General Overview of Soil Scientist Licensure/Certification

In the most recent CSA News (August 2007), Luther Smith, Executive Director of Certification Programs with the Tri-Societies, discussed how certification can promote the soils profession by providing a mechanism to identify qualified and competent scientists. He states “Certification provides more job opportunities and advancements, formalized continuing education and professional standing and is recognized by government agencies. It is part of being a professional and representing the profession.” (p. 28).

Soil scientist licensing/certification is at the forefront of debate in many states, as governments and professionals look to establish standards for those practicing the profession. Licensing/certification takes the necessary first steps to ensure persons working as soil scientists are knowledgeable of the field, regarded by their peers as ethical and competent, and dedicated to live-long learning. Many states (AL, AR, DE, GA, IN, ME, MN, MS, NH, NC, ND, OH, SC, WV, WI to name a few) already have laws establishing licensure/certification for soil scientists and more states are working towards similar legislation. For example, over the past few years Washington state soil and wetland scientists have been working towards licensing requirements for practicing scientists in their state (http://www.soilscientistlicensing.com). This past June, Georgia legislature passed an act defining ‘soil scientist’ and the ‘public practice of soil science’, establishing soil science as a professional discipline separate from engineering and geology. Such regulatory changes are often slow and require cooperation from a myriad of state professional, government and private agencies. However, many believe the resulting human and environmental health, safety and welfare benefits are well worth the time and monetary inputs in getting such legislations established.

More information on soil scientist and wetland scientist certifications offered through the Council of Soil Science Examiners and Professional Wetland Scientist, respectively can be found on page three. Since states can establish their own licensure/certification requirements, please check with the pertinent licensing board in your area for more info (http://en.wikipedia.org/wiki/List_of_State_Soil_Science_Licensing_Boards).

Dates of Interest:
- AWSS Travel Award Applications and Mentoring Nominations due September 1st
- AWSS Annual Meeting—November 6th
- Southwest Iowa Soils Tour Registration due August 31st
- CSSS Certification Exam—October 19th
General Overview of Soil Scientist/Classifier and Wetland Scientist Certification Process

Please see included websites for more details.

Council of Soil Science Examiners—https://www.soils.org/certifications/csse/

Four certification options available:

Certified Professional Soil Scientist (CPSS)
Certified Professional Soil Classifier (CPSC)
Associate Professional Soil Scientist (APSS)
Associate Professional Soil Classifier (APSC)

Eligibility Requirements:

**Associate Certification**
- Minimum of a bachelor’s degree with a major in the area for which application is made or a closely allied field of science and meet the minimum core requirements. Core requirements: 15 semester credits soil science (a soil classifier must include 5 semester hours in soil genesis, morphology, classification, interpretation, or mapping within the 15 semester credits of soil science), 6 semester credits plant or soil biology and 3 semester credits additional core courses
- Pass Fundamentals of Soil Science Exam

**Professional Certification**
- Meet Associate Certification criteria
- Five years of professional experience, subsequent to the bachelor’s degree, working in the area of certification. Experience while working toward an advanced degree does not qualify. Three years of experience is necessary for those with Masters degrees or PhD’s
- Five references familiar with work experience; at least one must be associated with applicant’s employment
- Pass Professional Practice Exam - to be taken after required experience is achieved
- Sign and agree to uphold the ARCPACS Code of Ethics

Once Certified:
- Earn 40 hours of continuing education (CEUs) every two-years and pay an annual maintenance fee

Professional Wetland Scientist Certification—http://www.wetlandcert.org/requirements.html

Two certification options available:

Wetland Professional In Training (WPIT)
Professional Wetland Scientist (PWS)

Eligibility Requirements:

**WPIT Certification**
- B.A. or B.S. degree with the following courses:
  - 15 semester credits in Biological Sciences such as general biology, botany, zoology, general ecology, plant/animal/aquatic/wetlands ecology, invertebrate zoology; taxonomy; marine science; fisheries biology; plant physiology, plant taxonomy, plant pathology, plant morphology; and relevant environmental sciences
  - 15 semester credits in Physical Sciences including soils, chemistry, physics, geology, hydrology, sedimentology, oceanography, coastal processes, environmental engineering, and similar courses
  - 6 semester credits of Quantitative Sciences including math, computer sciences, basic statistics, population dynamics, experimental statistics, and similar courses
  - List of 5 references; 3 references fill out a reference form: three must be Society of Wetland Scientist members, two must be certified Professional Wetland Scientists

**Professional Certification**
- Meet WPIT Certification criteria
- 15 additional semester credits in Wetland Related Coursework including wetland plant taxonomy; wetland hydrology; general hydrology; soil morphology, classification, and mapping; hydric soil identification; wetland restoration and creation; applied wetland ecology and management; wetland delineation/evaluation/classification
- Minimum of five (5) years of full-time professional experience

Council of Soil Science Examiners National Exam
Friday, October 19, 2007
Registration ends September 7
### Requirements for Licensed Soil Scientists: State-by-State Comparisons

<table>
<thead>
<tr>
<th>State</th>
<th>Minimal Education Requirement</th>
<th>Years Experience</th>
<th>Reciprocity</th>
<th>Teaching Experience Requirement</th>
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<tbody>
<tr>
<td>Alabama</td>
<td>Bachelor’s degree in soil science</td>
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The chart below was published in 2004 in *Soil Profiles—The Voice of the National Society of Consulting Soil Scientists, Inc.* Volume XIV, Number 2 (http://www.nscss.org/2004 Newsletter Summer.pdf)

The information contained may not be up-to-date. Interested parties should consult a state’s licensing board for more information.
I have just returned from a month in Chad (central Africa) where I was assessing the effect of land loss to petroleum development on soil quality in village farmers’ fields. Exxon-Mobile has taken land from farmers to develop oilfields and has compensated the farmers with small lump sums (that are soon spent). This leaves farm families with reduced land base and therefore, less stable shifting cultivation. I trained two teams of Chadian social workers to make soil quality measurements in the field and sample soils for lab analyses. We always went to the field with the farmer who worked the land. In some cases the farmers, who were largely illiterate and uneducated, were very interested in the process, even joining in the work. They especially took an interest in the infiltration measurements and the soil profile description by auger. A farmer, Abdon, and his wife taught me the Gambayi words for soil (nun) and subsoil (nun-kas). The research was funded by an NSF grant aimed mainly at human health studies, but included my work to investigate the soil health-human health connection.

~Ray
Encouraging and supporting women in soil science

Association of Women Soil Scientists

Volume 26, Issue 3    Summer 2007

Member Updates...
Submit your news via the website and we'll post your information in the next Member Updates section of the newsletter!

Brittany Kaufman
NRCS Soil Scientist
Pine Bluff, AR
I graduated with my bachelor’s degree in Environmental, Soil, and Water Science from the University of Arkansas-Fayetteville in May 2007. I have become a full time soil scientist with Arkansas Natural Resources Conservation Service after working as an Arkansas NRCS soil science trainee the past three summers. My job is fulfilling because I am contributing to agriculture, have the opportunity to travel, and work with great people.

Lynette Malecki Brown
I just graduated in May with my Ph.D. from the University of Florida, Soil and Water Science Department. My research investigated the effects of alum in a municipal wastewater treatment wetland. I am actively looking for a job in the state of Florida.

Ask Mother Earth... When is the best time to start a family?

Mother Earth’s reply... The best time to start a family is when you are ready for the challenges (and blessings) that come with having children. When you are ready for the commitment of having children, everything will fall into place around that. Some “things” may change once you have children, but so will you. I have not met one person that will not tell you life changes after you have kids. They make life more worth living and I have found that many of the things that were important for me in the past have a new place in my life. I think the most important question you can ask yourself is “Am I ready to be someone’s mother?”.

More online advice can be found at the following websites:
http://www.careerjournal.com/myc/workfamily/20050818-keates.html

Advice specific to academia:
http://www.nature.com/naturejobs/2005/051208/full/nj7069-884a.html
http://sciencereview.berkeley.edu/articles.php?issue=11&article=university
http://untenured-no-no.blogspot.com/2006/12/women-science-academia-family.html (blog)

Next Mother Earth Question...
I am working on my master’s degree in soil morphology and would like to get a job as a soil scientist with the federal government (NRCS or Forest Service). I keep watching the job postings at USAJOBS, but there are very few openings for entry-level soil scientists. What can I do to increase my chances of getting my dream job?

Go to http://www.awss.org to post your response. I only received one Mother Earth reply for the last question (thank you whoever you are). All answers are anonymous and welcome!
Meet our Members!

As promised, we will be “interviewing” current AWSS members in each newsletter to get a feel for who we are and what we do. It is my pleasure to introduce you to Beatrix Haggard!

Beatrix J. Haggard

Job title (Year in school): Junior. Agronomy with a soils emphasis and a minor in geology

E-mail: st_haggard@tarleton.edu

In a paragraph or so, please tell us a little about yourself. (Where you’re from, family, hobbies, interests, or whatever you would like to share)

I am from Azle, Texas which is about 45 minutes NW of Fort Worth. My parents are Gehrig and Mayna Haggard. I also have one sister Marissa Haggard-Church who is six years older than I am. She also graduated from Tarleton State University with a Wildlife Management degree. I am a rock hound to the extreme. I am on the soil judging team at Tarleton State University. I am also President of Tarleton’s Agricultural Resources Organization.

How did you become interested in the soil sciences?

I selected my major while I was in high school. My freshman year I expressed an interest in soils. At that point, my agriculture teacher gave me no choice but to participate in high school land judging. From then on, I knew that I wanted to study every aspect of the soil. Soil has always been my passion. I have always loved the fact that everything comes from the soil. So often people ask me what could possibly make someone want to major in soil, and my answer is that no matter what you use it came from the soil one way or another. I also feel that the more a person knows about the soil the more they know about themselves.

Please tell us about your current job and what you do there (or describe your current program of study and thesis/dissertation research project)

I am currently working in Delta Junction, AK for Trudy Pink on the Salcha-Big Delta Soil Survey. I started on June 11th and am having a wonderful time. We have a great crew. We work eight days on and six days off; what more could you ask for? I will be leaving Alaska on August 18th to go back to school at Tarleton. I start school on the 27th and am very excited about this fall. I will be taking Geomorphology, Advanced GIS, Geographic Techniques, Plant Physiology and Statistics and Probability. I plan on graduating in Spring 2008 and then going to LSU to start my masters with Dr. Weindorf.

What is the best part of your job (program/research)?

Currently, I love going into the field everyday. Whenever we leave to go out in the morning we have a beautiful view of the Alaska Range and the Granite Mountains, if it is clear. The past week we have been working on an alluvial fan off of the Granite Mountains and I absolutely love that area.

If you had it to do all over again, what would you change about your career?

I do not know yet. But when I find out I will be sure to tell you.

What advice do you have for up-and-coming soil scientists?

Find the niche of soils that you love and go after it with your heart.
Norman Borlaug was awarded the Congressional Gold Medal by President Bush on Tuesday, July 17, 2007. He is one of only five people in history to receive the Congressional Gold Medal, the Nobel Peace Prize, and the Presidential Medal of Freedom. The other individuals are Mother Teresa, Elie Wiesel, Martin Luther King, and Nelson Mandela.

Borlaug, widely known as the “Father of the Green Revolution” for his work on high-yield disease-resistant varieties of wheat, was awarded the Nobel Peace Prize in 1970.

In 1986, he founded the World Food Prize, an annual award to honor individuals whose work increases the quality, quantity, or availability of food in the world.


THE PRESIDENT: Thank you, all. Madame Speaker, thank you. Madame Speaker, Mr. Leader, members of the congressional leadership, members of the Iowa delegation, fighting Texas A&M Aggies, Dr. Borlaug and his family:

All around us are testaments to our republic’s young and storied history. Yet sometimes it takes a ceremony like this to remind us what a special place America is.

Ours is a land of hope and promise and compassion. And we see that compassion and promise in the man we honor today -- a farm boy, educated in a one-room schoolhouse, who left the golden fields of Iowa to become known as “The man who fed the world.”

Many have highlighted Norman Borlaug’s achievements in turning ordinary staples such as wheat and rice into miracles that brought hope to millions. I particularly appreciated the story about a former Vice President, and fellow Iowan, named Henry Wallace, who once came to observe Norman’s grain experiments up close. The Vice President looked around, and then asked why a good Iowa boy like Norman wasn’t working on something to do with corn. (Laughter.)

Norman Borlaug’s life has taken him from laboratories in America and Mexico to dusty villages throughout the developing world. He has consulted with presidents and prime ministers in important countries like Pakistan and India. He’s helped inspire students at Texas A&M, where an institute bearing his name is dedicated to completing his life’s work. To this day Norman leads an active life -- listen to a friend, who said that Norman spends half his year in Texas, half his year in Mexico -- and the other half wherever else he’s needed. (Laughter.) That is interesting math. I was going to say that I bet some of us wish we could use that kind of math during the budget process here in the Capitol. (Laughter.) I’m afraid sometimes we do.

What that friend meant was that Norman Borlaug has lived his life with urgency. He has long understood that one of the greatest threats to global progress is the torment of human hunger. And we’ve seen that plague haunt history many times. Famine in the mid-1800s forced hundreds of thousands of Irish citizens to take a sad and desperate journey to America -- and turned the Atlantic Ocean into what an Irish poet called “a bowl of bitter tears.” More than a century later, wrenching images of emaciated children in Ethiopia rallied the world to the tragedy of famine. Hunger continues to cast its miserable shadow across much of the developing world -- robbing villages of children, and forcing human beings to make desperate and daily searches for food and clean water.

Wealthy and prosperous nations have a moral obligation to help poor and struggling people find their own paths to progress and plenty. To whom much is given, much is required, and we’ve been given a lot here in America. It’s the calling of our conscience, and it’s a compelling national interest. A quote that Dr. Borlaug made reference to when he received the Nobel Prize says it well: “You can’t build peace on empty stomachs.”

In the past half-century, we have seen a glimpse of the world that is yet to come. Since the end of the World War II, the advance of trade and technology has lifted hundreds of millions of people out of poverty. That’s really the triumph of human liberty stretching across natural boundaries. It is a tribute to innovation and entrepreneurship. And these are the characteristics that can be found in the very best of our citizens, such as the man we honor today.

When Dr. Borlaug received the Presidential Medal of Freedom from one of my predecessors, Gerald Ford, the citation noted that Norman’s work “has pushed back the shadow of hunger on this planet and given us precious time to force its final retreat.” That final retreat will come only as long as we hold in our hearts the revolutionary spirit of men like Norman Borlaug, whose Green Revolution brought hope to troubled corners of the world, where grateful villagers still praise his name.

The most fitting tribute we can offer this good man is to renew ourselves to his life’s work, and lead a second Green Revolution that feeds the world, and today we’ll make a pledge to do so.

Dr. Borlaug, I thank you for your vision and dedication. I thank you for leading a life of great purpose and achievement. I thank you for proving to Americans that what we learned as children is true, that one human being can change the world. May God bless you, sir. May God continue to bless our wonderful country.

And now I ask the Speaker and Senator Reid to join me for the Gold Medal Presentation.

(The Congressional Gold Medal is presented.) (Applause.)
Editor’s Ramblings...A Newly Discovered Fascination with Podcasts

As a self-declared technophobe, I am slowly easing my way into the 21st century. I own a cell phone, but don’t use it. I have never text messaged anyone or downloaded a new ring tone. I finally bought an iPod this summer, but had to have someone show me how to operate it. I have successfully avoided trendy websites like Facebook and MySpace and only recently upgraded to DSL from dial-up. So, moving into the world of podcasts was a leap of faith for me. I have to admit, as much as I resisted, I am now addicted.

Podcasting as defined by Wikipedia is “a method of publishing files to the Internet, allowing users to subscribe to a feed and receive new files automatically by subscription, usually at no cost.” There are some great podcasts out there, from news shows to college lectures to entertainment (right now I am listening to a podcast of ‘A Prairie Home Companion’). You don’t need an mp3 player to enjoy podcasts; you can listen to them on your computer. They’re free and better yet, simple to access. I get my podcasts through iTunes, a free software package that can be downloaded from Apple (http://www.apple.com/itunes/). Once downloaded, you use iTunes to search for and subscribe to podcasts of interest. Once subscribed, each time you open iTunes (or synch your mp3 player) the software searches for and downloads the latest “episodes” of the podcast.

So, what is the benefit of all this rigmarole? For me, it is a way to keep up with what’s new in the world at a time that is convenient to me. I listen to podcasts on my iPod while driving, cleaning my office, doing the dishes, or any other time where I would have otherwise mindlessly listened to music. This week, podcasts such as NPR: Environment have taught me about making biodiesel from algae, the new trend of green cemeteries, and the effect of historical climate change on the Anastazi Indians. I have also “sat in on” Nathan Sayre’s lectures from his ‘World Regions, People and States’ course at UC-Berkley. I have heard from experts in precision agriculture on the importance of RTK and environmental biologists that warned me that global warming is going to stimulate poison ivy growth, leading to an explosion of super itchy plants. I have to admit, it’s nice to learn about the latest and greatest science topics without reading the newspapers, magazines and journals piling up on my desk. I’ll have to get to the piles sooner or later, but at least now, I have already been pre-exposed to much of the information. It also doesn’t hurt that podcasting plays into my short attention span, as many of the episodes are only five to ten minutes long.

I am so sold on this technology that I am going to make my own podcast with my soils students this fall. My students will be able to listen to my lovely voice explaining soil phenomenon just by turning on their iPods or computers. I think it sounds like fun. However, we’ll have to see if they choose to listen to the twelve soil orders rather than Green Day or U2, (or whatever kids are listening to these days). They tell me they will definitely use the technology, but they also tell me the study for hours on end (which I know is NOT true). I am not overly optimistic, but it’s worth a shot. If nothing else, I will have taken one more step to being technologically “with it”.

So, take the plunge if you haven’t already. I guarantee there is a podcast that will interest you. Also, did I mention it’s free? What more can you ask for?

~Jamie

Discussion Boards added to AWSS Secure Site

If you log-in to the AWSS secure site, you can now access posted discussion boards. Boards/threads have been established for the 2007 Tri-Society meetings, Careers, Graduate School, and Misc.

These boards can be used to ask questions of the membership, post job/assistantship openings, share news, or even find someone to share a room at the annual meetings.

While in the secure area, you can also sign up for a committee, access the membership directory, change your membership information, submit photos, and view the events calendar.

A mix of old and new near King City, Missouri
Encouraging and supporting women in soil science

More Editor's Ramblings...

My colleagues are exceptional packrats and recyclers. So it was no surprise this summer to run across a school newspaper from 1974 when pressing and storing plants for class. Carefully turning the yellowed pages of the fragile periodical, I admired the pictures of yesteryear and reveled on how campus and fashion had dramatically changed over the past thirty-three years. However, much to my disappointment, most of the articles were far less interesting than the images and advertisements; that is until I flipped to page eight. Blazing proudly at the top of the page, "Girl aggies find new interests" beckoned me. As I read through the article, I found the story to be amusing, humbling, infuriating, and inspiring all at once. As a person younger than the article itself, it is difficult to imagine the challenges and frustrations faced by these women pioneers. Women who worked hard and excelled at their studies, only to be turned down for employment because they were the "wrong" sex. By highlighting the struggles of female aggie undergraduates, the article only deepen my appreciation and respect for the women soil scientists who have come before me. The women who fought the stereotypes and misconceptions, who gained employment and succeeded in spite of the hurdles, and opened the doors so that I could easily gain an education and employment in a historically male field.

As the first full-time, female faculty member in Northwest's Ag Department, I work everyday with Drs. Padgitt and Brown. These gentlemen, although a little apprehensive about gal aggies many years back, are two of my biggest supporters. Amazingly, in the past three decades the male to student ratio in the Northwest Ag Department has dropped from the 60:1 mentioned in the article to about 1:1 today. This fall, my introductory soils course will be comprised of approximately one-third women. A far cry and considerable improvement from years past...

To go along with this theme, included on the succeeding pages, is a comprehensive article by Maxine Levin chronicling the history of women in the soil sciences. Read, enjoy, reflect... It is exciting to see many of our members were the first female soil scientists in their states and in the nation, the first females to own their own soil consulting companies, the first to hold soils faculty positions, and among the first women inducted as fellows in the Soil Science Society of America. You all are an inspiration!

~ Jamie
Women in Soil Science

Maxine J. Levin, Soil Scientist
Natural Resources Conservation Service (NRCS-USDA), Beltsville MD
Presented at the Soil and Water Conservation Society Annual Conference, San Diego CA July 6, 1998 Special Session- National Cooperative Soil Survey Highlights

The following is a brief overview on the history of women’s contributions to the field of soil science. Since almost nothing has been written on the topic, my comments are based on recent oral histories and research at the National Archives and National Agricultural Library in Washington, D.C. Most of the information is anecdotal and from the interviewees’ own experiences. I have tried to bring this information together within a historical framework. I have not included the Russian or Eastern European women soil scientists in this study, though their contributions are extensive and significant to the general study of soil science.

The Pioneers (1895-1965)

For the most part, early Soil Survey activity by women in the United States was limited to clerical work, copy editing of manuscripts, and cartographic drafting of maps. With a chemistry background, they were allowed to do lab work (19, 4). The first reference to women in Soil Survey was “the honorable mention” of Miss Janette Steuart and Miss Sorena Haygood who maintained laboratory and field records in Washington, D.C. for the Soils Division of USDA. According to Macy H. Lapham’s account, Miss Steuart was hired January 4, 1895, and was the first appointee to the Soils Division of what was then the U.S. Weather Bureau of USDA. Miss Steuart retired in 1923 and Miss Haygood retired sometime later (1).

In Macy H. Lapham’s book Crisscross Trails, 1949, he mentions briefly one of the earliest female pioneers in soil survey, Miss Julia R. Pearce. In June 1901, Mr. Lapham’s all male field party in Hanford, CA received a notice from Washington that Miss Pearce had been appointed to their crew as an assistant in the Soil Survey. It seems that Secretary of Agriculture Tama Jim Wilson (President McKinley’s Cabinet) had attended the annual commencement program at University of California at Berkeley. During the Secretary’s commencement address, Wilson commented that, with only two students who were graduating in agriculture from the university, it was a distressing situation for the country. He emphasized in his speech that the Department of Agriculture needed men and women trained for technical positions. After the speech, Miss Pearce (one of the two graduates) said that “she was ready and willing to come to the relief of the Department” and accept an appointment. So the Secretary sent her to the field party at Hanford, CA which was the closest Departmental office at hand (2). By other accounts of Tama Jim Wilson as Secretary of Agriculture, this government official was very sympathetic to the idea of women in the workplace (4, 37). Macy Lapham may have been sympathetic to having women in the workplace in 1901, however he was definitely uncomfortable with having women in the field with an all-male crew. In Macy Lapham’s book, it is not clear whether he actually sent the telegram, but the “joke” in Washington D.C. was that, the day she arrived, Lapham sent a telegram that said, “Miss Pearce is here, what in hell shall I do with her?” He did put her to work copying maps. A short time later she was transferred to Washington to work in the physical laboratory (2). A check of 1929 and 1952 records of USDA Bureau of Soils did not list her name as a past employee.

Field work, obviously from this accounting in Lapham’s memoirs, was out of the question for women before the 1940’s. It did not mean, however, that women were not in the field. They were there, just not officially. In a 1992 taped interview of Mary Baldwin, the wife of soil inspector Mark Baldwin (the Soil Survey, 1912-1944), Mary described mapping with her husband in northern Wisconsin and the Boundary Waters of Minnesota during the early 1920’s. She and her husband mapped during the summer months, camping and using a small boat to go from island to island. Mary would drop her soil surveyor husband off on one side of the island. He would map on foot and she would pick him up with the boat on the other side. While she waited for him, she might search for survey markers or make observations on her own of the general area. At one point of the interview, she said that, of course, she couldn’t map because she did not have the background. There were times however when she wished that she could have tried mapping on her own. As it was, she accompanied her husband everywhere during his remote mapping experiences, transcribing or taking field notes for him and assisting with the sampling (3).

Even if Mary Baldwin had believed that she could do soil survey on her own and be hired by the USDA, she likely would not have been hired due to her marital status. In 1890, a USDA female employee was told to resign when she married another government employee. In 1932, there was a clause in an appropriation law which said that married persons living with a federally-employed spouse would be dismissed first with government reductions in force and that preference should be given to others for new appointments. Though this legislation was repealed in 1937, it limited married women’s employment into the federal government at that time (37) and set a precedent for the future.

This law also may have become part of the SCS agency’s institutional memory without basis in regulations. In the early 1980’s, I was told that USDA regulations specified that married persons could not work in the same office if one person was the supervisor. In addition I was told that wives would need to find another office or agency to work for. Institutional culture of USDA tended to encourage fathers and sons to work for the same workplace in 1901, however he was definitely uncomfortable with having women in the field with an all-male crew. In Macy Lapham’s book, it is not clear whether he actually sent the telegram, but the “joke” in Washington D.C. was that, the day she arrived, Lapham sent a telegram that said, “Miss Pearce is here, what in hell shall I do with her?” He did put her to work copying maps. A short time later she was transferred to Washington to work in the physical laboratory (2). A check of 1929 and 1952 records of USDA Bureau of Soils did not list her name as a past employee.

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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 1946. 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). In 1951 Erwin Rice (5), a retired soil scientist in New York, started mapping soil survey under Mary Baltz’s direction in Madison and Oneida Counties, NY. He remembered Mary as a confident, petite woman who enjoyed mapping in the field. He called her a “splitter,” a soil scientist who tends to separate out concepts for new soils as opposed to lumping them together under general categories of old soil names. She had a good sense of humor and felt comfortable with the all-male crews. At that time Mary Baltz was responsible for all soil survey activities in Madison and Oneida Counties. Later she was assigned the task of doing map measurement for the whole state of New York. In contrast with today’s electronic techniques, the work was done by cutting out the soil map delineations on copies of the field sheets. All

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the areas with the same label were piled together and weighed. A factor converted the weight to acres. She hired a team of women to do the job in the winter months (6). Mary Baltz worked for SCS until about 1965. She married Duane Tyler (an employee from the Army Corps of Engineers) and quit SCS when Duane was transferred to Whitney Point, NY (5).

Women’s contributions to the Soil Survey in the 1930’s, 1940’s and 1950’s were more visible through editing, writing erosion history and lab work. For example, in 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 can be attributed to this series of lectures between 1936-37. Miss Olson, a geographer by training, was the head of the Erosion History section of the Soil Conservation Service (7). Lillian H. Weiland was the first female employee of the Soil Erosion Service in 1933 and worked as a secretary for Hugh Hammond Bennett (4). She also put together a document called the “Bibliography on Soil Conservation Compiled in the Office of the Chief of SCS” in 1935. June Henderson later revised the document in 1936. The bibliography consolidated ideas for soil erosion control technology for the new agency (8). Charlotte Whiford (Coulton) graduated with a M.S. in botany from Ohio State University before taking a job as secretary for a SCS field soils staff in Zanesville, OH, in the mid-1930’s. She was recruited by an old classmate, J. Gordon Steele, to work as an assistant soil technologist in Washington, D.C. on a series of reports on soil erosion. She later worked as an editor on soil surveys and eventually became head of the publications staff of the SCS. She retired in the 1980’s (4). 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 which were introduced in the 1941. 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 new set of color names were adopted by the American soil survey in 1949 (38).

On the academic side, 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 in 1939. 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 diffraction to look at the clay mineralogy structure in soils. Charles Shaw was her major professor. Kelly, Doer and Brown were mentors and co-workers with her in Riverside, CA, where she worked at the Sub-Tropical Horticulture Research Center. During her graduate studies, she worked in Riverside as well as Berkeley (12). According to American Men of Science (1944), she worked as a tree surgeon in Riverside, and then from 1928-1939 as an associate soil technologist for the California Agricultural Experiment Station (9, 10). From 1939 on to 1965 when she retired, she worked in and essentially ran the soil survey lab in the basement of Hilgard Hall (Room 33), University of California at Berkeley. Her job titles included “junior soil technologist” (1939-54), “associate specialist soils” (1954-60) and “specialist” (1960-65). The USDA Soil Survey Lab was headquartered at Berkeley for sometime. After 1952 and the establishment of the Beltsville USDA Laboratory, the Berkeley Soils Lab was phased out slowly as a state program activity but was still active in the early 1970’s. Ester Perry presented a paper with Huntington and Barrandino at the Western Soil Science Society (WSSS) meetings in Corvalis, OR, in 1952. The presentation praised the benefits of having a soils lab that could work closely with field soil scientists for quick turn-around of information for mapping. At that time, duplicate samples were sent to the USDA Lab in Beltsville as well (11). Despite the fact that Ester Perry was a major figure in the California Soil Survey effort, she never was promoted to associate professor or put on tenure track (12, 14). She also was never acknowledged in USDA records as an official soil survey collaborator (20). She just ran the lab. A large number of individuals (both men and women) never received academic status at Berkeley and worked as researchers or technicians their entire careers at the Agricultural Experiment Station (12, 13, 14).

In soil science, or specifically, pedology (study of soil genesis), as with all the earth sciences, there were very few women working in the field. Gary Sposito, who was a student in her lab for a year, remembers Ester Perry as being well aware that she was a pioneer woman in her profession. As one of “Ester’s Boys” (students who worked part-time in the lab) he thought that she effectively mentored many young men and women into a career in soil science. In the lab, he remembered her with a clipped, all-business voice giving orders. At the same time, she provided birthday cakes for all the students.

Academic Foundations—Mentoring the New Wave (1959-1975)

In the 1950’s and 1960’s very few women ventured into the field of soil science. Some came through the back door, majoring in geology, microbiology, or one of the plant sciences. They found, through their graduate studies, that soil science was a key element in their research and then continued on to further studies in soils. Some were mentored and encouraged by major professors (as was Ester Perry by Drs. Shaw and Kelly) to pursue soils and stick with it. As scientists and teachers, the women soil scientists who started in the 1950’s and 1960’s spent a good deal of their career mentoring others (both men and women) and valued that aspect of their careers greatly.

As an example of this mentoring activity, another story about Ester Perry comes to mind. The Soils 105 field trip is a course that University of California, Berkeley (UCB) and Davis (UCD) puts on each summer. This field course has convinced many prospective soil science students from UCB and UCD (including myself) that soil survey could be a lifelong interest and career path. The course has been going on since the 1930’s. In the 1950’s the field course was a requirement to graduate with a soil science major. Up until 1953 no women attended the field course. In that year, Eva Esterman, a soil science honors student, asked that she be allowed to take the course. (Eva remembers that the UCB Soils Department offered her an option to not take the course and still be able to graduate. She innocently told them that she wanted to take the course just like everyone else. Years later, the version told to Gordon Huntington, UCD faculty, was that Eva “demanded” to take the field course.) For six weeks in the field, the university arranged that she have separate sleeping facilities and comfort stops. Dr. Earl Story’s wife, in a separate car and with some discomfort, accompanied the bus with Eva and the other students as a chaperone. The academic dean at the time, Dr. Frank Haridine, considered the experiment a complete disaster and swore publicly that no women would ever again take the field trip (39, 14).

This triggered Ester Perry to step in and offer a Soils 105F course (“F” for female) which she planned and offered to teach for three years (1956-59). The trip was soil survey-oriented but with a different approach than the regular trip because Ester had different professional contacts. Three women attended in 1959. One of the women, Janet Heater of San Francisco, CA, was from Perry’s basement soils lab in Hilgard Hall. There were no women who wanted to take the course from 1960 to 1964. In 1965 the Soils 105 course officially became co-ed and Perry accompanied the two women attendees one more time as a chaperone with the larger group (14). By the time I took the course in 1972, the class was 50 percent women and there

(Continued from page 10)
was no chaperone. I heard stories about Ester Perry at Berkeley, which encouraged me on some level to continue my studies despite set backs. In searching for other women professors or researchers who had some emphasis in soils during their careers from 1959 to 1975, I found a handful of names in the United States: Jane Forsyth, Jaya Iyer, Nellie Stark, Elizabeth Klepper, Eva Esterman, and Cornelia Cameron. There may be more names. Unfortunately scientific research usually lists scientist's first names only by their initials and there are no computer sorts by gender. I found these names by word of mouth from their students and colleagues. For those who are not familiar with these women and their specialties I have written a short synopsis below:

Dr. Jane L. Forsyth is a professor of Geology at Bowling Green State University in Ohio. She earned a Ph.D. from Ohio State University in 1956. She has taught at University of Cincinnati, Miami University, University of California at Berkeley, Ohio State University and has been a professor at Bowling Green since 1965. Her soils research has centered on the age relationship of soils and till to Northern Ohio glacial geology. She has also done ecological studies relating plant distribution to geological substrates. One of her colleagues, Pete Birkland, University of Colorado, Boulder, says that amongst her peers she has been affectionately dubbed as the “Queen of the Pleistocene”.

Dr. Jaya Iyer is a professor in soil science at the University of Wisconsin, Madison Wisconsin. She originally came to the United States with a Ph.D. in Botany (1959) from the University of Bombay in India. She had an external referee for her Ph.D.: a soil scientist, Dr. Segvis Wild of the University of Wisconsin (Wisconsin Forestry Hall of Fame), who encouraged her to study soils. Later, she also finished a Ph.D. in soil science from the University of Wisconsin, Madison (1969) and began a highly successful career as the national expert in soils for tree nurseries (urban, Christmas tree and forestry production).

Dr. Nellie Stark earned a Ph.D. in Botany (Ecology) from Duke University (1962) with a minor in Soils, from credits she collected at Oregon State University in 1961. For several years she did ecological research with the Desert Research Institute looking at soils and nutrient cycling of litter in the tropical ecosystems of Brazil and Peru. She formulated a theory called the “biological life of a soil” which described how soils and plants interact during both developmental and decline phases of soil genesis. Indirect nutrient cycling, which involves uptake of ions from the soil, predominates when a soil is young; direct cycling (litter to roots, bypassing the soil) occurs as the soil becomes older and depleted by weathering. From 1970 to 1992 she was a tenured professor and Forest Soil Ecologist at the University of Montana, Missoula. She sponsored a soil chemistry lab for forestry that received and processed samples from all over the world.

Dr. Elizabeth L. Klepper is a recipient of the prestigious 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). She was the first woman ever to receive that honor from SSSA in 1985. Elizabeth L. Klepper is a research leader and plant physiologist at the Columbia Plateau Conservation Research Center, Pendleton, OR. Dr. Klepper holds degrees from Vanderbilt University and Duke University. Her research has concentrated on root growth and functioning under field conditions and plant-soil water relations.

Dr. Eva Esterman, the same woman who attended the UC Soils 105 field trip in 1953 and broke the gender barrier for that class, was the second woman at University of California, Berkeley to receive a Ph.D. in soil science in 1958. During the two years that she was a post-doctoral researcher at Berkeley she applied repeatedly to the civil service registers but she was never contacted for a position. She went on to be a professor in biology at San Francisco State University, California in 1960. She primarily taught botany, however eventually she was able to add soil science to the curriculum. Her research interest was in soil microbiology and biochemistry. She retired in 1982 and is now raising sheep.

Dr. Cornelia C. Cameron was a geologist for US Geologic Survey (USGS) in Reston, VA. She completed her Ph.D. in geology (with an emphasis in geomorphology) from the University of Iowa in 1940. After 11 years teaching earth sciences, she joined the USGS in 1951 and spent the next 43 years in field. She began her field career with USGS in military geology, doing terrain analysis of military sites in over 30 countries on five continents, many of them dangerous, militarized zones at the time. From 1964 until her death in 1994 at 83, her specialty was peat soils and their use as a soil additive and source of energy. Also she studied the impact of peat removal on swamp and bog environments. She was a prolific publisher on the subject of peat (110 publications) and gained international recognition. She received the USGS Meritorious Service Award in 1977, the Distinguished Service Award in 1986, and the Department of Interior's Public Service Recognition Award in 1990.

On the human side, Dr. Cameron was remembered as quite a character in the field. Dr. Cameron’s reputation for eccentricity partly had to do with her mother. Her mother was one of this country’s first female Ph.D.’s in botany and had a strong interest in her daughter’s work. Until she was 103, the senior Dr. Cameron accompanied her daughter on field expeditions around the world. Dr. Cornelia Cameron herself continued doing field work until a month before her death at 83. Dr. Cameron joked that when her mother got so old that her eyesight had deteriorated, she put a cow bell on her mother in the field, so she could find her mother if she wandered off. Jennifer Harden of USGS, California remembers the enthusiastic participation of the two of them on scientific society field trips. In a story about daughter and mother’s adventurous military terrain investigations in the Caribbean area before the Bay of Pigs invasion (early 1960’s), Dr. Cameron recounted that “Mother and I were a perfect pair. We told everyone that we told everyone that we told everyone that we told everyone that we were Canadian tourists. One time, as I doing traverses along the slopes of one of the islands, Mother stayed in the car. I was up slope from her when I saw a truck full of guerrillas pull up. Mother simply chimed them and they drove off”.

In the Classroom, In the Field and In the Lab (1970-1990’s)

In 1962, Charles Kellogg, assistant administrator for the Soil Survey U.S. Department of Agriculture, Washington, D.C. gave a talk before the Agronomic Education Division of the American Society of Agronomy in Ithaca, NY. In this recruitment paper, the male gender was referred to more than 30 times. The female gender or neutral references were never mentioned. Examples of the language used were: “The Soil Conservation Service annually recruits a considerable number of men who have completed the work for a B.S. degree in soil science or in agronomy. Our service offers a scientific career with opportunities for research to men in the field of soil science. . . . Our staff includes some of the outstanding men in the field of soil science. . . . We are becoming increasingly concerned about recruitment, especially of well-trained, broadly educated young men who can develop rapidly,” and so on (21). This recruitment paper shows how attitudes have changed as we are moving into the 21st century. While the 1960’s career counseling documents focused on helping girls plan for work and marriage, the documents in the 1970’s began to discuss ways to channel girls...
into nontraditional careers. Encouraging young women to enter nontraditional occupations continued as a theme into the 1980's (24).

In spite of some encouragement, I still remember specifically in my soil science classes a pervasively male orientation to instruction, particularly in the form of humor. Dr. Christine Evans, currently a soils professor at the University of New Hampshire, recalled for me a film titled "Movement of Soil Water." The film was produced by Washington State University in the 1950's but used up to the 1980's in university soil science classes. It used a cutout of a woman in a bathing suit to depict movement of water in a soil system. We also remember the classroom example of a soil profile, "Polly-Pedon", which was a picture outline of a woman with a "Barbie Doll" figure to depict the clay bulge development one sees in lower soil horizons (25).

The image so impressed me that in the 1980's in the field, some friends and I thought up a possible T-shirt for women soil scientists that said, "What a B2t!" (The "B2t" is the old field designation in soil survey for an increase in clay and soil development below the surface layer of a soil profile.) The difference in humor was that "B2t" sounds a lot like the word "beauty" so I would like to think that the humor was more empathetic to women. Overall, attitudes have changed what is now considered appropriate material for a classroom presentation. What was okay in 1970 would never fly now.

The atmosphere in today's classroom is more comfortable in general for women, but especially in the earth sciences.

In federal employment, legal changes slowly opened doors for more career opportunities for women. Some examples of legal changes were the following.

- Title VII of the Civil Rights Act of 1964 prohibited sex discrimination in federal employment.
- The Civil Service Reform Act of 1978 required that the federal work force reflect the nation's diversity (4). There was also a Women in Science and Technology Equal Opportunity Act in 1980 that opened up more opportunities for women to receive support in the university setting. Perhaps because of slow public reaction, effective use of these laws did not seem to occur in federal agencies until the 1980's. In soil survey as well as some of the other earth sciences, a woman needed to be persistent in the 1970's to obtain a field appointment.

According to SCS records in the 1970's (23) there were fewer than 15 women hired at any one time nationally in the Soil Scientist 470 series despite an acceleration in soil survey mapping and general increase in field crews. Almost every woman that I talked with who started at that time, thought that they were the only female soil scientist in the agency. Those of us in the field were not allowed to talk with employees outside our geographic area (county-based in SCS-USDA).

There were no professional organizations for field soil scientists outside of some informal state organizations. The Association of Women Soil Scientists (AWS) was not started until the early 1980's by a group of women soil scientists in the US Forest Service (Barbara Lueeiling, USFS, MN-president) (23).

In the 1970's and early 1980's, SCS-USDA California had five women field soil scientists: Arlene Tugel, Nancy Severy, Chris Bartlett, Lisa Holkolt, and myself. We were a crowd when compared to other states. Carole Jett was alone in SCS Nevada. Carol Wettstein was the only woman in Florida. Margie Faber, Karen Kotlar, and Marilyn Stephenson were in New York. Selden Collins worked in Michigan. Gay Lynn Kinter worked there as a State employee. Margaret Rice was in Mississippi. Sue Southard was in Utah (another temporary State employee). Mary Collins was in Iowa for a summer before she went on to graduate school. Janet Cormier and Sandra Nelson were in Maine. Debbie Brasfield was in Tennessee. Other field soil scientists were Irene Durbak Watterson (IL), Dyann Barnes (NH), Caryl Radtz Ess (MN), Greta Boley (NM), Barb Cencich (CO), Diane Hoppe (VA), Deborah Prevost (AZ), Vivian Owen (VA-State employee), and Kathy Newkirk (VA) (4, 23). There may have been more women but records of employees at that time are spotty and appear to have not been saved comprehensively in SCS-USDA archives.

Not all these women worked continuously throughout their career as field soil scientists. They also did not work in the same years as other women employees in the state. Some converted to soil conservationists to avoid having to move when a survey was finished. Some changed careers to follow their families. Some went into private consulting or other agencies. Some went back to school for higher degrees. In all, their contribution to soil survey was sizable with millions of acres mapped, and, at times, with some physical hardship. We all worked alone with no field partners. Carol Wettstein remembers the snakes and alligators in the Florida swamps. I imagine Janet Cormier experienced black flies that were just as trying during the 8 years she spent in the Great North Woods of Maine. For myself, hostile landowners hiding marijuana plots and runway luggage trucks in Northern California were my biggest fear. I also never went on a vehicle breaking down in the field. None of us had radios for safety in isolated areas until the late 1980's. I have permanent calluses on the palms of my hands from digging soil pits.

At the same time, despite rough conditions, we took the science seriously. Soil science is first and foremost a field-based science. Soil mapping begins by studying the landscape and building a conceptual model of how the topography, geology, plants, climate, water and animals interact to predict soil characteristics. Mapping then goes to the field where the soil scientists validate their predictions of soil types by digging, describing, and sampling the soils and vegetation. Benchmark samples are taken to the lab for analysis to further validate conceptual models. Finally the information is consolidated on to aerial photo maps, associated computer databases and manuscripts for publication. The base knowledge of observation in the field is what later validates and complements the lab soil scientist's work.

As a tribute to her hard work, Carol Wettstein was the first woman state soil scientist (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. Of published soil surveys where women were the party leaders (or the principal field investigators), I am sure of only three: Sacramento County, CA (Arlene Tugel), City of Baltimore, MD (Maxine Levin) and Indian River County, FL (Carol Wettstein). All three surveys were completed in the 1980's. Because there were significantly more men who made project leaders of soil surveys in the late 1980's and 1990's, there should potentially be several more soil surveys (with women as lead scientists) published in the next few years. In fact there was an all-female crew of soil scientists led by Deborah Prevost that mapped Hualapai-Havasupai Indian Reservation, AZ in the late 1980's and early 1990's. It is scheduled to be published in 1999 (36). Constrictions with time-in-grade factors and mobility issues often have limited women in SCS-USDA from receiving credit for their service through published soil surveys.

There are other aspects of the National Cooperative Soil Survey which do not leave a paper trail of published soil survey citations or publications. Soil correlations and data management specialists in the NRCS state offices (such as Sue Southard [CA], Renee Gross [NE], Carmen Santiago [PR], Panola Rivers [PA], Kathy Swain [NH] and Deborah Anderson [NC]) make significant contributions to soil survey data and manuscripts but are not cited in the soil survey itself. Also, in the last few years there are women soil scientists who have led the effort to digitize soils information, (Vivian Owen [TX], Jennifer Brookover [TX], Darlene Monds [MA], Barbara Alexander [CT], Caroline Alves [VT], Lindsay Hodgman [ME], Caryl Radatz [MO].)
and Jackie Pashnik [RI]) and, once again, with no citation in the published material. In the National Cooperative Soil Survey there are also field soil scientists who mostly work with soil survey interpretations and education. Like agricultural extension specialists, these soil scientists act as a bridge between university research, soil survey mapping and the public, interpreting soil surveys for practical use by agencies and individuals. On-site field investigations are also involved. Examples of women soil scientists who specialized in interpretations as well as doing soil survey mapping have been Sue Southard (CA) (volcanic soils and vertisols), Lenore M. Vasilas (MD) (hydric soils), Jeannine Freyman (VA), Karen Kotlar (NY), Gay Lynn Kinter (MI), Donna Hinze (NE) and Deborah Prevost (NV).

Women in the SCS-USDA, now Natural Resources Conservation Service (NRCS), have perhaps made more traceable and visible contributions to soil science in the National Soil Survey Laboratory (NSSL) and Center (NSSC), or as researchers in the Soil Quality and Watershed Sciences Institutes. Carolyn G. Olson, as a lead research scientist at the National Soil Survey Center, Lincoln NE, received honors as a 1996 Fellow with SSSA (19). She graduated with a Ph.D. from Indiana University in Geology under Robert Ruhe. After a 10 year stint with USGS in Menlo Park, CA and Reston VA, she transferred to the SCS-USDA, National Soil Survey Center and has worked there in Lincoln NE since 1989 (27). Her research focuses on soil-geomorphology, quaternary geology and clay mineralogy (19). Other female soil scientists at the NSSL and NSSC are Rebecca Burt (working with soil physical properties), Joyce Scheyer (urban soil properties), Susan Samson-Liebig (soil chemistry), Lea Pytlak (technical soil services), Sharon Waltman (national soil survey databases and GIS interpretations), and Carol Franks (soil biology). In the Institutes, Arlene Tugel (NM), Betty McQuaid (NC) and Cathy Seybold (OR) have been working with soil quality and watershed health indicators (26).

Other federal agencies, such as the United States Geological Survey (USGS), have also provided avenues for women in soil science research. Jennifer W. Harden, USGS, Menlo Park, CA, received her Ph.D. in soils at the University of California, Berkeley in 1982. She was the last Ph.D. graduate student to directly work under Hans Jenny and Rodney Arkley. Her thesis work used a soil chronosequence in the Central Valley of California as a hazard assessment to date geologic faulting. She developed the Harden Index from that data which used soil horizons and carbon-dating to measure time in the alluvium sequencing. Since then, she has also worked on the effect of climate on soil, particularly as it relates to groundwater recharge and wetland assessment. Since the mid 1980’s, she has been a front-runner in research on global change issues of soil carbon, CO₂ emissions, and soil carbon sequestration (22). Marith Reheis, USGS Denver CO, has also done significant research in using soil properties as a paleoclimatic record for chronosequence mapping in Rocky Mountain glacial outwash. Originally a geologist by training, she received her Ph.D. in Soil Science under Pete Birkland, University of Colorado, Boulder in 1984 (29). At NASA’s Goddard Space Flight Center, Elissa Levine has, since 1987, been working with soils in forested ecosystems. She has been modeling soil physics and soil chemistry to assess watershed leaching, soil carbon ecosystem effects, and the effects of acid precipitation on soils and groundwater. She was recently appointed Lead Scientist for the NASA Global Change Master Directory. She was also selected as a Fellow of the Brandwein Institute for Science Education. This award is based on her work as the principal scientist in the GLOBE program’s soil investigations for teaching soil science worldwide to K-12 students (31).

Since the 1970’s, the US Forest Service (USFS) has had women scattered around the country involved with the National Cooperative Soil Survey ecological unit inventories as well as technical soil interpretations in the specialties of forest soil productivity, soil erodibility, fire ecology, and forest ecosystem health. As each National Forest has its own infrastructure of field staff, it is harder to summarize USFS women’s contribution to soil science through my personal contacts. USFS women with lifetime activity in soil science that I am aware of are Greta Boley (Washington, DC), Claire Johnson (Six Rivers NF, CA), Carol Smith (SCS-USDA and Tahoe NF, CA), Barbara Lewelling (Superior NF, MN), Connie Carpenter (White Mtn NF) and Mary Beth Adams (NE Forest Experiment Station, WV) (23).

In US universities, there are at this time three female pedology (soil genesis) professors: Janice L. Boettinger, Utah State University, Logan; Mary Collins, University of Florida, Gainesville; and Christine Evans, University of New Hampshire, Durham. Both Dr. Boettinger and Dr. Evans are associate professors in their respective departments. Dr. Evans is focusing her research in the field of describing anthropogenic (human-influenced) soils and developing terminology to describe soil properties derived from human activity (25). Dr. Janice Boettinger has been working on an extensive review of worldwide zeolite mineral occurrences in soils and the use of zeolite and clinoptilolite for waste disposal systems of animal production operations. She is also working on characterizing selected soil resources of Utah which includes research on saline, wet soils and irrigation-induced hydric soil characteristics (30). Dr. Mary Collins was made a fellow of ASA in 1996 and a Fellow of SSSA in 1997. Her research at University of Florida focuses on the genesis, morphology and classification of soils; identifying and delineating hydric soils; using ground penetrating radar to study subsurface properties; and pedoarcheology (19). She is best known for her dedication to the field and reaching out to other countries to spread soils technology. As part of the People to People Program, she first opened the door to doing ground penetrating radar soil investigations in China and Portugal (27).

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). Mary Beth Kirkham is a professor at Kansas State University Ecosystems and Conservation Lab and has worked on heavy metal uptake by plants and soil-plant-water relations for over 20 years. Mary K. Firestone is a professor of Soil Microbiology at University of California, Berkeley. Besides being a SSSA Fellow, she also has received the Edith Truong Soil Science Award. Her research focuses on the microbial population-basis of carbon and nitrogen processing in ecosystems. Jean L. Steiner is Director of the USDA-ARS Southern Piedmont Conservation Research Laboratory in Watkinsville, GA. Her research is in humid region water balance studies in complex topographies. Diane E. Stott, a 1997 ASA Fellow, is a Soil Microbiologist with the USDA-ARS in West Lafayette IN. She has researched organic matter dynamics on soil structure and erodibility and has worked on modeling the effects of plant residue decay on erodibility (19).

The women described above are only a sampling of the women who contributed research, mapping, applications and education to the field of soil science in the last 25 years. Examples of other contributing scientists, to briefly name a few, are: Nancy Cavallaro, University of Puerto Rico (soil chemistry and tropical soil fertility); Laurie Drinkwater, Rodale Institute, PA (sustainable agriculture); Kate Skow, University of California, Davis (soil microbiology); Jeri Berc, NRCS-USDA (soil conservation); and Katherine Newkirk, Woodshole Marine Biological Lab (global warming). Soil scientists in the private consulting sector have also contributed to the knowledge base though often their work has not been published because of restrictions of confidentiality for clients. Examples of excellent consulting soil scientists that I have known are Laura Kuh (Redding, CA); Marie E. Davis (Georgetown, CA); and Janet Cormier (ME). Janet Cormier started a private consulting firm specializing in pedo-archeology after she left SCS-USDA in 1988. In 1997, the State of Maine honored Janet Cormier (posthumously) by dedicating in her name an archeological Indian site in southern Maine (32).

(Continued on page 15)
The "Yes" Generation (1990 and on)

As women have increased in numbers in the classroom, lab and field, I have seen changes in attitude within the soil science discipline. With these changes, the women who are graduating in soil science in the 1990's appear to be more confident, more intellectually engaged, and less defensive than I remember myself and my peers in the 1970's. I asked my co-worker, Lenore M. Vasilas, Baltimore MD (who finished her M.S. in soils in 1997) what she thought. She responded, "Oh we don't think about it... We just go ahead and do it!" and I thought, "that says it all right there" (33). Newsweek described the new workforce of the 1990's as the "Yes Generation" (April, 1998) and I like the title.

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 before (34).

What does this mean in terms of diversity in the workplace? I suspect it means we will eventually see more women working in the field in soil survey and private consulting firms, and, as teachers and researchers in university and laboratory settings. In 1985 there were 85 women soil scientists employed by SCS-USDA. As of May 1998, there were 94 women soil scientists in various level positions. This is not a large increase. However, the overall population of soil scientists in the agency decreased with downsizing, so actually the percentage of females increased somewhat (35).

There is a world of difference between the Miss Julia Pearce's experience in the early 1900's and Ms. Vasilas's reality in 1998. "What in hell shall I do with her?" she responded to a common professional assumption that the soil scientist knows what to do with the information, and she will do it quite well if she's given the chance. Personally, I am confident for the future of soil science and the women in it. The next 100 years of investigation and discovery should provide soil scientists with a world of new environmental challenges.

I want to thank John Tandarich (Soil Science Society of America [SSSA] Historian), Douglas Helms (Natural Resources Conservation Service [NRCS] Historian), Gordon Huntington (University of California, Davis) and Gary Sposito (University of California, Berkeley) for their assistance. They have been investigating the history of soil science for several years and provided me with very helpful comments. I also want to thank the 20 or so other men and women whom I interviewed informally over the phone for their thoughts and experiences.

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(39) Informal phone interviews with Jeri Berc and Eva Esterman, 8/7/98.
PSCI Fall Tour of South West Iowa

Friday, September 28th 2007, 8 am concluding with meeting on Saturday September, 29th at the Armstrong Research Farm

Registration Due by August 31, 2007

36 beds have been reserved at the Creighton University Retreat Center (3 miles south of the Armstrong Farm) for Thursday and Friday nights. The cost to stay at the center is $20 per night. Transportation and meals for the tour will be $20. Check the functions you plan on attending and send appropriate amount made out to PSCI to: Ryan Dermody at 514 S. Marion Ave, Washington Iowa 52353.

Thursday night $20 □
Friday night $20 □
Friday Tour and Lunch $20 □
Friday evening Cookout sponsored by PSCI □
Saturday Meeting Armstrong research Farm 10am □

Send Questions to Ryan Dermody at ryan.dermody@ia.usda.gov
PICTURE ESSAY

Flooding in Coffeyville, Kansas—late June/early July

- 71,400 gallons of oil released into the Verdigris River from Coffeyville Resources Refining and Marketing, LLC
  - Contaminating soils/waters, threatening drinking water supplies in Kansas and Oklahoma
  - Soils to be removed or bioremediated in-situ depending on contaminant concentrations

http://www.epa.gov/region7/cleanup/coffeyville/index.html
The Association of Women Soil Scientists (AWSS) is a 501(c)(6) nonprofit organization of women and men in soil science who support these goals:

- To establish and maintain high standards for professional women soil scientists;
- To promote and enhance communication among professional soil scientists;
- To promote a dialogue of soil information and to encourage an interchange with other technical and scientific communities;
- To promote better understanding of the role of soil scientists;
- To provide assistance and encouragement for women in non-traditional fields and for women seeking employment in the field of soil science.