGNHS	1929
	USDA, SCS	1961
	USDA, NRCS	2006
Brown	USDA-Bureau of Chemistry and Soils	1929
	USDA, SCS	1974
Buffalo	WGNHS	1917
	USDA, SCS	1962
Burnett	USDA, NRCS	2006
Calumet	USDA-Bureau of Chemistry and Soils	1925
Calumet and Manitowoc	USDA, SCS	1980
Chippewa	USDA, SCS	1989
Clark	USDA, NRCS	2002
Columbia	WGNHS	1916
	USDA, SCS	1978
Crawford	USDA-Bureau of Chemistry and Soils	1930
	USDA, SCS	1961
Dane	USDA-Bureau of Soils	1915
	WGNHS	1917
	USDA, SCS	1978
Dodge	USDA, SCS	1980
Door	USDA-Bureau of Soils	1918
	WGNHS	1919
	USDA, SCS	1978
Douglas	USDA, NRCS	2006
Dunn	USDA, SCS	1975
	USDA, NRCS	2004
Eau Claire	USDA, SCS	1977
Florence	WGNHS	1962
	USDA, NRCS	2004
Fond du Lac	WGNHS	1914
	USDA, SCS	1973
Forest	USDS, NRCS	2005
Grant	WGNHS	1956
	USDA, SCS	1961
Green	USDA-Bureau of Chemistry and Soils	1928
	WGNHS	1930
	USDA, SCS	1974
Green Lake	USDA-Bureau of Soils	1928
	WGNHS	1929
	USDA, SCS	1977
Iowa	USDA-Bureau of Soils	1912
	WGNHS	1914
	USDA, SCS	1962
Iron	USDA, NRCS	2006
Jackson	USDA-Bureau of Soils	1922
	WGNHS	1923
	USDA, NRCS	1998
Jefferson	WGNHS	1916
	WGNHS	1970
	USDA, SCS	1979

Juneau	WGNHS	1914
	USDA, SCS	1991
Kenosha & Racine	USDA-Bureau of Soils	1922
	USDA, SCS	1970
Kewaunee	WGNHS	1914
	USDA, SCS	1980
La Crosse	WGNHS	1914
	USDA, SCS	1960
	USDA, NRCS	2006
La Fayette	USDA, SCS	1966
Langlade	WGNHS	1947
	USDA, SCS	1986
Lincoln	USDA, NRCS	1996
Manitowoc	USDA-Bureau of Chemistry and Soils	1926
Marathon	USDA, SCS	1989
	USDA, NRCS	2003
Marinette	WGNHS	1911
	USDA, SCS	1991
Marquette	WGNHS	1961
	USDA, SCS	1975
Menominee	WGNHS	1967
	USDA, NRCS	2004
Milwaukee	USDA-Bureau of Soils	1918
	WGNHS	1919
Milwaukee and Waukesha	USDA, SCS	1971
Monroe	USDA-Bureau of Chemistry and Soils	1929
	WGNHS	1931
	USDA, SCS	1984
Oconto	USDA, SCS	1988
Oneida	WGNHS	1959
	USDA, SCS	1993
Outagamie	USDA-Bureau of Soils	1921
	WGNHS	1921
	USDA, SCS	1978
Ozaukee	USDA, SCS	1970
Pepin	USDA, SCS	1964
	USDA, NRCS	2001
Pierce	USDA-Bureau of Chemistry and Soils	1929
	WGNHS	1930
	USDA, SCS	1968
	USDA, NRCS	2006
Polk	USDA, SCS	1979
Portage	USDA-Bureau of Soils	1917
	WGNHS	1918
	USDA, SCS	1978
Price	USDA, NRCS	2006
Racine	USDA-Bureau of Soils	1907
Racine & Kenosha	WGNHS	1923
Richland	USDA, SCS	1959
	USDA, NRCS	2006
Rock	USDA-Bureau of Soils	1920
	WGNHS	1922
	USDA, SCS	1974
Rusk	USDA, NRCS	2006
Sauk	USDA-Bureau of Chemistry and Soils	1925
	USDA, SCS	1980
Sawyer	USDA, NRCS	2006
Shawano	USDA, SCS	1982

Sheboygan	USDA-Bureau of Chemistry and Soils	1929
	WGNHS	1931
	USDA, SCS	1978
St. Croix	USDA, SCS	1978
Taylor	USDA, NRCS	2005
Trempealeau	USDA-Bureau of Chemistry and Soils	1927
	USDA, SCS	1977
Vernon	USDA-Bureau of Chemistry and Soils	1928
	USDA, SCS	1969
Vilas	WGNHS	1915
	USDA, SCS	1988
Walworth	WGNHS	1924
	USDA-Bureau of Soils	1924
	USDA, SCS	1971
Washburn	USDA, NRCS	2006

Washington	USDA, SCS	1971
Washington & Ozaukee	WGNHS	1926
	USDA-Bureau of Soils	1926
Waukesha	WGNHS	1914
	WGNHS	1956
Waupaca	USDA-Bureau of Soils	1920
	WGNHS	1921
	USDA, SCS	1984
Waushara	WGNHS	1913
	USDA, SCS	1989
Winnebago	USDA-Bureau of Chemistry and Soils	1927
	USDA, SCS	1980
Wood	WGNHS	1918
	USDA-Bureau of Soils USDA, SCS	1917 1977

** - Surveys in red were published on the Internet. There is no hard copy publication.

List of Soil Surveys Published 1900-1958

ADAMS COUNTY, WI – 1924 - WGNHS

By: A. R. Whitson, W. J. Gieb, T. J. Dunnewald, H. W. Stewart of the Wisconsin Geological and Natural History Survey, and F. J. O'Connell, Julius Kubier, Oscar Magistad and J. A. Weslow of the U.S. Department of Agriculture Bureau of Soils.

ADAMS COUNTY, WI – 1924 – USDA, Bureau of Soils

By: W. J. Gieb, in charge, J. A. Weslow, F. J. O'Connell, and Julius Kubier, of the Department of Agriculture, and T. J. Dunnewald, H. W. Stewart, Oscar Magistad of the Wisconsin Geological and Natural History Survey.

BARRON COUNTY, WI – 1948 – WGNHS

By: F. D. Hole, G. H. Robinson, and R. J. Muckenhirn.

BARRON COUNTY, WI – 1958 – USDA, Soil Conservation Service

By: Glenn H. Robinson and A. J. Nessel, in charge, Soil Survey – Bureau of Plant Industry, Soils, and Agricultural Engineering. R. A. Erickson, Soil Conservation Service, and F. D. Hole, University of Wisconsin.

BAYFIELD AREA, WI – 1914 – WGNHS

By: A. R. Whitson, W. J. Gieb, L. R. Schoenmann and F. L. Musback of the Wisconsin Geological and Natural History Survey and Gustavus B. Maynadier of the U.S. Department of Agriculture.

BAYFIELD COUNTY, WI – 1929 – WGNHS

By: A. R. Whitson, W. J. Gieb, Charles E. Kellogg, Kenneth Ableiter, H. Cook, M. Whitson, Burel Butman, Delmar S. Fink, M. H. Gallatin, H. H. Hull, of the Wisconsin Geological and Natural History Survey.

BROWN COUNTY, WI – 1929 – USDA, Bureau of Chemistry and Soils

By: A. C. Anderson, in charge, W. J. Gieb, and M. J. Edwards, U.S. Department of Agriculture and M. B. Whitson, C. E. Born, and Harold Bandoli, Wisconsin Geological and Natural History Survey.

BUFFALO COUNTY, WI – 1917 - WGNHS

By: A. R. Whitson, W. J. Gieb, T. J. Dunnewald, and O. J. Noer of the Wisconsin Geological and Natural History Survey and Clarence Lounsbury and L. Cantrell of the U.S. Department of Agriculture.

CALUMET COUNTY, WI – 1925 – USDA, Bureau of Chemistry and Soils

By: W. J. Gieb, U.S. Department of Agriculture, in charge and A. H. Meyer, J. A. Chucka, and H. H. Hull of the Wisconsin Geological and Natural History Survey.

COLUMBIA COUNTY, WI – 1916 - WGNHS

By: A. R. Whitson, W. J. Gieb, and Guy W. Conrey of the Wisconsin Geological and Natural History Survey, and Arthur E. Taylor of the U.S. Department of Agriculture.

CRAWFORD COUNTY, WI – 1930 – USDA, Bureau of Chemistry and Soils

By: M. J. Edwards, in charge, and W. J. Gieb, U.S. Department of Agriculture and Olaf Larson, D. E. Wilcox, and E. H. Tyner, Wisconsin Geological and Natural History Survey.

DANE COUNTY, WI – 1915 – USDA, Bureau of Soils

By: W. J. Gieb and Arthur E. Taylor, of the U.S. Department of Agriculture, and Guy Conrey, of the Wisconsin Geological and Natural History Survey.

DANE COUNTY, WI – 1917 – WGNHS

By: A. R. Whitson, W. J. Gieb, and Guy W. Conrey of the Wisconsin Geological and Natural History Survey, and Arthur E. Taylor of the U.S. Department of Agriculture.

DOOR COUNTY, WI – 1918 – USDA, Bureau of Soils

By: W. J. Gieb, in charge, and Carl Thompson, of the U.S. Department of Agriculture, and H. V. Geib, of the Wisconsin Geological and Natural History Survey.

DOOR COUNTY, WI – 1919 – WGNHS

By: A. R. Whitson, W. J. Gieb, and H. V. Geib of the Wisconsin Geological and Natural History Survey, and Carl Thompson of the U.S. Department of Agriculture, Bureau of Soils.

FOND DU LAC COUNTY, WI – 1914 – WGNHS

By: A. R. Whitson, W. J. Gieb, L. R. Schoenmann and F. L. Musbach of the Wisconsin Geological and Natural History Survey, and Guy Conrey and Arthur E. Taylor of the U.S. Department of Agriculture.

GRANT COUNTY, WI – 1956 – WGNHS

By: Francis D. Hole of the Wisconsin Geological and Natural History Survey, and G. H. Robinson of the U.S. Department of Agriculture.

GREEN COUNTY, WI – 1928 – USDA, Bureau of Chemistry and Soils

By: W. J. Gieb, in charge, A. C. Anderson, and F. J. O'Connell, U.S. Department of Agriculture, and T. J. Dunnewald, M. J. Edwards, Walter Vosquil, and Kenneth Whitson, Wisconsin Geological and Natural History Survey.

GREEN COUNTY, WI – 1930 – WGNHS

By: A. R. Whitson, T. J. Dunnewald, M. J. Edwards, Walter Vosquil and Kenneth Whitson of the Wisconsin Geological and Natural History Survey, and A. C. Anderson and F. J. O'Connell of the U.S. Department of Agriculture, Bureau of Chemistry and Soils.

GREEN LAKE COUNTY, WI – 1928 – USDA, Bureau of Soils

By: W. J. Gieb, in charge, A. C. Anderson, E. H. Bailey, and M. J. Edwards, U.S. Department of Agriculture, and Homer Chapman, Oscar Magistad, F. J. O'Connell, T. J. Dunnewald, and Kenneth Whitson, Wisconsin Geological and Natural History Survey.

GREEN LAKE COUNTY, WI – 1929 – WGNHS

By: A. R. Whitson, W. J. Geib, Homer Chapman, Oscar Magistad, F. J. O'Connell, T. J. Dunnewald, and Kenneth Whitson of the Wisconsin Geological and Natural History Survey, and A. C. Anderson, E. H. Bailey and M. J. Edwards of the U.S. Department of Agriculture.

IOWA COUNTY, WI – 1912 – USDA, Bureau of Soils

By: Clarence Lounsbury, of the U.S. Department of Agriculture, and T. J. Dunnewald and Emil Truog, of the Wisconsin Geological and Natural History Survey.

IOWA COUNTY, WI – 1914 – WGNHS

By: A. R. Whitson, W. J. Geib, T. J. Dunnewald, and Emil Truog of the Wisconsin Geological and Natural History Survey, and Clarence Lounsbury of the U.S. Department of Agriculture.

JACKSON COUNTY, WI – 1922 – USDA, Bureau of Soils

By: W. J. Geib, in charge, A. L. Goodman, G. W. Musgrave and C. B. Clevenger, of the U.S. Department of Agriculture, and T. J. Dunnewald, of the Wisconsin Geological and Natural History Survey.

JACKSON COUNTY, WI – 1923 – WGNHS

By: A. R. Whitson, W. J. Geib, and T. J. Dunnewald of the Wisconsin Geological and Natural History Survey, and A. L. Goodman, G. W. Musgrave and C. B. Clevenger of the U.S. Department of Agriculture, Bureau of Soils.

JEFFERSON COUNTY, WI – 1916 – WGNHS

By: A. R. Whitson, W. J. Geib, and O. J. Noer of the Wisconsin Geological and Natural History Survey, and A. H. Meyer of the U.S. Department of Agriculture.

JUNEAU COUNTY, WI – 1914 – WGNHS

By: A. R. Whitson, W. J. Geib, L. R. Schoenmann, C. A. LeClair, and O. E. Baker of the Wisconsin Geological and Natural History Survey, and E. B. Watson of the U.S. Department of Agriculture.

KENOSHA AND RACINE COUNTIES, WI – 1922 – USDA, Bureau of Soils

By: W. J. Geib, in charge, and A. E. Taylor, of the U.S. Department of Agriculture, and J. E. Kubier, H. W. Stewart, and W. M. Gibbs, of the Wisconsin Geological and Natural History Survey.

KEWAUNEE COUNTY, WI – 1914 – WGNHS

By: A. R. Whitson, W. J. Geib and E. J. Graul of the Wisconsin Geological and Natural History Survey, and A. H. Meyer of the U.S. Department of Agriculture.

LA CROSSE COUNTY, WI – 1914 – WGNHS

By: A. R. Whitson, W. J. Geib, and T. J. Dunnewald, of the Wisconsin Geological and Natural History Survey, and Clarence Lounsbury, of the U.S. Department of Agriculture.

LANGLADE COUNTY, WI – 1947 – WGNHS
By: A. R. Whitson, W. J. Geib, L. R. Schoenmann, C. A. LeClair, and O. E. Baker of the Wisconsin Geological and Natural History Survey, and E. B. Watson of the U.S. Department of Agriculture.

MANITOWOC COUNTY, WI – 1926 – USDA, Bureau of Chemistry and Soils
By: A. C. Anderson, in charge, W. J. Geib, and M. J. Edwards, U.S. Department of Agriculture, and H. H. Hull and Merritt Whitson, Wisconsin Geological and Natural History Survey.

MARINETTE COUNTY, WI – 1911 – WGNHS
By: S. Weidman and P. O. Wood.

MILWAUKEE COUNTY, WI – 1918 – USDA, Bureau of Soils
By: W. J. Geib, of the U.S. Department of Agriculture, in charge, and T. J. Dunnewald, of the Wisconsin Geological and Natural History Survey.

MILWAUKEE COUNTY, WI – 1919 – WGNHS
By: A. R. Whitson, W. J. Geib, and T. J. Dunnewald, of the Wisconsin Geological and Natural History Survey.

MONROE COUNTY, WI – 1929 – USDA, Bureau of Chemistry and Soils
By: W. J. Geib, in charge, A. C. Anderson, M. J. Edwards, and E. H. Bailey, U.S. Department of Agriculture, and Homer Chapman, Robert Bartholomew, and O. L. Stockstad, Wisconsin Geological and Natural History Survey.

MONROE COUNTY, WI – 1931 – WGNHS
By: A. R. Whitson, W. J. Geib, Homer Chapman, Robert Bartholomew, and O. L. Stockstad, of the Wisconsin Geological and Natural History Survey, and A. C. Anderson, M. J. Edwards, and E. H. Bailey of the U.S. Department of Agriculture.

OUTAGAMIE COUNTY, WI – 1921 – USDA, Bureau of Soils
By: W. J. Geib, in charge, and H. V. Geib, of the U.S. Department of Agriculture, and Marion C. Ford and Martin O. Tosterud, of the Wisconsin Geological and Natural History Survey.

OUTAGAMIE COUNTY, WI – 1921 – WGNHS
By: A. R. Whitson, W. J. Geib, Martin O. Tosterud, Marion C. Ford and E. J. Graul, of the Wisconsin Geological and Natural History Survey, and Horace V. Geib of the U.S. Department of Agriculture.

PIERCE COUNTY, WI – 1929 – USDA, Bureau of Chemistry and Soils
By: W. J. Geib, in charge, M. J. Edwards, and E. H. Templin, U.S. Department of Agriculture, and H. R. Lathrop, Wisconsin Geological and Natural History Survey.

PIERCE COUNTY, WI – 1930 – WGNHS
By: A. R. Whitson, F. L. Musbach, W. J. Geib, H. R. Lathrop, and W. H. Pierre, of the Wisconsin Geological and Natural History Survey, and M. J. Edwards, E. H. Templin, and E. H. Bailey, of the U.S. Department of Agriculture, Bureau of Chemistry and Soils.

PORTAGE COUNTY, WI – 1917 – USDA, Bureau of Soils
By: W. J. Geib, in charge, and L. R. Schoenmann, of the U.S. Department of Agriculture, and Lewis P. Hanson, of the Wisconsin Geological and Natural History Survey.

PORTAGE COUNTY, WI – 1918 – WGNHS

By: A. R. Whitson, W. J. Geib, T. J. Dunnewald, and Lewis P. Hanson, of the Wisconsin Geological and Natural History Survey, and L. R. Schoenmann of the U.S. Department of Agriculture.

RACINE COUNTY, WI – 1907 – USDA, Bureau of Soils
By: Grove B. Jones and Orla L. Ayrs of the U.S. Department of Agriculture

RACINE AND KENOSHA COUNTIES, WI – 1923 – WGNHS
By: A. R. Whitson, W. J. Geib, H. W. Stewart, W. M. Gibbs, and C. B. Clevenger of the Wisconsin Geological and Natural History Survey, and A. E. Taylor of the U.S. Department of Agriculture, Bureau of Soils.

ROCK COUNTY, WI – 1920 – USDA, Bureau of Soils
By: W. J. Geib, in charge, and Arthur E. Taylor, of the U.S. Department of Agriculture, and Guy Conrey and W. M. Gibbs, of the Wisconsin Geological and Natural History Survey.

ROCK COUNTY, WI – 1922 – WGNHS
By: A. R. Whitson, W. J. Geib, Guy Conrey, and W. M. Gibbs, of the Wisconsin Geological and Natural History Survey, and A. E. Taylor of the U.S. Department of Agriculture, Bureau of Soils.

SAUK COUNTY, WI – 1925 – USDA, Bureau of Chemistry and Soils
By: W. J. Geib, in charge, and M. J. Edwards, E. H. Bailey, and A. C. Anderson, U.S. Department of Agriculture, and T. J. Dunnewald, J. F. Fudge, O. L. Stockstad, and Homer Chapman, Wisconsin Geological and Natural History Survey.

SHEBOYGAN COUNTY, WI – 1929 – USDA, Bureau of Chemistry and Soils
By: W. J. Geib, in charge, and A. C. Anderson, U.S. Department of Agriculture, and W. H. Pierre, A. H. Meyer, G. D. Scarseth, and Robert Bartholomew, Wisconsin Geological and Natural History Survey.

SHEBOYGAN COUNTY, WI – 1931 – WGNHS
By: A. R. Whitson, W. J. Geib, A. H. Meyer, W. H. Pierre, G. D. Scarseth, Wisconsin Geological and Natural History Survey, and A. C. Anderson, U.S. Department of Agriculture.

TREMPEALEAU COUNTY, WI – 1927 – USDA, Bureau of Chemistry and Soils
By: M. J. Edwards, in charge, E. H. Bailey, and W. J. Geib, U.S. Department of Agriculture, and J. F. Fudge, Burel Butman, and Harold Cook, Wisconsin Geological and Natural History Survey.

VERNON COUNTY, WI – 1928 – USDA, Bureau of Chemistry and Soils
By: M. J. Edwards, in charge, and A. C. Anderson, U.S. Department of Agriculture, and A. H. Meyer, J. A. Chucka, and D. E. Wilcox, Wisconsin Geological and Natural History Survey.

VILAS COUNTY, WI – 1915 – WGNHS
By: A. R. Whitson, T. J. Dunnewald, W. C. Boardman, C. B. Post, and A. R. Albert.

WALWORTH COUNTY, WI – 1924 – USDA, Bureau of Soils
By: W. J. Geib, in charge, L. R. Schoenmann, and W. B. Cobb of the U.S. Department of Agriculture, and V. C. Leaper, and W. H. Pierre, of the Wisconsin Geological and Natural History Survey.

WALWORTH COUNTY, WI – 1924 – WGNHS
By: A. R. Whitson, W. J. Geib, W. H. Pierre, and C. B. Clevenger, of the Wisconsin Geological and Natural History Survey, and L. R. Schoenmann and W. B. Cobb, of the U.S. Department of Agriculture, Bureau of Soils.

WASHINGTON AND OZAUKEE COUNTIES, WI – 1926 – WGNHS

By: A. R. Whitson, W. J. Geib, W. H. Pierre, Vern C. Leaper, and Oscar Magistad of the Wisconsin Geological and Natural History Survey, and A. C. Anderson and Julius Kubier, of the U.S. Department of Agriculture, Bureau of Soils.

WASHINGTON AND OZAUKEE COUNTIES, WI – 1926 – USDA, Bureau of Soils
By: W. J. Geib, in charge, A. C. Anderson, A. H. Meyer, Julius Kubier, and C. B. Clevenger, of the U.S. Department of Agriculture, and W. H. Pierre, V. C. Leaper, and Oscar Magistad, of the Wisconsin Geological and Natural History Survey.

WAUKESHA COUNTY, WI – 1914 – WGNHS
By: A. R. Whitson, W. J. Geib, A. H. Meyer, P. O. Wood, and G. B. Jones.

WAUKESHA COUNTY, WI – 1956 – WGNHS
By: Francis D. Hole, Wisconsin Geological and Natural History Survey.

WAUPACA COUNTY, WI – 1920 – USDA, Bureau of Soils
By: W. J. Geib, in charge, and Clarence Lounsbury, of the U.S. Department of Agriculture, and Martin O. Tosterud, of the Wisconsin Geological and Natural History Survey.

WAUPACA COUNTY, WI – 1921 – WGNHS
By: A. R. Whitson, W. J. Geib, and Martin O. Tosterud, of the Wisconsin Geological and Natural History Survey, and Clarence Lounsbury of the U.S. Department of Agriculture.

WAUSHARA COUNTY, WI – 1913 – WGNHS
By: A. R. Whitson, W. J. Geib, G. Conrey, A. K. Kuhlman, and J. W. Nelson.

WINNEBAGO COUNTY, WI – 1927 – USDA, Bureau of Chemistry and Soils
By: A. C. Anderson, in charge, and W. J. Geib, U.S. Department of Agriculture, and H. H. Hull and Merritt Whitson, Wisconsin Geological and Natural History Survey.

WOOD COUNTY, WI – 1917 – USDA, Bureau of Soils
By: W. J. Geib, of the U.S. Department of Agriculture, in charge, and Guy Conrey, W. C. Boardman, and Clinton B. Post, of the Wisconsin Geological and Natural History Survey.

WOOD COUNTY, WI – 1918 – WGNHS
By: A. R. Whitson, W. J. Geib, Guy Conrey, W. C. Boardman, and Clinton B. Post, of the Wisconsin Geological and Natural History Survey.

Early Reconnoissance (sic) Soil Surveys

RECONNOISSANCE SOIL SURVEY OF PART OF NORTH WESTERN WISCONSIN – 1911 – WGNHS
By: S. Weidman, E. B. Hall, and F. L. Musback.

RECONNOISSANCE SOIL SURVEY OF SOUTH PART OF NORTH WESTERN WISCONSIN – 1914 – WGNHS
By: S. Weidman, E. B. Hall, and F. L. Musback.

RECONNOISSANCE SOIL SURVEY OF NORTH PART OF NORTH WESTERN WISCONSIN – 1914 – WGNHS
By: F. L. Musback, T. J. Dunnewald, C. Thompson, and O. J. Bergh.

RECONNOISSANCE SOIL SURVEY OF NORTH EASTERN WISCONSIN – 1916 – WGNHS

By: A. R. Whitson, W. J. Geib, C. Thompson, C. B. Post, A. L. Buser, L. R. Schoenmann, and A. E. Taylor.

RECONNOISSANCE SOIL SURVEY OF NORTH PART OF NORTH CENTRAL WISCONSIN – 1916 – WGNHS

By: A. R. Whitson, W. J. Geib, T. J. Dunnewald, Clinton B. Post, W. C. Boardman A. R. Albert, Arthur E. Taylor, L. R. Schoenmann, and C. Thompson.

RECONNOISSANCE SOIL SURVEY OF SOUTH PART OF NORTH CENTRAL WISCONSIN – 1917 – USDA, Bureau of Soils

By: W. J. Geib, in charge, Arthur E. Taylor, J. B. R. Dickey, and Carl Thompson, of the U. S. Department of Agriculture, and T. J. Dunnewald and Clinton B. Post, of the Wisconsin Geological and Natural History Survey.

RECONNOISSANCE SOIL SURVEY OF SOUTH PART OF NORTH CENTRAL WISCONSIN – 1918 – WGNHS

By: A. R. Whitson, W. J. Geib, T. J. Dunnewald, and Clinton B. Post, of the Wisconsin Geological and Natural History Survey, and Arthur E. Taylor, J. B. R. Dickey, and Carl Thompson, of the U. S. Department of Agriculture.

List of Soil Surveys Published 1950-2006

This section provides the following information for each Wisconsin soil survey: 1) date when field work was completed and date published, 2) soil scientists who did the manuscript report, 3) number of map units, 4) number of soil series, 5) number of pages in report, 6) scale of general soil map and number of map units, 7) number of map sheets, and 8) scale of soil maps.

ADAMS COUNTY

Major fieldwork for the soil survey was completed in the period 1973-1977. Soil names and descriptions were approved in 1978. The survey report was published in 1984. Dale E. Jakel, Soil Conservation Service, developed the survey report. The survey recorded 31 series and 55 map units in an area of 439,680 acres. The report consists of 142 pages. A general soil map of the county in color at a scale of 1:253,440 has 7 units. The detailed soil mapping consists of 57 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

ASHLAND COUNTY

Major fieldwork for the soil survey was completed in 2005. Soil names and descriptions were approved in 2006. A streamlined survey report was published on the Internet in 2006. Jesse M. Turk, Natural Resources Conservation Service, developed the survey report. The survey recorded 106 series and 193 map units in an area of 676,755 acres. The report consists of 244 pages. A general soil map of the county will be developed at a later date.

BARRON COUNTY

Major fieldwork for the soil survey was completed in the period 1940-47. The survey report was published in 1958. Glenn H. Robinson, Soil Conservation Service, developed the survey report. The survey recorded 30 series and 127 map units in an area of 554,240 acres. The report consists of 103 pages. The detailed soil mapping consists of 4 sheets at a scale of 2.0 inches per mile, or 1:31,680. The maps do not have a photomosiac base.

BARRON COUNTY (update)

Major fieldwork for the soil survey was completed in 1991. Soil names and descriptions were approved in 1992. The survey report was published in 2001. Dale E. Jakel, Natural Resources Conservation Service, developed the survey report. The survey recorded 50 series and 84 map units in an area of 569,197 acres. The report consists of 264 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 66 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

BAYFIELD COUNTY

Major fieldwork for the soil survey was completed in the period 1927-39. Soil names and descriptions were approved in 1958. The survey report was published in 1961. J. Kenneth Ableiter, Soil Conservation Service and F. D. Hole, Wisconsin Geological and Natural History Survey, developed the survey report. This reconnaissance soil survey recorded 26 series and 68 map units in an area of 961,920 acres. The report consists of 77 pages. The soil mapping consists of 12 sheets at a scale of 1:63,360. The maps do not have a photomosiac base.

BAYFIELD COUNTY (update)

Major fieldwork for the soil survey was completed in 2003. Soil names and descriptions were approved in 2004. A streamlined survey report was published on the Internet in 2006. Tim Miland, Natural Resources Conservation Service, developed the survey report. The survey recorded 96 series and 206 map units in an area of 967,872 acres. The report consists of 258 pages. A general soil map of the county will be developed at a later date.

BROWN COUNTY

Major fieldwork for this soil survey was done in the period 1966-69. Soil names and descriptions were approved in 1970. The survey report was published in 1974. Ernest G. Link, assisted by Charles F. Leonard, Howard E. Lorenz, Wayne D. Barndt, and Steven L. Elmer, Soil Conservation Service, developed the survey report. The survey recorded 39 series and 5 variants, and 110 map units in an area of 336,000 acres. The report consists of 119 pages. A general soil map of the county in color at a scale of 1:190,080 has 10 units. The detailed soil mapping consists of 47 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

BUFFALO COUNTY

Major fieldwork for this soil survey was done in 1957. Soil names and descriptions were approved in 1960. The survey report was published in 1962. Delbert D. Thomas developed the survey report, with contributions by Paul H. Carroll and Gordon N. Wing, Soil Conservation Service. The survey recorded 36 series and 202 map units in an area of 455,680 acres. The report consists of 103 pages. A general soil map of the county in color at a scale of 1:253,440 has 8 units. The detailed soil mapping consists of 45 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

BURNETT COUNTY

Major fieldwork for the soil survey was completed in 2002. Soil names and descriptions were approved in 2003. The survey report was published on the Internet in 2006. Fred J. Simeth, Natural Resources Conservation Service, developed the survey report. The survey recorded 102 series and 175 map units in an area of 562,733 acres. The report consists of 984 pages. A general soil map of the county will be developed at a later date.

CALUMET AND MANITOWOC COUNTIES

Major fieldwork for this soil survey was done in the period 1971-1975. Soil names and descriptions were approved in 1976. The survey report was published in 1980. Augustine J. Otter, Soil Conservation Service, developed the survey report. The survey recorded 39 series and 1 variant, and 76 map units in an area of 251,520 acres. The report consists of 176 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 123 sheets on a photomosiac base at a scale of 4 inches per mile, or 1:15,840.

CHIPPEWA COUNTY

Major fieldwork for the soil survey was completed in 1984. Soil names and descriptions were approved in 1985. The survey report was published in 1989. Dale E. Jakel and Roger A. Dahl, Soil Conservation Service developed the survey report. The survey recorded 67 series and 2 variants, and 129 map units in an area of 666,464 acres. The report consists of 280 pages. A general soil map of the county in color at a scale of 1:253,440 has 8 units. The detailed soil mapping consists of 151 sheets on a photomosiac base at a scale of 4 inches per mile, or 1:15,840.

CLARK COUNTY

Major fieldwork for this soil survey was completed in 1993. Soil names and descriptions were approved in 1994. The survey report was published in 2002. Duane T. Simonson and Howard E. Lorenz, Natural Resources Conservation Service developed the survey report. The survey recorded 63 series and 90 map units in an area of 779,953 acres. The report consists of 421 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 88 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

COLUMBIA COUNTY

Major fieldwork for the soil survey was completed in the period 1967-1971. Soil names and descriptions were approved in 1972. The survey report was published in 1978. Michael J. Mitchell, Soil Conservation Service, developed the survey report. The survey recorded 58 series and 4 variants, and 153 map units in an area of 497,920 acres. The report consists of 156 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 122 sheets on a photomosiac base at a scale of 4 inches per mile, or 1:15,840.

CRAWFORD COUNTY

Major fieldwork for the soil survey was completed in 1958. Soil names and descriptions were approved in 1959. The survey report was published in 1961. Robert W. Slota and Glenn D. Garvey, Soil Conservation Service developed the survey report. The survey recorded 28 series and 142 map units in an area of 375,040 acres. The report consists of 85 pages. A general soil map of the county in black and white at an unlisted scale has 5 units. The detailed soil mapping consists of 39 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

DANE COUNTY

Major fieldwork for the soil survey was completed in the period 1966-71. Soil names and descriptions were approved in 1972. The survey report was published in 1978. Carl L. Glocker and Robert A. Patzer, Soil Conservation Service developed the survey report. The survey recorded 60 series and 3 variants, and 153 map units in an area of 766,912 acres. The report consists of 193 pages. A general soil map of the county in color at a scale of 1:126,720 has 10 units. The detailed soil mapping consists of 181 sheets on a photomosiac base at a scale of 4 inches per mile, or 1:15,840.

DODGE COUNTY

Major fieldwork for this soil survey was completed in the period 1953-58. Soil names and descriptions were approved in 1967 and amended in 1976. The survey report was published in 1980. Robert E. Fox, Soil Conservation Service and Gerhardt B. Lee, Professor of Soil Science, University of Wisconsin developed the survey report. The survey recorded 39 series and 5 variants, and 111 map units in an area of 582,400 acres. The report consists of 201 pages. A general soil map of the county in color at a scale of 1:253,440 has 7 units. The detailed soil mapping consists of 135 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

DOOR COUNTY

Major fieldwork for this soil survey was completed in the period 1970-74. Soil names and descriptions were approved in 1975. The survey report was published in 1978. Ernest G. Link, Steven L. Elmer, and Sidney A. Vanderveen, Soil Conservation Service developed the survey report. The survey recorded 34 series and 7 variants, and 75 map units in an area of 314,560 acres. The report consists of 132 pages. A general soil map of the county in color at a scale of 1:316,800 has 6 units. The detailed soil mapping consists of 80 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

DOUGLAS COUNTY

Major fieldwork for the soil survey was completed in 2004. Soil names and descriptions were approved in 2006. A streamlined survey report was published on the Internet in 2006. Fred J. Simeth, Natural Resources Conservation Service, developed the survey report. The survey recorded 116 series and 216 map units in an area of 859,385 acres. The report consists of 274 pages. A general soil map of the county will be developed at a later date.

DUNN COUNTY

Major fieldwork for this soil survey was completed in 1969. Soil names and descriptions were approved in 1970. The survey report was published in 1975. Gordon N. Wing, Soil Conservation Service, developed the survey report. The survey recorded 49 series and 7 variants, and 131 map units in an area of 545,792 acres. The report consists of 117 pages. A general soil map of the county in color at a scale of 1:190,080 has 8 units. The detailed soil mapping consists of 126 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

DUNN COUNTY (update)

Major fieldwork for this soil survey was completed in 2000. Soil names and descriptions were approved in 2003. The survey report was published in 2004. Theron A. Meyer, Natural Resources Conservation Service, developed the survey report. The survey recorded 90 series and 171 map units in an area of 552,723 acres. The report consists of 694 pages. A new general soil map was not published as part of this update project. The detailed soil mapping was printed on a quarter quad format using digital map finishing at a scale of 5.28 inches per mile, or 1:12,000.

EAU CLAIRE COUNTY

Major fieldwork for this soil survey was completed in the period 1967-73. Soil names and descriptions were approved in 1974. The survey report was published in 1977. Delbert D. Thomas, Soil Conservation Service, developed the survey report. The survey recorded 55 series and 2 variants, and 111 map units in an area of 414,272 acres. The report consists of 144 pages. A general soil map of the county in color at a scale of 1:190,080 has 7 units. The detailed soil mapping consists of 95 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

FLORENCE COUNTY - WGNHS

This bulletin was published in 1962. The report consists of 140 pages. A soil map at the scale of 1:63,360 is included**.** Major fieldwork for this soil survey was done by F. D. Hole, G. W. Olson, K. O. Schmude, and C. J. Milfred.

FLORENCE COUNTY

Major fieldwork for this soil survey was completed in 1995. Soil names and descriptions were approved in 1995. The survey report was published in 2004. Joseph M. Boelter and Angela M. Elg, Natural Resources Conservation Service developed the survey report. The survey recorded 40 series and 79 map units in an area of 318,215 acres. The report consists of 367 pages. A general soil map of the county was not developed. The detailed soil mapping consists of 55 sheets on a photomosiac base at a scale of 5.28 inches per mile, or 1:12,000.

FOND DU LAC COUNTY

Major fieldwork for this soil survey was completed in the period 1958-63. Soil names and descriptions were approved in 1967. The survey report was published in 1973. Ernest G. Link, Soil Conservation Service, developed the survey report. The survey recorded 50 series and 7 variants, and 192 map units in an area of 463,360 acres. The report consists of 115 pages. A general soil map of the county in color at a scale of 1:190,080 has 8 units. The detailed soil mapping consists of 92 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

FOREST COUNTY

Major fieldwork for this soil survey was completed in 1995. Soil names and descriptions were approved in 1995. The survey report was published in 2005. Joseph M. Boelter, Angela M. Elg, and James R. Barnes, Natural Resources Conservation Service developed the survey report. The survey recorded 39

series and 54 map units in an area of 669,863 acres. The report consists of 292 pages. A general soil map of the county was not developed. The detailed soil mapping consists of 98 sheets on a photomosiac base at a scale of 5.28 inches per mile, or 1:12,000.

GRANT COUNTY - WGNHS

This bulletin was published in 1956. The report consists of 54 pages. A soil map at the scale of 1:63,360 is included. F. D. Hole developed the survey report.

GRANT COUNTY

Major fieldwork for this soil survey was completed in 1951. Soil names and descriptions were approved in 1959. The survey report was published in 1961. Glenn H. Robinson and A. J. Klingelhoets, Soil Conservation Service developed the survey report. The survey recorded 31 series and 230 map units in an area of 757,760 acres. The report consists of 98 pages. A general soil map of the county in black and white at an unlisted scale has 6 units. The detailed soil mapping consists of 72 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

GREEN COUNTY

Major fieldwork for this soil survey was completed in the period 1960-63. Soil names and descriptions were approved in 1967. The survey report was published in 1974. Carl L. Glocker, Soil Conservation Service, developed the survey report. The survey recorded 75 series and 4 variants, and 204 map units in an area of 374,272 acres. The report consists of 161 pages. A general soil map of the county in color at a scale of 1:190,080 has 8 units. The detailed soil mapping consists of 70 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

GREEN LAKE COUNTY

Major fieldwork for this soil survey was completed in the period 1970-73. Soil names and descriptions were approved in 1973. The survey report was published in 1977. Frank L. Anderson and Howard F. Gundlach, Soil Conservation Service developed the survey report. The survey recorded 46 series and 2 variants, and 105 map units in an area of 226,816 acres. The report consists of 132 pages. A general soil map of the county in color at a scale of 1:190,080 has 7 units. The detailed soil mapping consists of 32 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

IOWA COUNTY

Major fieldwork for this soil survey was completed in 1958. Soil names and descriptions were approved in 1960. The survey report was published in 1962. A. J. Klingelhoets, Soil Conservation Service, developed the survey report. The survey recorded 40 series and 1 variant, and 227 map units in an area of 487,040 acres. The report consists of 101 pages. A general soil map of the county in black and white at an unlisted scale has 6 units. The detailed soil mapping consists of 44 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

IRON COUNTY

Major fieldwork for the soil survey was completed in 2005. Soil names and descriptions were approved in 2006. A streamlined survey report was published on the Internet in 2006. Terry Kroll, Natural Resources Conservation Service, developed the survey report. The survey recorded 94 series and 198 map units in an area of 514,259 acres. The report consists of 252 pages. A general soil map of the county will be developed at a later date.

JACKSON COUNTY

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1992. The survey report was published in 1998. John E. Langton and Duane T. Simonson, Natural Resources Conservation Service developed the survey report. The survey recorded 60 series and 94 map units in an area of 639,879 acres. The report consists of 328 pages. A general soil map of the county in color at a scale of 1:316,800 has 10 units. The detailed soil mapping consists of 84 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

JEFFERSON COUNTY - WGNHS

This bulletin was published in 1970. The report consists of 172 pages. A soil map at the scale of 1:63,360 is included. Clarence J. Milfred and Francis D. Hole developed this report.

JEFFERSON COUNTY

Major fieldwork for this soil survey was completed in the period 1971-75. Soil names and descriptions were approved in 1976. The survey report was published in 1979. Carl L. Glocker, Soil Conservation Service, developed the survey report. The survey recorded 48 series and 2 variants, and 82 map units in an area of 360,960 acres. The report consists of 169 pages. A general soil map of the county in color at a scale of 1:190,080 has 7 units. The detailed soil mapping consists of 84 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

JUNEAU COUNTY

Major fieldwork for this soil survey was completed in 1987. Soil names and descriptions were approved in 1987. The survey report was published in 1991. Howard F. Gundlach, Randall R. Gilbertson, Richard M. Johannes, and Theron A. Meyer III, Soil Conservation Service developed the survey report. The survey recorded 35 series and 1 variant, and 60 map units in an area of 514,752 acres. The report consists of 205 pages. A general soil map of the county in color at a scale of 1:253,440 has 8 units. The detailed soil mapping consists of 120 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

KENOSHA AND RACINE COUNTIES

Major fieldwork for this soil survey was completed in 1965. Soil names and descriptions were approved in 1967. The survey report was published in 1970. Ernest G. Link and Owen R. Demo, Soil Conservation Service developed the survey report. The survey recorded 55 series and 5 variants, and 135 map units in an area of 390,400 acres. The report consists of 113 pages. A general soil map of the county in color at a scale of 1:190,080 has 9 units. The detailed soil mapping consists of 105 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

KEWAUNEE COUNTY

Major fieldwork for this soil survey was completed in the period 1974-77. Soil names and descriptions were approved in 1977. The survey report was published in 1980. Ernest G. Link and Steven W. Frings, Soil Conservation Service developed the survey report. The survey recorded 40 series and 3 variants, and 84 map units in an area of 211,072 acres. The report consists of 187 pages. A general soil map of the county in color at a scale of 1:190,080 has 8 units. The detailed soil mapping consists of 48 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

LA CROSSE COUNTY

Major fieldwork for this soil survey was completed in 1956. Soil names and descriptions were approved in 1957. The survey report was published in 1960. Marvin T. Beatty, Soil Conservation Service, developed the survey report. The survey recorded 32 series and 176 map units in an area of 300,160 acres. The report consists of 93 pages. A general soil map of the county in color has 6 units. The detailed soil mapping consists of 30 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,0000.

LA CROSSE COUNTY (update)

Major fieldwork for the soil survey was completed in 1999. Soil names and descriptions were approved in 2001. A survey report was published on the Internet in 2006. Duane T. Simonson, Natural Resources Conservation Service, developed the survey report. The survey recorded 63 series and 100 map units in an area of 307,437 acres. The report consists of 426 pages. A general soil map of the county will be developed at a later date.

LA FAYETTE COUNTY

Major fieldwork for this soil survey was completed in 1960. Soil names and descriptions were approved in 1964. The survey report was published in 1966. Bruce G. Watson, Soil Conservation Service, developed the survey report. The survey recorded 37 series and 4 variants, and 179 map units in an area of 411,520 acres. The report consists of 137 pages. A general soil map of the county in color at a scale of

1:190,080 has 9 units. The detailed soil mapping consists of 105 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

LANGLADE COUNTY

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1984. The survey report was published in 1986. Michael J. Mitchell, Soil Conservation Service, developed the survey report. The survey recorded 29 series and 33 map units in an area of 568,333 acres. The report consists of 167 pages. A general soil map of the county in color at a scale of 1:253,440 has 6 units. The detailed soil mapping consists of 66 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

LINCOLN COUNTY

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1993. The survey report was published in 1996. Michael J. Mitchell, Natural Resources Conservation Service, developed the survey report. The survey recorded 39 series and 51 map units in an area of 581,261 acres. The report consists of 266 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 70 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

MARATHON COUNTY

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in 1986. The survey report was published in 1989. William D. Fiala, David A. Buss, Sam D. Hagedorn, Kim A. Kidney, and John O. Werlein, Soil Conservation Service developed the survey report. The survey recorded 41 series and 79 map units in an area of 1,008,768 acres. The report consists of 217 pages. A general soil map of the county in color at a scale of 1:253,440 has 10 units. The detailed soil mapping consists of 122 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

MARATHON COUNTY (update)

Major fieldwork for this soil survey was completed in 1985. Revised mapping of certain map units in the northern and western parts of the county was completed in 1996. Soil names and descriptions were approved in 1986 and 1997. The survey report was published in 2003. William D. Fiala, David A. Buss, Sam D. Hagedorn, Kim A. Kidney, and John O. Werlein, Natural Resources Conservation Service developed the survey report. The survey recorded 41 series and 79 map units in an area of 1,008,768 acres. The report is published in two parts. Part 1 has 230 pages, part 2 includes the detailed soil maps and map sheet index. A general soil map of the county in color at a scale of 1:253,440 has 10 units. The detailed soil mapping consists of 122 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

MARINETTE COUNTY

Major fieldwork for this soil survey was completed in 1986. Soil names and descriptions were approved in 1987. The survey report was published in 1991. Howard E. Lorenz, Soil Conservation Service, developed the survey report. The survey recorded 50 series and 85 map units in an area of 916,051 acres. The report consists of 263 pages. A general soil map of the county in color at a scale of 1:316,800 has 11 units. The detailed soil mapping consists of 116 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

MARQUETTE COUNTY - WGNHS

This bulletin was published in 1961. The report consists of 95 pages. A soil map at the scale of ¾ inch = 1 mile is included**.** T. R. Peck and G. B. Lee developed this report.

MARQUETTE COUNTY

Major fieldwork for this soil survey was completed in the period 1946-63. Soil names and descriptions were approved in 1969. The survey report was published in 1975. Keith O. Schmude, Soil Conservation Service, developed the survey report. The survey recorded 31 series and 3 variants, and 129 map units in an area of 291,200 acres. The report consists of 91 pages. A general soil map of the county in color at a scale of 1:190,080 has 8 units. The detailed soil mapping consists of 37 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

MENOMINEE COUNTY - WGNHS

This bulletin was published in 1967. The report consists of 203 pages. Three maps were included in this report: glacial, soils, and vegetation at a scale of 1:63,360. Clarence J. Milfred, Gerald W. Olson, Francis D. Hole, developed the publication, with chapters by F. P. Baxter, F. G. Goff, W. A. Creed, and Forest Stearns.

MENOMINEE COUNTY

Major fieldwork for this soil survey was completed in 1998. Soil names and descriptions were approved in 1998. The survey report was published in 2004. Michael J. Mitchell and Richard M. Johannes, Natural Resources Conservation Service developed the survey report. The survey recorded 54 series and 103 map units in an area of 233,664 acres. The report consists of 435 pages. A general soil map of the county was not developed. The detailed soil mapping consists of 37 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

MILWAUKEE AND WAUKESHA COUNTIES

Major fieldwork for this soil survey was completed in the period 1963-65. Soil names and descriptions were approved in 1966. The survey report was published in 1971. J. A. Steingraeber and Charles A. Reynolds, Soil Conservation Service developed the survey report. The survey recorded 59 series and 4 variants, and 142 map units in an area of 152,960 acres. The report consists of 177 pages. A general soil map of the county in color at a scale of 1:190,080 has 10 units. The detailed soil mapping consists of 138 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

MONROE COUNTY

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1981. The survey report was published in 1984. Wayne D. Barndt and John E. Langton, Soil Conservation Service developed the survey report. The survey recorded 42 series and 78 map units in an area of 585,280 acres. The report consists of 206 pages. A general soil map of the county in color at a scale of 1:253,440 has 6 units. The detailed soil mapping consists of 138 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

OCONTO COUNTY

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1985. The survey report was published in 1988. David C. Roberts, John E. Campbell, and Terry L. Kroll, Soil Conservation Service developed the survey report. The survey recorded 35 series and 67 map units in an area of 650,976 acres. The report consists of 180 pages. A general soil map of the county in color at a scale of 1:316,800 has 8 units. The detailed soil mapping consists of 155 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

ONEIDA COUNTY - WGNHS

This bulletin was published in 1959. The report consists of 59 pages. A soil map at the scale of ¾ inch = 1 mile is included**.** F. D. Hole and K. O. Schmude developed the report.

ONEIDA COUNTY

Major fieldwork for this soil survey was completed in 1987. Soil names and descriptions were approved in 1988. The survey report was published in 1993. Joseph M. Boelter, Soil Conservation Service, developed the survey report. The survey recorded 27 series and 46 map units in an area of 791,347 acres. The report consists of 181 pages. A general soil map of the county in color at a scale of 1:253,440 has 9 units. The detailed soil mapping consists of 95 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

OUTAGAMIE COUNTY

Major fieldwork for this soil survey was completed in the period 1965-66 and 1970-74. Soil names and descriptions were approved in 1975. The survey report was published in 1978. Wayne D. Barndt, Howard E. Lorenz and Steven W. Frings, Soil Conservation Service developed the survey report. The survey recorded 44 series and 1 variant, and 85 map units in an area of 406,016 acres. The report consists of 129 pages. A general soil map of the county in color at a scale of 1:190,080 has 7 units. The detailed soil mapping consists of 84 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

OZAUKEE COUNTY

Major fieldwork for this soil survey was completed in the period 1962-64. Soil names and descriptions were approved in 1966. The survey report was published in 1970. Dale E. Parker, Donald C. Kurer, and Joseph A. Steingraeber, Soil Conservation Service developed the survey report. The survey recorded 42 series and 2 variants, and 87 map units in an area of 150,400 acres. The report consists of 92 pages. A general soil map of the county in color at a scale of 1:126,720 has 5 units. The detailed soil mapping consists of 41 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

PEPIN COUNTY

Major fieldwork for this soil survey was completed in the period 1958. Soil names and descriptions were approved in 1961. The survey report was published in 1964. Delbert D. Thomas, Soil Conservation Service, developed the survey report. The survey recorded 39 series and 3 variants, and 217 map units in an area of 151,680 acres. The report consists of 141 pages. A general soil map of the county in color at a scale of 1:126,720 has 7 units. The detailed soil mapping consists of 16 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

PEPIN COUNTY (update)

Major fieldwork for this soil survey was completed in 1996. Soil names and descriptions were approved in 1997. The survey report was published in 2001. Theron A. Meyer, Natural Resources Conservation Service, developed the survey report. The survey recorded 59 series and 106 map units in an area of 158,925 acres. The report is divided into three parts. Part 1 consists of 152 pages; part 2 consists of 404 pages; and part 3 includes the detailed soil maps.

PIERCE COUNTY

Major fieldwork for this soil survey was completed in the period 1957-61. Soil names and descriptions were approved in 1965. The survey report was published in 1968. Orville L. Haszel, Soil Conservation Service, developed the survey report. The survey recorded 55 series and 4 variants, and 245 map units in an area of 378,240 acres. The report consists of 165 pages. A general soil map of the county in color has 10 units. The detailed soil mapping consists of 102 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

PIERCE COUNTY (update)

Major fieldwork for the soil survey was completed in 2005. Soil names and descriptions were approved in 2006. A streamlined survey report was published on the Internet in 2006. Theron A. Meyer and Timothy J. Miland, Natural Resources Conservation Service developed the survey report. The survey recorded 71 series and 159 map units in an area of 378,732 acres. The report consists of 174 pages. A general soil map of the county will be developed at a later date.

POLK COUNTY

Major fieldwork for this soil survey was completed in the period 1973-75. Soil names and descriptions were approved in 1976. The survey report was published in 1979. Everett J. Kissinger, Soil Conservation Service, developed the survey report. The survey recorded 36 series and 7 variants, and 103 map units in an area of 619,520 acres. The report consists of 203 pages. A general soil map of the county in color at a scale of 1:253,440 has 8 units. The detailed soil mapping consists of 124 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

PORTAGE COUNTY

Major fieldwork for this soil survey was completed in the period 1966-71. Soil names and descriptions were approved in 1972. The survey report was published in 1978. Augustine J. Otter and William D. Fiala, Soil Conservation Service developed the survey report. The survey recorded 31 series and 7 variants, and 71 map units in an area of 515,840 acres. The report consists of 96 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 67 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

PRICE COUNTY

Major fieldwork for the soil survey was completed in 2004. Soil names and descriptions were approved in 2005. A streamlined survey report was published on the Internet in 2006. Arthur L. Voigtlander, Natural Resources Conservation Service, developed the survey report. The survey recorded 64 series and 150 map units in an area of 818,547 acres. The report consists of 216 pages. A general soil map of the county will be developed at a later date.

RICHLAND COUNTY

Major fieldwork for the soil survey was completed in 1949. Soil names and descriptions were approved in 1956. The survey report was published in 1959. Glenn H. Robinson and A. J. Klingelhoets, Soil Conservation Service, developed the survey report. The survey recorded 26 series and 74 map units in an area of 373,760 acres. The report consists of 42 pages. A soil association map (specific soil series are not identified) of the county in color has 4 units. The detailed soil mapping consists of 51 sheets at a scale of 3.16 inches per mile, or 1:20,000. The maps do not have a photomosiac base.

RICHLAND COUNTY (update)

Major fieldwork for the soil survey was completed in 2001. Soil names and descriptions were approved in 2002. A streamlined survey report was published on the Internet in 2006. Duane T. Simonson, Natural Resources Conservation Service, developed the survey report. The survey recorded 64 series and 101 map units in an area of 377,863 acres. The report consists of 140 pages. A general soil map of the county will be developed at a later date.

ROCK COUNTY

Major fieldwork for this soil survey was completed in the period 1965-69. Soil names and descriptions were approved in 1970. The survey report was published in 1974. No specific individual was identified as having developed the survey report. The survey recorded 54 series and 5 variants, and 149 map units in an area of 461,440 acres. The report consists of 160 pages. A general soil map of the county in color at a scale of 1:190,080 has 9 units. The detailed soil mapping consists of 56 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

RUSK COUNTY

Major fieldwork for the soil survey was completed in 2004. Soil names and descriptions were approved in 2005. A streamlined survey report was published on the Internet in 2006. Arthur L. Voigtlander, Natural Resources Conservation Service, developed the survey report. The survey recorded 78 series and 140 map units in an area of 595,622 acres. The report consists of 188 pages. A general soil map of the county will be developed at a later date.

SAUK COUNTY

Major fieldwork for this soil survey was completed in the period 1962-76. Soil names and descriptions were approved in 1977. The survey report was published in 1980. Howard F. Gundlach, Soil Conservation Service, developed the survey report. The survey recorded 54 series and 5 variants, and 127 map units in an area of 544,640 acres. The report consists of 248 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 131 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

SAWYER COUNTY

Major fieldwork for the soil survey was completed in 2005. Soil names and descriptions were approved in 2006. A streamlined survey report was published on the Internet in 2006. Arthur L. Voigtlander, Natural Resources Conservation Service, developed the survey report. The survey recorded 96 series and 202 map units in an area of 863,846 acres. The report consists of 266 pages. A general soil map of the county will be developed at a later date.

SHAWANO COUNTY

Major fieldwork for this soil survey was completed in the period 1974-80. Soil names and descriptions were approved in 1981. The survey report was published in 1982. Howard F. Gundlach, John E. Campbell, Terry J. Huffman, William L. Kowalski, Raymond L. Newbury, and David C. Roberts, Soil Conservation Service developed the survey report. The survey recorded 39 series and 7 variants, and 90

map units in an area of 597,055 acres. The report consists of 216 pages. A general soil map of the county in color at a scale of 1:253,440 has 8 units. The detailed soil mapping consists of 114 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

SHEBOYGAN COUNTY

Major fieldwork for this soil survey was completed in the period 1967-73. Soil names and descriptions were approved in 1974. The survey report was published in 1978. Robert J. Engel, Bruce A. Roberts, and Joseph A. Steingraeber, Soil Conservation Service developed the survey report. The survey recorded 45 series and 3 variants, and 96 map units in an area of 323,392 acres. The report consists of 116 pages. A general soil map of the county in color at a scale of 1:190,080 has 5 units. The detailed soil mapping consists of 77 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

ST. CROIX COUNTY

Major fieldwork for this soil survey was completed in the period 1969-74. Soil names and descriptions were approved in 1975. The survey report was published in 1978. John E. Langton, Soil Conservation Service, developed the survey report. The survey recorded 43 series and 2 variants, and 113 map units in an area of 469,760 acres. The report consists of 145 pages. A general soil map of the county in color at a scale of 1:190,080 has 8 units. The detailed soil mapping consists of 96 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

TAYLOR COUNTY

Major fieldwork for the soil survey was completed in 1998. Soil names and descriptions were approved in 2000. A survey report was published on the Internet in 2005. Joseph M. Boelter, Natural Resources Conservation Service, developed the survey report. The survey recorded 45 series and 99 map units in an area of 628,538 acres. The report consists of 699 pages. A general soil map of the county will be developed at a later date.

TREMPEALEAU COUNTY

Major fieldwork for this soil survey was completed in the period 1958-67. Soil names and descriptions were approved in 1968. The survey report was published in 1977. John E. Langton, Soil Conservation Service, developed the survey report. The survey recorded 35 series and 6 variants, and 128 map units in an area of 470,340 acres. The report consists of 121 pages. A general soil map of the county in color at a scale of 1:253,440 has 8 units. The detailed soil mapping consists of 112 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

VERNON COUNTY

Major fieldwork for this soil survey was completed in the period 1958-64. Soil names and descriptions were approved in 1965. The survey report was published in 1969. Robert W. Slota, Soil Conservation Service, developed the survey report. The survey recorded 33 series and 1 variant, and 148 map units in an area of 515,200 acres. The report consists of 82 pages. A general soil map of the county in color at a scale of 1:253,440 has 5 units. The detailed soil mapping consists of 140 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

VILAS COUNTY

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1984. The survey report was published in 1988. Larry L. Natzke and David J. Hvizdak, Soil Conservation Service developed the survey report. The survey recorded 21 series and 1 variant, and 43 map units in an area of 651,098 acres. The report consists of 156 pages. A general soil map of the county in color at a scale of 1:253,440 has 7 units. The detailed soil mapping consists of 83 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

WALWORTH COUNTY

Major fieldwork for this soil survey was completed in the period 1959-64. Soil names and descriptions were approved in 1966. The survey report was published in 1971. Orville L. Haszel, Soil Conservation Service, developed the survey report. The survey recorded 41 series and 3 variants, and 100 map units in an area of 358,400 acres. The report consists of 107 pages. A general soil map of the county

in color at a scale of 1:190,080 has 9 units. The detailed soil mapping consists of 96 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

WASHBURN COUNTY

Major fieldwork for the soil survey was completed in 2001. Soil names and descriptions were approved in 2002. A survey report was published on the Internet in 2006. Fred J. Simeth, Natural Resources Conservation Service, developed the survey report. The survey recorded 81 series and 148 map units in an area of 546,912 acres. The report consists of 854 pages. A general soil map of the county will be developed at a later date.

WASHINGTON COUNTY

Major fieldwork for this soil survey was completed in the period 1963-65. Soil names and descriptions were approved in 1966. The survey report was published in 1971. Keith O. Schmude, Soil Conservation Service, developed the survey report. The survey recorded 48 series and 2 variants, and 106 map units in an area of 273,920 acres. The report consists of 105 pages. A general soil map of the county in color at a scale of 1:190,080 has 7 units. The detailed soil mapping consists of 72 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

WAUKESHA COUNTY - WGNHS

This bulletin was published in 1956. The report consists of 63 pages. A soil map at the scale of 1:63,360 is included**.** F. D. Hole developed the report.

WAUPACA COUNTY

Major fieldwork for this soil survey was completed in 1981. Soil names and descriptions were approved in 1982. The survey report was published in 1984. Augustine J. Otter, Soil Conservation Service, developed the survey report. The survey recorded 34 series and 1 variant, and 61 map units in an area of 487,040 acres. The report consists of 167 pages. A general soil map of the county in color at a scale of 1:253,440 has 6 units. The detailed soil mapping consists of 96 sheets on a photomosiac base at a scale of 4.0 inches per mile, or 1:15,840.

WAUSHARA COUNTY

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in 1986. The survey report was published in 1989. Augustine J. Otter, Fred J. Simeth, and Duane T. Simonson, Soil Conservation Service developed the survey report. The survey recorded 31 series and 1 variant, and 49 map units in an area of 408,122 acres. The report consists of 158 pages. A general soil map of the county in color at a scale of 1:190,080 has 8 units. The detailed soil mapping consists of 48 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

WINNEBAGO COUNTY

Major fieldwork for this soil survey was completed in the period 1973-1976. Soil names and descriptions were approved in 1977. The survey report was published in 1980. Micheal J. Mitchell, Soil Conservation Service, developed the survey report. The survey recorded 49 series and 2 variants, and 74 map units in an area of 369,920 acres. The report consists of 182 pages. A general soil map of the county in color at a scale of 1:190,080 has 7 units. The detailed soil mapping consists of 39 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

WOOD COUNTY

Major fieldwork for this soil survey was completed in the period 1960-70. Soil names and descriptions were approved in 1971. The survey report was published in 1977. Robert J. Bartelme, Soil Conservation Service, developed the survey report. The survey recorded 45 series and 3 variants, and 83 map units in an area of 516,544 acres. The report consists of 104 pages. A general soil map of the county in color at a scale of 1:253,440 has 11 units. The detailed soil mapping consists of 64 sheets on a photomosiac base at a scale of 3.16 inches per mile, or 1:20,000.

Wisconsin 10th State to have Entire Soil Survey On-line

The decision to have all 69 Wisconsin Soil Survey Areas available on the Web Soil Survey (WSS) website in time for the May 16th, 2006 Year of Soil celebration at the Wisconsin State Capitol was put in motion by State Soil Scientist Don Fehrenbacher sometime in January of 2006. This gave the soil scientists less than five months to complete all the remaining population and editing of tabular data, as well as the remaining spatial data certification, for more than 6 Soil Survey Areas (SSA). This deadline date preceded the originally planned date by more than 4 months. This decision was admittedly received with some skepticism by most of the soil scientists and the digitizing unit staff but all felt it was a worthwhile goal and pledged to give the effort every chance to succeed. Fifty five older published soil surveys, four new updated soil surveys, and five of the NW10 surveys had already been SSURGO (Soil Survey Geographic Database) certified and were available on WSS. The SSA's that remained were the update of Pierce County and the five remaining initial surveys of the NW10. Fieldwork was essentially complete but countless hours of soil property data remained for needed checking and editing. Correlation editing was also ongoing for most or all of these counties, which affected the time needed for spatial editing and verification.

It needs to be mentioned that every one of the soil scientists in the state gave an extra effort in the final years and were an important part of this milestone event even though there names might not be seen in the following paragraphs. John Campbell, Scot Haley and Mark Krupinski were GS-11 "super mappers" who had higher goals and were willing to travel further and map in areas of the NW10 wherever they were needed. Scot Haley had already moved to Indiana to accept the Area Resource Soil Scientist position at Fort Wayne, but his efforts in NASIS and 3dMapper were not forgotten. Jesse Turk, soil scientist in Ashland, was the GIS and 3dMapper expert who managed the field digitized spatial layers for the NW10. Roger Dahl, spent several years on mapping details in the NW10, mostly to Rusk and Sawyer counties, and exceeded his goals consistently. Rich Johannes was another dedicated soil scientist who accepted mapping assignments wherever he was needed. Donna Ferren-Guy, Chanc Vogel, and Duane Simonson, were assigned to the update surveys in MLRA 105 and all contributed in ways that helped in this success. Donna spent the last mapping season helping to complete the update of Pierce County and Chanc accepted several mapping details to areas in the NW10. Duane was Chanc and Donna's supervisor for many years while they completed the updates of La Crosse and Richland counties. Carl Wacker, Assistant State Soil Scientist at the State Office in Madison, was invaluable in assisting all soil scientists with his expertise in tabular property data. Sam Hagedorn and Angie Elg were two ex-NRCS contract mappers brought on board during the final stages of the field soil survey work to give the mapping a boost.

This short summary will take you through the final days beginning the last week of April. The deadline date was fast approaching and even though we still had lots of work to do, the topic of success was starting to emerge in the conversations of soil scientists across the state.

The final push to complete all the SSURGO certifications began the week of April 24th when Art Voigtlander, Fred Simeth, and Jeff Talsky traveled to Madison to review pen plots for Sawyer County and make digital edits and re-correlations. The next two weeks Art worked with Mark Roloff and Adolfo Diaz, from the Digitizing Unit, to complete the correlation changes needed for Price and Rusk County. Dave Hvizdak, NW10 Correlator, was also in Madison at this time assisting with correlation edits for Sawyer, Ashland, and Iron counties, and Joe Jahnke, MO10 SDQS for Wisconsin, was assisting from St. Paul by phone. Howard Gundlach, Soil Scientist assigned to the Digitizing Unit, was also working on spatial edits and joins for Sawyer County. Most NW10 soil scientists were trouble shooting for any county and any issue where they could help out. The attitude was very positive as everyone felt we were very close and we actually had a chance to complete the state.

Tim Meyer and Tim Miland arrived in Madison very early the morning of May 15, the day before the Year of Soil celebration, to clean up remaining issues with the Pierce County update and planned to commit this SSA in late morning. Spatial issues with the county boundary join between Pierce County and Minnesota prevented this survey from verifying. It took several spatial imports before the issues were resolved. It wasn't until mid afternoon before Pierce County had been committed.

Ken Lubich, National Program Director for the Soil Survey Division of the Natural Resources Conservation Service, was present in Madison for a presentation on the status of the Soil Survey Program and also to take part in the Year of Soil celebration. Ken began his career as a field soil scientist in Wisconsin and also served as State Soil Scientist and National Digitizing Coordinator in Madison. In the early afternoon of May 15th, most soil scientists attended the presentation by Ken Lubich at the Best Western Inn on the Park motel although some were still working at the State Office on last minute spatial issues. In late afternoon at the conclusion of Ken's presentation and subsequent discussions, and with all of the Wisconsin soil scientists now in attendance, the group moved upstairs into the hospitality room for pizza and a few Point beers which were specially brewed and labeled for the "2006 Year of Soil". During the presentation and the hospitality activities, work on the SSAs continued. Many of the NW10 soil scientists including Art Voigtlander, Terry Kroll, and Fred Simeth were furiously resolving issues on the last few survey areas including Sawyer, Ashland, and Iron. Adolfo Diaz and Mark Roloff were converting these correlation issues into spatial edits and resubmitting spatial layers to the staging server from back at the State Office. The soil scientists were huddled around Ken Lubich's notebook computer with Dave Hvizdak who was making the tabular edits and exporting tabular data from NASIS as fast as correlation or property data were resolved. The soil scientists were in constant communication with the Digitizing Unit by cell phone. Many spatial issues were still being resolved and as soon as the spatial data was imported to the staging server and all the data was verified, Dave was committing NW10 surveys to the Soil Data Warehouse. Adolfo stayed at the State Office and worked late into the night to handle the final spatial edits and submissions. The last spatial submission for Sawyer County actually took place from Adolfo's home. The deadline of midnight was fast approaching but through a total group effort that night, by 10:00 PM there was only one soil survey area remaining to be committed to the Soil Data Mart. The tabular layer for Sawyer County had already been exported to the staging

server and was awaiting import of the spatial layer. There was some discussion that the staging server did not accept data after 10:00 PM so it was questionable whether we would meet the deadline after all. A call to Adolfo Diaz at home assured us that he had submitted the spatial layer and he would let us know if it was accepted. Most soil scientists headed to their motel rooms about 11:00 PM not knowing whether we were 100% successful or not. After an unsuccessful attempt to make a wireless internet connection, and after waiting for the motel PC to be freed up, Tim Meyer and Don Fehrenbacher successfully logged in to the staging server, and discovered that the Sawyer County spatial layer import had been completed. They quickly verified the tabular with the spatial data and committed the last digital Wisconsin soil survey to the Soil Data Mart at 11:30 PM on May 15, 2006. On the morning of May 16, 2006, Wisconsin became the 10th state to complete SSURGO certification on 100% of the 69 soil survey areas and have them all available on the Web Soil Survey website!!

--by Tim Meyer

2006 Year of the Soil Celebration

For the Love of Soil
Celebrating the Completion of Wisconsin's Soil Survey

MADISON, WI – May 18, 2006 – Hundreds of individuals – including many soil scientists, school groups, and state and federal dignitaries – celebrated the completion of the Wisconsin soil survey with the Year of Soil event held at the State Capitol on Tuesday, May 16. Governor Jim Doyle has declared 2006 as the "Year of Soil" in Wisconsin. Wisconsin now becomes the 10th state to have complete digital soil survey coverage.

In his speech at the event, Bruce Knight, Chief of the US Dept. of Agriculture Natural Resources Conservation Service (NRCS), pointed to the 24/7 Internet access to the soil survey information as a boon for conservation and a boon to landowners and community planners.

"It will help farmers, developers, homeowners, and others make wise land-use decisions on where to plant a field, where to put a road, or where place a septic system," he said.

Knight personally thanked the more than 300 soil scientists who did the soil mapping and the many others who contributed to the effort to map the more than 35 million acres of land and catalog the hundreds of different soil types in Wisconsin.

Knight also presented the national Excellence in Conservation Award, NRCS's highest honor, to Paul Daigle of Marathon County. Through his work as a grazing lands specialist, Paul has helped over 200 farmers convert to grazing operations on 18,000 acres in Lincoln and Marathon Counties. Grazing is an environmentally and economically sound farming system well-suited to Wisconsin soils.

"Soil surveys are cooperative ventures including folks from a number of sectors—federal, state, county, university, and Tribes. NRCS has had many partners in achieving this success," he said, highlighting the agency's partnerships with the state of Wisconsin, including its agencies of the Department of Agriculture, Trade and Consumer Protection, the Department of Natural Resources, the Department of Administration; and the five bands of the Lake Superior Chippewa Indians.

State Conservationist Pat Leavenworth was master of ceremonies for the event and highlighted the importance of completing the state soil survey, which began over 100 years ago in the state.

Joining the dignitaries were several school groups who participated in hands-on soil projects with Chicago Field Museum's Soil Adventure Mobile. The 3rd and 4th grade students from Antigo Elementary provided a special tribute to Wisconsin's official

State Soil by singing “The Antigo Silt Loam Song” written by noted soil scientist Francis Hole.

A large soil sample of Wisconsin’s Antigo Silt Loam is part of a USDA-NRCS display of state soils that will be included in a 5,000-square-foot educational soils exhibit opening in 2008 at the Smithsonian Museum of Natural History in Washington, DC. The Soil Science Society of America (SSSA), Madison, WI, is spearheading the effort to develop a soils exhibit at the Smithsonian. SSSA was one of the exhibitors and sponsors of the Year of Soil celebration at the state capitol.

Other exhibitors and sponsors that surrounded the rotunda at the state capitol building with soils exhibits and displays included: Wisconsin Department of Agriculture Trade and Consumer Protection, Wisconsin Department of Administration, Wisconsin Society of Professional Soil Scientists, and the University of Wisconsin. The event also featured a variety of samples highlighting food grown in Wisconsin soils.

For more information on the 2006 Year of Soil or web soil survey, visit **www.wi.nrcs.usda.gov**.

State Conservationist Pat Leavenworth was master of ceremonies for the “Year of Soil” event.

Bruce Knight, Chief of the U.S. Dept. of Agriculture, Natural Resources Conservation Service (NRCS), speaks to the "Year of Soil" audience about the importance of having soil survey information readily available to the public.

The 3rd and 4th grade students from Antigo Elementary provided a special tribute to Wisconsin's official State Soil by singing "The Antigo Silt Loam Song" written by noted soil scientist Francis Hole.

Many soil scientists, school groups, and state and federal dignitaries – celebrated the completion of the Wisconsin soil survey with the Year of Soil event held at the State Capitol.