

# The History of Women in Soil Science

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March is celebrated as National Women's History Month. This year, the theme is "Working to Form a More Perfect Union: Honoring Women in Public Service and Government". This theme honors the women who have shaped America's history and its future through their public service and government leadership. The field of soil science has also been impacted by a number of notable women, and today, we are delighted to see more and more women continue to drive that field forward. So, in celebrating National Women's History Month, the North Dakota NRCS Soil Science Staff would like to provide our agency members with a brief overview of the history of American women in soil science and their contributions to both the discipline and our agency as a whole.

A very special "Thank you" to Maxine J. Levin, who played a significant role in not only the writing of this article, but in her dedication to documenting and promoting equality for women in the field of soil science. Historical information is adapted from an interview with Maxine (2016) and her narrative "Women in Soil Science - 1895 to Present" on the Association of Women Soil Scientists (AWSS) website (2001). Additional information about AWSS can be found at <http://www.womeninsoils.org/womensci.html>.

## *The Pioneers (1895-1965)*

**1895** Miss Janette Steuart and Miss Sorena Haygood maintained laboratory and field records in Washington, D.C. for the Soils Division of what was then the U.S. Weather Bureau of USDA.

**June 1901** Miss Julia Pearce was appointed to one of the first USDA Soil Survey field parties (Hanford, CA) as an assistant in the Soil Survey (Macy Lapham, Crisscross Trails). She copied maps. A short time later, she was transferred to Washington to work in the physical laboratory.

### **1920's**

Mary Baldwin, the wife of soil inspector Mark Baldwin (USDA Soil Survey, 1912-1944) described mapping with her husband in northern Wisconsin. She and her husband mapped during the summer months, camping and using a small boat to go from island to island.

**Mid 1930's** Charlotte Whitford (Coulton) graduated with a M.S. in botany from Ohio State University before taking a job as secretary for a Soil Conservation Service (SCS) field soils staff in Zanesville, OH. She was recruited to work as an assistant soil technologist in Washington, D.C. on a series of soil erosion reports. She later worked as an editor on soil surveys and eventually became head of the publications staff of the SCS.

**1937** Miss Lois Olson and Dr. Arthur Hall spoke on studies in erosion history as part of a series of research seminars to the Soil Conservation Service. Some of today's thinking on interpretations of the soil survey and field practices to control erosion is attributed to this series of lectures between 1936 and 1937. Miss Olson, a geographer by training, was the head of the Erosion History section of the Soil Conservation Service.

**1939** Ester Parsons Perry was the first woman to receive a Ph.D. in soil science in the United States. She received her Ph.D. in soil science from the University of California, Berkeley. Her thesis was titled, Profile studies of the more extensive primary soils derived from granitic rocks in California (9). From reading her thesis, Professor Gary Sposito of the University of California, Berkeley, thinks that she was one of the first students to use x-ray defraction to look at the clay mineralogy structure in soils. From 1939 on to 1965 when she retired, she worked in and ran the soil survey lab, University of California at Berkeley.

**1941** Dorothy Nickerson was a color technologist for USDA from the late 1920's through the 1940's. Nickerson was instrumental in developing the soil color standards for soil survey. She worked with T.D. Rice, Kenneth Kelly, and Albert H. Munsell to adapt the Munsell color chart system for describing soil color in the lab and the field. After extensive colorimetric testing by Nickerson in the lab and by soil scientists in the field, the Munsell color charts and a new set of color names were adopted by the American soil survey in 1949.

**1946** Officially, the first woman soil scientist in the field for the Soil Conservation Service (SCS)-USDA was Mary C. Baltz (Tyler). Mary Baltz graduated from Cornell University and joined the soil survey as a "junior soil surveyor" in Madison and Oneida Counties, NY. W.W.II labor shortages provided an opening for her to work in a job that, up to that time, appeared to be reserved for men (4). Mary Baltz worked for the SCS until about 1965.



**1992** Mary West is Executive Committee Chair. Guest editors are Susan Samson, Jackie Pashnik, and Donna Duffy. Committees are organized: Executive, Newsletter, Mentoring, Directory, Meetings, Current Issues, Membership, Other Societies. AWSS discrimination/sexual harassment survey is conducted. AWSS support group is formed. AWSS meets at ASA meeting in Minneapolis, MN. The first AWSS meeting with SWCS takes place in Baltimore, MD. Membership is 170.

### *In the Classroom, In the Field and In the Lab (1965-1990's)*

**1950-60's** Very few women received soil science degrees, taught, conducted research, or worked in the field. While the 1960's career counseling documents focused on helping women plan for work and marriage, the documents in the 1970's began to discuss ways to channel women into nontraditional careers. Encouraging young women to enter nontraditional occupations continued as a theme into the 1980's.

**1964** Title VII of the Civil Rights Act of 1964 prohibited sex discrimination in federal employment.

**1965-1975** Women who received a Soil Science Ph.D. in the late 1950s and early 1960's began teaching soil science in US Universities: Dr. Nellie Stark, Dr. Eva Esterman, and Dr. Jane I. Forsyth.

**1978** The Civil Service Reform Act of 1978 required that the federal work force reflect the nation's diversity.

**Mid  
to late  
1970's**

Women were more commonly hired to work for the SCS as field soil scientists.

**1980**

The Women in Science and Technology Equal Opportunity Act in 1980 opened up more opportunities for women to receive support in the university setting.

**Early  
1980's**

The Association of Women Soil Scientists (AWSS) was started by a group of women soil scientists in the US Forest Service.

**1985**

Dr. Elizabeth L. Klepper was the first woman ever to receive the prestigious Fellow Award from Soil Science Society of America (SSSA). Her research has concentrated on root growth and function under field conditions and plant-soil water relations. She is a recipient of other Fellow awards from all three agronomic research societies: American Society of Agronomy (ASA), Crop Society of America (CSA), and Soil Science Society of America (SSSA). Other female SSSA Fellows that have provided outstanding contributions to soil science are Mary Beth Kirkham (1987), Mary K. Firestone (1995), and Jean L. Steiner (1996).



**1988**

Carol Wettstein was the first woman state soil scientist with the Soil Conservation Service (NRCS)-USDA (SCS Maryland 1988-89) and later was state soil scientist in Colorado (1990-95). Carole Jett was state soil scientist in California in 1991, and Carol Franks was a state soil scientist in Arizona in 1994.

### *The "Yes" Generation (1990 and on)*

With the mid 1980's through 1990's there has been a substantial increase in women researchers and associate professors in our US universities in the soil science field. As an example, at last count there are 3 women pedology professors in the US: Dr. Mary Collins, Dr. Janice Boettinger, and Dr. Christine Evans. Women researchers and associate professors in all aspects of soil sciences are active throughout our university system and research agencies. An associated written paper documents many of these women's recent achievements. Many women have presented a paper on their career highlights in a seminar at the Soil and Water Conservation Society meeting in 1999, and many other women are consist in their performance and participation in SSSA meetings.

According to the Fall 1996 Enrollment for Agriculture, Renewable Natural Resources and Forestry Report by FAEIS, between 1987 and 1996, soil science, education, communication and social science experienced the largest growth in percent female participation. Soil Sciences was 16.2% female in 1987 and 32% female in 1996. General enrollment of students (B.S., M.S. and Ph.D.'s) in the soil sciences has held relatively steady between 1987 and 1996, fluctuating between 1,200 and 1,500 students. In 1996 there were 228 female B.S. graduates in soil science, almost double from 10 years before. Doctoral and Masters candidates in the soil sciences in 1996 are also about one-third female, once again double from 10 years prior (34).

## 21<sup>st</sup> Century Women of Soil Science

From 1990 to the present day, women in soil science and the NRCS have made tremendous progress and contributions to their field. These women have assumed leadership roles at every level of the agency, from MLRA leaders to State Soil Scientists and even the national level.

One of the first women to join a State Office Soils Staff was *Carol Jett* as State Soil Scientist of California in 1991. She then went on to serve as Associate Deputy Chief for Programs, the NRCS point for the implementation of the Conservation Title of the 2002 Farm Bill; and served on assignment as Congressional Staff with the House Agricultural Committee in 1999. For her efforts and dedication to the conservation of soil and water, she was awarded the Soil Conservation Society Norman A. Berg Conservation Legacy Award in 2009.



Carol Jett receiving her Conservation Legacy Award (SWCS Newsletter, 2009).

Now, many women have had the opportunity to lead their state's soils staff as State Soil Scientist. To name a few: *Cory Owens* (Oregon), *Kamara Holmes* (South Carolina), *Kim McCracken* (New Hampshire and Maine), *Deanna Peterson* (first Florida, then South Dakota), *Carmen Santiago* (liaison for Puerto Rico), *Debbie Surabian* (Connecticut), *Francine Lheritier* (Colorado), and *Astrid Martinez* (Wyoming) who moved over to the conservation side and now serves as Wyoming's State Conservationist. *Diane Shields*, the Assistant State Soil Scientist in Delaware acted as State Soil Scientist when Massachusetts and Delaware combined.

Once the door was opened for women in more leadership roles, many women began to take on management positions at the agency's national centers and female representation in the agency became noticeably more pronounced. *Sharon Waltman* serves on the NSSC Soil Business Services staff Geospatial Research Unit as a Soil Scientist-Spatial Data Analyst. *Lenore Vasilas* is a Technical Soils Specialist on NSSC Technical Soil Services staff, specializing in hydric soils. She also serves as the chair for the National Technical Committee for Hydric Soils. *Linda Scheffe* also serves on the Technical Soil Services staff in Lincoln, but utilizes her background knowledge and experiences in technical soil services as an Agronomist. *Skye Wills* currently works as a Research Soil Scientist at the NRCS-NSSC Soil Quality and Ecosystems Staff, with her research focusing on dynamic soil properties and soil carbon. *Pam Thomas* once served as State Soil Scientist in South Carolina, and is now Associate Director of Soil Survey Programs for the NRCS Soil Science Division. *Susan Andrews* was the National Leader for Ecosystem Services at the NSSC and identifies herself as an "agroecologist", understanding and advocating for the combined agriculture and ecosystem services that soils offer. *Cathy Seybold* started her soils career in the field, before earning her Ph.D. in soil physics and now works on the NSSC Soil Survey Interpretations staff. *Susan Southard* also works on the Interpretations staff as a Soil Scientist and Liaison to the National Park Service while residing in California. *Maxine Levin* is a pioneer amongst her peers in the field of soils. She has been an active soil scientist since early on in her career, taking on a number of difference leadership roles in different levels of the agency. She was appointed National Program Manager for Soil Survey Division in 2000, and now serves as the National Leader for Soil Survey Interpretations for the National Soil Survey Center. She is a passionate advocate for women's success in the field of soil science, and is one of the founding members of the Association of Women Soil Scientists.

Some women have taken their experience in the field and applied it to their research. *Carol Franks* was one of the first female State Soil Scientists, holding the position in 1994 in Arizona. Carol later went on to assume the position of Research Soil Scientist, conducting her research on soil biology and soil health at the Kellogg Soil Survey Lab in Lincoln, NE. *Rebecca Burt*, a Research Soil Scientist at the Kellogg National Soil Survey Lab in Lincoln, NE, is credited for creating the “KELLOGG SOIL SURVEY LABORATORY METHODS MANUAL”. This publication outlines the methodology in analytical procedures and serves as a reference for the laboratory analyst. She wrote some of these methods and was in charge of the review process including additions, corrections, and consistency of other methods.

Women have assumed essential roles in some of the more specialized branches of the NRCS. *Bianca Mobius-Clune*, Ph.D, has become the Director of the Soil Health Division (SHD), and *Diane Stott* serves as a National Soil Health Specialist for the SHD as well. *Betty McQuaid* serves as a Soil Ecologist with the NRCS Watershed Science Institute in Raleigh, NC. *Carrie Ann Houdeshell* is the Regional Modeling Unit Coordinator at Davis, CA. *Panola Rivers* is the Team Leader of the Digital Soil Survey Team on the Geospatial Technology Branch of the NRCS-NGCE, and *Jennifer Sweet* is a Soil Scientist on the Soil Geodatabase Team on the Geographic Sciences Branch of the NRCS-NGCE in Ft. Worth, TX. Sweet is currently serving as the Acting National Leader for Soil Business Systems.



Eva Muller, 2001 Soil Scientist of the Year (NCSS Newsletter, 2001).

Currently, four out of the twelve Regional Directors of the NRCS Soil Survey Division are women. *Deborah Anderson* is the director of Region 3, located in North Carolina. *Dr. Cynthia Stiles* paved her way up to the position of director of Region 2 in California by first working as a research soil scientist, a supervisory soil scientist, and Assistant State Soil Scientist in Hawaii. *Cathy McGuire* had a similar path to become director of Region 8 in Arizona. And lastly, *Eva Muller* directs Region 4 in Montana, after an impressive history as a Soil Data Quality Specialist. For her exemplary efforts, she was presented the prestigious Soil Scientist of the Year award in 2001—the first woman to ever receive the award.

The acknowledgement of Muller’s success only pushed the door open for more women to be recognized for this prestigious award. In 2010, *Caryl Radatz* was named Soil Scientist of the Year. She was one of the first woman MLRA leaders, later on serving as MRLA Region 10 Leader and State Soil Scientist of Minnesota. Again in 2013, this award was presented to another notable women: *Lindsay Hodgman*, who serves as the Assistant State Soil Scientist of New Hampshire and Maine.

Some women have made a significant impact within the NRCS, and later gone out to make an even greater impact on the field of soil science through other methods. *Stephanie Connolly* has worked in West Virginia since 2001 as a Forest Soil Scientist in the Monongahela National Forest. Stephanie has been an advocate for soil science within the USDA Forest Service, and an ambassador for soil survey programs in WV within the National Cooperative Soil Survey. Before she was National Leader for Climate Change for the USDA-OCE Climate Change Program Office, *Carolyn Olson* was the National Leader for Research at the NSSC. She is also the Past President of the Soil Science Society of America. *Susan Casby-Horton*, a Temple TX geomorphologist, is now an NRCS Earth Team Volunteer, NCSS Cooperator and Adjunct Professor of Soils at Texas Tech University and known for her research on

gypsiferous soils. *Sheryl Kunickis*, a former field soil scientist and GIS specialist in the national office is now Director of the Office of Pest Management Policy for the USDA-ARS. *Arlene Tugel* was a soil scientist with the NRCS Soil Survey Division and liaison to the USDA Agricultural Research Service. In previous positions, Arlene was a founding member of the former NRCS Soil Quality Institute. She also served as Soil Scientist for Interpretations at the West National Technical Center (Portland, OR) and was State Soil Correlator and a Soil Survey Project Leader in California. She was one of the first Resource Soil Scientists in the country, and was a strong supporter of state-transition models. She developed the manual for dynamic soil properties and essentially coined the term, alongside Maxine Levin.

Influential women in the NRCS have also had an impact within the Association of Women Soil Scientists (AWSS), an organization that seeks to establish and maintain high standards for professional women soil scientists. Many of these women have been able to flourish and receive additional support and encouragement in their careers through involvement with the AWSS. *GayLynn Kinter*, a very active Resource Soil Scientist in Michigan, is responsible for many significant contributions to the success of this organization, even selling t-shirts at nationwide events like the Soil Society of America conference. *Laura Craven*, Soil Survey Leader in Pueblo, CO, has also been active in the association, serving as a past secretary/treasurer and coordinating a joint effort in AWSS co-hosting a soil conference in Illinois and Wisconsin in 2008. *Dena Anderson* is a Resource Soil Scientist in Indiana and has served as president of the AWSS for a number of years. The Assistant State Soil Scientist of Connecticut, *Margie Faber*, is one of the founding mothers of AWSS and truly active within this organization, currently serving as the AWSS Historian.

The brilliant women mentioned in this narrative are just a few of the pioneers and role models that have paved the way for equality in this field once dominated by men. The outlook for women in soil science is encouraging; we can anticipate this trend to continue, as more and more women continue to pursue an education in natural resources and engage their passion for soil and water conservation. In the field, through research, private consulting, education, and through their positive influence in leadership roles, we can expect to see even more trailblazers create significant change and leave a resounding impact on not just women's history, but the progress of conservation as a whole.