Natural Resources
Conservation Service

Proceedings

National State Soil Scientist's Meeting – 2005

Laughlin, Nevada
February 1-3

USDA- NATURAL RESOURCES CONSERVATION SERVICE NATIONAL STATE SOIL SCIENTISTS MEETING February 1-4, 2005

USDA- NATURAL RESOURCES CONSERVATION SERVICE NATIONAL STATE SOIL SCIENTISTS MEETING 2005

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Welcome

William Dollarhide, MLRA Region 3 Leader and Jeannie Weakley, editor, hosts of the conference welcomed everyone to Nevada and gave an over view of conference logistics. Bill encouraged every one to use this opportunity to see the soils and landscapes of Nevada and reminded participants if they had had a chance to take advantage of the road tour guide on the way to the meeting to do it on the trip back to Las Vegas.

The Future of NRCS

"The real voyage of discovery consists not in seeking new lands, but in seeing with new eyes"
Dana D. York, Associate Chief, NRCS, Washington, DC
January 11, 2005

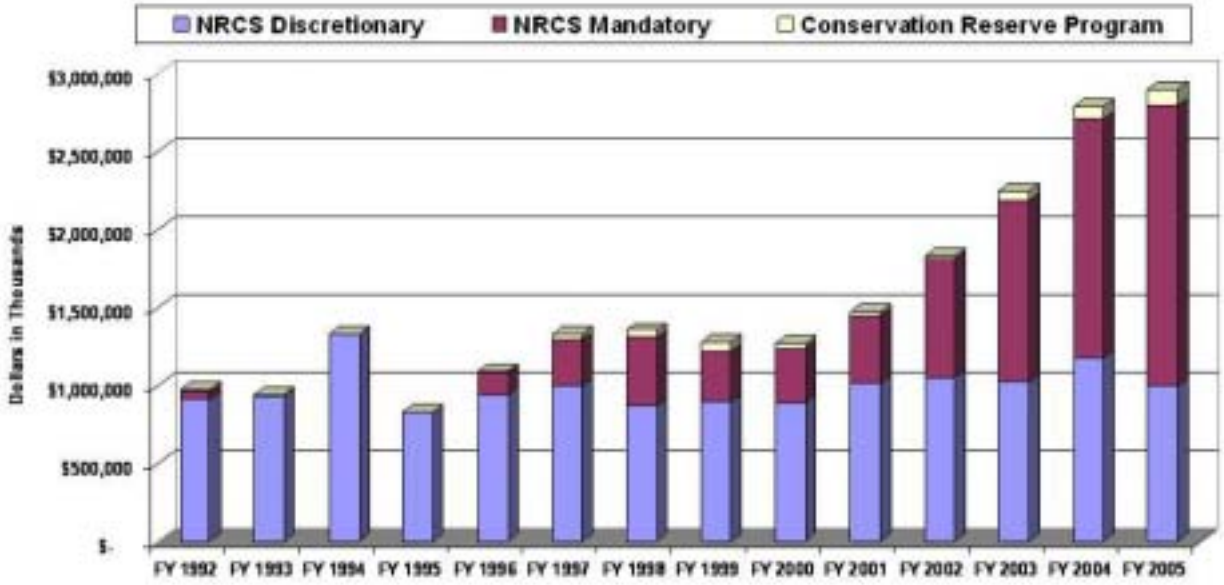
Organizational Change is Affected By:

- Leadership
- Budgets
- Employees
- Procedures

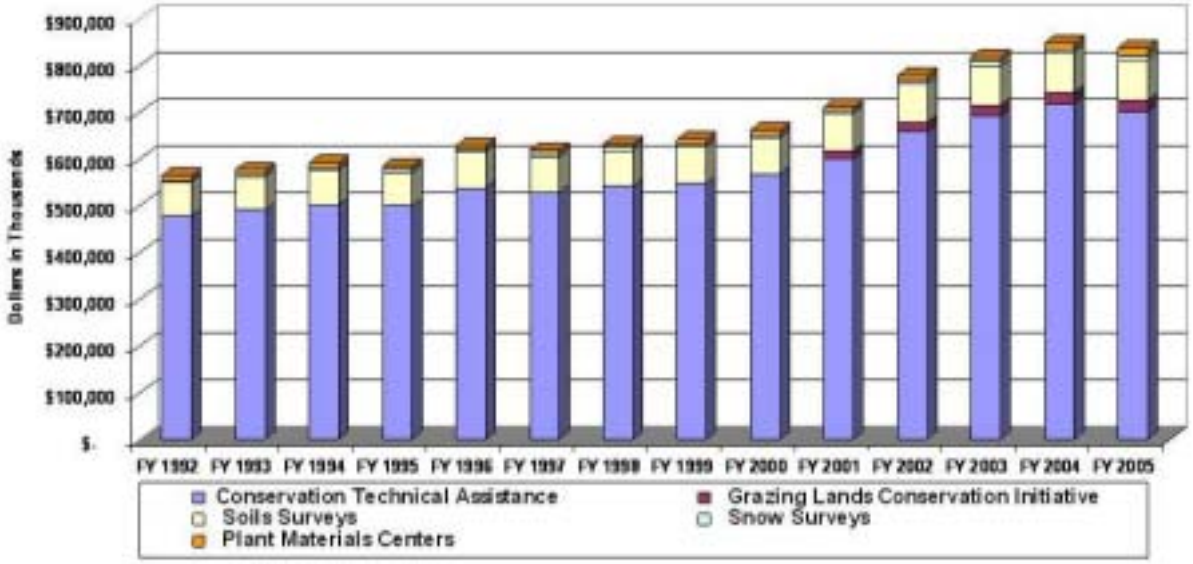
Leadership sets the "Tone" for Organizational Change by:

- Developing an Inspiring Vision
- Focusing Resources to Achieve the Vision
- Paying Attention to Details
- Listening to the Front Line
- Delegating Responsibility
- Evaluating Results
- Making Necessary Adjustments

Natural Resources Conservation Service Funding Trends
FY 1992-2005



Natural Resources Conservation Service
Conservation Operations Funding Trends
FY 1992-2005

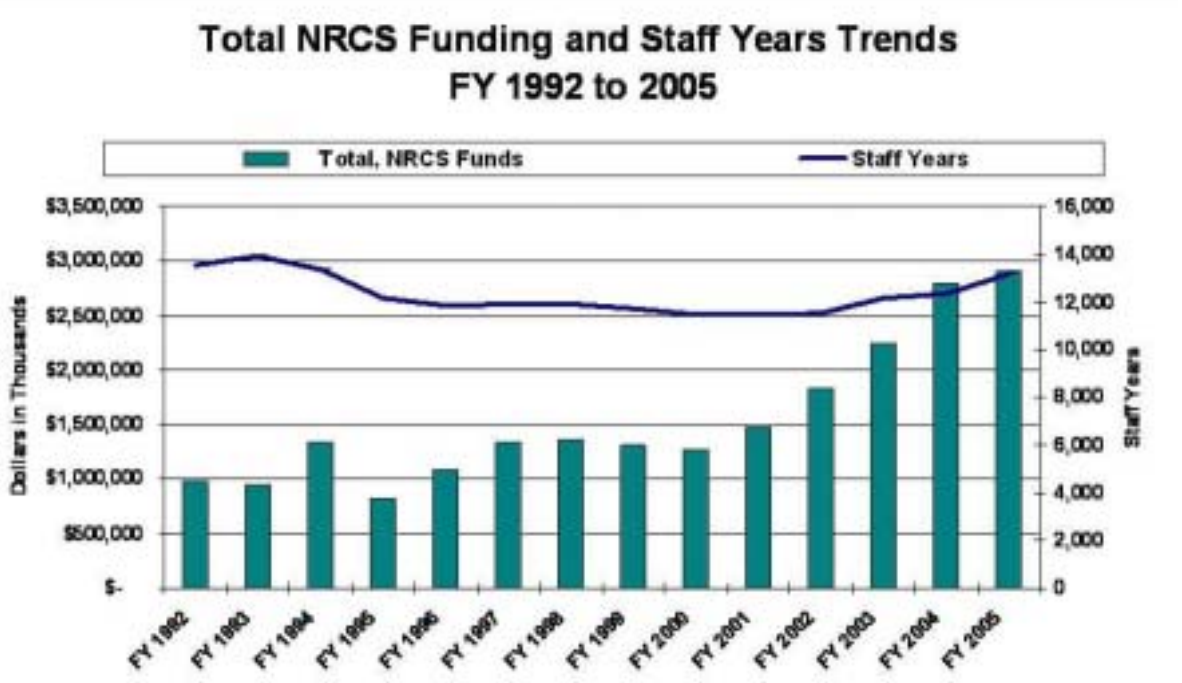


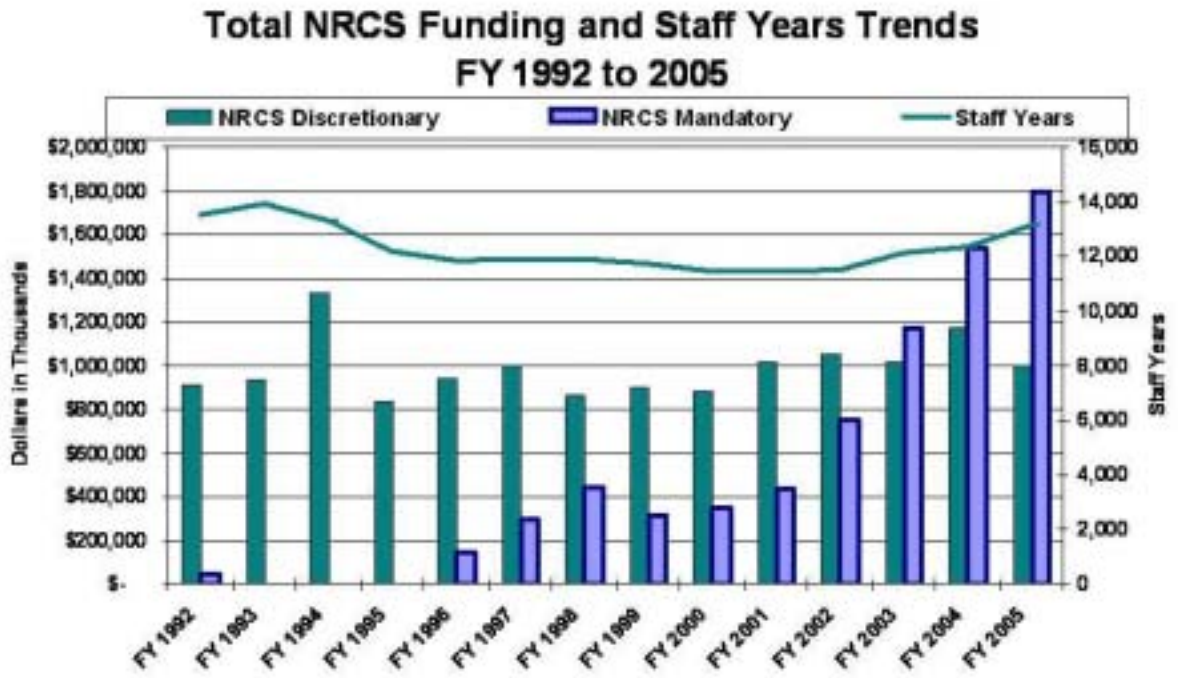
TA Appropriation Comparison
($ in thousands)

	FY2004	FY2005	Change	
	Incl. 0.59% rescission	Incl. 0.80% rescission		
CTA	$741,657	$719,429	($22,228)	-3%
Soil Surveys	85,686	86,498	812	1%
Snow Survey	9,195	10,416	1,221	13%
PMC	11,432	14,318	2,885	25%
Surveys & Planning	10,500	7,026	(3,473)	-33%
Flood Prevention	4,569	3,469	(1,100)	-24%
Watersheds	35,195	31,250	(3,945)	-11%
Rehabilitation	16,988	14,725	(2,264)	-13%
RC&D	51,641	51,228	(413)	-1%
Total Discretionary	$966,864	$938,359	($28,505)	-3%

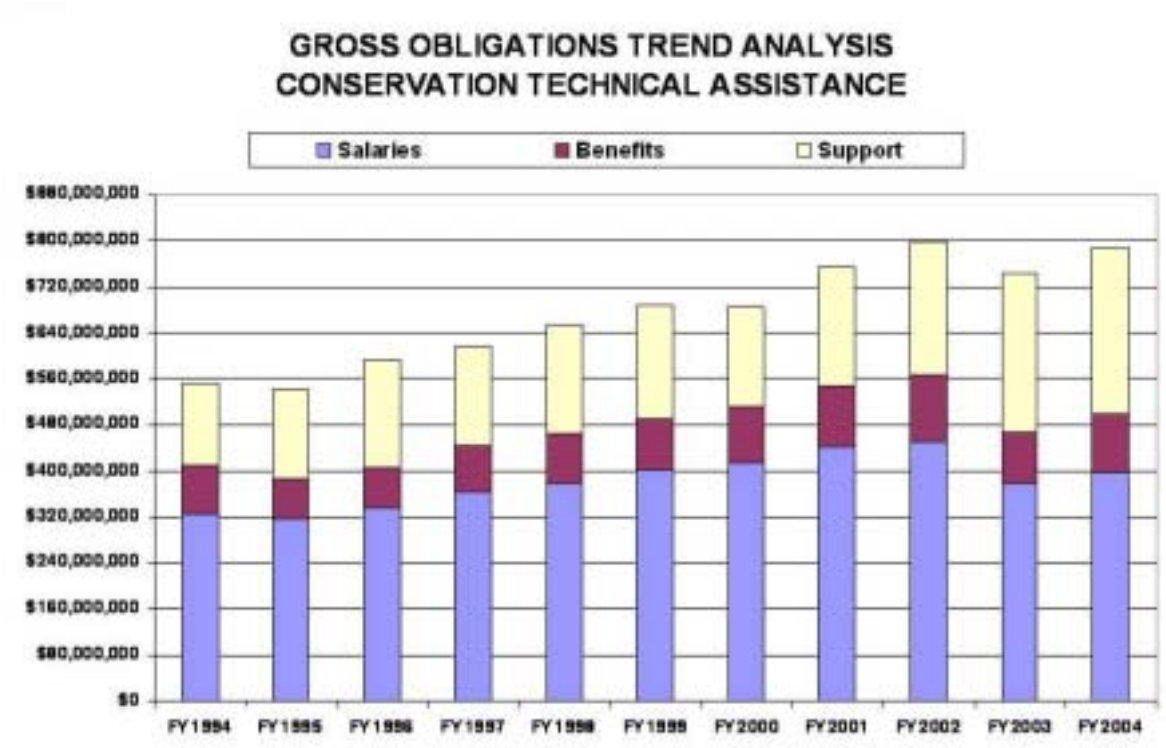
FA Appropriation Comparison
($ in thousands)

	FY2004	FY2005	Change	
	Incl. 0.59% rescission	Incl. 0.80% rescission		
CTA	$0	$0	$0	
Soil Surveys	0	0	0	
Snow Survey	0	0	0	
PMC	0	0	0	
Surveys & Planning	0	0	0	
Flood Prevention	5,368	6,451	1,082	20%
Watersheds	41,354	33,802	(7,553)	-18%
Rehabilitation	12,641	12,555	(86)	-1%
RC&D	0	0	0	
Total Discretionary	$59,364	$52,808	($6,556)	-11%





Our government is like fat people who must lose weight. They need to eat less and exercise more: instead when money gets tight, they cut off a few fingers and toes"-<u>Reinventing Government</u>



NRCS WORKFORCE DATA

NRCS PFT Profile

Total Number of PFT Staff	11,976
Average Age	44 years
Average Length of Service	17 years
Average Grade	GS-10
Average Age at Retirement	59
Attrition Rate (All)	6%
Attrition Rate (Voluntary Retirement)	3%

NRCS PFT Profile

Number Eligible to Retire in next 5 years	4,148
• CSRS	81%
• FERS	19%
Percentage of Staff	34.6%
Number Eligible to Retire in next 10 years	5,817
• CSRS	72%
• FERS	28%
Percentage of Staff	48.5%

SENIOR EXECUTIVE SERIES SNAPSHOT

Total Senior Exec	21

Percent Eligible to Retire Now (2005)	38% (8)
Percent Eligible to Retire in 5 Years	76% (16)
Percent Eligible to Retire in 10 Years	81% (17)
Average Age	53.5 years
Average Length of Service	26 years

STATE CONSERVATIONIST PROFILE

Total Number of Staff	52
Average Age	53 years
Average Length of Service	30 years
Average Grade	GS-15

NHQ PFT Profile

Total Number of NHQ PFT Staff	476
Average Age	48 years
Average Length of Service	21
Average Grade	GS-13
Number Eligible to Retire in next 5 years	220
Percentage of Staff	46%
Number Eligible to Retire in next 10 years	299
Percentage of Staff	63%

RETIREMENT PROJECTIONS
BY MISSION CRITICAL SERIES

SERIES	DESCRIPTION	TOTAL	2005	2006	2007	2008	2009	2010
0401	Gen. Biol Sci	599	-43	-38	-44	-63	-56	-62
0454	Rangeland Mgt	92	-1	-8	-8	-6	-11	-7
0457	Soil Conservation	2096	-134	-148	-160	-157	-178	-185
0458	Soil Con Tech	613	-35	-45	-51	-52	-46	-59
0470	Soil Science	526	-42	-42	-49	-47	-36	-36
0471	Agronomy	80	-7	-4	-9	-9	-2	-2
0802	Civil Eng Tech	276	-22	-22	-29	-15	-23	-26
0810	Civil Engineering	289	-16	-15	-14	-23	-25	-23
0890	Ag Engineering	71	-4	-9	-4	-5	-5	-4
1102	Contracting	52	-4	-5	-4	-3	-6	-6

Where will Our New Employees Come From?

Young Americans say "Helping People" is the Primary Motivator for Government Service

- 47%-Helping people and making a difference
- 26%-Having good Pay and Benefits
- 15%-Serving your Community or County
- 11%-Having Job Security
- 1%-Not Sure

Council for Excellence in Governments-2004 Survey of 455 17-24 year olds

- Despite their desire to help, just one in three young Americans say that a career in government service is appealing.
- Young Americans say "public" service , not "government" service.
- Teachers are their primary role model (57%) compared to Civil Servants (17%)
- From the "Ask Not" Generation to a Generation "Not Asked".

"The answer to cuts in federal funds may not be to cut services-- but to find a new way of doing things"

Sometimes the most difficult to change is: How We Do Our Work

If you have: Leadership, Financial and Human Resources--

"You can lead a horse to water, but you can't make them drink!"

"But we have always done it that way"

NRCS Has ALWAYS been about Change

- Helping customers *change* their business practices to solve problems (erosion), be more conservation based (sustainability), and be more profitable (the bottom line).
- Conservation program *changes* with each new fiscal year.
- NRCS workforce is constantly *changing.*
- NRCS organization is always *changing* in response to improved customer service, efficiency, diversity, and cost of operations.
- Conservation planning is about managing *change.*
- Conservation technology *changes* with new innovations.

So What May the Future Bring?

The Customer…

- Increasingly will get on-line through My.USDA to conduct business.
- May upload field and harvest monitoring data to NRCS databases through the Conservation Plug-In to satisfy conservation program requirements.
- May update their conservation plan using commercial software containing the Conservation Plug-In.
- Will continue to engage technical service providers to obtain conservation program and technical services.

The NRCS Field Office…

- May be fewer in number to focus limited resources on resolving resource issues .
- Would become more virtual with customers and TSPs directly engaged with the business of conservation.
- Would become more mobile and connected- maybe through their vehicle and not a traditional office.
- Would be more transparent and accessible as a center of knowledge and expertise for conservation.
- Will have most up-to-date conservation planning and program delivery status displayed geospatially service area.
- Will have conservation plan records in a centralized corporate database that will be used as an information base to ground truth and refine this institutional knowledge

The District Conservationist will…

- Be an enabler, coordinator, and gatekeeper facilitating and leading the delivery of conservation program services.
- Through:

- Increasing use of tablet PCs in the office or field.
- Using a combination cell phone / PDA device to communicate with fellow employees, partners, TSPs, and customers and streamline data collection in the field.
- Tapping into the knowledge and information base in agency corporate databases using improved search engines and geospatial analysis techniques.
- Continuing to use the Toolkit, Protracts, Smartech, eFOTG, and PRS integrated to streamline workflow and improve operational efficiency.

The Technical Service Provider…

- Will use commercial software containing the Conservation Plug-In to service customer needs for assistance.
- Will be granted access by customers to applicable records in USDA databases.
- Might pay a transaction fee for servicing customer records to cover 24x7 support of the Conservation Plug-In.

So-what may be different in the future…

- Increased mobility and access to data
- Fewer/different types of offices, not organized around geo-political boundaries.
- Customer self-servicing
- Increased leveraging of private sector resources

"Strangely enough, in the midst of change, the present course may often be the most risky one."

Program Assessment Rating Tool Scores for NRCS Programs

Program	Score	Rating	Year
CTA	59	Results Not Demonstrated	2003
Soil Survey	71	Moderately Effective	2003
WHIP	60	Results Not Demonstrated	2003
Snow Survey	82	Moderately Effective	2003
FRPP	66	Results Not Demonstrated	2003
Plant Materials	63	Results Not Demonstrated	2003
NRI	69	Results Not Demonstrated	2003
Watershed and Flood Prevention	65	Adequate	2004
EWP	56	Results Not Demonstrated	2004
EQIP	72	Moderately Effective	2004
RC&D	41	Results Not Demonstrated	2004

Big success- Accomplishments 2001-2004

Soil Survey Trends 10/4/04

	Surveys Published	Surveys Map Finished	Initial and Update Mapping	SSURGO Surveys Archived	Digital Data Sets Distribution
2001	**28**	**51**	**24,365,174**	**139**	**31,209**
2002	**66**	**57**	**22,633,208**	**288**	**50,361**
2003	**62**	**64**	**22,513,113**	**317**	**78,394**
2004	**79**	**80**	**27,619,929**	**339**	**91,880**

Future Directions

- Complete the initial soil survey and increase soil survey digitizing.
- Maintain and keep our soils database up-to-date.
- Continue to adopt of new technology.
- Develop the Web Soil Survey.
- Continue to implement MLRA Soil Survey Management Areas.
- Look for new ways to assist NRCS to become more effective and efficient through the Soil Survey Program.

The Future and Success is about balancing…

Customer Service	Human Capital
Satisfaction	Efficiency
Outcomes	Operational Cost
Environment	Management
Conservation	Organization
Programs	Change
Accountability	Technology

What is your Role in the Future?

How can you better:

- Create a clear vision?
- Focus your resources to meet this vision?
- Take time to pay attention the details?
- Listen to employees, partners and stakeholders?
- Evaluate if you have been successful?

The Future is in Your Hands- How Will You Get There?

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Observations and Comments

William Puckett, Deputy, Chief of Soil Survey and Resource Assessment, NRCS, Washington, DC

Issues and Opportunities

- Web Soil Survey
  - ✓ Electronic publications
- SSURGO
  - ✓ Conservation Security Program
  - ✓ Homeland Security
- Conservation Technical Assistance
  - ✓ Draft policy on CTA
  - ✓ How does CTA dollars affect your program?
  - ✓ Have you talked with your State Conservationist about CTA and Technical Soil Services?
  - ✓ How would we fund our Resource Soil Scientists if all CTA were shifted to other priorities?
  - ✓ What goals do we have for CTA?
  - ✓ What is a PART score?
- Technical Soil Services
- Strategic Planning

Issues and Opportunities

- Marketing and Communications
  - ✓ Who are we?
  - ✓ What is our message?
  - ✓ What do we want soil survey to be in 2, 5, 10, 20 years from now?
- Complete the "Once-Over"
- Fully implement the MLRA Concept

Issues and Opportunities

- Recruitment and retention of soil scientist
  - ✓ Agency's core corporate data
  - ✓ 5 billion dollars
  - ✓ Boot Camp
  - ✓ Are you training your replacement?
- National Cooperative Soil Survey Program
- Quantifying Reliability of Soil Survey Information
- New technology
  - ✓ SoLIM
  - ✓ 3dMapper
  - ✓ LIDAR
  - ✓ EPIC, APEX, SCI, CropMan, COMET, SMAF
- New Technology Infrastructure
  - ✓ National Technology Support Centers
  - ✓ National Geospatial Development Center
  - ✓ Remote Sensing Labs
  - ✓ National Soil Survey Center
  - ✓ National Cartography and Geospatial Center

- ✓ 18 MLRA Offices
- ✓ Digital Map Finishing Centers
- ✓ NHQ

- 2006 World Congress of Soil Science

Future???????????

- What is the future for Soil Survey?
  YOU

Thank You!

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Key Soil Survey Issues and National Program Direction
State Soil Scientist Conference

Micheal L. Golden
Director, Soil Survey Division

I am very pleased we are able to hold this state soil scientist conference at Laughlin, Nevada. Thanks go to Bill Dollerhide and his staff for helping to set up the meeting.

Since the last time we met in St. Joseph, Missouri there have been many personnel changes. We now have Dana York as the Associate Chief, Dr. Bill Puckett as the Deputy Chief for Soil Survey and Resource Assessment, myself as Director of the Soil Survey Division, Ken Lubich as the Soils Program Manager, Dennis Lytle as the Major Land Resource Area (MLRA) Coordinator, Dr. Carolyn Olson as the Science Advisor, and Maxine Levin as liaison for Soil Technology to Programs.

Dr. David Hammer is the National Soil Survey Lab (NSSL) and Soil Investigations National Leader at the National Soil Survey Center (NSSC). The National Cartographic and Geospatial Center (NCGC) have been reorganized and Sam Brown is the Geospatial Branch Leader. We have a new National Geospatial Development Center (NGDC) at Morgantown. Jon Hemple is Director of the Center with Sharon Waltman and Henry Ferguson as lead individuals for spatial and tabular database integration.

We have three regional technology centers with Leander Brown, Ed Griffin and Terry Aho as core lead soil scientists with primary soil technology transfer to states. We have six (6) new MLRA Region Leaders and State Soil Scientists with Steve Park, Mike Risinger, Luis Hernandez, Don Fehrenbacher, Doug Slaybaugh, and Mike Doemier.

I am very excited about where we are at this particular period of time in soil survey history. I believe we have started the biggest and brightest times of our careers. We have started on the third paradigm of soil survey. For much of our careers we have wanted the actual tools we have available at our finger tips today. This is the foundation of a new way of doing business. Our forefathers in pedology must have dreamed over the possibility of having all soils inventoried and housed in one place.

1. We have over 2900 soil surveys in the soil data warehouse with over 2100 SSURGO projects on line and these are the official soil databases. As of January 30 we had almost all of the soil surveys in the soil data warehouse and now they are available on the soil data mart. I would personally like to pat each of your backs for achieving this enormous goal. We should let our state conservationists and other leaders know how big a deal this really was.
2. We have established 18 MLRA Region Offices for quality assurance for initial and maintenance of soil surveys. These have been very successful.

NRCS's top leadership has indicated that we can expect flat budgets at best in the future. Chief Knight has challenged us to "Find a better way of making, maintaining, and providing soil data and soil information."

I find this challenge to be achievable and rewarding to all of us. Leadership has set the stage for what I call the era of the "New Soil Survey".

- The New Soil Survey is how we will do business in the future.
- The New Soil Survey is how we will be structured in the field.
- The New Soil Survey is how we will manage "All" tabular and spatial data.
- And the New Soil Survey will be how we market soil information and data to the public.

We will ultimately provide our soil data to more users as we market and implement the "New Soil Survey".

We have a rich history of over 100 years of soil science with pedologists reading the landscapes and understanding why soils form differently and delineating those features that make soil map units unique. Today we have a total of about 950 soil scientists throughout the agency and only about 500 field soil scientists. About 50% of the total soil scientists will be eligible to retire within five (5) years and that includes about 90% of everyone in this room. We need to recruit and train very aggressively new employees to become the best soil scientists for the "New Soil Survey".

To a great extent we are making soil surveys almost the same way for the past 60 years. We have had Seven (7) Approximations and nine (9) editions to Soil Taxonomy. We have about 60 years of patch work soil surveys from various stages of correlation. We have about 97% of all the private lands with a complete correlated soil survey.

We need complete soil survey coverage across "All" lands. We need to dust off the concept of making soil surveys on "All" American lands. We have a very good relationship with National Cooperative Soil Survey (NCSS) cooperators and partners but there remains a significant area without detailed soil survey coverage. We need to look at taking the lead in making soil surveys on all lands regardless of ownership.

We need to restructure the area of responsibilities at the project level. We no longer have 1500 field soil scientists but only about 500. Much of the country is still doing business one county at a time even in maintenance. I propose we structure the 300 odd soil survey project offices into about 125 MLRA Management Areas (MMA's) to provide support and ownership of all the spatial soil layers and all the tabular data map units within those areas. These areas will possibly cross county, state and region lines. They may be groups or portions of MLRA's.

With the existing staff of about 500 field soil scientists grouped in about four staff per MLRA Management Area (MMA) that makes about 125 areas to cover all the United States and Territories land mass. You can still establish satellite offices within the MLRA Management Area's and if we get more funding and staffing then we can add to the base number of MMA's.

1. The New soil survey with MLRA Management Area's would first ensure there is complete digital coverage for their area. In some cases STATSGO will need to be used. Or the field staff could utilize new GIS techniques to predict soil landscapes catena's on a broader area. Correlation by MO Region Offices by Soil Data Quality Specialists (SDQS's) will be essential. Correlation on the broad areas should be first then subset more detail mapping as needed. We should use the MLRA Management Team approach to determine annual and long range plans for work within the MMA. Some may elect to focus on completion of initial mapping or within specific watersheds; others may focus on "Benchmark Landscape Catena's" for the most critical need for maintenance.

This is a fundamental change in the way we have done business. The New Soil Survey will focus on comparing similar correlated units and start managing one typical data map unit for a given area where one series or phase of map units have been correlated over an area of counties or states. Spatial changes may be needed in maintenance. We will utilize SSURGO as the starting place for edits. Changes in NASIS will be needed for tabular edits for each of the data map units (DMU's). Progressively correlated units will be approved and moved to the soil data warehouse for immediate use. Therefore we are making the data in the warehouse live and the most current at any given time. The New Soil Survey will be moving into a maintenance mode where soil surveys are managed by MLRA Management Area. We will keep the most current information updated and available on the Soil Data Marts where the public can access soils via the "Web Soil Survey".

2. The New Soil Survey will implement and train employees in new technologies. NGDC will be looking at existing and advancing ArcGIS and SoLIM technologies. This includes development of a "Sol Survey Toolkit" where the field soil scientist selects which tool they need while enhancing existing soil survey lines. The toolkit should include ArcGIS tools, SoLIM, 3DMapper, Pedon, GPS; etc; These need to be useable in the field and have the ability to transfer data and lines back into a manageable database such as NASIS. The Soil Survey Business Analysis Group (SBAAG) which is being restructured and NGDC will lead this effort.

3. The New Soil Survey will build on existing NASIS functionality. It has traditionally been a tabular database but for NASIS 2007 we need to advance it into the spatial arena. So when we maintain a given area in our MLRA Management Area we do not have to manually measure and report areas. Spatial areas will be generated with acres to show progress in soil survey schedule with out-put to POINTS or other reporting systems for managers. We need to base our production on how many DMU's we improve with updated correlations. This should allow us to move to a refresh rate of about once every 10 years as compared to once every 90 years that we currently have.

4. The New Soil Survey should make Marketing of soils information first rather than last. We have traditionally not been very visible to users of soil data. We are going to utilize a private marketing firm to assist in how to better market our products and ensure that our message is more visible. In addition we will utilize a private firm to assist in developing an Information System Plan (ISP) for the soil survey and resource assessment (SSRA) deputy area. Upon completion of the ISP we can better manage the flow of our data and information. Marketing also means recognizing our partners. We are continuing the Achievement Awards for soil scientists. This year we are starting the first NCSS Cooperator Achievement Award with nominations due next month. We need to look at our base financial support and a better accountability for CTA-01 funds and activities. We are covered in policy for CTA-01 but we have no structure for reportable items by Resource Soil Scientists and others. We will be looking at ways to improve this issue.

5. The New Soil Survey will need a new Strategic Plan. We will begin development of a new plan this spring.

6. The New Soil Survey will be utilizing temporal soil properties. Bob Grossman and others at the NSSC have been leading this effort for years while looking at several use-dependent soil properties. Today, Arlene Tugel, Karl Hipple, Cathy Seybold, Amanda Moore, and Carolyn Olson are leading the efforts.

Future initiatives for Soil Survey are not far away. We will be looking at Soil change in Farm Bills. New Farm Bill programs provide incentives for enhancing the soil resource. However, much of our standard soil survey information requires reinterpretation to address questions of resource condition, environmental quality and sustainability. Producers, land managers, and policy makers need information about how soils change to predict and assess management effects. To meet this need, information about how soils change should be added to surveys of the National Cooperative Soil Survey (NCSS). We should focus on changes that occur over the human time scale. This is a time scale relevant to producers, and has not been addressed by standard soil surveys.

We are working with ARS (Agricultural Research Service) to develop sampling guides. In particular, dynamic soil properties will utilize use-dependent soil properties for soil change. Through the NCSS, we hope to encourage advances in the science of soil change for the development of new soil survey procedures to collect and interpret soil data.

The Soil Survey Division and Strategic Plan will address major agenda items such as:

- Completing the SSURGO initiative
- Providing complete digital coverage of the US to start maintenance

- Implement MLRA Management Areas for complete office coverage
- Implement New Technologies at MLRA Management Areas
- Use of Temporal Soil Properties
- Market soil information and implement the Web Soil Survey

We have a bright future ahead of us in the New Soil Survey. Our future is one where we can determine our own destiny. Our future is to use what we have learned from the patch-work of soil surveys from the past century. To take what soil information we have and make it better, to use the latest technology we have to make our discipline better.

When we have a "New Soil Survey" we should remember that we are only as good as we can market our product. One that is science based and integrated into the future.

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Soil Survey Funding Formula

Ken Lubich, Program Manager

The formula was originally developed with a team of State Soil Scientists in 1992.

Data Used in the formula:

- Initial mapping remaining: 1/FTE per 40,000 acres (exceptions for Alaska)
  - Divided by 10 - the number of years needed to complete initial soil survey
- Acres needing updating (revised in recent years): 1/FTE per 80,000 to 240,000 acres. (AK 640,000)
  - Amount varies by type of mapping normally done in the state
  - Divided by 20 – the number of years we ideally would like to cycle through all surveys
- Number of Surveys Areas: 1 FTE per 10 survey areas
  - Divided by 2 – to split between CO-01 and CO-02 for technical services
- Number of Map Units, Components, and Series:
  - Used to recognize workload difference from state to state (0, .5 or 1 FTE)
- Base staffing: 3 FTEs per state (exceptions DE: 2, RI and PB: 1)
  - Base staffing is intended to help small states which also tend to be high cost of living states

Off the top items prior to applying formula

Shown as Program Managers Earmarks – in State Allocation

- Special Projects - These are usually research projects of national significance or specific things states are doing for the overall national program.
- Native American Mapping Initiative – Accelerated funding to states with large acreage remaining.
- Digital Map Finishing Sites - funded under special projects at $200,000 per site.

Part of the off the top budget, but not shown as an earmark

- Reimbursable funds - $1,000 off the top for every $12,000 in reimbursable, based on average of past 3 years (always a year behind – in FY05 used FY03, FY02, FY01)
- MLRA Regional Offices – funded at a base level determined by staffing required. MLRA Regional Offices tend to cover similar acreages, but vary significantly in number of active survey areas, which was considered in setting the base staffing.

Congressional Earmark - Also off the top, but shown as Congressional Earmark

Appling Calculations

Calculations in formula are not followed as an absolute, nor determine the number of FTE's a state should have. They are used to determine the states percentage of the total allocation, after off the top allocations. The formula percentage is used to guide and gradually change the budget allocation. Generally we don't shift states more than 5% from pervious year allocation.

FY 2005 Specifics

In FY 05 proposed budget the national overhead was reduced and carryover re-allocated in allowance, resulting in total allocations to states in FY05 equaling FY04, in spite of a lower overall allocation. Carry over appears to have been returned in FY04. In FY05 we reduced the allocation to 3 states, which were 45% or more above what our calculations indicated they should be, by 7%. These reductions result in a few small increases to states at least 15% below the formula calculations.

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Hiring: Advice from State Soil Scientists that have been successful recruiting and hiring new soil scientists

Hiring New Soil Scientists in North Dakota

Paul Benedict, State Soil Scientist, Bismarck, North Dakota

Soon after I came to North Dakota two years ago we had several openings for entry-level soil scientists. I became quite concerned when my first two job offers were turned down by native North Dakotans. Both individuals were unwilling to sign the Career Intern Program's required mobility agreement. Undergraduate students in the Soils Department at North Dakota State University were at the time very limited so I figured we would have to import someone in from out of state. My predecessor, Cleveland Watts, had earlier hired a couple of new soil scientists out of the University of Wisconsin, Stephens Point so I gave them a call. All of their recent grads were already placed.

I called a several colleges with soils programs. Several people initially showed interest but either they never followed through (perhaps North Dakota was a little too cold for them), or their qualifications were lower than I was willing to go. Our acting state conservationist at the time suggested we advertise with an incentive bonus. Before doing that I thought I would give my peers a chance to help me. I sent an email to each state soil scientist asking if they were aware of qualified applicants that they had been unable to hire. I also sent the same message to special emphasis program leaders nationally and in several states. I was amazed at the response. I received dozens of replies. As a result we were able to hire 5 new soil scientists.

This year we are hiring one SCEP student and it seems there are more people willing to move to North Dakota. Also North Dakota State University's Soils Department is growing again.

The University of Wisconsin, Stephens Point has been very helpful to us in North Dakota in recruiting. Dr. Aga Razvi, Professor of Soil& Waste Resources, (715) 346-3618, Aga.Razvi@uwsp.edu is good contact at the University for potential employees.

RECRUITING AND RETAINING SOIL SCIENTISTS

Mike Sucik, State Soil Scientist, Des Moines, Iowa

- Graduates with 15 credits of soils are out there!!!
- Talk to University faculty when getting ready to hire.
- Universities will help graduate gain an additional few credits through special projects
- Don't depend on personnel staff to do your recruiting.
- Teach soil scientists TSS as well Soil Survey

Recruiting, and Hiring Soil Scientist

Joe Moore, State Soil Scientist, Alaska

Alaska doesn't fill career vacancies on a regular basis, but we do hire several seasonal positions every year. We have been very successful in filling these with qualified individuals. I release information on these folks at the end of each summer. Several over the past few years have then been picked up as permanent hires in other states.

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Recruiting, Hiring and Retaining Staff

Bob McLeese, State Soil Scientist, Champaign, Illinois

If we have the jobs, they will come. Do we have a strategic plan for soil survey? Do we have a staffing plan? Do we have a plan to bring on new hires to close the gap? We can answer yes to those questions in Illinois, but I bet we can't answer yes in most states. If we can not, then the State Soil Scientist is not doing his/her job. It is about relationships and communication. Relationship with the State Conservationist, the Human Resources Mgr, and the College professors. Does the State Soil Scientist know how many students each of the universities in his/her state have in a soils curriculum? If not, they are not doing their job. The students are out there, we just need to be cultivating better relationships and better communicating are needs.

We need a good Employee Development Plan and training opportunities for our new hires. We need to find a way to give them the field experience that they need to become a good soil scientist. We need to lay out the plan and the potential career ladder to them when they come on board. Then we need to equip them with the best tools and technology that is out there. To do that we need a staff/support ratio that is better than 80/20. 80/20 will not cut it. We probably need to be at 70/30.

The State Soil Scientist has to be the leader and motivator behind all of this. If he/she does not do it, it won't happen.

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Successful Strategies for Hiring Soil Scientist

Darrell Schroeder, State Soil Scientist, Casper, Wyoming

- I try to have a perpetual program of employing students using SCEP
  - I try to have more SCEPS than I have planned needs for hiring
    - **Some will change their mind not come to work for NRCS**
    - **There will be ample opportunities for a job in other states if for some reason I cannot place a SCEP**
- I have provided graduate research opportunities for SCEPs
- I made recruitment and hiring my job and don't depend on the human resources section to do it. I find the applicants and offer the jobs.
- I hire using the Career Intern program and promise permanent employment
- I try to enlist the help of many university contacts
  - I have a list of about 60 contacts at Universities across the US that I inform about vacancies
  - I enlist the help of my soil scientists to spread the word about vacancies
  - Many soil scientists maintain contact with university professors and college mates
- I use email as a method of distributing notices of vacancies
  - I include a flyer that can be posted by professors that provides information about
    - ✓ the duties of the job,
    - ✓ the town and region,
    - ✓ pay range,
    - ✓ qualification requirements,
    - ✓ what information should be included in job application,
    - ✓ how applications can be sent (email, regular mail,
    - ✓ date applications must be received,
    - ✓ information to contact me (phone, email address, mailing address.
- I use a short (2-3 week) time period for accepting applications, I extend the timeframe if needed.
- I make a selection and offer the job within a few days after the application deadline.

- I sell the job
    - Working outdoors;
    - Job stability,
    - Pay- I tell them what pay they will start at, if a promotion will occur after one year, COLAs,
    - Benefits - life and health insurance, vacation and sick time, flex schedule,
    - Excellent training program,
    - Working with others in the same profession
- I use incentives to attract and hire top quality soil scientists
    - Pay expenses for moving their household goods and per diem to travel to their duty station.
- I keep applications of unsuccessful applicants in my files
    - I sometimes find myself suddenly needing to fill a vacated position

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Defining Soil Survey Marketing and future marketing efforts

Gary Muckel, Soil Scientist, NSSC

Marketing defined – A process of organized thought and action that helps achieve product or organizational goals.

Begins with a problem or goal statement, identification of target groups and the priority of these groups, their conditions, leadership, communication tools, connections, and how they can help you achieve your goals. It is then that you identify your specific objectives, i.e. how do you measure success. What is your market position, timing, resources, and your ability to carry out your goals? Then develop your strategies, plans, and actions and carry them out with evaluations and redirection.

The main idea is to focus your resources and develop products for those target audiences that can really help you. These products must meet customer needs, marketing is part of each product development, it is not selling what you got).

Our mission in soils is to "make soil and natural resource data of the highest possible quality available in a manner that meets the needs and expectations of our customers." We want to increase access and use of soil information by current and potential users.

SSD marketing trends – trends influence and orient our marketing. As we develop capabilities our market position changes.

- **Switch to electronic delivery of soils information**
  - Change to government regulations and general manual on official data
  - Change over with Web soil survey this June
  - Pre introduction with SWCS, NACD, FM&RA, NHQ, ASA
  - News releases about April-May
  - Nomadic display planned at several groups this summer-display on order
  - Delivery from one central point-via http://soils.usda.gov, updates appreciated
- **Culture shift within soil survey to focus on application of soil information not the grind of collecting data nor the formatting of a manuscript**
  - From data collection and updates
  - To refinement with consistent seamless information
  - To focus on delivery and application of information
  - Via tailored information to other agencies
  - Via the eFOTG
  - Via the Customer Service Toolkit
  - All data from the soil data mart
  - Basic deliverables are tables and maps

- **Accountability**
  - Measurement of success of our delivery
  - Products are one set of measures,
  - current phase of soil survey is delivery.
  - Methods for measuring the success of the delivery of soil information are different.
  - Web trends, and Foresee results (that irritating popup survey) are tools to provide measurement of delivery of the information and opportunity for customer feedback.

Our soils national Web site receives 1.4 million hits/month and 133,000 unique visitors/month. 83% in the USA, 17% outside the USA. Dominant referring sites are: direct to soils, google, NRCS, msn.search.

- **Strategic marketing plan**
  - Move forward with other data layers, i.e. STATSGO
  - Integration of Common Resource Area
  - Shorten the pathway of soil information from the field to the customer
  - Development of focused marketing to specific audience groups

5 Year Plan plus one

Educators-NSTA, state associations, Dig-In, education CD, maps, booklets, biology, planners, From the Surface Down, mini profile cards, Web site

Land Users-accessible data, electronic data
Farm advisors, farm and ranch managers
Agency program managers, district conservationists, technical service providers

Land Use Planners and Contractors-risks and hazards and understanding soils in an modified environment Understanding Risks and Hazards, Urban Primer

Wildlands-short comings here except newest planners and partnering with SRM

International Soil Scientists-World Congress, tours, and displays highlighting Soil Taxonomy, cooperative effort, electronic delivery, interpretations

Geographers- marketing plan to be drafted in next couple of weeks, National Geospatial Development Center is leading.

Smithsonian Exhibit-educators and policy makers-

- February opening with Menfro monolith announcing upcoming exhibit
- News releases
- Fund raising ≈ $650,000 to date, pledges not included
- 12 states without a liaison, contributions by state on updated Jan. 1 spreadsheet.
- Joint effort with professional soil scientists in government, universities, sponsors, and private business
- 8 million visitors a year plus traveling exhibits and sales items
- Funding for a traveling exhibit planned from National Science Foundation grant. It would visit 45 libraries over a 3 year period with the exhibit, youth guide, and a trunk of activities and supplies. States will be asked to help with programs.
- Details at: http://www.soils.org/Smithsonian/liaison.html

Expansion of market position

- Electronically available data
- Images to enhance our publications and exhibits and provide for textbooks
- Scanning project and image library in process with 5000 slides scanned
- Web capabilities
- Local interpretations development capability
- Future enhancements to STATSGO access and map products
- Excellent partnerships
- Agency support
- Remember your civil rights responsibilities and ensure that all people have access to soil information-The Environmental Justice Report asked that printed reports be placed in community centers. You will need to ensure that happens.

Expectations for State Soil Scientists

- Maintain the soildatamart
- Utilize the National Technical Support Centers
- Contact with your customers

  - Hold user conferences
  - Reach out to other groups
  - Obtain user input into update plans
  - Contact to state associations of science teachers, contractors, conservation districts, farm groups, farm managers, FFA
- Establish close relations with your NRCS Public Affairs Officer and other agency folks, i.e. SRCs, programs
- Use your Web site for articles, special interpretations
- Submit articles to NRCS for soils success stories
- Use and promote the **http://soils.usda.gov** site and help keep it current
- Use marketing within the cooperative survey partnerships to attack state problems
- Provide for technical assistance to customers
- Promote soil information to those that should be using it
- Develop a statewide marketing plan

What help do you need from the SSD?

- Materials?
- Exhibits?
- Power points
- Posters?
- Booklets?

Send your marketing needs to gary.muckel@usda.gov
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Web Soil Survey

Jim Fortner, Soil Scientist, NSSC

Background:

- Memo from Mike Golden to STC, dated November 10, 2004
  - NRCS moving away from hardcopy soil survey report publication in most cases
  - Moving towards electronic publication – CD and Web
  - Print hardcopy maps until on-the-fly generation is possible

Web Soil Survey Purpose

- Application that helps producers, agencies, TSPs, and others get electronic access to relevant soil and related information needed to make use & management decisions about the land
- Provide alternative to traditional hardcopy publication
- Provide means for quicker delivery of information – reduce publication backlog
- Provide electronic access to full soil survey report content
- Provide access to most current data
- Allow customer to get just information they want/select
  - Map units for just their geographic AOI
  - Desired sections of manuscript, with some mandatory sections
  - Information relevant to customer's landuse – e.g. rangeland concerns

Web Soil Survey Products – Multiple Report Products

- Standard Soil Survey Manuscripts (PDF)
  - Text, tables, and maps by SSA (Alpha)
  - Whole or by AOI (Beta)
  - Subset of tables, based on specific mapunits (Beta)
- Customized Soil Resource Reports (PDF) (Beta)
  - By AOI
  - Content specifically chosen by user
  - Thematic Maps (with tables and text)
  - Different format from Soil Survey Manuscripts
- Soil Data Mart Tables by AOI (Beta)
- Soil Map on Ortho backdrop for the AOI from SSURGO (Beta)

Web Soil Survey Functionality

- Customer can select geographic area of interest (AOI)
- View soil and thematic maps online
- Interact with official soil data on Soil Data Mart
- Access data across SSA boundaries
- Access historical versions of soil survey report
- Provide link to related NRCS information and resource data
- Download data
- Print on demand

Provide Easy Access to Relevant Information

- Cross-Platform Browser Support
  - IE, Netscape, Mozilla, and Mozilla Firefox
- Authentication not required
  - Optional Level 1 and Level 2 Authentication provides more functionality
- 508 Accessibility
- User-defined area of interest (AOI)
- Filtering of data: resource, land cover, use of land

- Choose what is included in the output report
- Online Help

Target Audience – Everyone
- General public
- Engineers, scientists, and other specialists in local governmental agencies
- NRCS (and other governmental agencies) field employees or technical service providers

Planned Timeline
- Alpha test – February 2005
  - ~50 participants
  - Primarily to evaluate interface and layout
- Beta test – April 2005
  - Wider test group, evaluate functionality
- Public release – late June 2005
- Additional functionality on a bi-yearly release schedule

Alpha Test Functionality
- Use a map to define an area of interest
- For the area of interest:
  - Get status about what datasets are available
  - Display a soil map
  - Display thematic maps from Web SDV
  - Download a PDF manuscript w/selected map sheets
  - For ecological sites, assess the current condition and get information about how to move the site to an improved state including photos

Pathway through WSS
- Define area of interest
- Browse soil information, learning about the concepts, running interpretations, etc.
- For customized soil resource report, while browsing information, simultaneously choose what to save to output report
- Select/download the output report

Area of Interest (AOI) Builder
- Variety of Navigation Features
- AOI Collections – discontinuous AOIs
  - Polygons, Lines, and Points
- Interactive Map: Data Catalog, Layers with Legend
- Import and Export
- Save

Area of Interest Features
- Navigate to an AOI using basic map navigation themes (Alpha version):
  - Transportation
  - Ortho photo
  - Hydrography
  - Political features
- Define an AOI by drawing a polygon (Alpha), line or point (Beta version) on a map
- Display datasets available for a specific area (Alpha)
  - PDF manuscript
  - PDF maps

  - SDM supplemental tables
  - Digital maps
- Select or navigate to an AOI using selection criteria (Beta):
  - SSA
  - County
  - Watershed Boundary
  - Zip Code
  - Township/Range/Section
- Save AOI (Beta)
- Assign AOI properties: AOI name, NRCS landuse, description (Beta)
- Create multiple, distinct AOI units within an AOI
- Additional selection criteria for defining an AOI, such as shape file, latitude and longitude point file, USGS 7.5-minute quadrangle
- Land boundary associated with a landowner's NRCS customer statement
- Line or point with user defined buffer

Soil Data Explorer Features
- Filter the soil information by resource, land cover, or use of land
- Learn the terminology and concepts of soils and specific land covers and land usages
- View interpretive soil data and soil properties in the form of thematic maps, tables, and text description
- Assess the current condition of an ecological site and manage the site toward an improved state

Business Requirements
- To be fully functional WSS needs PDF text, PDF maps, digital maps in SDM, attribute data in SDM
- Must have manuscript text in proper format including links between text and maps – instructions sent to states by S Anderson 12/22/04
- File size limit - < 3.5 Mb each, not total for the survey area
- Text in one file, separate file for each map sheet
- All text submitted must pass editorial review
- About 40 surveys currently on Web are OK

Basic Procedures
- Project staff prepares manuscript text
- Tech review and edits completed
- Editors do English edit, format and prepare PDF files
- PDF map files prepared and submitted to editors by DMF sites (?)
- Editors submit PDF files, text and maps to Staging Server
- SSS commits files to SDW/SDM

Current State's Role
- Continue to develop manuscript text as usual
- Web SS goes operational in June 2005
- Unless approved otherwise by Mike Golden for GPO printing, all surveys prepared for publication in FY 2005 will be published on CD and/or Web SS
- File format, PDF, is the same for both
- Editors will prepare files accordingly & stockpile until June.
- Editors will place stockpiled files on staging server when WSS becomes operational.

PDF Manuscript vs On-the-fly MUD generation
- Need PDF for efficient delivery of whole SSA product when requested & for CDs
- Same format for Web SS and CDs

- Long range plan is to generate on-the-fly to keep in sync with attribute tables
- On-the-fly generation not ready to go
- Currently several content formats are used across the country. We can not support this many in Web SS – too much overhead involved.
- We could support 3 or 4 different formats if agreement could be reached on content and layout.
- Editors would be involved in design of program to generate output
- Standardization of NASIS data population would be essential to work with these scripts
- Are you (states) all willing to compromise a bit on MUDs to make this happen?

Outstanding Issues

- What to do with the 2500+ published surveys that we have?
  - Web Soil Survey is designed to handle them
  - How to get them into electronic format and in what form – text or image?
  - Someone needs to make decision on priority of this task

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Web Soil Surveys: Editorial Considerations

By Stanley P. Anderson, Editor, NSSC, Lincoln, NE

1. The editors have developed a new 1-column format for the text of those surveys that will be available only on CD and/or the Web. These surveys will require electronic maps (PDF files). The traditional 2-column format should be used if the survey is to be printed through GPO (offset printing). The 1-column format results in 50% more pages than the 2-column format. (A text of 200 pages in the 2-column format will be 300 pages in the 1-column format.) **Before the editor begins work on a survey, he or she must know whether or not the survey will be printed.** If the State Soil Scientist decides to go to press at the last minute (after the editor has already prepared the survey in the 1-column format), either the editor will have to spend an extra week preparing the survey in the 2-column format or the agency will have to pay the extra cost of printing the 1-column format.
2. A SOI-7 is still necessary, even for surveys to be available only on CD and/or the Web.
3. Technical and format problems in SDM tables can be identified but not fixed by the editors. Ideally, all of these problems will be solved before the editor receives the survey.
   Examples:
   Judging by the SDM "Sand" column, there are no "Good" sources anywhere in the US.
   In the "Topsoil" column, note:
   Hard to reclaim 0.00
   Hard to reclaim 0.68
   After the first instance of "Hard to reclaim" "(dense layer)" is needed, and after the second instance "(rock fragments)" is needed.
   If a SDM table has blank columns, the editor will need to arrange to have the table reformatted once and for all.
4. When we make a widget (a CD or Web product that includes all of the text, tables, and maps), we will have new problems with "nonstandard tables" because the SDM tables are not in a monotype (such as Courier New) and are not formatted with spaces. The nonstandard tables should be formatted with tabs and should be restricted to climate tables (for now) and tables showing sampling data (**"**Engineering Index Test Data," "Physical Properties of Selected Soils," and "Chemical Properties of Selected Soils"). **All other tables (including "Wildlife Habitat" and a table showing limitations for cropland or pasture) should be developed through the SDM**.
5. **Someone (the editor or the SDQS) must coordinate getting the maps into PDF.** PDF files can be created either by scanning printed flats or distilling PS files from a DMFC.
6. **We may need a benevolent dictator to limit the number of formats available in WSS.** The coding system for text formatting will change from @ codes, such as <@23> for the first horizon in a series description, to "semantic tags," which will be content driven. The long-range plan is to have these tags built into NASIS so that the text is "tagged" when the project leader makes text entries.
7. Prewritten material describing the Soil Data Mart tables has been edited. The editors (Stan Anderson, Aaron Achen, and Pattie West) kept "Use and Management" and "Soil Properties" pretty much as they were in the last version of the PWM (2001), but we had to change how we refer to the tables. There will be no table numbers, even in the widget.

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LiDAR - Uses for Soil Survey

David Hoover, State Soil Scientist, Boise, Idaho

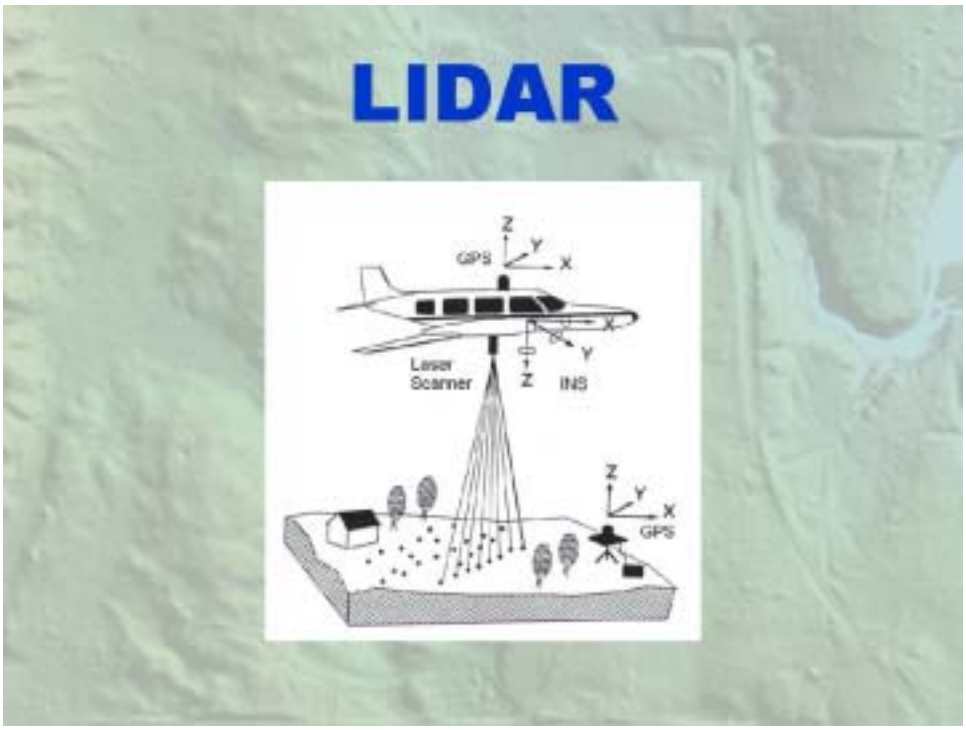
An emerging new technology for terrain analysis

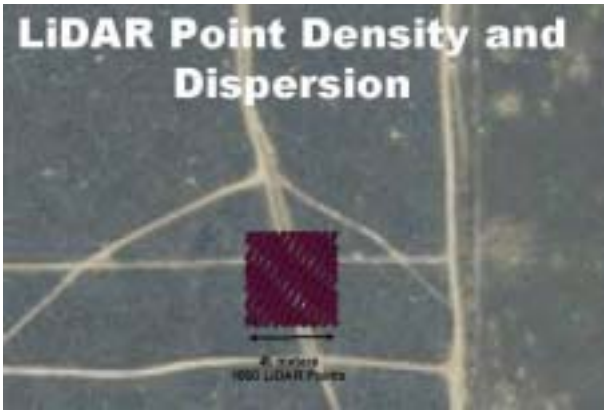
LiDAR is an acronym for **Light Detecting And Ranging**

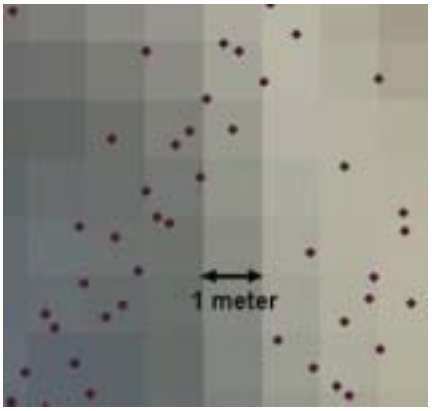
LiDAR

LiDAR

- Lasers with timing systems that are able to measure distances with an accuracy of less than 5 centimeters.
- Pulse rate of LIDAR systems of up to 50,000 pulses per second
- The light has enough time to travel from the sensor to the ground and back before the next pulse is sent.
- A scanning mirror is used to direct the laser pulses back and forth across a wide swath underneath the path of the airplane.
- The aircraft typically fly at an altitude of 700 meters, which allows elevation recording across a swath about 300 meters wide depending on the type of instrument used. A series of overlapping, parallel swaths are conducted so the entire study area is mapped.
- The precise location of the laser sensor head and attitude of the aircraft must be accurately known in order to individually georeference each laser "hit".
- LIDAR is actually the convergence of three technologies: Laser Rangefinding, GPS and INS (Inertial Navigations Systems),







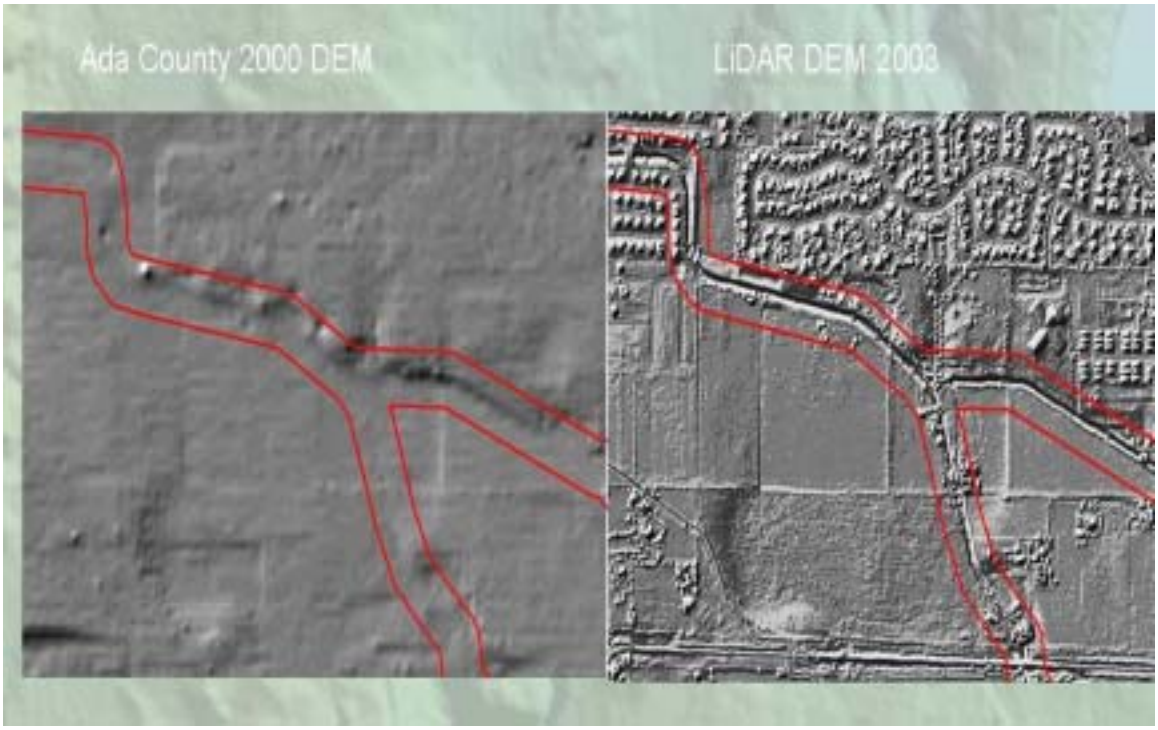
Light Detecting And Ranging

- $200–$1000/mi^2
- Economy of scale
- Extensive filtering to remove tree canopy (first return data)

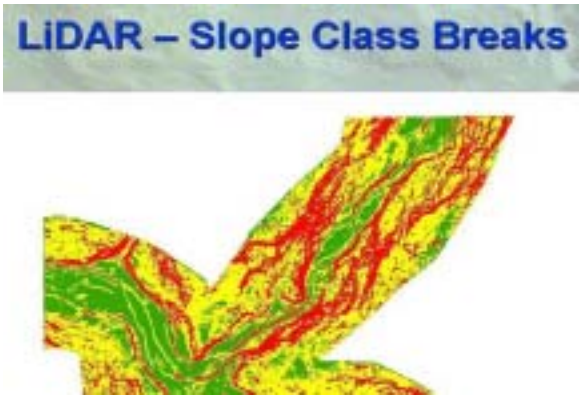
Contrast of Two Technologies

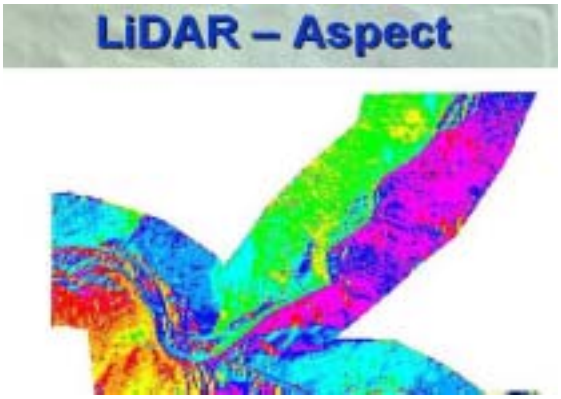
Boise Valley Study Area

- Jointly funded by Natural Resources Conservation Service and Bureau of Reclamation
- Nm Tc$anloodplain and terrace analysis for soil survey investigations
- BoRc$aRainfall/runoff and hydraulic study in 10 Mile and 15 Mile drainages
- Need for higher quality data
  - 10 m or 30 m cells vs 2 m cells
  - 6 m vertical accuracy vs 15 cm vertical accuracy
- Approximately 100,000 acres
- Cost of about $50,000
- nlown in December 2003
- Data was available in 3 months

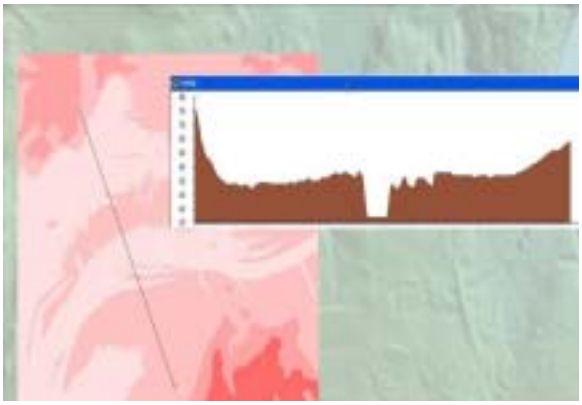


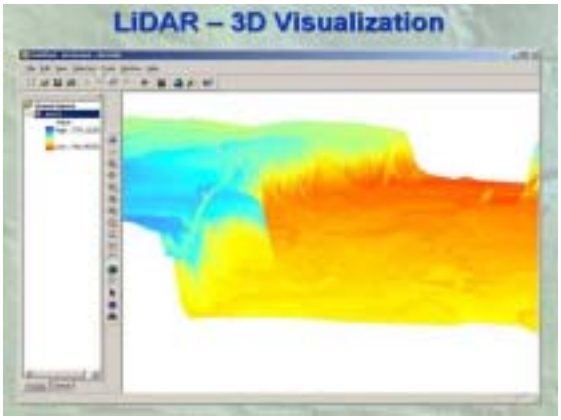
Some LiDAR Products

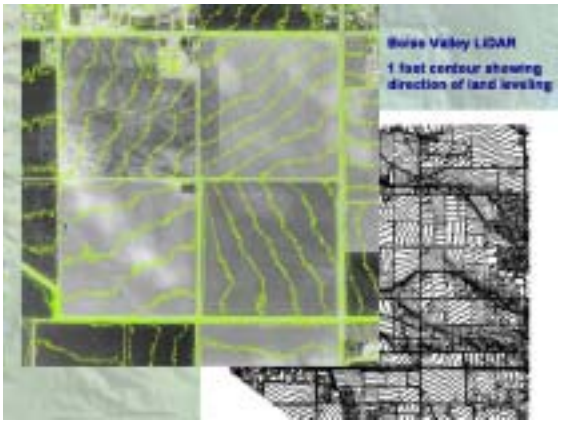




LiDAR – Detailed Cross Sections







Applications for Field Investigations

- Low relief terrain analysis
- Vegetation analyses
- Structural identification
- Pollution gradients (first uses of LiDAR)
- Bathymetric analyses

Conclusions

- Investigate cooperative funding efforts
- Have technical staffs become informed
- Purchase and test on applications

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PedonCE

Alan Price, Soil Data Quality Specialist

PedonCE, Field Data Recorder for Sites and Pedons

Over the past two decades, many parts of the inventory of soils have steadily moved from a paper, analog world to the digital arena. Soil maps have been digitized. Soil properties and interpretations have been stored and generated from the NASIS database. The development of soil survey manuscripts has been automated. The World Wide Web has made our spatial and attribute data available to nearly anyone. In most cases, however, the methods of recording field data, i.e., sites and pedons, has changed little over the past century. Forward steps have been made. Windows Pedon provided the software to collect this data on laptops or tablet computers in the field. These hardware platforms have often proven to be too large, too heavy, too fragile, and the screens not visible in daylight conditions. Personal digital assistants (PDAs) have filled this hardware niche, and in partnership with the PedonCE software, complete site and pedon descriptions can now be captured electronically in the field. The data are stored in a Windows Pedon Access database format and can subsequently be imported into NASIS, eliminating the need for entering the data on paper in the field and then re-entering the data digitally into NASIS.

Electromagnetic Induction Surveys using GPS and PDA

Electromagnetic induction (EMI) has been used for many years to collect apparent conductivity data (ECa), and this data has been used as a proxy for soil properties such as salinity, drainage, depth to bedrock, clay content, and parent material. Early EMI instruments did not have any data logging capabilities so readings were recorded on paper. Prior to the wide-spread use of geographic positioning systems (GPS), the location of EMI data points also had to be surveyed from known points and logged on paper. The hardware and software of today have greatly simplified the process of collecting and interpreting EMI data. Both EMI and GPS data can now be simultaneously and continuously collected and stored on a personal digital assistant (PDA). Thousands of data points can be collected in short periods of time. This data can then be loaded into mapping software to display the output as cross-sections, two dimensional maps, and three dimensional diagrams.

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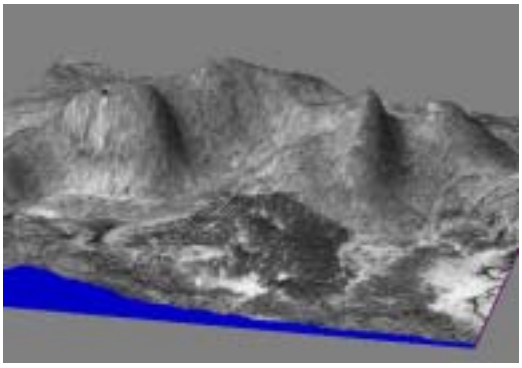
3dMapper™ Presentation Abstract for State Soil Scientist Meeting, Laughlin Nevada

Jesse Turk, Soil Scientist, Ashland, Wisconsin

The 3dMapper™ software was developed by Jim Burt and A-Xing Zhu of the geography department at the University of Wisconsin-Madison. The software was developed as a part of the SoLIM project as a landscape viewer and tool to capture soil landscape relationships from soil scientists. In order to view landscapes in 3d, 3dMapper™ merges the DEM and Orthophoto into a file that provides a detailed 3d image. When the orthophoto and DEM are merged, the DEM is interpolated to the resolution of the orthophoto, preserving the original photo resolution. Using this detailed 3d image, a user can digitize line, points or polygons, as well as add existing soil survey lines to check for validity.



Two Versions of 3dMapper™ are currently available, a free public domain version and a commercial version. The free version was developed as a part of the SoLIM project which used NRCS funds, is available for download at http://solim.geography.wisc.edu . When funding through the SoLIM project ran out, the further improvements to the software were made available through the commercial version, available at www.terrainanalytics.com . The current cost for the commercial version is $500. NRCS made a bulk purchase of licenses and currently has a few available. Ken Lubich is the contact for the remaining 3dMapper™ licenses. The commercial version has many features the free version does not currently have, including but not limited to:

- Shapefile support
- Polygon Topology
- Ability to import a complete table
- Generalizing and smoothing of lines and polygons
- Snap digitizing
- Copy and paste lines and polygons from one layer to another
- Slope break vectorization
- And much more

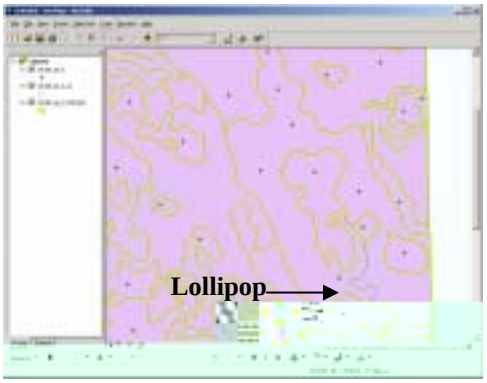
Through the work implementing 3dMapper™ into the Wisconsin soil survey program, many benefits of using 3dMapper™ compared to traditional methods of creating initial soil surveys have been identified. These benefits include:

- Takes out some of the subjectivity of different individuals abilities to see stereo
- Allows users to interpret a larger piece of landscape than can be seen under a stereo scope
- Allows multiple users to see the same landscape at the same time - This is good for training or development of soil-landscape model.
- Allows users to overlay different GIS layers to aid in soil delineations

Examples:

- Raster slope map
- Land Type Association map units
- Hydrographic layers

- Lines created in 3dMapper™ are vectors and georeferenced to the orthophotography, eliminating the need for compilation and digitizing.
- Soil mapping created in 3dMapper™ can readily be used in a GIS Context where it can begin to be analyzed and quality controlled
  - Acres can be tabulated
  - Missing map unit symbols can be identified
  - Common lines can be identified
  - Lollipops can be found



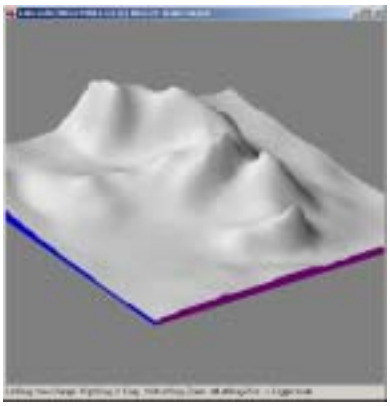
Software Functionality Overview

In the comparison of traditional methods to using 3dMapper™ some disadvantages were found, including:

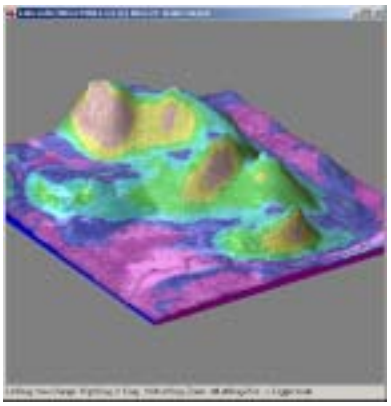
- Slightly more time consuming for the soil scientist up front (when not considering compilation and digitizing time savings)
- Transition from office to field may be difficult
- Reliant on data available for creating .3dm files and the quality of that data (primarily DEM data)

The 3dMapper™ software provides a very intuitive interface for manipulating the 3d view. Tools include: full rotation of the 3d image, zooming, panning and adjustment of the vertical exaggeration. Details of each pixel are displayed as the cursor is panned on the 3d image and displayed in a dialog box (see right).

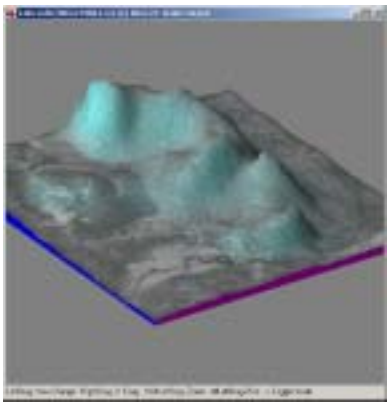
To Aid in soil map creation, several terrain overlays are available these include:



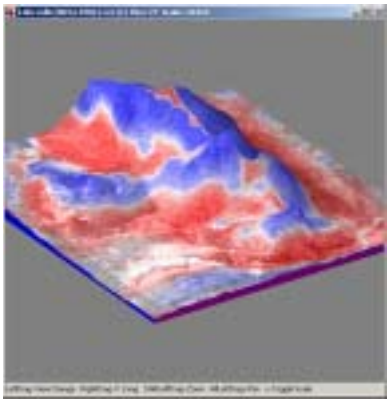
Hillshade



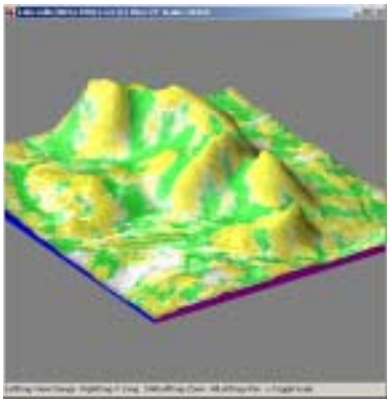
Classed Slope Map



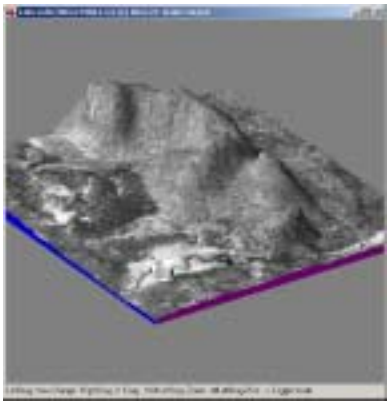
Unclassed Slope Map



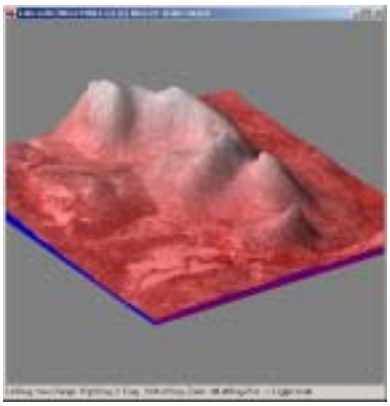
Profile Curvature



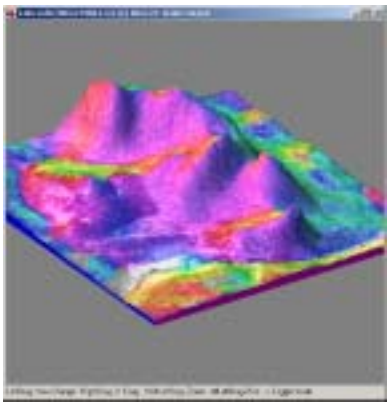
Planform Curvature



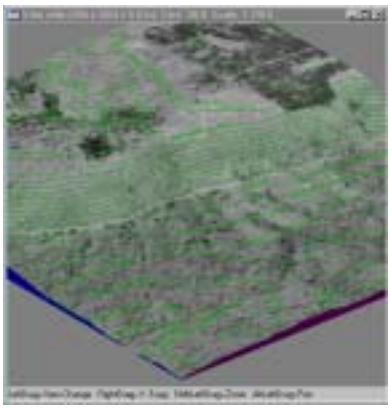
Artificial Illumination



Elevation

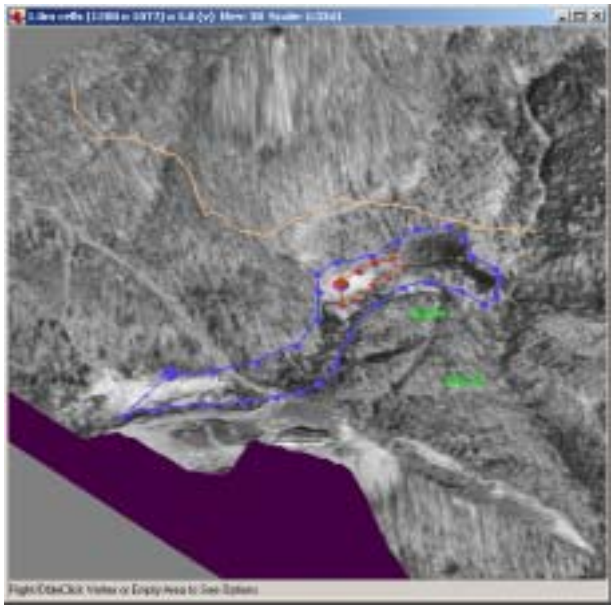


Aspect

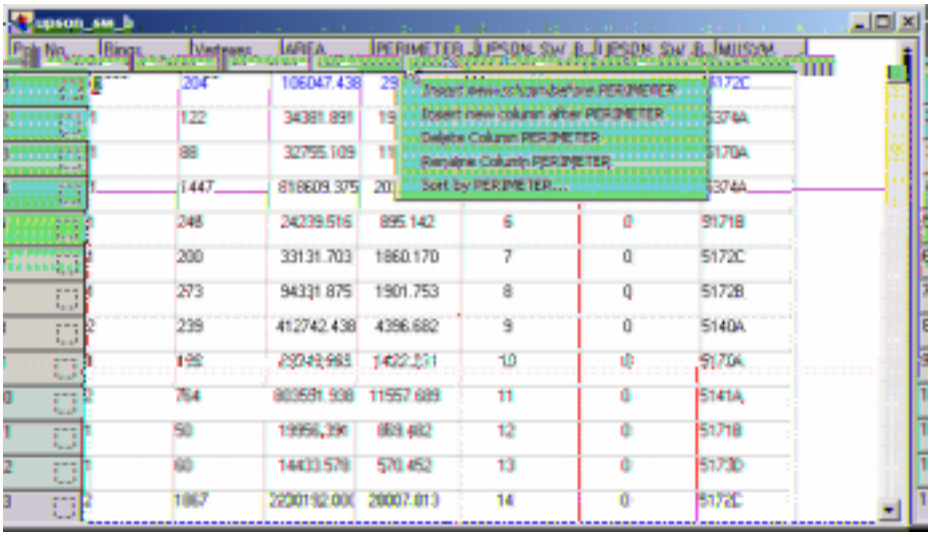


Contour Intervals

One of the main benefits 3dMapper™ has compared to other three dimensional viewing software is the ability to digitize while viewing the landscape in 3D. The software supports digitizing point, line and polygon features which can be saved either as a shapefile or as a simple text file. Lines and Polygons can be smoothed or generalized to increase digitizing speed while providing appealing line work.

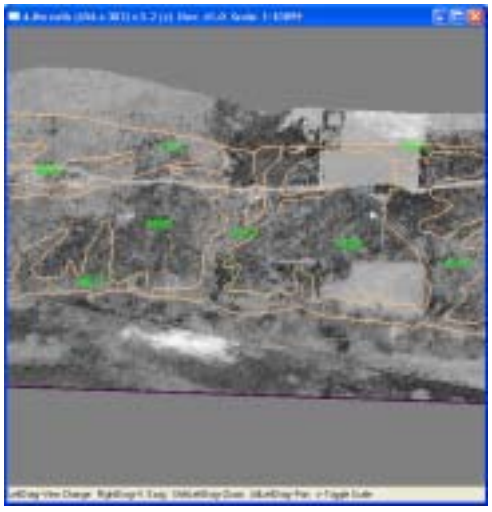


Upon import of a shapefile, the complete table associated with the shapefile is imported. Also if new point, line, or polygon layers are created, a table is associated with those layers. These tables are completely editable and very functional. 3dMapper™ has the capability of adding an acres column that is automatically updated when edits are made to a polygon.



Conclusion

3dMapper™ has proven to be a very useful tool in the completion of the initial soil survey in Wisconsin. The tool has opened communications about soil-landscape relations in the project offices, decreased the amount of time spent compiling traditional soil mapping and has moved our products into a digital environment much quicker.



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PURC Model

Pedogenic Understanding Raster Classification Model: Ongoing Use in Wyoming

Nephi J. Cole, Soil Scientist, Buffalo, Wyoming, NRCS

Research Rationale

Traditional soil survey

- Very labor and time intensive
- Not necessarily quantitative
- Often an "art form"

Soil survey by PURC Model

- More efficient
- Quantitative
- Science-based prediction of soil distribution
- Better product
- Increased accuracy and flexibility

PURC:

Pedogenic Understanding Raster Classification Model

A system of steps for using readily available quantifiable raster data sets in conjunction with expert knowledge to develop predictive maps of soil distribution.

Why quantifiable?

Basic GIS Principles

Vector data

- Composed of points, lines, and polygons

Raster data

- Composed of individual pixels
- Each pixel has its own identity
- Raster layers can be mathematically combined or manipulated

Quantifiable Data Layers

Imagery (Landsat, Ikonos, etc.)

DEM (Digital Elevation Model)

- Raster (pixel, grid)
- Elevation (meters)

Soil-forming factors: Digital data proxies

Soil = f (Cl, O, R, P, T…)– Jenny (1941**)**

Therefore, identify a series of soil forming factors and you can identify an area where suites of soils are likely to occur.

Data Acquisition and Review: Digital data proxies for soil-forming factors

Soil = f (Cl, O, R, P, T…)– Jenny (1941**)**

Climate (Cl)

- Precipitation

Relief (R)

- DEM-derived data
    - slope, aspect, elevation
    - roughness, compound topographic index (CTI), plan curvature
    - USU Landform Index

Digital Data Proxies for Soil-Forming Factors: Organisms (O)

Fractional Vegetation Index (FVI)

Uses Normalized Differenced Vegetation Index (NDVI) derived from Landsat TM data

- (NDVI – min NDVI) (max NDVI – min NDVI)
- FVI is expressed as a percent

Parent Material (P)

Soil Enhancement (3 Band Mineralogy)

- Uses Landsat TM data
    - Band 3/ Band 2 (Blue)
        - Carbonate radical
    - Band 3 / Band 7 (Green)
        - Ferrous iron
    - Band 5 / Band 7 (Red)
        - Hydroxyl radical

Three General Stages

- Preliminary (pre-mapping stage)
- Developmental (ongoing survey stage)
- Final (product development stage)

Preliminary Stage, PURC: Data Acquisition and Review

Hard copy data

- Bedrock geology
- Soil maps, etc.

Digital Data

- Landsat 7 data scenes
- Digital Elevation Models (DEMs) 10m & 30m
- River, road, precipitation, land ownership, etc.

Reconnaissance

- Field visit to project area
- Take photographs
- Make notes

Pre-Processing: ERDAS Imagine, ARCGIS

Re-projection

- Common projections

Resolution standardized

Geographic extent defined

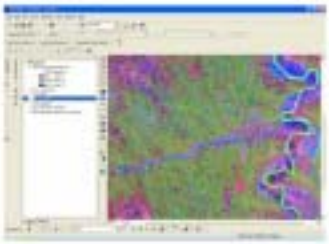
Compatible formats

Develop Data Sets for Simple Classification

Selection of proxy data layers representing soil forming factors stacked into multi-band images

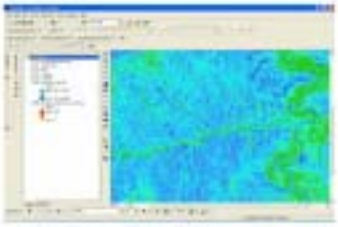
- Different Data for different regions
- Soil forming factors

Relief: Slope

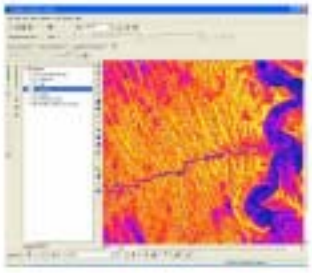


Parent Material: Soil Enhancement (3 layers)

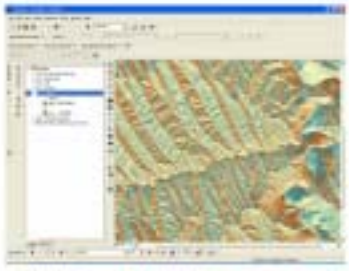
Relief: Relative Elevation



Organisms: Fractional Vegetation



Relief: Compound Topographic Index



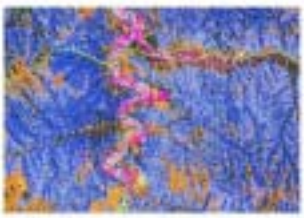
Climate/Relief: Aspect

Layer Stacking

Classification

ERDAS Imagine

- Simple knowledge-based classification (Rule-based)
  - Slope breaks
  - Vegetation classes
  - Parent material classes



In-Field Review of Pre-mapping

Development Stage: Ongoing Survey

Incorporate Expert Knowledge
Digital Knowledge-based Model Development
Data Collection
Result Analysis
Refinement

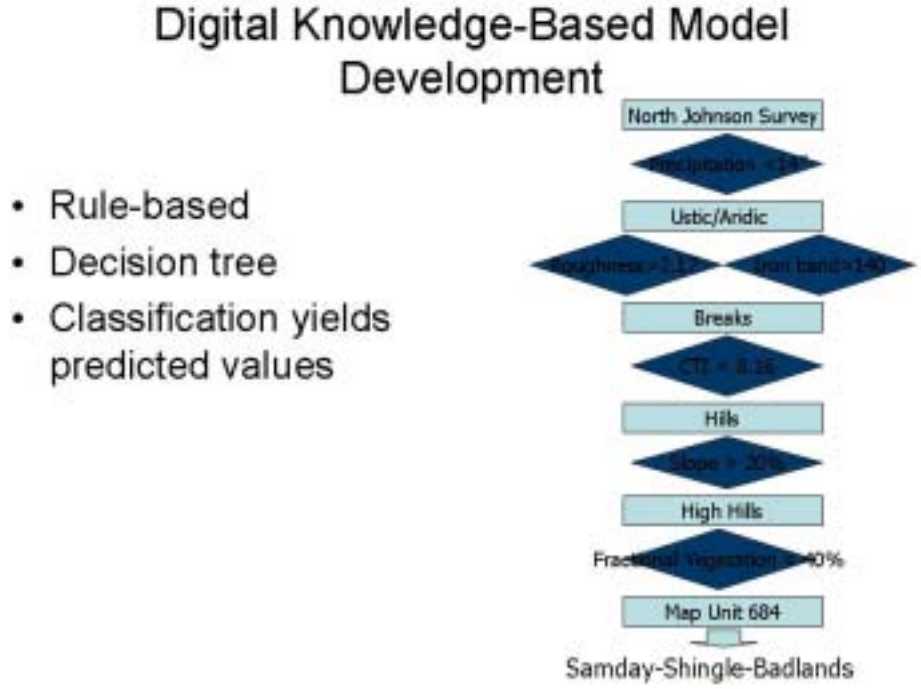
Incorporate Expert Knowledge

Conceptual models of local soil scientists

- Number of map units
- Discriminating variables

Existing soil data

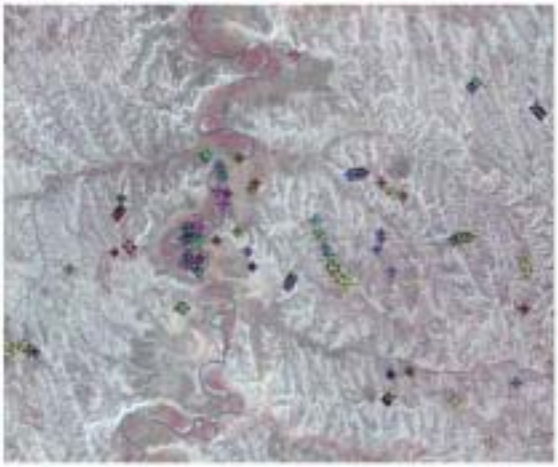
- Map unit descriptions
- Existing maps (spatial extent)



Digital Knowledge-Based Model Development: ERDAS Imagine Knowledge Engineer

Targeted Data Collection

- Stratified according to
  - Area
  - Complexity
- Observed
  - Stored in digital format
  - Color-coded display



Result Analysis

Daily Qualitative, QAQC Qualitative
Statistical analysis compares predicted and observed values
Show p-values, confidence intervals

Refinement

Feedback
Iteration

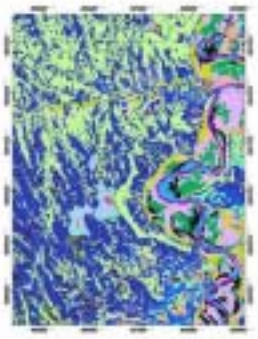
"Final" Stage

Finalize model

- Final Corrections
  - Aesthetics, names etc.
  - Not classification changes
- Archive Model

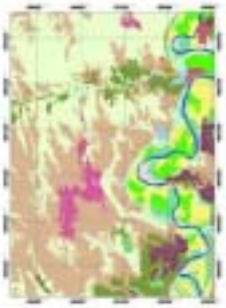
"Final" classification

- Archive all input data layers
- Archive final classification
- Pixel map



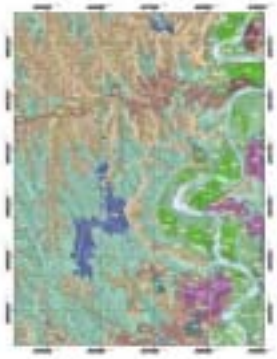
Neighborhood Analysis

- Majority Filter
  - Procedure reduces "noise"
  - Eliminate single pixels
  - Routine in remote-sensing
- Minimum area elimination



Vectorization: Polygon Map

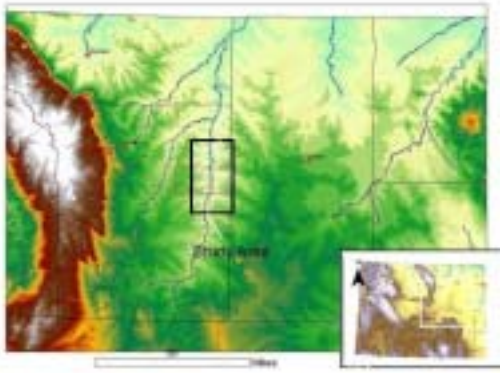
- Grouping and elimination
  - Eliminate groups <minimum size
- Vectorize
  - Raster clumps converted to vectors (polygon) in ArcGIS/ArcInfo
- Vector editing
  - Eliminates "edginess"
  - ArcInfo/ArcEdit

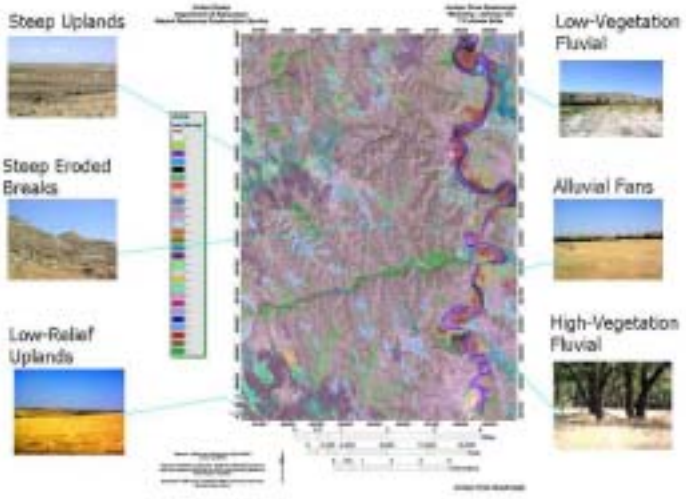


Original Study Area (2003-2004)

- Six 7.5-minute quads in Johnson County, north-central Wyoming
- Powder River Basin east of the Big Horn Mountains
- Joint interest area
  - Bureau of Land Management (BLM)
  - Natural Resources Conservation Service (NRCS)
- Mesic Temp, Aridic Moisture
- Wasatch Formation (Tertiary)
  - Sandstones, siltstones, mudstones, conglomerates

Study Area: Powder River Basin





Areas Mapped in 2004

- Mountain System
  - Steep mountain slopes
  - Plateau
- Foothills
  - Alluvial fans
  - Steep Hills
- Uplands
- Plains
- Scoria Hills

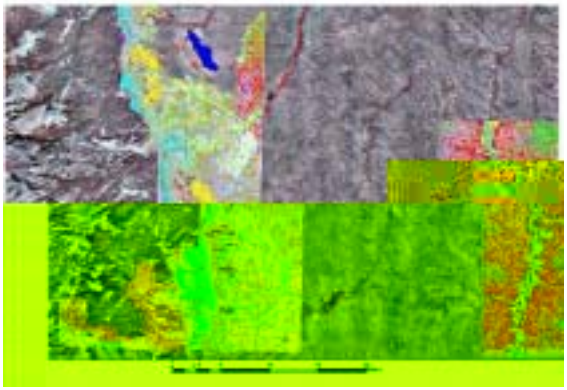
Expanded Area (2004-present)

- North Johnson County, Wyoming
- Powder River Basin
  - Mountain System
  - Foothills
  - Uplands
- Frigid and/or Mesic
- Ustic and/or Aridic
- Various geologic formations

Areas Mapped in 2004

- Mountain System
  - Steep mountain slopes
  - Plateau
- Foothills
  - Alluvial fans
  - Steep Hills
- Uplands
- Plains
- Scoria Hills

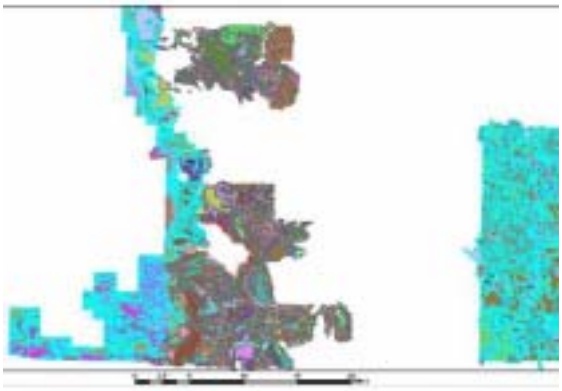
Raster Based Models

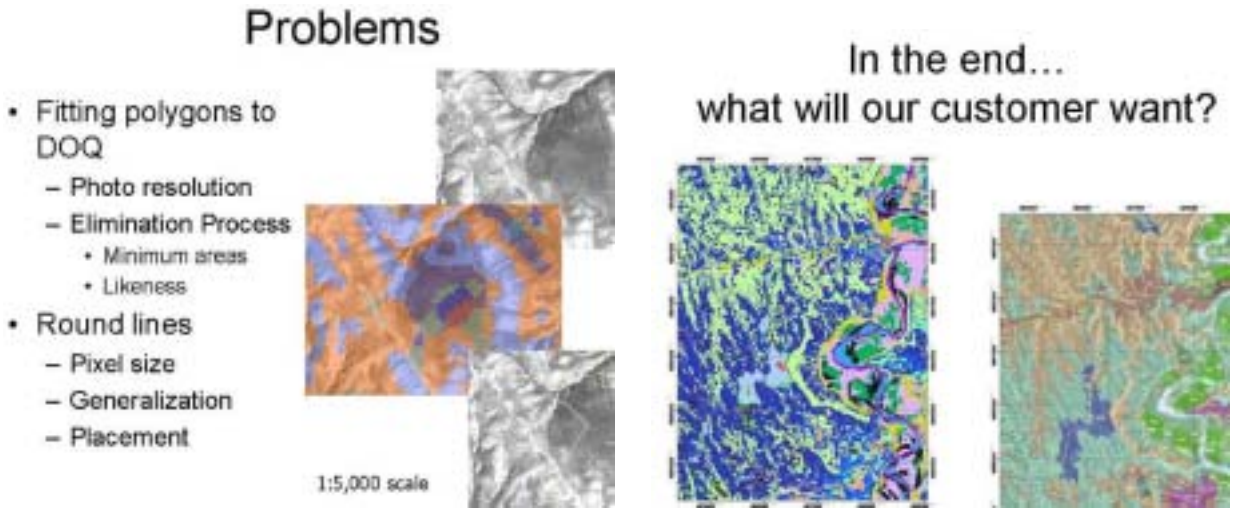


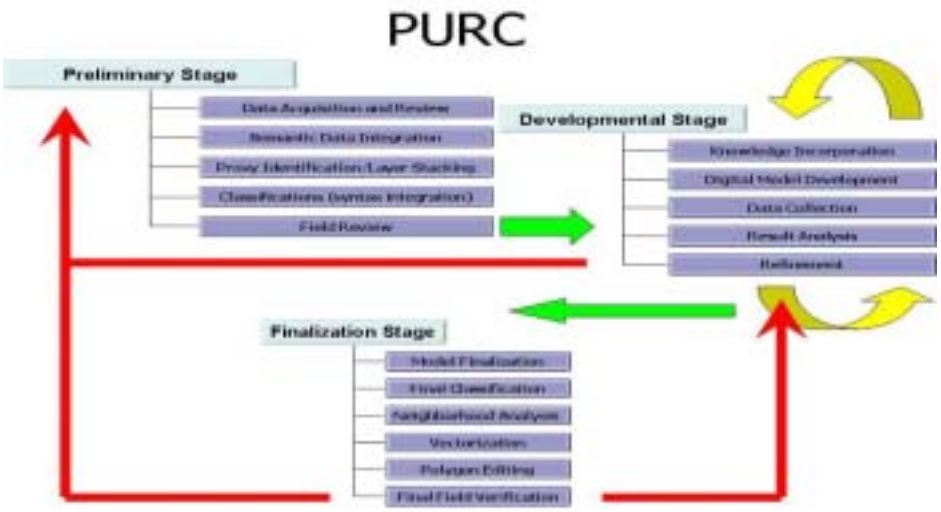
Methods for Using Raster Based Modeling

- Backdrop
  - Simple predictive pre-mapping tool
  - Traditional polygons
- Comprehensive prediction of soil distribution
  - Pixel based to Map Unit level
  - Hand developed polygons
- Automated
  - Pixel based prediction of soils
  - Final pixel based product
  - Polygons derived from pixel based product using automated techniques

Mapping Completed







Conclusions

Soil survey by PURC

- Quantitative
- Science-based prediction of soil distribution
- Better products
    - Uniformity throughout the survey area
    - Increased accuracy and flexibility
        - Pixel-based high-resolution maps
        - Traditional polygon type maps
        - Statistics on accuracy and precision
- More efficient (depending on mapping requirements)

- Requires investment in skills and technology
    - Field level should be technically proficient is GIS
    - Specialized GIS and Remote Sensing skills needed at higher levels
    - Specialized software and IT needs

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Application of Terrain Modeling for Soil Survey Updates on the Glaciated Allegheny Plateau

Chris Fabain, Soil Scientist, Bloomsburg, Pennsylvania

GIS and terrain modeling techniques are being used to produce soil-landscape models to update soil surveys on Pennsylvania's Glaciated Allegheny Plateau (MLRA 140). These models are being developed using ARCGIS 8.3, ArcView 3.3, Spatial Analyst, and Microsoft Excel with commonly available GIS data including SSURGO soils, USGS 10-m DEM's, digital orthophotography, surficial geology and bedrock geology.

Terrain models are being developed to answer five key update needs for Susquehanna County and MLRA 140: slope gradient, soil drainage class and depth to seasonal high water table, depth to bedrock, slope stability for lacustrine-influenced landscapes and soil temperature regimes. The process involves using digital elevation model's (DEM's) to produce terrain attributes such as slope, curvature and elevation above local stream. The terrain attributes are combined with other GIS coverages to develop digital terrain model's (DTM's) to predict key soil properties.

The soil drainage and slope models were field tested and compared with the published Susquehanna County Soil Survey across a 250,000 acre area of very deep glacial tills in the Upper Catskill geologic formation.

A comparison of the soil drainage model and the field soil survey was made based on the drainage class definitions used for the published Susquehanna County Soil Survey. Field verification (209 observations) of the soil drainage model showed substantial increases in accuracy when compared to the published soil survey. The soil drainage model delineated the correct drainage class in 58.7% of observations and correctly identified the correct class or a similar interpretive class in 69.2% of observations. The published soil survey results were 45.2% and 59.6% respectively.

Field verification from 259 observations demonstrated an increase in the accuracy for determinations of slope gradient for slopes greater than 15%. Across all slope classes, the published soil survey correctly estimated 69.1% of the points in the correct slope class and the DEM-based slope model correctly identified 71.8% in the correct slope class. Most of the errors for both the soil survey and the DEM-based slope maps were within one slope class. The soil survey and the slope model performed similarly for slopes < 15%, however the DEM-based slope classes were much better for slopes > 15%. Much of the DEM's error in the update area was from underestimating slope at higher slope classes. However this error is somewhat predictable and can be compensated for in making slope models.

GIS and terrain modeling techniques are an efficient tool for projects with limited staff to manage soil survey operations and make substantial improvements to our soil survey products. In the glaciated Allegheny Plateau, terrain models produced from USGS 10-m DEM data have sufficient precision to assist with 2nd order soil survey updates at scales as fine as 1:12,000.

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Altered Soils Workshop Report
Map Unit Design of Altered Soils
A Discussion on Soils Altered by Man Through Land Leveling, Irrigation, and Urbanization

David Hoover, SSS Boise, Idaho

Summer 2004 Workshop Held in Boise, Idaho

Involvement from State, MO, and National staffs

Workshop Goals

1. Classification
2. Mapping
3. Interpretations

Mechanical Alterations
- Subtle changes
  - Loss of surface soil
- Drastic changes
  - Destruction of diagnostic horizons
  - Several feet of cut or fill
- Complications
  - Field to field differences
  - Temporal changes

Water Table Alterations
- Subtle changes
  - Soils wetter/cooler longer than normal
- Drastic changes
  - Change from published data
  - Elevated or dropped water tables
  - New redox or other features
- Complications
  - Field to field differences
  - Temporal changes

Urban and Suburban Alterations
- Subtle changes
  - Below normal infiltration
  - Disturbed surfaces
- Drastic changes
  - New areas of water
  - Altered drainage patterns
  - Numerous subdivisions linked
- Complications
  - Sufficient anthropogenic terminology?
  - Temporal changes/rate of change

Discussion Points

- What is an "altered soil"?
  - Something different than normal
  - Human alterations vs. natural change
  - One phase of a state-transition model
  - Somewhere there is a time factor
  - Need to recognize when an alteration occurs, then notate, classify, and describe what is actually there!

Discussion Points

- How do we map spatially intricate altered soils?
  - Broadly – with emphasis on interpretations and map unit descriptions
  - Map what's there now
  - Describe the variability

Discussion Points

- How do we map temporally variable altered soils?
  - Revival of the undifferentiated unit
  - Creative aspects of map unit design
  - High consideration of user needs
  - Utilize management data layers
  - Utilize block diagrams to show processes

Discussion Points

- How do we classify altered soils?
  - Controversial subject!
  - Classify what it naturally is but make sure the tables reflect current conditions
  - Avoid mapping temporary features, i.e. irrigated Aridisols becoming Udic

Discussion Points

- How do we present interpretations on altered soils?
  - Need meaningful interpretations
  - First accurately come up with what is out there, then design the mapping unit and the interpretations
  - Where does soil survey end and technical soil services begin?

Additional Points

- We're not going to be able to map every variable in the field
- Need to discuss how technology can help us – placing other informational data layers over the soils layer
- Use dependent soil properties are important to look at
- Maybe we can't give everything users want in a soil survey

Additional Points

- Need to study how chemical and physical changes occur after long irrigation
- Need to look at a shorter time frame than 30 years for the life of a soil survey
- ICOMANTH talks about "fill" areas but not so much about "cuts" – revisions?
- Maybe we can't give everything users want in a soil survey

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SoLIM---Where are we at?

Jon Hempel, Director, NGDC

Current Projects

- University of Wisconsin-Madison
- Vermont NRCS/Dartmouth University
- West Texas
- Isle Royale/Park Service
- Pennsylvania NRCS/Penn State
- Missouri NRCS
- Illinois NRCS
- Arizona NRCS
- Tennessee NRCS-Smokey Mtns.

SoLIM-Soil Landscape Inference Modeling

- Maps are pixel/raster based
- Works best in areas that have strong soil landscape relationships
- Produces a soil series map
- Not from soil properties, but from digital elevation model (landscape) derivatives
- Employs fuzzy logic model-soil at a given pixel is assigned more than one soil class with varying degrees of class membership
- Class membership-prediction based on the landscape formative elements similar to weather prediction models
- Each member is regarded as a similarity measure between the soil at a given pixel and the typical location for a given soil
- Similarity measures allow to predict soils on a continuum or spatial gradation
- Applies soil landscape model consistently across landscape

Future

- NGDC is available to present detailed background information on the SoLIM process
- NGDC will coordinate projects
- Assist with landscape data collection-MO collaboration
- Provide training on running the inference engine
- Potentially run the inference for your project
- Ultimately develop a cadre of experienced GIS specialists and soil scientists that can assist others in the process

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NCSS Conference 2005
Maxine Levin, Soil Survey Division, Washington DC

NCSS promotes the use of soil information and develops procedures for making soil surveys and describing soils. Participants of the National Cooperative Soil Survey (NCSS) include representatives from the 1862 land-grant universities experiment stations, NRCS, USFS, BLM, BIA, EPA, USFWS, National Association of Consulting Soil Scientists, the 1890 land-grant universities and western tribal colleges.

The NCSS Conference 2005 is scheduled for May 21-26, 2005 in Corpus Christi Texas. The theme of the Conference will be Planning the New Soil Survey—Personnel Development, Technology, Standards and Electronic Delivery. This is an opportunity for cooperators from universities, governmental agencies and the private sector to meet and address issues of concern to soil science and to the National Cooperative Soil Survey. Please provide copies of this announcement to cooperators in your state and to other individuals who might be interested in attending. All NRCS State Soil Scientists are welcome if they attend with a NCSS cooperator.

Hosts— NRCS Temple TX, TX A&M University
Omni Corpus Christi Hotel, Marina Towers
Optional Field Tours May 21-22, 2005
Conference Committee Meetings, Workshops and Presentations May 23-26, 2005
MO Board of Directors Meetings/Southern Tier May 26, 2004

Optional Field Tours

Saturday May 21, 2005 King Ranch Tour
Ranch History, Land Management, and Benchmark Soil Landscapes
12 Noon- 8PM, Dinner included

Sunday, May 22, 2005 Padre Island National Seashore Tour
Barrier Island Landscape, Subaqueous Soils, Ecological Site Descriptions, Water Table Monitoring
7:30 AM-4:30 PM, Lunch Included

Poster and Computer Demos

This is an opportunity for Students, University Reps, Private Consultants and Federal and State Reps to share information in casual, relaxed setting

Sunday Evening, Omni Corpus Christi Hotel, Marina Tower, May 22, 2005 6-8PM—Opening Reception/Soils Social
Wednesday Evening, Omni Corpus Christi Hotel, Marina Tower, May 25, 2005—Closing Reception

Workshops

Option 1: Major Land Resource Area Correlation and Mapping in Soil Survey—Dennis Potter, NRCS Dennis Lytle, NRCS Riviera Ballroom 1
Option 2: Building Inference Models in GIS to Map Soils—Bill Effland, NRCS, Amanda Moore, NGDC, NRCS Riviera Ballroom 2

Committees

This is an opportunity for all cooperators and Partners to provide input and discussion to the plans and structure of the New Soil Survey
http://soils.usda.gov/partnerships/ncss/conferences/national_2005/committees.html

Standing Committees---
Research Agenda---
David Hammer, Nancy Cavallaro
Standards—
Craig Ditzler, Duane Lammers, Bill Ypsilantis
New Technology----
Jon Hempel, Pete Biggam

Committee 1: WEB Soil Survey—Promoting Partnerships
Co-Chairs:
Dennis Lytle, NRCS, Washington, DC (dennis.lytle@usda.gov)
Rick L. Day, Pennsylvania State University, University Park (rday@psu.edu)
Committee 2: Ecological Principles in Soil Survey
Co-Chairs:
Curtis Talbot, NRCS, NSSC (curtis.talbot@usda.gov)
Randy Davis, USFS, Washington, DC (rdavis03@fs.fed.us)
Committee 3: Recruitment and Retention of Soil Scientists in Soil Survey
Co-Chairs:
Gary Steinhardt, Purdue University, IN, (gsteinhardt@purdue.edu)
Denise Decker, USDA-NRCS, Human Resources, Washington, DC (denise.decker@usda.gov)
Roy Vick, State Soil Scientist, North Carolina(roy.vick@nc.usda.gov)
Committee 4: Water Movement and Water Table Monitoring in Soil Survey
Co-Chairs:
Henry Lin, Pennsylvania State University (henrylin@psu.edu)
Cathy Seybold, NRCS (cathy.seybold@usda.gov)
Website
http://soils.usda.gov/partnerships/ncss/conferences/national_2005/index.html
Registration: http://www.peopleware.net/1542
National Cooperative Soil Survey
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National Cooperative Soil Survey

Task force on national and regional conferences
Report to state soil scientists meeting
February 2, 2005
Jon Gerken, SSS, Columbus, Ohio

At the 2003 National Cooperative Soil Survey Conference in Plymouth, Massachusetts, comments in both the NRCS agency meeting and the cooperator meeting noted a decrease in attendance at conferences and lack of effective communication within the National Cooperative Soil Survey program.

Then Acting Director of the Soil Survey Division, Wayne Maresch, established a task force to develop recommendations for responding to these concerns. Jon Gerken was appointed to chair the task force. Specific charges that were given to the task force were:

1. Bring together a task force of 5-7 persons with diverse NCSS background. Jon Gerken, assigned Chair of Task Force will recommend potential members to be confirmed by Director of Soil Survey Division, NRCS. Co-Chair is recommended to be non-federal NCSS cooperator. Meetings will be by teleconference and email communication.

2. Review By-Laws of NCSS Conference and proceedings of past conferences to evaluate structure and function of NCSS conferences. Progress report in Nov 2003 and plan of action to Steering team ASA meetings; report to Regional Conferences June 2004

3. Review 2003 NCSS University Conference Report with suggestions for improved communication with University NCSS participants.

3. Encourage private sector participation; Investigate avenues to encourage consulting soil scientists to attend to regional and National conferences; Request that the regional conferences address this issue in their conferences and report back to the 2005 NCSS conference.

4. Consider requests of Standing Committees from 2003 NCSS Conference, Plymouth, Massachusetts:
Request meeting time at National Conferences
Request formal meeting time (face to face) during the alternate years between National Conferences
Formalize structure for New Technology and Research Agenda Committees with alignment with Regional Conferences
In all cases Bylaws should be reviewed and possibly revised

5. NASCA requests that the NCSS By Laws include NASCA in Steering team for conferences and in amendment lists of cooperators; Task Force will draft changes and present to Steering Team at Nov 3, 2003 meeting at ASA Meetings in Denver.

Individuals selected to be members of the task force were Randy Southard, University of California – Davis to represent the west region, Michael Lilly, State Soil Scientist in Mississippi, to represent the south region, and Marty Rabenhorst, University of Maryland, to represent the northeast region. Jon Gerken, State Soil Scientist in Ohio represents the north central region, and Bob Ahrens, Director of the National Soil Survey Center, was appointed to represent the national conference and the Soil Survey Division.

Jon Gerken drafted changes for the national bylaws to include references who to the National Association of State Conservation Agencies, identified in the last charge.

A report was presented to the National Conference Steering Committee at its meeting in Denver in the fall of 2004. The report included identification of the task force members, draft bylaws changes to include the National Association of State Conservation Agencies and plans for soliciting input from the regional conferences during 2004. A copy of the report is included as attachment 1.

Prior to the 2004 regional conferences, a write up describing the concerns that had been identified was sent to the four regional steering committee chairs and the four regional liaisons from the Soil Survey Division. Also included were suggested committee charges designed to generate discussion and feedback from the regional conferences. A copy of the write up is included as attachment 2.

Following the 2004 regional conferences, the task force, through a series of e-mail communications and teleconferences, discussed comments from the regional conferences. The comments generally fell into one of three categories:
1. Participants are unfamiliar with conference bylaws.
2. Institutional knowledge and continuity in the work of steering committees was adversely impacted by the loss of regional soil scientists.
3. Conference bylaws don't establish a structure that facilitates effective communication between national and regional conferences.

The task force is now developing recommendations for changes in the national bylaws to be acted on at the national conference in May, 2005.

Attachment 1

National Cooperative Soil Survey Conferences
Structure and Function Task Force

9/03

Chair: Jon Gerken, NRCS, OH

Purpose of Task Force: Form a Task Force of 5-7 people (co-chaired by Jon Gerken, NRCS and rep from NCSS partnership) to look at NCSS Conference structure and function and make recommendations for changes to Bylaws
Desired Outcome: Increased participation by all of NCSS Partnership; Improved coordination and planning of all soil survey activities in NCSS

Charges:

1. Bring together a task force of 5-7 persons with diverse NCSS background. Jon Gerken, assigned Chair of Task Force will recommend potential members to be confirmed by Director of Soil Survey Division, NRCS. Co-Chair is recommended to be non-federal NCSS cooperator. Meetings will be by teleconference and email communication.

Proposed Task Force members are:

Jon Gerken, State Soil Scientist, Ohio, NRCS Co-chair (representing North Central Region)
Randy Southard, University of California, Davis, University Co-chair (Invited, representing West Region)
Mike Lilly, State Soil Scientist, Mississippi (representing South Region)
Martin Rabenhorst, University of Maryland, (Invited, representing Northeast Region)

2. Review By-Laws of NCSS Conference and proceedings of past conferences to evaluate structure and function of NCSS conferences. Progress report in Nov 2003 and plan of action to Steering team ASA meetings; report to Regional Conferences June 2004

Task force will report to regional conferences the concerns that initiated the task force activities. The task force will propose that each of the regional conferences provide membership an opportunity to review concerns that have been raised and provide feedback to the task force. This will be done by drafting a committee topic and committee charges that can be used in regions that have maintained the functioning of committees within their region. The charges to these committees would consider both the regional conference functions and interaction of the regional conferences with the national conference, as well as the type of meeting and the desired function NCSS members feel the national conference should offer.

The task force will gather feedback from the regional conferences and write a report and draft recommendations to the National Conference Steering Committee, to be delivered at the National Conference in Corpus Christi, Texas in 2005.

3. Review 2003 NCSS University Conference Report with suggestions for improved communication with University NCSS participants.

3. Encourage private sector participation; Investigate avenues to encourage consulting soil scientists to attend to regional and National conferences; Request that the regional conferences address this issue in their conferences and report back to the 2005 NCSS conference.

4. Consider requests of Standing Committees from 2003 NCSS Conference, Plymouth MA:
   - Request meeting time at National Conferences
   - Request formal meeting time (face to face) during the alternate years between National Conferences
   - Formalize structure for New Technology and Research Agenda Committees with alignment with Regional Conferences
   - In all cases Bylaws should be reviewed and possibly revised

   1. NASCA requests that the NCSS By Laws include NASCA in Steering team for conferences and in amendment lists of cooperators; Task Force will draft changes and present to Steering Team at Nov 3, 2003 meeting at ASA Meetings in Denver.

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Draft new National bylaws:

Exhibit 602-1 Bylaws of the National Cooperative Soil Survey Conference.

Article I. Name

Section 1.0 The name of the Conference shall be the National Cooperative Soil Survey (NCSS) Conference.

Article II. Objectives

Section 1.0 The objective of the Conference is to contribute to the general human welfare by promoting the use of soil resource information and by developing recommendations for courses of action, including national policies and procedures, related to soil surveys and soil resource information.

Article III. Membership and Participants

Section 1.0 Permanent chair of the Conference is Director Soil Survey Division, NRCS.

Section 2.0 Permanent membership of the Conference shall consist of:

Section 2.1.1 Members of the steering committee,

Section 2.1.2 Two State members appointed by each of the four regional conferences and six NRCS lead soil scientists as members representing each of the six NRCS Regions,

Section 2.1.3 Individuals designated by the Federal agencies listed in Appendix A.

Section 2.1.4 Soil scientists from each of the six NRCS regional offices are included as members.

Section 3.0 Participants of the Conference shall consist of:

Section 3.1.1 Permanent members,

Section 3.1.2 Individuals invited by the Steering Committee.

Article IV. Regional Conferences

Section 1.0 Regional Conferences are organized in the northeast, north-central, southern, and western regions of the United States.

Section 2.0 Regional Conferences determine their own membership requirements, officers, and number and kind of meetings.

Section 3.0 Each Regional Conference adopts its own purpose, policies, and procedures, provided these are consistent with the bylaws and objectives of the NCSS Conference.

Section 4.0 Each Regional Conference shall publish proceedings of regional meetings.

Article V. Executive Services

Section 1.0 The National Headquarters Soils staff of the Natural Resources Conservation Service (NRCS) shall provide the Conference with executive services.

Section 1.1 The Soils staff, NRCS, shall:

Section 1.1.1 Carry out administrative duties assigned by the Steering Committee.

Section 1.1.2 Distribute draft committee reports to participants.

Section 1.1.3 Issue announcements and invitations.

Section 1.1.4 Prepare and distribute the program.

Section 1.1.5 Make arrangements for lodging, food, meeting rooms, and, local transportation for official functions.

Section 1.1.6 Provide a recorder.

Section 1.1.7 Assemble and distribute the proceedings.

Section 1.1.8 Provide publicity.

Section 1.1.9 Maintain the Conference mailing list.

Section 1.1.10 Maintain a record of all Conference proceedings; proceedings of Regional Conference meetings; and a copy of each Regional Conference's purpose, policies, and procedures.

Article VI. Steering Committee

Section 1.0 The Conference shall have a Steering Committee.

Section 1.1 The steering committee shall consist of:

Section 1.1.1 The Director Soil Survey Division, NRCS, is permanent chair and is responsible for all work of the Steering Committee.

Section 1.1.2 The U.S. Forest Service Soil Survey Leader.

Section 1.1.3 The Bureau of Land Management Senior Soil Scientist.

Section 1.1.4 Four Agriculture Experiment Station Soil Survey Leaders, one from each respective Regional Conference. This normally is the State representative that will be chair or vice chair of the next Regional Conference.

Section 1.1.5 Six NRCS soil survey staff leaders, to include representatives of the National Headquarters, National Soil Survey Center, and Regional soil staffs as determined by the Director Soil Survey Division, NRCS.

Section 1.1.6 The President-elect of the National Society of Consulting Soil Scientists, Inc., representing the private sector.

Section 1.1.7 A representative of the 1890 College from the vicinity of the next conference recommended by the Conference Chair.

Section 1.1.8 A representative of the Tribal College from the vicinity of the next conference recommended by the Conference Chair.

Section 1.1.9 A representative of the National Association of State Conservation Agencies.

Section 2.0 The Steering Committee shall select a vice chair for a 2-year term. The vice chair acts for the chair in the chair's absence or disability or as assigned.

Section 3.0 The Steering Committee shall formulate policy and procedure for the Conference.

Section 4.0 The Steering Committee shall:

Section 4.1.1 Determine subjects to be discussed.

Section 4.1.2 Determine committees to be formed.

Section 4.1.3 Select committee chair and obtain their approval and that of their agency for participation.

Section 4.1.4 Assign charges to the committee chairs.

Section 4.1.5 Recommend committee members to committee chairs.

Section 4.1.6 Determine individuals from the United States or other countries with soil science or related professional interest to be invited to participate.

Section 4.1.7 Determine the place and date of the Conference.

Section 4.1.8 Organize the program and select the presiding chairs for the sessions.

Section 4.1.9 Assemble in joint session at least once during each Conference to conduct business of the Conference.

Section 5.0 Steering Committee work will normally be done by correspondence and telephone communication.

Section 6.0 Fifty percent of the Steering Committee shall constitute a quorum for the transaction of business. Items shall be passed by a majority of members present or corresponding. The chair does not vote except in the case of a tie vote.

Article VII. Meetings.

Section 1.0 A meeting of the Conference normally shall be held every 2 years in odd-numbered years for the presentation and discussion of committee reports; exchange of ideas; and transaction of business. It shall consist of committee sessions and general sessions. Opportunity shall be provided for discussion of items members may wish to have brought before the Conference.

Section 2.0 The time and place of meetings shall be determined by the Steering Committee.

Section 3.0 The Steering Committee is responsible for planning, organizing, and managing the conference.

Section 4.0 The Steering Committee shall meet immediately after the conference to summarize recommendations and propose actions to be taken.

Section 5.0 Meetings of the Steering Committee, other than at the conference, may be called with the approval of the Steering Committee.

Article VIII. Committees

Section 1.0 The committees of the Conference shall be determined by the Steering Committee. Permanent or standing committees, ad hoc committees, and task force groups are considered to be committees of the Conference. The Steering Committee shall select committee chairs.

Section 2.0 Committee members shall be selected by the committee chairs. Committee members shall be selected after considering Steering Committee recommendations, Regional Conference recommendations, individual interests, technical proficiency, and continuity of the work. They are not limited to members of the National Cooperative Soil Survey.

Section 3.0 Each committee commonly conducts its work by correspondence among committee members. Committee chairs shall provide their committee members with the charges as assigned by the Steering Committee and procedure for committee operation.

Section 4.0 Each committee chair shall send copies of a draft committee report to the Steering Committee prior to the Conference.

Section 5.0 Each committee shall report at the Conference.

Article IX. Amendments

Section 1.0 The bylaws may be amended by ballot with a majority vote of the permanent members. An amendment shall, unless otherwise provided therein, be effective immediately upon adoption and shall remain in effect until changed.

APPENDIX A

MEMORANDUM OF UNDERSTANDINGS WITH THE NATURAL RESOURCES CONSERVATION SERVICE IN THE NATIONAL COOPERATIVE SOIL SURVEY CONFERENCE:

--Bureau of Indian Affairs, U.S. Department of the Interior
--Bureau of Land Management, U.S. Department of the Interior
--Bureau of Reclamation, U.S. Department of the Interior
--Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture
--Defense Mapping Agency, U.S. Department of Defense
--Economics and Statistics Service, U.S. Department of Agriculture
--Environmental Protection Agency
--Farm Services Agency, U.S. Department of Agriculture
--Forest Service, U.S. Department of Agriculture
--National Agricultural Statistics Service, U.S. Department of Agriculture
--National Association of State Conservation Agencies
--National Institute of Standards and Technology, U.S. Department of Commerce
--National Oceanic and Atmospheric Administration, U.S. Department of Commerce
--National Park Service, U.S. Department of the Interior
--National Society of Consulting Soil Scientists, Inc.
--Office of Territorial Affairs, U.S. Department of the Interior
--Tennessee Valley Authority (quasi Federal)
--U.S. Army Corps of Engineers, U.S. Department of Defense
--U.S. Fish and Wildlife Service, U.S. Department of the Interior
--U.S. Food and Drug Administration, U.S. Department of Health and Human Services
--U.S. Geological Survey, U.S. Department of the Interior

Attachment 2

National/Regional Conference
Task Force

Background: A concern has been raised at various NCSS meetings that we may have lost some of our effectiveness in communicating needs and concerns within the structure of the National Cooperative Soil Survey program. Some of the issues that have been raised as concerns include:

1. When NRCS maintained four regional technical centers, the regional soil scientist was charged with heading the planning committee for the regional conference, participating in the national conference steering committee and attending the national conference. This helped ensure that concerns from the regional conferences were passed along to the national leadership and national activities were reported back to the regional conferences. A perception exists that the current structure does not provide the same level of communication from regional to national conference and back.
2. Conferences no longer commit the same level of resources to deliberation of committee charges as was the case in past years. For example: in 1982 the North Central Regional conference agenda, in 28 hrs. 45 min. of meeting time (excluding breaks) included 15 hours of committee meetings and reports, 5 hours of informational reports, 3:45 of agency meetings and a 5 hour optional field trip on Friday morning. In addition, committee deliberation was largely done prior to the conference by mail so that many individuals that could not attend the conference could contribute. By the time of the conference, committees were expected to have a draft report completed, including any recommendations that would be proposed. These reports were then discussed at the conference. Many committees now have very little activity prior to the conferences, limiting the effectiveness of their deliberations and development of recommendations.
3. In earlier years, the national conference was attended by invitation only and was a working conference. In recent years the attendance at the national conference has been opened to allow many more state program managers (NRCS and Partners) to attend. This may be contributing to the national conference agenda becoming more of an informational agenda than a working agenda.

Discussion Topics

1. What are the high priority issues that require a regional and national conference structure to deal with? Some suggestions are that it be a few items like Taxonomy (Standards?) and Research Needs and that they be made standing committees in the national and regional conferences that are identified in the bylaws.

2. How can the high priority issues mentioned in item 1 best be discussed within the National and Regional Conference structure?
    a. Between regional and national conferences
    b. Between NRCS and cooperating agencies
        i. University partners
        ii. Federal agency partners
        iii. State agency partners
        iv. Private consultants

3. Given the current structure of NCSS and activities within partner organizations, what is a proper mix of agenda time devoted to informational topics, committee activities, and field trips at NCSS conferences?
    a. National Conferences
    b. Regional Conferences

4. What specific recommendations would you make to encourage participation in national and regional conferences by:
    a. University faculty?
    b. Federal agency partners?
    c. State agency partners?
    d. Private sector soil scientists?

Items to consider:
Loss of regional tech center reps
Loss of resources (agency budgets, loss of institutional knowledge through retirement and reorganization)

References available:
National and regional bylaws
University Cooperators' report from 2003 National Conference
Past Conference Proceedings (available on CD)
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Update on the World Congress of Soil Science

Robert J. Ahrens, Director, NSSC

The 18th World Congress of Soil Science will convene in Philadelphia July 9-15, 2006. The theme of the Congress is *Frontiers of Soil Science: Technology and the Information Age*. The Congress is held every four years, and it last met in the U.S. in 1960 in Madison, Wisconsin.

The Congress will provide soil scientists within the National Cooperative Soil Survey the opportunity to showcase new technologies, become more acquainted with new innovations used in other parts of the world, and receive valuable training

The International Union of Soil Scientists is divided into Divisions representing various disciplines of soil science. Each Division is further divided into Commissions. Division 1, Soil in Time and Space, includes Commissions on Soil Morphology, Soil Geography, Soil Genesis, and Soil Classification. Each Division has both oral and poster symposia. Symposia are given four days of the Congress, and a fifth day in the middle is devoted to one-day tours. One of the mid-Congress tours will include a visit to an MLRA Soil Survey Project Office to view the methods and technologies used to update and maintain soil surveys on a Land Resource Area basis. In addition, sixteen pre and post tours are planned. NRCS soil scientists will be involved with many of the tours.

The Congress is the impetus for a marketing effort, which will include a large NRCS display, as well as the Smithsonian Soil Exhibit, which is goaled to open concurrently with the Congress.

NRCS soil scientists are encouraged to participate in the Congress and present professional papers and/or join the tours.

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National Centers "Working Together"

Presented by Jack Carlson, Director, ITC

National Soil Survey Center (NSSC)
National Cartography and Geospatial Center (NCGC)
National Geospatial Development Center (NGDC)
Information Technology Center (ITC)

National Soil Survey Center (NSSC-Lincoln)

- Develop and maintain National Cooperative Soil Survey standards
- Perform soils laboratory analyses
- Perform soil investigations
- Develop soil interpretations
- Coordinate delivery of technical soil services
- Provide business leadership and responsibility for Soil Survey Division applications (including NASIS, LIMS, PEDON, Soil Data Warehouse/Mart, and Web Soil Survey)
- Develop and maintain the business case for soil-related business applications

National Cartography and Geospatial Center (NCGC-Fort Worth)

- Provide cartographic services
- Acquire and deliver data, including business leadership and responsibility for the Resource Data Gateway
- Warehouse geodata and provide training
- Provide technical leadership for remote sensing
- Support GIS and GPS applications and provide training
- Build mobile data collection applications
- Provide information archiving
- Review and edit technical publications
- Support the National Resource Inventory (NRI)

National Cartography and Geospatial Center (NCGC-Fort Worth)

- Support the National Cooperative Soil Survey (NCSS)
    - Acquisition of soil imagery (field, publication, ortho, satellite)
    - Acquisition of other layers (DEM, LIDAR, DRG, elevation)
    - Soil Survey support
        - ✓ Digital map finishing
        - ✓ SSURGO
        - ✓ Soil Survey Publication
        - ✓ Digital Soil Survey cadre
        - ✓ Web soil maps and policy
    - Soil geodata warehousing
    - Mobile soil inventory tools
    - Training support (orthomapper)

National Geospatial Development Center (NGDC, Morgantown)

- Research and prototype technologies to improve the detail and accuracy of modern soil surveys and resource inventories
- Test and prototype field-based technologies for more efficient data collection

- Research new digital data collection, organization, and mapping and analysis technologies, including spatial data mining, geostatistics, and multivariate spatial statistics
- Research and prototype web-based map services to improve delivery of information to the user community
- Research and prototype innovative methods to display information and facilitate its interpretation, understanding and use

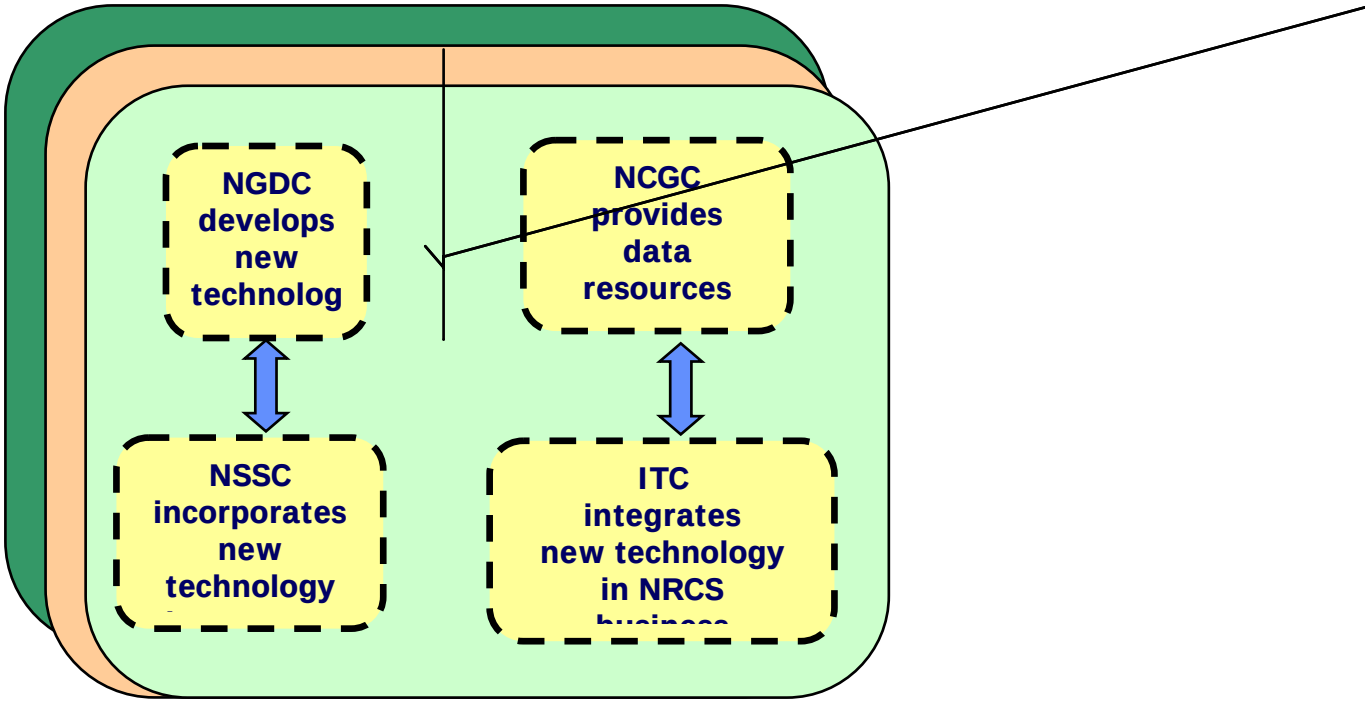
Information Technology Center (ITC-Fort Collins)

- Build, deploy, and support most national business applications in the NRCS IT Investment Portfolio
- Coordinate the lifecycle of all NRCS supported business applications
- Maintain and apply project management and software development standards
- Maintain the NRCS project management system, source code repository, and change control process
- Provide leadership and approval authority for application and data architectures, common user interfaces, and deployment platforms
- Operate an application testing and certification service

Soil Business Area Advisory Group (SBAAG)

- Provide a forum for coordination between the four centers
- All four centers have representatives on SBAAG
- Serve as management review body for business analysis in collaboration with SSD leadership
- Recommend priorities
- Sponsor ephemeral teams as needed to obtain input on specific business concerns

Basic Workflow



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National Geospatial Development Center (NGDC)

157 Clark Hall Annex, Prospect St
West Virginia University, Morgantown, WV 26506

Web: ngdc.wvu.edu
Email: Jon.Hempel@mail.wvu.edu
Trevor.Harris@mail.wvu.edu
Tel: (304) 293-8232

History of Center

- Funding
  - $4.5M earmark from WV Senator Robert Byrd in FY 04 and FY 05
  - Building on existing GIS expertise at WVU
  - Meet the GIS needs of NRCS
- Partnership between NRCS and WVU to provide GIS and Geo-Visualization expertise to the agency through the Center
- Dr. Trevor Harris serves as the WVU Co-Director
- Allocation: 50% CO-01 and 50% CO-02
- Christine Clark, RIAD, served as NRCS Co-Director in FY 04
  - FY 04-building infrastructure of the Center established
  - Build vision for the Center
- Jon Hempel started as Co-Director in September of 2004

Current Staffing

USDA	WVU
Jon Hempel-Co-Director	Dr. Trevor Harris-Co-Director
Sharon Waltman-Soil Scientist, Spatial Specialist	Jesse Rouse-GIS Specialist
Henry Ferguson-Soil Scientist, Data Specialist	Jim Canon-Network Administrator
Amanda Moore-Soil Scientist, GIS Specialist	Dr. Tim Warner-Remote Sensing
Vacant-Natural Resource Specialist	Dr. Briane Turley-Administration
Vacant-Business Area Specialist	Vic Baker-Visualization Specialist
Vacant-Information Specialist	Dr. Jennifer Miller-GIS
Vacant-GIS Specialist	Graduate/Undergraduate students
Vacant-Administrative Assistant	

Mission

- To enhance NRCS's ability and capacity to produce and utilize soil and resource information through the innovative development and application of appropriate geospatial technologies.

Goals

- Focus on developing and integrating technologies that bring the full wealth of soil and resource data and information to the user community by:
  - Providing the capability and staff to undertake geospatial development and research
  - Implement research prototypes as functional user-friendly applications
  - Address future soil information dissemination in partnership with the National Cartographic and Geospatial Center by developing technologies to support distribution, and
  - Promote partnerships with educational institutions, private industry, and government agencies

National Geospatial Development Center

A collaborative effort between West Virginia University and USDA-NRCS

The Center supports the agency's natural resource business needs through the innovative use of GIS and other technology tools.

Projects

- Remote Sensing Toolkit
- Orthorectification of Area Segments (PSU) Imagery
- Watershed Boundary Delineation
  - tools for development of 10 and 12 digit Hydrologic Units
  - assist in development of data (state edge matching)
- Elevation data comparison – LIDAR, 10M, 30M, ADS-40
- Custom or COTS 2.5D soils viewer
- Request for Proposals
  - Marketing of Soil Survey Information
  - Information Systems Plan
- Flooding potential from SSURGO
- Subaqueous Soil Survey
- Soil Series extent maps
- SOLIM
- West Texas Project

Geovisualization

- 2.5D ArcScene – soils
  - Public access
- VRGIS engine with web link
  - Analytical and management tool

Predictive Soil Mapping Projects

- SoLIM-Soil Landscape Inference Modeling
  - University of Wisconsin-Madison
  - Vermont NRCS/Darmouth University
  - West Texas
  - Isle Royale/Park Service
  - Missouri NRCS
  - Illinois NRCS
  - Arizona NRCS

- Utah State University (PURC)
- Washington State
- University of Idaho
- California NRCS
- Florida State University

West Texas Project

Telecommunications Project

- Upgrade physical telecommunication infrastructure in the region to assist producers with remote access
- Project has evolved now to include an upgrade to resource information delivery in the region
  - **Completion of the once-over soil survey (8,000,000 acres)**
  - **Providing web access of soil survey information**
    - ***Assist NGDC with the development of 2.5D soils viewer***
  - **Acquire data to assist with the development of resource information**
    - ***Hyperspectoral imagery***
    - ***ADS-40 elevation data***

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The New Operation at the National Cartography and Geospatial Center

Tommie Parham, Director, NCGC

USDA

Natural Resources Conservation Service

National Cartography & Geospatial Center

Fort Worth, TX

"A Long and Rich History"

.. Over 60+ years providing Cartographic products

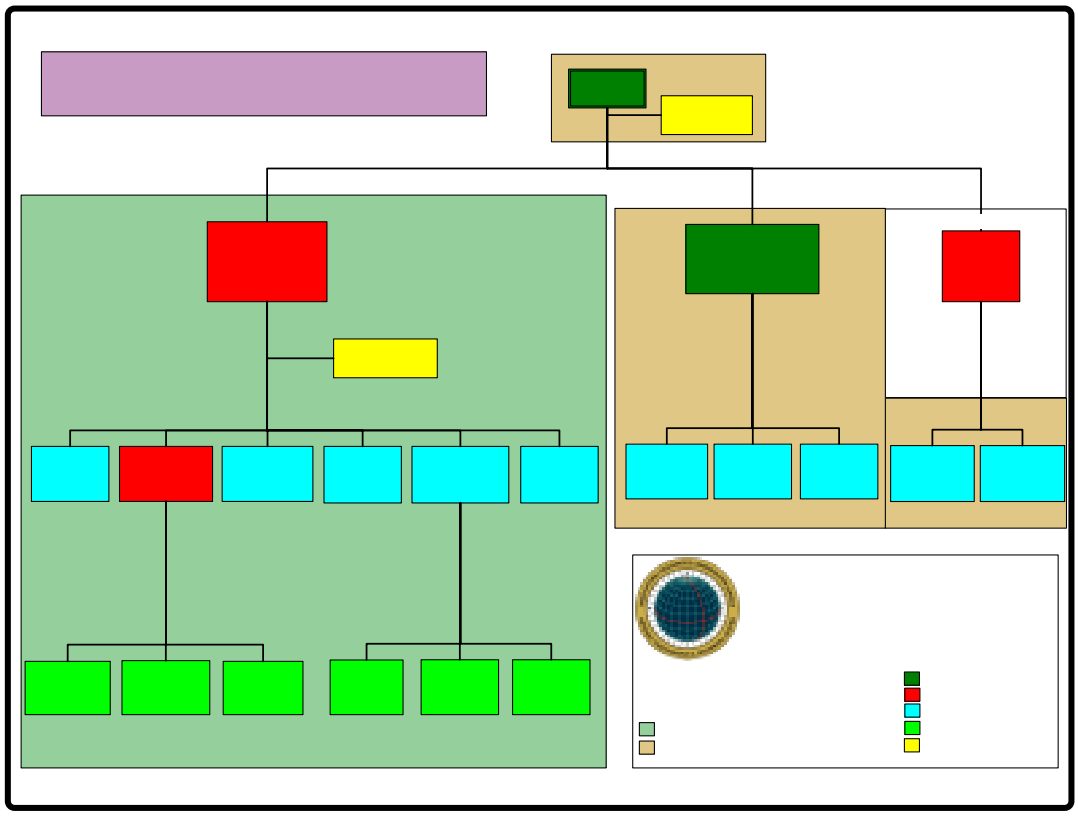
.. 20+ years of Geospatial development and training

TOMMIE L. PARHAM - DIRECTOR OF NCGC

The New NCGC
Delivering Geospatial Business Solutions

National Cartography & Geospatial Center

- Geographic Sciences Branch
- Geospatial Technology Branch
- Resource Technology Branch



NGDC A-76 Study

- A-76 Competitive Sourcing driven
- Created under Full Cost Comparison
  - Assisted in the process by Management Analysis Incorporated (MAI)
  - Performance Work Statement used to determine staff classifications, staff grades, workloads, etc.
  - Bid submitted from Agency Tender Organization (ATO)
  - Under obligation to follow through on the ATO bid

NCGC provides technical leadership for NRCS in...

- Cartography
- Remote Sensing
- NRI Support
- Global Positioning Systems (GPS)
- Geographic Information Systems (GIS)
- Soil Survey Support
- SSURGO, DMF, SOIL SURVEY PUB.
- Archiving of Information
- Technical Publication Edits and Reviews
- Geo- Data Ware housing & Training

Technology Development

- Global Positioning System
- Mobile Data Collection

Building Complete Building Applications

GPS, Mobile Computing, Arcpad, and Digital Cameras can,

..Increase efficiency
..Provide more information, and
..Produce better products

Geospatial Training

"Training for Tomorrow's Applications"

- Introduction to ArcGIS
- ArcGIS Spatial Analyst
- ArcPad 6.03

Geospatial Data

"Streaming Information to Users"

The Geospatial Data Gateway provides One Stop Shopping for natural resources or environmental data at anytime, from anywhere, to anyone. The Gateway allows you to choose your area of interest, browse and select data from our catalog, customize the format, and have it downloaded or shipped on CD.

We see the trees in the forest

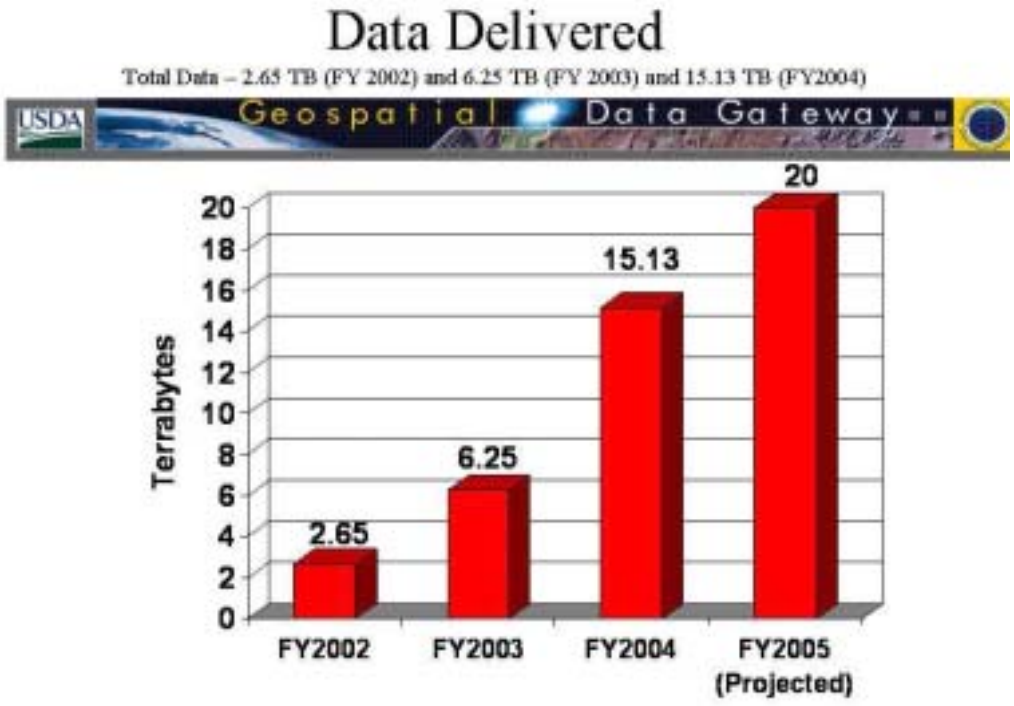
NCGC is prepared to continue to provide high quality, innovative cartographic and geospatial products and services to all our customers and partners.

Acquisition and Processing of Imagery

- Moderate Resolution Satellite Imagery
- Very High Resolution Aerial Photography

Vision

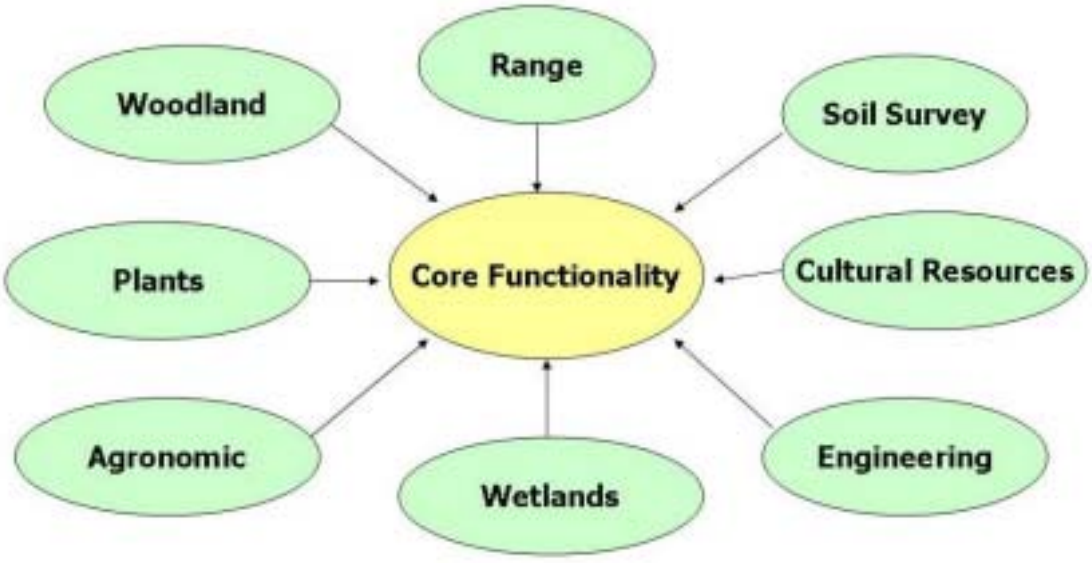
Use technology to provide **easy *access*** and delivery of data or information at ***anytime***, from ***anyplace***, to ***anyone*** using a secured, efficient and cost effective processes.

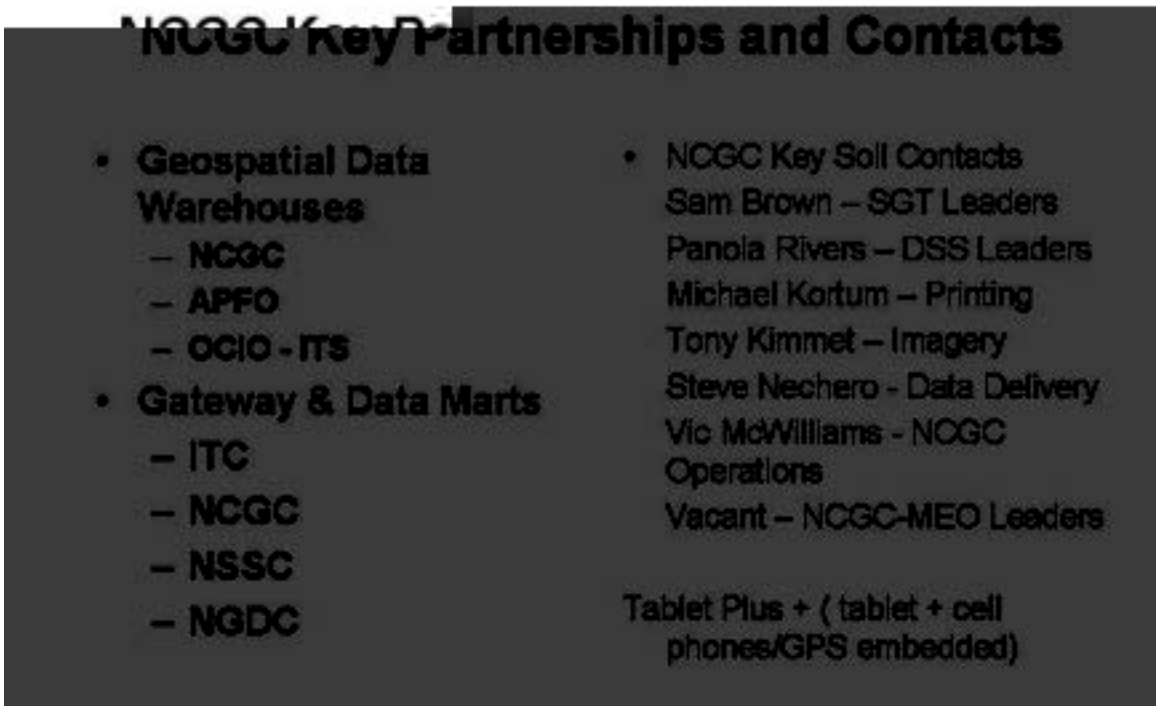


The New NCGC

- Acquisition of Soil Imagery
  - Field
  - Publication
  - Ortho
  - Satellite
- Soil Mobile Business Solutions
- Soil Survey Support
  - SSURGO
  - DMF
  - SOIL SURVEY PUB.
  - Digital Soil Survey Cadre
  - Web Soil Maps & Policy
- Elevation Data (LIDAR)
- DOQ & Other Raster Data
- Geo-data Ware housing & Training
- Technology Transfer
- Soil Map Printing
- Black & White Samples from Oce 800 – (GPO soil maps Sub.)
  - Samples
  - Brown & Kortum
- DEMs Service Vehicle available at NCGC
  - 10 Meter DEMs
  - State Status Chart
  - Finalizing MOU w/USGS
- Web Soil Publications
- Data Delivery

Mobile Resource Inventory and Assessment Tools Integration





National Cartography & Geospatial Center (NCGA)
Delivering Geospatial Business Solutions

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National Technology Support Centers
Soil Scientists
Working with SSS and NSSC

Terry Aho (West)
Leander Brown (East) Edward Griffin (Central)

Assistance That Can Be Provided By NTSC Soil Scientists

Direct Assistance

- Perform overview of Soil Survey Program with State
- Soil Scientist to identify areas to collaborate
- Assist with Strategies to coordinate and deliver soil survey data and interpretations to meet specific program needs (example; CRP, EQIP ranking systems/eligibility criteria)
- Technical Assistance and guidance in developing interpretive needs. (example; mass burial sites for Poultry etc)
- Assist with Pilot or Demonstration Projects and Field Trails
- Consultative assistance as requested, on technology issues (GIS systems, etc)
- Assist with addressing complex Natural Resource Issues and identifying additional sources of support (NSSC, SSD, NTSC, etc)
- Application models that NTSC Soil Scientists have prior experience (A-76 Contract Reports, Databases, FPPA, etc)

National Technical Standards, References, and Related Materials

- Develops soil science related policies and procedures
- Implementation strategies for maintaining and coordinating FOTGs with primary emphasis on section II
- Provide technical leadership and expertise for development and maintenance of soils-related aspects of conservation practice standards and quality criteria used in FOTGs.
- Ensure consistency of technical practice standards

Technology Transfer and Training

- Provides specific guidance to states
- Collaborates with others regarding detailed training in the application of soil survey data and interpretations to programs such as FPPA, RPP, and Farm Bill programs.
- Collaborates to provide training and guidance at all level in the use, understanding, and appropriate application of soil survey information
- Promote the use and integration of soil survey information in public and program policies.
- Provide technical expertise and serves as Soil Survey Division Representative to ARS, Universities research stations, and others in the use & application of soils and soil survey information in developing of environmental models

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eFOTG Guidance for consistency

Prepared by Terry Aho, Edward Griffin and Leander Brown - NTSC Resource Soil Scientist
Presented by Terry Aho (PowerPoint file name, FOTG guidance.ppt, handout eFOTG guidance file name, FOTG guidance.doc)

Field Office Technical Guides, Official Technical Reference

FOTG is the technical reference for official data, standards and references used for conservation planning and agency program applications.

A review of agency policy, General Manual Title 450 (Technology) Part 401

- Technical guides are primary technical references for NRCS
- Technical information for conservation and program delivery
- Localized to an identified geographic area
- Compilation of technical knowledge and standards

State Conservationists are responsible for:

- Development, quality, coordination, use and maintenance
- Coordinate FOTG contents to achieve reasonable uniformity between and among states where MLRA are shared
- Coordinate FOTG contents across state lines where program criteria require reasonable uniformity
- Establish membership to a State Technical Guide Committee (STGC)
- STGC approves and distributes state/FO developed supplemental FOTG materials
- Establish procedures for maintaining up-to-date FOTG (minimum every 5 years)
- Send concerns and needs to regional technology specialist
- Establish policy for distribution of FOTG within state

Section II minimum content, GM 450 part 401.6

- Statement identifying official soil survey maps, data, interpretations and methods of access and program applicability
- Official data may exists as hard copy or electronic, example: highly erodible soil list may exist as hard copy while standard data and interpretations exist as link to Soil Data Mart
- Official soil maps, either hard copy or electronic. Archived versions for program purposes (e.g. 1990 soil map for survey area recently updated). Both maps are included in the FOTG and clearly identified for intended purpose
- Contemporary data are electronic and exists as a link to the Soil Data Mart. Where archived version is required, data may exist either electronic or hard copy
- Brief narrative description (non-tech)
- Soil interpretations required to meet national program needs and needs of area served by FOTG. Some of these will be generated from soil data and available electronically from SDM, others (e.g. HEL lists) may exist only as hard copy

Concepts and business requirements
FOTG is:

- A five volume set of official, authorized data and information for conservation planning and program delivery needs for a given geographic area
- Available for use by everyone, either at the field office or electronically over the Web (eFOTG)

Agency Requirements met by eFOTG

- Provide improved access and delivery of official technical guide materials, anytime, anywhere to meet conservation and program needs
- Provide a consistent customer experience in accessing FOTG (look an feel, navigation, etc.)
- Provide agency identity (branding) of official FOTG
- Provide consistent delivery of official most up-to-date FOTG
- Improve customer access and reduce where possible the need for special software to use FOTG (e.g. Microsoft Access)

Recent Agency Directions

National Bulletin: 450-4-12 (June 17, 2004)

- Soil Data Warehouse and Soil Data Mart will reduce workload, eliminate redundant databases, and ensure delivery of consistent information
- SDW/SDM provides a single source of official soil survey information for most data and interpretations for section II
- Data and information not in SDW/SDM are delivered through FOTG either as separate documents or independent data files (e.g. hard copy/PDF HEL lists)

State action:

- Populated SDW/SDM with official soil survey data and interpretations providing a single authoritative source
- Link section II of eFOTG to specific soil survey area in SDM
- Maintain archived and programmatic soil information not available on SDM in section II of eFOTG
- Provide statements in section II that describes the official soil survey information, how the data may be accessed and their intended purpose

Current State of Affairs (eFOTG)

- Current implementation of eFOTG varies state to state making it difficult for consistent and effective delivery of FOTG material
- Delivery of only pre-packaged Microsoft Access database makes it impossible for customers without the software, to access and utilize the soil data
- Redundant delivery of Access soil database and/or pre-generated soil reports for data that exists in Soil Data Mart increases the risk of inconsistent data
- Delivery of soil data from non-NRCS sites increase redundancy and reduces customer recognition that the data is NRCS official FOTG
- Linking to other non-NRCS sites for delivery of section II data, implies that all data at the linked site is also part of section II
- Linking section II to SDM other than to a specific soil survey (with navigation limited), raise the risk a customer will miss parts of the FOTG
    - Not all of section II is electronic (SDM), accessing FOTG for a specific geographic area (FO) using eFOTG and then navigating to data for another FOTG without using eFOTG for navigation (navigating in SDM) increases the risk user will miss part of the official section II for those data that may be PDF or hard copy reference.

What's Next for eFOTG

- Plans exist to retool eFOTG to provide better local area FOTG delivery. Currently eFOTG requires states to develop folders for FO geographic area of operations (e.g. county)
- Need new functions on SDM to provide local reports, ability to pre-package downloads in MS Access upon request, display spatial data (soil map) and soil survey text

- Resource Soil Scientist at the National Technology Support Centers, can facilitate State Soil Scientists and NSSC in development of guidance for implementing a consistent and effective Section II

Drafting Guidance

- Until eFOTG can be updated, create folders in Section II based on specific FOTG identified geographic area (e.g. County, FSC, etc.)
- Add content, fact sheet, links to SDM, etc. for FOTG geographic area folder (e.g. county)
- A soil survey may occur in more than one FOTG
- For current contemporary soil data in each FOTG link directly to specific soil survey area on the Soil Data Mart, limit navigation
- Avoid pre-package datasets and linking to non-NRCS sites
- Include archived data and programmatic data, either as electronic hard copy (scanned PDF), data files or reference to hard copy available in field office.
- Include statements on how to access data and for what purpose, e.g. Highly erodible list for program support of 1990 Food Security Act available hard copy in Field Service Center for Alpha county; LESA for Alpha County Land use planning effective 1996 to present, available electronically from (http://www.nrcs.usda.gov/technical/efotg/alpha county/LESA1996.PDF)

Let's get started

- Handout eFOTG Section II Guidance, draft template to begin our attempt at improving delivery of consistent, official soil data in FOTG.
- We (all of us SSS, NSSC, SSD) can craft eFOTG guidance that will work for us all, while meeting our needs and improving user experience in accessing and delivering of Soil Information in Section II, FOTG
- Review the handout eFOTG Section II Guidance
  - Is it clear, does it make sense ?
  - Will it work in your state ?
- Send your comments to your regions NTSC resource soil scientist by March 8, 2005
- NTSC soil scientists will coordinate responses and work with SSD and NSSC in reconciling differences by March 22, 2005
- A final draft will be sent to SSS by March 29, 2005 for a two week review and comment period
- eFOTG Section II Guidance distributed by April 30, 2005

What's the hurry

- Bruce Knight, Chief NRCS wants to make a public splash-announcement this summer (June/July) of Web Soil Survey, Soil Data Mart and our electronic delivery of soil survey information (we can expect a significant increase in customer access)
- The Soil Survey Program can be ahead of the curve and lead the agency by providing our Official Soil Survey information and delivery through eFOTG in a consistent quality manner and improving our customers experience

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Technical Soil Services Advisory Group: 2001 – 2005

Kipen J. Kolesinskas
USDA-NRCS State Soil Scientist CT-RI
Chair, Technical Soil Services Advisory Group

Background

The participants at the State Soil Scientist's Meeting (2001) in Lawrence, Kansas, recommended that a committee be formed to advise soil survey leadership on matters related to Soil Survey Technical Services (TSAG). It would provide a forum for communication between state soil scientists, soil survey leadership, resource soil scientists, and other practitioners. Original members included:

- Russ Kelsea
- Edward Ealy, Jr.
- Michael Petersen
- Neil Peterson
- Dennis Potter
- Timothy Wheeler
- Kip Kolesinskas

In 2002, division leadership elevated this ad-hoc advisory group to full formal status. The new group was appointed by then-Director Berman Hudson. The new membership included a broad cross section of those involved in technical soil services, and included:

- Russ Kelsea , Sponsor Rep.
- Steve Depew
- Edward Ealy, Jr.
- Rich Gehring
- Lisa Krall
- Clayton Lee
- Larry Natzke
- Michael Petersen
- Neil Peterson
- Gerald Stratton
- Larry Trahan
- Kip Kolesinskas

Activities

The group participated in a number of teleconferences and two meetings. We met at the State Soil Scientist Meeting (2002) and brainstormed with the participants' ideas and concerns on a number of technical soil services issues. Through teleconferences, the group further refined and prioritized a list of current issues to consider. A second meeting to accelerate progress was held at the Soil Survey Center in July 2003. That list includes:

- Establish a basic skill set for resource soil scientists, and define the accompanying training need.
- Address the need for a place to share presentations, outreach materials, etc. Create a user-friendly website for users of soil survey materials.
- Ensure there is a link between technical soil services and the soil survey program.
- More people are needed to perform technical soil services – we are below a critical mass.
- Promote technical soil services that support the CTA Program.
- Promote the use/need for soils information and expertise to carry out the Farm Bill.
- Develop soils training outlines, which include the role of technical soil services that can be used with new employees, leaders, etc.
- Develop guidelines/certification standards (educational and/or experience) for technical service providers completing work related to technical soil services.

Accomplishments

- A sample position description has been prepared and is currently under review by NHQ and NSSC staff.

- A sample employee development plan has been prepared and is currently under review by NHQ and NSSC staff.
- Prepared and published an article in *Soil Survey Horizons* on the link between technical soil services and the soil survey program.
- Provided information and examples of technical soil services to national teams developing NRCS policy on community planning and CTA.
- Presented TSAG priorities and accomplishments at Northeast NCSS Meeting in Canaan, West Virginia.
- Shared Northeast NCSS Technical Soil Services Ad Hoc Committee notes with TSAG members and others.
- Prepared popular articles on technical soil services activities and accomplishments for publication in *NRCS This Week*, professional society newsletters, state NRCS publications, and popular press.
- Shared prepared presentations and outlines with other NRCS soil scientists nationwide.

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Soil Survey - *Helping People Understand Soils*

Russ Kelsea, National Leader for Soil Survey Technical Services, NSSC

HEL, Success, and How can we be Effective?

Highly Erodible Land

- program compliance
- 1990 data (and maps)
- in FOTG, not managed in NASIS
- update and maintenance have no effect
- rules in Nat'l Food Security Act Manual

A Success Story…

Conservation Reserve Program

- recognized limitations of 1990 data
- abandoned HEL
- acquired new soil survey data
- Administrator's letter to the Chief

An almost Success Story…

RUSLE2

- recognize need for soil survey data
- acquire full SSURGO attribute dataset
- hand process the files
- only need a few soil characteristics

Soil Survey - *Helping People Understand Soils*

- Are you an NRCS employee who happens to be soil scientist, or
- Are you a professional soil scientist who happens to be an NRCS employee?
- Are we delivering a product the client needs, or
- Are we trying to convince the client to use the product we create?

- What is the problem?
- Who can do something about it?
- What exactly to they need from us to be successful?

We are the enablers who can make them successful.

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Soil Survey - *Helping People Understand Soils*

Conservation Technical Assistance Program

Russ Kelsea, National Leader for Soil Survey Technical Services, NSSC

Soil Survey - ***Helping People Understand Soils***

Soil Survey Program functions

- make the inventory
- keep it current
- interpret and report
- promote and provide assistance

(42 USC 3271 et. seq. and other statutory authorities)

Agency Implementation

- make the inventory } CO-02
- keep it current
- interpret and report } CO-01
- promote and provide assistance

- **Conservation Programs Manual, Part 525**
- **Conservation Technical Assistance Program**
- **"CTA Policy"**

Part 525.01(c) -- Authorities and Regulations

- 16 USC 590a-f, 590q
- 42 USC 3271-3274

Part 525.01(d) -- Objectives

Provide soils information and interpretations to individuals or groups of decision makers, communities, States, and others to aid in sound decision making in the wise use and management of soil resources.

Part 525.01(h) -- Relation to Other Conservation Provisions and Programs

The CTA Program also facilitates the use of soil survey information developed and published by the Agency's Soil Survey Program. The soils information and technical consultation and assistance provided through the CTA Program increase the practical use of soils information and mapping for the wise use and management of soil resources.

Part 525.20(f) -- Conservation Technical Consultation Assistance

… that does not lead to the development of a conservation plan.
Technical consultation and assistance in the distribution, interpretation, application, and use of soil survey.

Part 525.25(c) -- Comprehensive Plans with a Unit of Government

- Community planning
- Local laws and regulations

525.40 -- Fund Management

- State Conservationist is responsible for fund integrity
- Code time to program benefiting
  - EQIP, CRP, CSP, WRP, WHIP, etc.
  - CTA
  - SOIL

525.41 -- Accountability

- Activities
  - technical consultations
- Work Products
  - clients assisted
  - 1006's completed
- Performance Measures
  - land protected

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Using Soils Information with the Revised Universal Soil Loss Equation RUSLE2

Dave Lightle, Conservation Agronomist,
National Soil Survey Center, Lincoln, NE

Status of ARS Erosion Models

- Revised Universal Soil Loss Equation
  - (RUSLE2 windows) - NRCS Field Office implementation underway
- Wind Erosion Prediction System (WEPS) implementation halted in October 2001, additional development underway – database development, testing, training, revisions, and enhancements remain to be done.

RUSLE2

- Has been adopted Nationally by NRCS for use in assessing erosion by water and for comparing alternative treatment systems in Conservation Planning activities.
- NASIS soils data is required.
- RUSLE2 implementation is well underway in NRCS Field Offices.
- RUSLE2 and database components are available at: http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

RUSLE2 Features

- By utilizing common user inputs of climate, soils, field and slope geometry and common crop management systems, the RUSLE2 interface has become a common platform for other assessment tools:
- Soil Conditioning Index - SCI
- Soil Tillage Intensity Rating - STIR

RUSLE2 and the Conservation Security Program

- The Soil Conditioning Index tool is required in determining producer eligibility and payment tier placement for the Conservation Security Program (CSP).
- The minimum level of treatment for soil quality on cropland is considered achieved when the Soil Conditioning Index value is positive.
- The SCI is now an imbedded tool in the RUSLE 2 model. All States will need to have RUSLE 2 implemented in the selected watersheds and will need to enter other forms of erosion – such as Wind erosion.
- Nationally Significant Resource Concerns Identified in CSP
- Soil quality and water quality are nationally significant resource concerns for all land uses.
- This means that all CSP participants – regardless of their Tier of participation, must have already addressed soil and water criteria.

Nationally Significant Resource Concerns Identified in CSP

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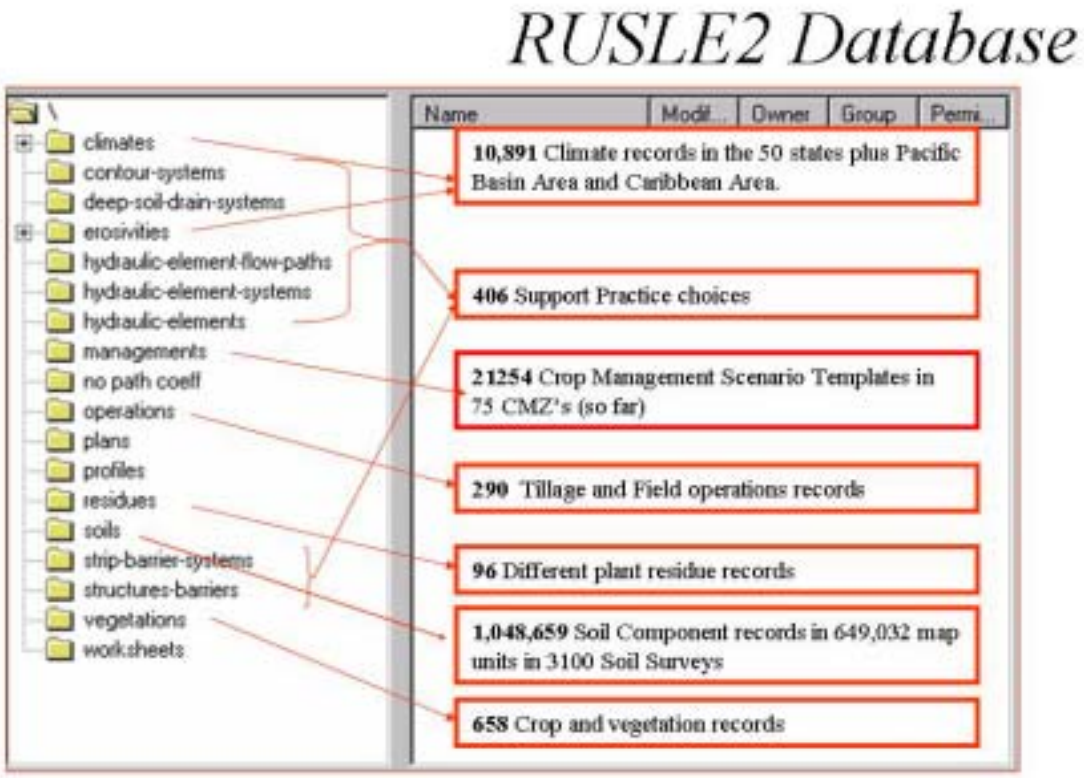


Soils Updates

- State soils staffs are posting revised soils data to the New Soil Data Mart.
- State Agronomists need to be aware of these and import these new data sets into RUSLE2 and send the exports to the RUSLE2 database manager for locking the data and posting.
- These new soils need to be made a part of the local RUSLE2 database

RUSLE2 Database

How do we get the soils information contained in NASIS into the RUSLE2 model?
Steps to put NASIS soils data into the RUSLE2 model

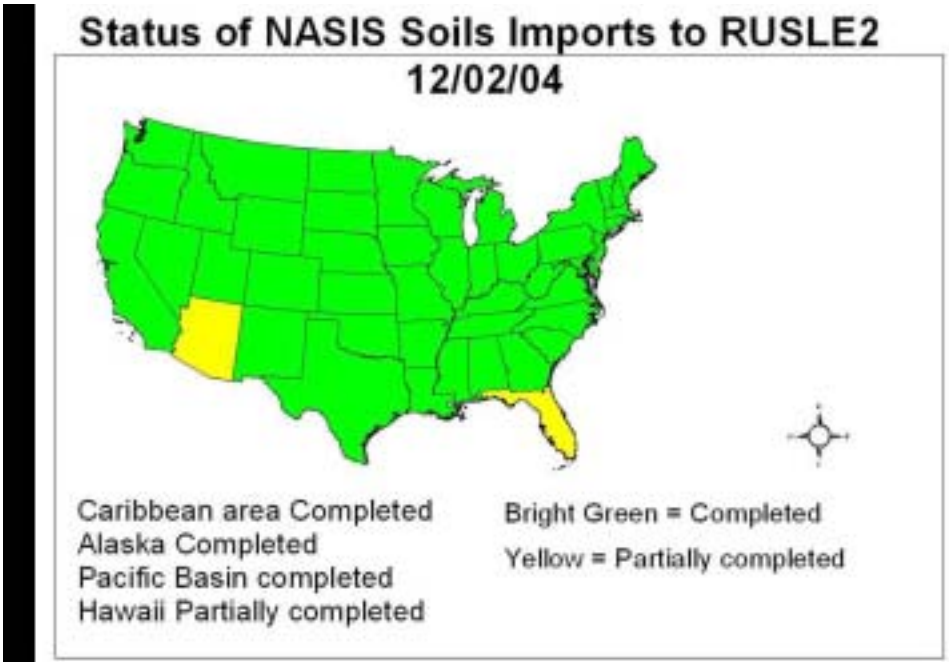
- Populate and quality check the NASIS soil data needed by RUSLE2
- Create download from NASIS and convert to MS Access format
- Use: "File"/ "Import"/ " NASIS soil database" utility in RUSLE2 to build a soils table for each soil survey area

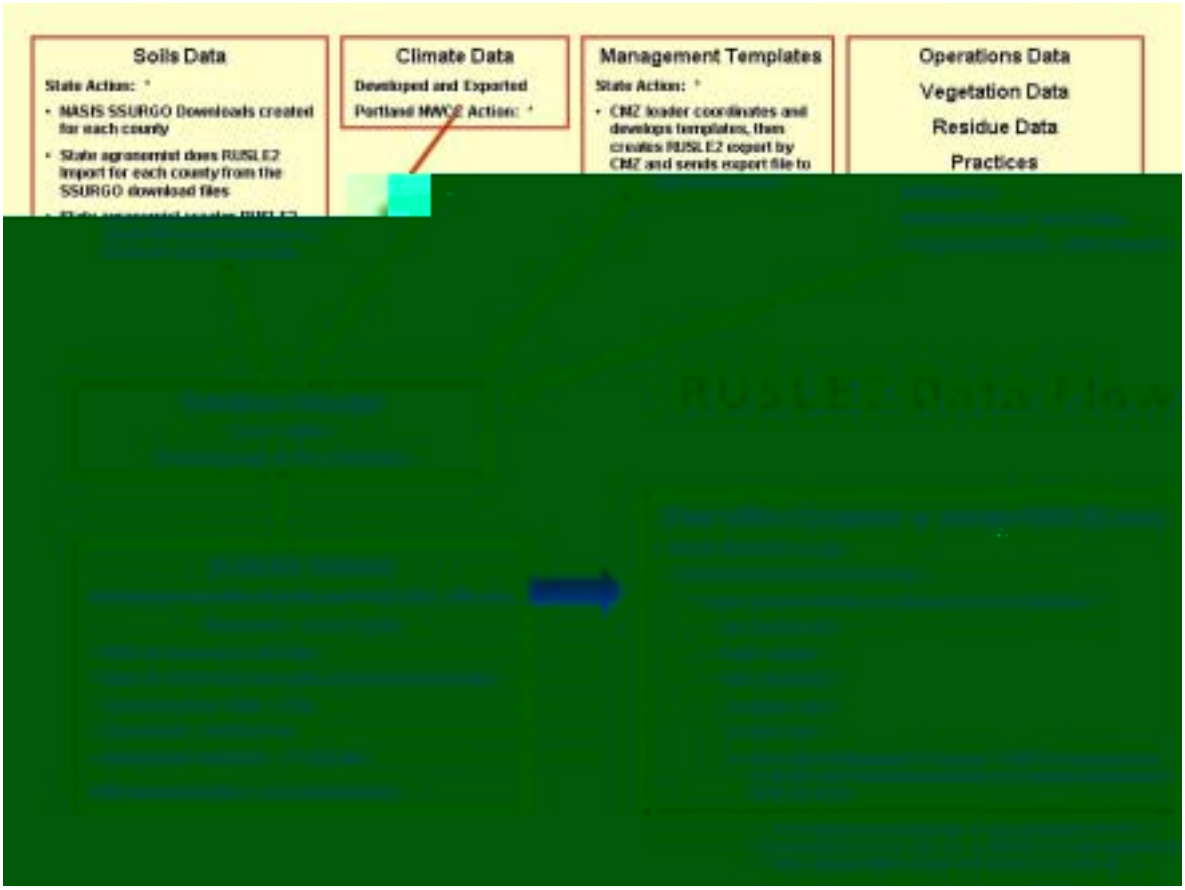
How will soils updates be handled?

State Agronomist notified that an update is available on the Soil Data Mart.
Data is downloaded, formatted by the appropriate Access Template and imported into RUSLE2 by state agronomist.

How will soils updates be handled?

- RUSLE2 export created for each county or soil survey area created and sent to database manager.
- Data locked by database manager and export posted to RUSLE2 website. Old data archived.





RUSLE2 and database components are available at:
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm
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Soil Survey Investigations and the National Soil Laboratory

David Hammer
National Leader for Soil Investigations

Introduction

I am delighted to be here and to be the new National Leader for Soil Investigations and Director, National Soil Laboratory. This is a time when changes probably are being made at a faster pace than time in the agency's history. The opportunity to come to work every day and be surrounded by soil scientists dedicated to making the soil survey the best it can be is truly a dream. My objectives during this presentation are: 1) give you a brief background of my experience; 2) present some general goals, and 3) try to promote dialog among us.

Background

I was raised in rural Illinois, where my father managed cooperative grain facilities. We moved frequently, so I saw much of the state and was exposed to many agricultural practices during my childhood.

I graduated from the U.S. Naval Academy with a degree in Mechanical Engineering, then joined the U.S. Marine Corps and spent nearly six years as a pilot with them, including a tour in Viet Nam.

After my Marine Corps experience, I received my M.S. degree in Forestry, with an emphasis on forest ecology, from the University of Illinois. I became fascinated with soils during that experience, and acquired 30 hours of credit in soil science and related courses.

My subsequent experience was as a Forest Soils Specialist II with the Washington State Department of Natural Resources, mapping soils in the cooperative soil survey as part of the Forest Land Grading Program. I participated in the surveys of Skagit and Whatcom Counties. I was employed for about six months on soft money with the U.S. Forest Service in Wenatchee, WA prior to going to the University of Tennessee to complete my Ph.D.

At the University of Tennessee, I organized a small soil characterization laboratory and represented the University on the Cooperative Soil Survey. I attended field reviews, participated in special projects, and conducted research on soil morphology, soil water movement, and forest site evaluation.

I accepted a tenure-track faculty poselacu8(Iw (19[illegible]
Department ofion labor1935 tate spechng [illegible]

laboratory analyses, data archival, and land-use interpretations; b) a place where academicians and other students of the soil resource seek sabaticals with us, and c) the center will have internships in a variety of locations and disciplines, that will attract bright

In the context of the above objectives, I suggest that we should reconfigure the Soil Institute to better train field soil scientists to engage in hypothesis-based testing in the field, to better analyze their data, and to more efficiently sample so that the National Soil Laboratory resources are most precisely obtained and can be more broadly applied. The better our understanding of correlations among soil and landscape attributes, the more reliable will be the models we use to fill data bases and develop interpretations. Careful reorganization could result in participants receiving graduate credit for their efforts. One way to ensure that these objectives are met could be to repeat the institute experience at selected land grant institutions that retain relatively "robust" faculty. An ancillary benefit could be that long-term collaboration with NRCS might strengthen those soil programs.

The Role of the Laboratory

The Soil Survey Laboratory is the best laboratory of its kind in the country for the country, and is one of very few that performs the full suite of soil chemical, mineralogical and physical analyses. Our cost per sample is less than most private laboratories because we are not required to make a financial profit.

Quality, science-based data are the foundations for all of our working models of soil science and for our interpretations. In that context, the relevant questions for our current laboratory operations and the laboratory-produced data base should include:

- What data do we have?
- What kinds of correlations can we identify among soil/landscape attributes:
- Where do we need more data?
- What should be our priorities when collecting new data?
- What is our sampling intensity for specific interpretations questions?
- Are our data being collected on the basis of a testable hypothesis?
- Can the collected data address the full suite of our needs?
  - Interpretations
  - Technical
  - Classification
- Can we make the laboratory more cost-effective and productive?
- Can we develop a national soil laboratory network with colleges that still retain soil laboratory capabilities?

The Investigations and Laboratory staffs will work together to answer these questions, and dialog also will include the other National Leaders.

Important Remaining Challenges

As the soil survey *inventory* nears completion, the challenge is to better understand the pedologic and geomorphic *processes* that shaped the landscapes and developed the soils. This will require understanding in four dimensions – the three dimensions of space and the fourth dimension of time. Soil attributes vary at different rates both temporally and spatially. Understanding the processes is essential if we are to develop the best interpretations required for sustainable soil-landscape management.

Understanding soil/geomorphic processes will require us to sample in different ways than we did for classification. We will have to focus on vadose zone hydrology, because water is the universal solvent, and we will have to learn much more about dynamic soil properties.

As we move into the dynamic processes of pedogenesis and geomorphology, we will be aided by sophisticated statistical and computer technologies that were not available even a decade ago. These technologies will require new expertise, new investments in hardware and infrastructure, and soil scientists with different skills and visions than previously required.

We can use the new technology to educate users as well as to model and interpret. These technologies will require more and better data than we now have. One of our challenges probably will be to better inform users of the potentials and limitations of our data and models than we have in the past.

The challenges of the future will require that we also develop better understandings of the ancillary disciplines that use soil science information: civil engineering, ecology, land use planners, etc. We should be pro-active in trying to determine their perspectives, their needs and their abilities to interact with us. Collaboration will require different skills than many of us have, and will require focused time, dialog and effort. In my opinion, our success as soil scientists depends upon our meeting all of these challenges.

This truly is an exciting time to be a soil scientist, and I'm delighted and humbled to be a new member of the best soil science agency in the world.

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Soil Data Mart

Electronic Information Delivery Site

Paul Finnell, Soil Scientist, NSSC

SDM Objectives

- A single source of current official soil survey data of high quality that meets USDA national program responsibilities.
- Access to current and previous versions of official soil survey data (versioning of data).
- Products that meet customer needs.
- Customer access for selecting, interpreting, reporting and downloading soil survey data and information.

Soil Data Mart Progress (5/3)

Domain	Number of Downloads
si	1
us	95
org	18
arpa	17
br	4
swt	1
mil	18
edu	360
net	427
gov	1102
ca	6
Unknown	1649
com	764
Total	**4462**

Soil Data Mart Progress

28526 Total Oct 2004

9845	unknown	24	arpa
4769	gov	17	nz
3939	Data Gateway	16	ca
3302	net	4	br
3259	com	1	fr
2352	edu	1	coop
629	us	1	si
187	mil	1	swt
175	org	1	ar
		1	ch
		1	il
		1	pl

Soil Data Mart Progress

14602	unknown	4	local
11733	Gateway	4	br
7124	gov	4	121
5644	net	2	cc
5001	com	2	swt
4477	edu	2	nl
900	us	1	jp
637	mil	1	fr
272	org	1	coop
36	arpa	1	si
22	ca	1	sa
17	nz	1	tv
8	ch	1	ar
6	uk	1	de
		1	il
		1	au
		1	pl

50508 total downloads
January 15, 2005

Soil Data Mart Design

- "The" National soils delivery system
- The "Publication" site
- Maintains a similar "look and feel"
- Share reports for eFOTG and Web Soil Survey
- Allows for State and National reports
- Allows the State to "tailor" its choice of reports

Soil Data Mart

State Soil Scientist:

- Certifies exported data to SDM
- Exports the interpretations for each SDM report
- Follows the Soils Division naming convention for any locally developed interpretations and reports

Choices –

- Decision: use only "National" Reports and Interpretations
  Export all 48 National and Standard Interpretations
- Decision: develop State Reports and Interpretations
- **State develops a SSURGO template containing the reports needed for each state interpretation**

Report Naming Conventions

- ACCESS and SDM Reports
  Any report, other than the National reports, will have the state code (or agency code) at the end of the report title
  For example:
  Nonirrigated Yields of Corn, Soybeans, and Oats by Map Unit (IA)

Interpretation Naming Convention

- State Developed Interpretations
  Any interpretation, other than the National or Standard interpretations, will have the state code (or agency code) at the end of the report title
  For Example:
  FOR - Potential Seedling Mortality (MI)

Interpretation Naming Convention

- **Interpretation "Rule" name will use the prefixing protocol established for NASIS interpretations.**
  (e.g. AGR, ENG, FOR, etc.)
- **Interpretation "Rule" name will include the suffix of two-letter FIPS state code or Agency codes in parentheses, preceded by one space**
  (e.g., "ENG - Septic Tank Absorption Fields (OH)";
  "WLF – Desert Tortoise Habitat (BLM)")
- **Terms or codes such as MOxx, initials, survey area, etc. are not used**

State Interpretations

- Primary rule uses naming convention
- Interpretation must be complete
- Interpretation is documented
- State interpretations must be exported
- State SSURGO template must be developed and a report created for the interpretation

Interpretation is documented

- Description field in the NASIS Rule table will be used to fully document the state-created interpretation
  (including "Summary", "Description", "Scope" with source citation

SSURGO Templates

Developing State SSURGO Templates

- Download most recent version of the template from SDM
- Create local reports
- Turn off national reports

State SSURGO Templates

- Using state interpretations
  (e.g. Sewage Lagoons (VA),
  Dwellings with Basements (NC), etc.),
- Modify existing national property reports
  (e.g. Chemical Properties (CA),
  Water Features (CA), etc.),
- Create a brand new report
  (e.g., Soil Fact Sheet [VT])

State SSURGO Templates

- **Report Name (Drop Down Menu on SDM):**
  e.g., Chemical Soil Properties (CA). Multiple versions of the same report may be used within a state with the names modified to distinguish between them, e.g. Chemical Soil Properties (CA), Chemical Soil Properties for Volcanic Soils (CA).
- **Name Modification:**
  State codes or Agency codes (BLM, FS, NPS, etc.) will be the only modifier allowed to be added to the report name. Terms such as MOxx, initials, survey area, etc. are not used.
- **Report Title:**
  This "report title" is the actual title on the printed report page and will match the report name – e.g., Chemical Soil Properties (CA).
- **Documentation:**
  The "Report Documentation" field in the Access template table "SYSTEM - Soil Reports" is the prewritten material specific to the report and will be reviewed by editorial staff.

Process Steps

- SSS sends template to Hotline staff
- Report format and prewritten material are sent for English edit.
- Report names and interpretations are verified for national naming convention
- Interpretations are checked for completeness
- Hotline staff compiles all edits and updates the SSURGO database
- SSURGO database is returned to SSS for final review, then sent to ITC

Table of Contents

Soil Properties and Computer Models
How soil properties are used in environmental models

Paul Finnell, Soil Scientist, NSSC

NRCS Models

➢ AGNPS	➢ EPIC	➢ GLA
➢ GLEAMS	➢ HUWQ	➢ HYDRIC
➢ MMP	➢ NAPRA	➢ NUTRIENT SCREEN
➢ ROSETTA	➢ RUSLE2	➢ RZWQ
➢ SWRRB	➢ VEGSPEC	➢ WATER BUDGET
➢ WEBD	➢ WEPS	➢ WEQ
➢ WinPST	➢	➢

AGNPS

- AGricultural Non-Point Source (AGNPS)
- Developed by Agricultural Research Service (ARS) http://msa.ars.usda.gov/ms/oxford/nsl/AGNPS.html
- Predicts soil erosion and nutrient transport/loadings from agricultural watersheds using 8 GIS layers

AGNPS

GIS Layers

➢ Soils	➢ Elevation	➢ Land use
➢ Management practice	➢ Fertilizer or nutrient inputs	➢ Type of machinery used for land preparation
➢ Channel slope	➢ Slope length factor	➢

AGNPS – Soil Factors

➢ Albedo	➢ Base Saturation	➢ Bulk Density
➢ CaCO3Clay Ratio	➢ Field Capacity	➢ Fine Sand Ratio
➢ Hydrologic Soil Group	➢ Impervious Depth	➢ Inorganic N Ratio
➢ Inorganic P Ratio	➢ K-Factor	➢ Layer Depth
➢ Number Soil Layers	➢ Organic Matter Ratio	➢ Ph
➢ Rock Ratio	➢ Sand Ratio	➢ Saturated Conductivity
➢ Silt Ratio	➢ Soil Name	➢ Soil Texture
➢ Specific Gravity	➢ Volcanic Code	➢ Wilting Point
➢ Organic N Ratio *	➢ Organic P Ratio *	➢
➢	➢	➢

EPIC

- Erosion Productivity-Impact Calculator
- Developed by Agricultural Research Service (ARS) http://www.brc.tamus.edu/epic/
- Assess the effect of soil erosion on productivity. Predict the effects of managem

➢ Field Capacity	➢ Sand Content	➢ Silt Content
➢ Organic N Concentration	➢ pH	➢ Sum of Bases
➢ Organic Carbon	➢ Calcium Carbonate	➢ Cation Exchange Capacity

➢ component interp	➢ component interp restriction	➢ component kind
➢ component name	➢ component percent r	➢ drainage class
➢ flooding duration class	➢ flooding frequency class	➢ geomorph feat name
➢ geomorph feat type name	➢ horizon depth to bottom r	➢ horizon depth to top r
➢ mapunit acres	➢ mapunit name	➢ mapunit symbol
➢ ponding duration class	➢ ponding frequency class	➢ sat hydraulic conductivity h
➢ sat hydraulic conductivity l	➢ sat hydraulic conductivity r	➢ soil moist depth to top h
➢ soil moist depth to top l	➢ soil moist depth to top r	➢ soil moisture status
➢ taxonomic great group	➢ taxonomic order	➢ taxonomic subgroup
➢ taxonomic suborder	➢ taxonomic temp regime	➢
➢	➢	➢

MMP

- Manure Management Planner
- Developed by Purdue University
  http://www.agry.purdue.edu/mmp/
- used to create manure management plans for crop and animal feeding operations

MMP

➢ Area symbol	➢ Component name	➢ Component pct r
➢ Map unit symbol	➢ Organic matter h	➢ Organic matter l
➢ Restriction depth l	➢ Slope h	➢ Slope l
➢ Texture	➢	➢

NAPRA

- National Agricultural Pesticide Risk Analysis
- developed jointly by NRCS and the University of Massachusetts.
- evaluates the potential loss of pesticides to ground and surface waters by modeling pesticide movement,

- U.S. ARS Salinity Laboratory http://www.ussl.ars.usda.gov/models/rosetta/rosetta.htm
- Rosetta can be used to estimate the following properties:
  - Water retention parameters according to van Genuchten (1980)
  - Saturated hydraulic conductivity
  - Unsaturated hydraulic conductivity parameters according to van Genuchten (1980) and Mualem (1976)

ROSETTA

Area symbol	Clay total separate r	Comp name
Db third bar_r	Hz depb_r	Hz dept_r
Mu sym	Sand total_r	Silt total_r
Water fifteen bar_r	Water third bar_r	

RUSLE2

- Revised Universal Soil Loss Equation, Version 2 (RUSLE2)
- Developed by Agricultural Research Service (ARS) http://fargo.nserl.purdue.edu/rusle2_dataweb/About_RUSLE2_Technology.htm
- primarily to guide conservation planning, inventory erosion rates and estimate sediment delivery.

RUSLE2

Component Name	Component Percent	Hydrologic Soil Group – drained and/or undrained	K Factor (Kf)
Map Unit Symbol	Map Unit Name – slope phase, erosion phase	Soil Texture And Modifier	T Factor
Taxonomic Order	Total RV Clay For The Surface Horizon	Total RV Sand For The Surface Horizon	Total RV Silt For The Surface Horizon

RZWQ

- Root Zone Water Quality
- Developed by Agricultural Research Service (ARS) http://gpsr.ars.usda.gov/products/rzwqm.htm
- process-based model that simulates the growth of the plant and the movement of water, nutrients and agro-chemicals over, within and below the crop root zone of a unit area of an agricultural cropping system under a range of common management practices

RZWQ

- cec7

clay_total_separate	Db third bar	hzdepb_r
om	pH 01m cacl2	pH 1to1 h2o
sand_total_separate	silt_total_separate	water_one_tenth_bar
water_one_third_bar		

SWRRB

- Simulator for Water Resources in Rural Basins-Water Quality
- Developed by Agricultural Research Service (ARS)
- predict the effect of management decisions on water, sediment, and pesticide yield with reasonable accuracy for ungaged rural basins

SWRRB

albedo_dry	rock_frag_greater_than_10_in	rock_frag_3_to_10_in
bulk_density_one_third_bar	organic_matter_percent_?	sieve_number_4

VEGSPEC

- Vegetative Practice Design Application
- Developed by NRCS ITC
- VegSpec utilizes soil, plant, and climate data to select plant species that are (1) site-specifically adapted, (2) suitable for the selected practice, and (3) appropriate for the purposes and objectives for which the planting is intended.

VEGSPEC

area_symbol	area_type_name	cointerp
comonth	component_name	component_percent
flooding_duration_class	flooding_frequency_class	horizon_designation
mapunit.mapunit_symbol	ponding_depth	ponding_duration_class
ponding_frequency_class	restriction_depth_to_top	restriction_kind
sequence_number	slope_gradient	soil_moist_depth_to_top
taxonomic_order	texture_class	

WEPS

- Wind Erosion Prediction System
- Developed by Agricultural Research Service (ARS) http://www.weru.ksu.edu/weps.html
- a continuous, daily, time-step model, it simulates not only the basic wind erosion processes, but also the processes that modify a soil's susceptibility to wind erosion

WEPS

albedo_dry	areaname	areasymbol
bulk_density_one_third_bar	bulk_density_oven_dry	calcium_carbonate_equivalent
cation_exch_capcty_nh4oacph7	chfrags.fragment_volume	chtexturegrp.texture_class
clay_total_separate	component_name	component_percent
ecec	horizon_thickness	linear_extensibility_percent
ponding_depth	ponding_duration_class	ponding_frequency_class
restriction_depth_to_top	restriction_kind	sequence_number
slope_gradient	soil_moist_depth_to_top	taxonomic_order
texture_class		

WINPST

- Windows based Soil-Pesticide Interaction Screening Tool
- Developed by NRCS NWCC http://www.wcc.nrcs.usda.gov/pestmgt/
- a pesticide environmental risk screening tool that considers the impact of water table depth, irrigation, residue management and pesticide application area, method and rate class

WINPST

area_name	area_symbol	comonth.month
compname	comppct_r	cosoilmoist.soimoiststat
hydgrp	hzdepb_r	kwfact
lep_r	mapunit.musym	om_h
om_l	om_r	ph01mcacl2_h
ph01mcacl2_l	ph1to1h2o_h	ph1to1h2o_l

➢ resdept_h	➢ resdept_l	➢ seqnum
➢ slope_h	➢ slope_l	➢ soimoistdept_h
➢ soimoistdept_l	➢ texture	➢

Soil Properties for Models

➢ albedo dry	➢ area name	➢ area symbol
➢ area type name	➢ base saturation	➢ bulk density fifteen bar
➢ bulk density one third bar	➢ bulk density oven dry	➢ caco3clay ratio
➢ calcium carbonate equivalent	➢ cec nh4oac ph7	➢ clay total separate r
➢ coarse fragment volume	➢ comonth.month	➢ component interp
➢ component interp restriction	➢ component kind	➢ component name
➢ component percent r	➢ cosoilmoist.soimoiststat	➢ cosoimoistdept l
➢ drainage class	➢ ecec	➢ fine sand separate
➢ flooding duration class	➢ flooding frequency class	➢ geomorph feat name
➢ geomorph feat type name	➢ horizon depth to bottom r	➢ horizon depth to top r
➢ horizon designation	➢ horizon thickness	➢ hydrologic soil group
➢ kf factor	➢ kw factor	➢ layer depth
➢ linear extensibility percent	➢ map unit symbol	➢ mapunit acres
➢ mapunit name	➢ organic matter percent l, rv, h	➢ particle density
➢ ph 01m cacl2	➢ ph 1to1 h2o	➢ pore quantity, shape, size
➢ restriction depth to top h	➢ restriction depth to top l	➢ rock frag 3 to 10 in
➢ rock frag greater than 10	➢ sand coarse separate	➢ sand total separate
➢ sat hydraulic conductivity	➢ sieve number 4	➢ silt total separate
➢ slope l, h	➢ soil texture and modifier	➢ sum of bases
➢ t factor	➢ water fifteen bar r	➢ water one tenth bar
➢ water one third bar	➢ water satiated	➢

Focus

- Concentrate on collecting property data
- Compare field collected data to database properties
- Emphasize the collection of the following estimated properties on field descriptions

➢ Sand (and fractions)	➢ Silt	➢ Clay
➢ Coarse fragments	➢ Organic Matter	➢ Bulk Density
➢ Water States	➢	➢

Focus

The “mapping” of soils for the US is essentially complete. NRCS is now in need of “soil scientists” and no longer in need of “soil mappers”. The paradigm must shift from drawing lines on a map to analyzing and improving the quality of our data to meet the needs of our customers.

The product focus on the initial soil survey was a bound publication. The product focus on the maintenance soil survey is electronic management of our “data” and electronic delivery of our “information”.

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Benchmark Soils

Tom Reedy, Soil Scientist, NSSC
Tomas Reinsch, Soil Scientist, NSSC
Sharon Waltman, Soil Scientist, NGDC

DEFINITION

1. It is to the research community's advantage to focus their investigative effort on key soils. These soils have the greatest potential for applying new technology across large areas, and also for transferring new technologies to similar soils, thereby optimizing cost–benefit ratios. We refer to these soils as "benchmark soils."
2. Because soil survey is ongoing, maintaining the list of benchmark soils and evaluating completeness of lab data is also ongoing. Benchmark soils maintenance *reaffirms* the NCSS program to complete a geospatially representative national laboratory dataset.
3. The current list is a compilation of states' preferences. Because benchmark soils transcend administrative boundaries, there is a strong argument for creating a list that reflects geographic areas (MLRAs).

APPLICATION

1. assessment of conservation effects
2. as sites for evaluating interpretations
3. macro/micronutrient and trace element studies
4. dynamic soil property change and other monitoring studies
5. Elrashidi et al. 2004, 7 of 9 soils were benchmark in "Phosphorus loss by runoff for an Agricultural Watershed in Southeast Nebraska**"**
6. saturated hydraulic conductivity studies
7. soil quality
8. studies of soil erodibility factors
9. crop and range plant adaptation and yield
10. soil fertility
11. source for training materials and onsite training activities
12. crop/soil/pesticide modeling scenarios for surface water and groundwater assessments
13. pedotransfer function modeling
14. EPA Office of Pesticide Programs–crop/soil/pesticide modeling scenarios for surface water and groundwater assessments. Bill Effland successfully argued for benchmarks soils as a foundation for these studies. "EPA didn't even know there was a list until I got a hold of one in the early 90s" (Marketing opportunity?)
15. IQuum inc. is developing an analytical device that can extract nucleic acids from environmental and clinical samples, as well as perform real time polymerase chain reaction (PCR) amplification of the extracted materials. They are interested in a set of representative soil types that are widely distributed in the US

CRITERIA

1. Benchmark Soil Criteria:
   a) EXTENT: commonly of large extent (>100,000 acres) in the Land Resource Region (LRR); moderate or large extent in the MLRA (> 10,000 acres). "A series of relatively high extent in the MLRA." Not all series of moderate or large extent are benchmark soils.
   b) KEY SOILS: holds a key position in the soil classification system,

c) IMPORTANT SOILS: that are important for specialty crops and engineering uses (such as forestry, ranching, recreational development, urban development, wetland restoration, or other uses), OR
d) EXISTING DATA: there are large amounts of data.

2. MLRA Criteria:
   a) EXTENT: Total extent of benchmark soils should comprise about 20 to 25 percent of the total soil area of the MLRA, and
   b) Since benchmark soils represent similar soils, about 60 to 80 percent of all soils in the MLRA are collectively represented.

CURRENT STATUS

1. About 1215 benchmark soil series.
2. Last updated in the 1980s, well before the completion of many soil surveys (once over).
3. Taxonomic summary — NO benchmark soils with classification errors.
   NO benchmark soils with obsolete subgroups
4. NSSL characterization data status of the 1215 benchmark soils: Table 1 indicates NASIS acres, and the data completeness index (DCI) status for benchmark soil pedons[1]. The DCI maximum value is important, since it indicates the most complete dataset(s) in the system. The goal would be to strive for a max DCI = 9. ***State university labs are not reflected in the following table***. Table 2 summarizes the NSSL dataset.

Table 1 – Indicates # pedons correlated and # pedons sampled as, not correlated (low apples), along with their range in data completeness index (DCI). **Click here to link to the entire report: DCI_benchmark_soils_min_max.rtf**

MLRA Office 1
OREGON

		correlated as			*sampled as*		
			DCI			*DCI*	
seriesname	***acres***	***count***	***min***	***max***	***count***	***min***	***max***
DESCHUTES	47336	3	8	8	5	5	8
DIGGER	230166	1	8	8	5	5	8
HANKINS	81313				3	7	8
HEMBRE	86049	2	8	9	3	8	9
HENLINE	23979						
HONEYGROVE	204798	3	4	7	6	7	9
JORY	213078	10	6	8	27	2	9
KEEL	45426	2	8	8	1	8	8
KINNEY	206622	2	5	5	2	5	5
LAPINE	122240	7	7	9	9	6	9

[1] Pedon data in the database were evaluated to determine the quantity of data available for each pedon and a data completeness index (DCI) assigned. Data frequency for each data element was determined for each horizon. A one was assigned if data were present and a zero if no data were present. The frequencies were grouped by similar analysis and a representative data element chosen to represent the most common analysis suites. The indicators were clay, organic carbon, extractable sodium, cation exchange capacity by ammonium acetate at pH 7, pH in water, bulk density at 1/3 bar, gravimetric water content at 15 bar, volume of <2mm divided by volume of whole soil at 1/3 bar, and mineralogy. If either sand or clay mineralogy existed for any horizon within a pedon, the pedon was considered to have complete mineralogy data. The data indicators for each horizon were averaged for a pedon and scaled to an index range of 0 to 9.

Table 2 – Row 3 is a subset of row 2. In row 3 we're trying to identify pedons that have "fully characterized data" (i.e., lab characterization data with DCI > 6), which would indicate benchmark soils with a low level of "data gaps."

Benchmark Soils (1215)	NSSL Status	Data Completeness Index (DCI)
218 (18%)	No Data	
711 (58%)	At least one correlated pedon	1 – 9
592 (48%)	At least one correlated pedon "*fully characterized*"	7 – 9
286 (24%)	At least one pedon "*sampled as, not correlated*"	1 – 9
1215		

5. 17 (32%) State Soils are not on the Benchmark list (Table 3):

Table 3 – State Soils are not on the Benchmark list

AL	BAMA	NV	OROVADA
AR	STUTTGART	OK	PORT
CO	SEITZ	PR	BAYAMON
DE	GREENWICH	TN	DICKSON
FL	MYAKKA	UT	TAYLORSFLAT
GU	AKINA	VA	PAMUNKEY
ID	THREEBEAR	VI	VICTORY
ME	CHESUNCOOK	WY	FORKWOOD
MS	NATCHEZ		

6. SPATIAL COVERAGE: Figure 1 – Approximation of spatial coverage of current benchmark soils list by STATSGO units for the U.S. We assumed all STATSGO units have at least one benchmark soil. Data sources are STATSGO (1994) and MLRA (version 4.0) data-and benchmark soils list (SC file query). The areas with no color disproved our assumption.

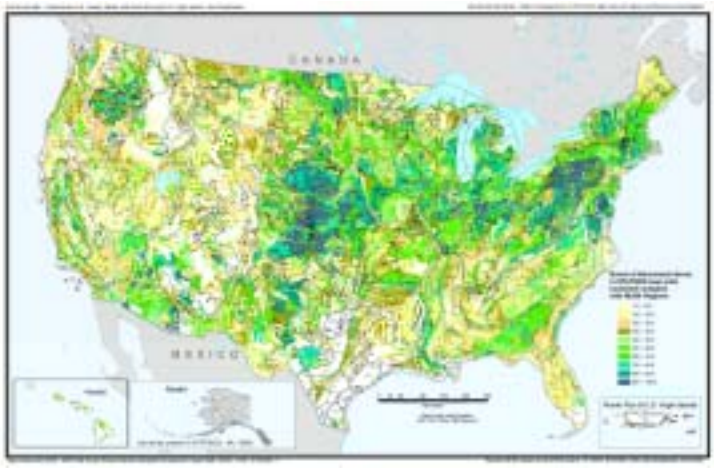

Figure 1 – Approximation of spatial coverage of current benchmark soils list by STATSGO units for the conterminous U.S. Click here to view PDF file: benchmark_statsgo_mlra.pdf

7. Approximation of spatial

coverage of current benchmark soils list by MLRA. Data sources are STATSGO (version 1994), revised MLRA (version 4.0) data, and benchmark soils list (SC file query). With multiple STATSGO units per MLRA, this map should guarantee some coverage in each MLRA (Figure 2).

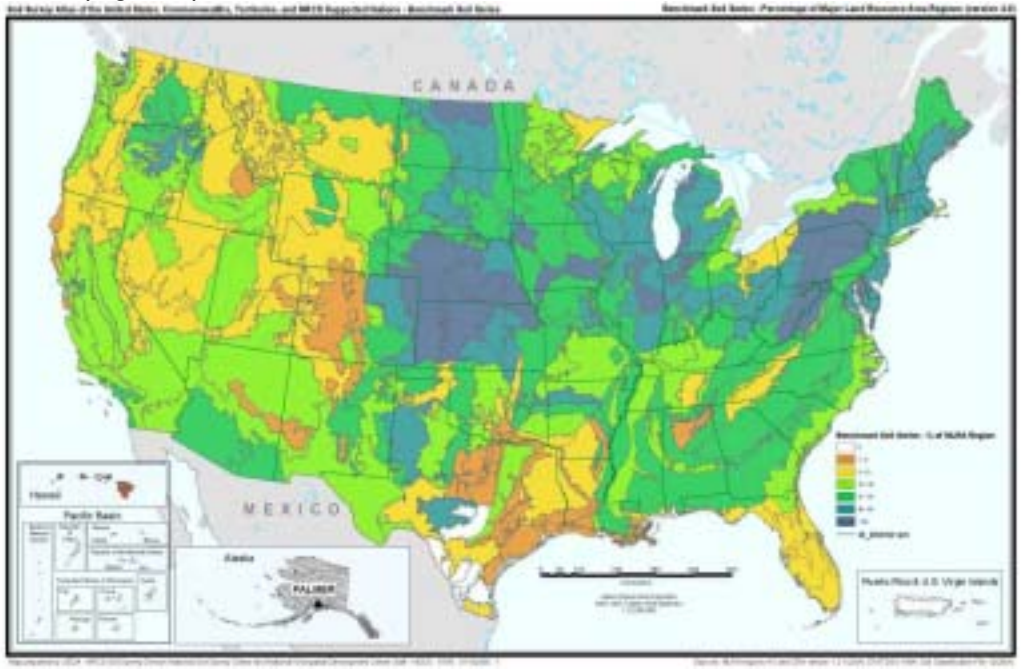

Figure 2– There are ways to explain the differences in coverage. 1) benchmark soils were originally geared for agriculture (cropland), hence more extensive in central than western. 2) At the time the list was last revised, predominance of extensive benchmark soils in Central and Eastern states suggest a higher degree of completion of the once-over. 3) Taxonomic diversity is higher in the west than the rest of the country and so centering on BM series results in relatively low total coverage for the MLRAs. Note that some MLRAs contain no STATSGO units whose components are a benchmark soil. Click here to view PDF file: Generalized_benchmark_statsgo_mlra.pdf

REVISION ANALYSES — How real is it?"

At the summer 2004 MO Leaders' meeting, Bob Ahrens encouraged the MO's to work with the States and "Revise the benchmark list to reflect reality."

1. Analysis hurdle: is there a dependable database from which component acres by MLRA, or series correlated by MLRA, can be analyzed?

   a) **NASIS?** Since the project to revise *LRRs and MLRAs of the U.S.*, (Handbook 296), **NASIS is no longer current**. In addition, **some datasets do not contain MLRA area overlap tables.**

Conclusion, ***NASIS*** *is reliable only where*
1) MLRA area overlap is available, and
2) MLRAs have not changed geospatially or alphanumerically.

b) **The SC FILE?** The SC file indicates the MLRAs in which series are correlated. A series listed as benchmark may have been correlated in 3 MLRAs, but it may not be dominant in all of them (i.e. no data on acreage extent). In addition, since the project to revise *MLRA,* new MLRAs have been added, previous MLRAs have been split (into A, B, C, etc.), and delineations have been significantly altered in most parts of the country (Tables 4 and 5). Practically NONE of the MLRA revisions are reflected in the SC file at the current time. Example:

Table 4 – In the SC file, there are 90 active MLRAs (32%) with no series. Click here to view PDF file: Count Benchmark MLRA using.pdf

Count of Obsolete MLRA Using for Benchmark Series		Count of Active MLRA Using for Benchmark Series	
OBSOLETE MLRA	Count BM Soils	ACTIVE MLRA	Count BM Soils
90	44	90A	0
		90B	0
91	38	91A	0
		91B	0
		92	7
93	21	93A	0
		93B	0
		94A	18

Conclusion, ***SC is not reliable and in DIRE NEED OF CORRECTION.***

Note: One solution to the SC file issue is to overlay MLRA map over series distribution and extent maps to recreate MLRA correlated (Figure 3). If there is good SSURGO coverage in the MLRA, update the SC file with SSURGO data. This component information from SSURGO can also be used to revise the list of benchmark soils.

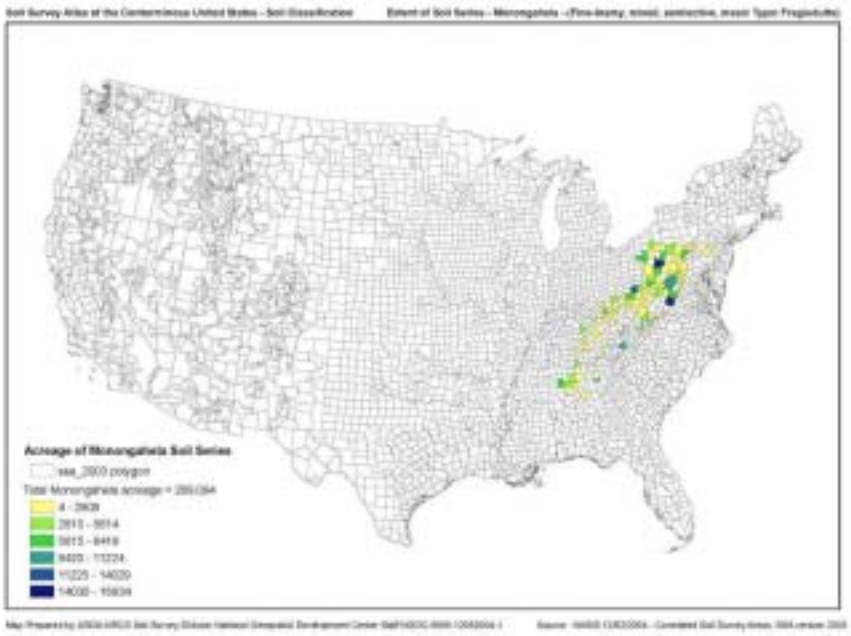

Figure 3 – The MLRA status of series in the SC file is not current, but it can be updated with GIS. Solution: Overlay MLRA map with geospatial distribution and extent maps for each series. monongahela_extent.pdf

2. Recommended Analysis: The integrity and completeness of available datasets will determine the most appropriate analysis approach. Refer to the following priority sequence identified in items a), b), and c) below.

   a) **Revise and maintain benchmark soils with GIS analysis tools**. If SSURGO coverage for the MLRA is complete or nearly so, the best way to accurately evaluate and revise benchmark soils is to use it in combination with the revised MLRA map. This is our analysis of choice. ***Contact Sharon Waltman at the National Geospatial Development Center for advice*** (Sharon.Waltman@mail.wvu.edu).

   EXAMPLE: As a result of the project to revise *LRRs and MLRAs of the U.S.*, MLRA 94D has undergone significant geospatial revisions. NASIS data is useless, but this MLRA has a nearly complete SSURGO dataset. In the following demonstration, we cookie-cut MLRA 94D from SSURGO and conducted the following 3 analyses**:**

   1) Since we had no idea which benchmark soils from the current list occurred in the revised MLRA 94D, we recreated the list of benchmark soils for MLRA 94D by comparing SSURGO with the current list (Figure 5). Four existing benchmark soils were “discovered” to occur in MLRA 94D (Antigo, Rubicon, Loxley, Carbondale).

Figure 4 is a plot of the distribution of each of the 4 benchmark soils from the current list that were “discovered” this way.

RGO and MLRA 4.0 were used to extract SSURGO in MLRA ents were compared to the benchmark soils list (SC file) to ch mark soils mapped in 94D. Click here to view PDF file: 94d_new.pdf

2) we were to construct a new benchmark list of MLRA 94D from ld we need?” We would query the database to get a list of **ALL** the s, subtotal acres by series name, and sort by acre-extent in We would also include the family classification of each series

-que report series by acreage extent in descending order. Of the first 7 only mark soil makes the list. Also the first 7 series represent only 5 (Say ilas are in the same family). Geospatial representation for the MLRA

	Family_class
	SANDY, MIXED, FRIGID ENTIC HAPLORTHODS
	COARSE-LOAMY, MIXED, SUPERACTIVE, FRIGID ALFIC HAPLORTHODS
	SANDY, MIXED, FRIGID ENTIC HAPLORTHODS
	SANDY, MIXED, FRIGID TYPIC HAPLORTHODS
	SANDY, MIXED, FRIGID ENTIC HAPLORTHODS
eenaw	SANDY, MIXED, FRIGID ALFIC HAPLORTHODS

7). With the assumption that series within families typically behave similarly compared to series among families, this analyses should significantly expand the "effective geographic extent" for any given benchmark soil constructed this way. This in turn translates into greater inference space with regard to technology transfer (81% representation in table 7 compared to 66% in table 6). The results from table 7 suggest that this is the preferred analysis.

Table 7– query of MLRA 94D to family by acreage extent in descending order, then series w/in family in descending order. Here, 7 families = 81 % of MLRA, and 7 series (one from each family, highlighted in yellow) are selected to represent the same 81 %. Green highlight soils are current benchmark soils. Even though the Rubicon is not dominant, it is codominant. Depending on available data and research information, there may not be a reason to replace Rubicon with Sayner. Only one other existing benchmark soil (Loxley) made the 81% list.

Family_class	Family acres	Family %_of MLRA	Series name	Series acres	
SANDY, MIXED, FRIGID ENTIC HAPLORTHODS	366973	38.34	Sayner	148564	
			Rubicon	104488	
			Vilas	78661	
			Karlin	32696	
			Rousseau	2564	
COARSE-LOAMY, MIXED, SUPERACTIVE, FRIGID ALFIC HAPLORTHODS	116911	12.21	Padus	109701	
			Goodman	4243	
			Padwet	2227	
			Sarona	731	
			Newot	9	
			Mequithy	0	
SANDY, MIXED, FRIGID TYPIC HAPLORTHODS	86028	8.99	Pence	86028	
SANDY, MIXED, FRIGID OXYAQUIC HAPLORTHODS	60377	6.31	Croswell	48815	
			Croswood	9189	
			Manitowish	2373	
SANDY, MIXED, FRIGID ALFIC HAPLORTHODS	53533	5.59	Keweenaw	53533	
DYSIC, FRIGID TYPIC HAPLOSAPRISTS	49345	5.15	Loxley	49345	
EUIC, FRIGID TYPIC HAPLOSAPRISTS	42863	4.48	Lupton	27264	81%

b) If MLRA area overlap exists and MLRA boundaries and MLRAs have not been significantly altered, use NASIS.

Joe Chiaretti, NRCS, Reno, NV, used NASIS to evaluate benchmark soils by MLRA in Nevada. Joe's comments: "The Nevada benchmark list grew by 42 percent from 104 to 148 series. Only 47 of the series on the current list are still present on the revised list of 148. Fifty seven series currently listed as benchmark for Nevada will no longer be benchmark soils. The 148 proposed benchmark soils are less than 9 percent of the total number of series used in the state.") Click here to view Joe's detailed procedural analysis: NV Benchmark update procedure.doc.

c) Use STATSGO (1994) and MLRA 4.0 to evaluate series and family extent. Reinsch's top 25 percent list generated from STATSGO can be used to revise the Benchmark Soil

list. Tom tabulated acres for each component, sorted in descending order, then subtotaled to 25% for the MLRA

Table 8 – Top 25 percent extensive STATSGO components by MLRA. **mlra_top 25%_series_benchmark.xls**

MLRA	COMPNAME	mlraacres	mlrapct	benchmark
94B	KALKASKA	571509	9	Y
	RUBICON	508830	8	Y
	CARBONDALE	311749	5	Y
	MENAHGA	280851	4	
94C	RUBICON	88176	7	Y
	EMMET	69950	5	Y
	DETOUR	67219	5	
	WATER	56729	4	
	GRAYCALM	52840	4	
	ROSCOMMON	52165	4	Y
94D	SAYNER	209009	16	
	PADUS	149499	11	
95A	KEWAUNEE	615452	15	Y
	ONAWAY	297211	7	Y
	MANAWA	233815	6	Y

NSSH Revision

Click here to view draft NSSH 630: proposed 630 Benchmarksoils_2002-4.doc

1. 630.00 Definition and Purpose
2. 630.01 Policy and Responsibilities
3. 630.02 Criteria for Selecting Benchmark Soils
4. 630.03 Evaluating and Revising the Status of Benchmark Soils
5. 630.04 Maintaining a Record of Benchmark Soil Data Needs
6. Exhibit 630-1 Sample Narrative Record for Benchmark Soils

Parts 630.00 Definition and Purpose, 630.02 Criteria for Selecting Benchmark Soils, and 630.03 Evaluating and Revising the Status of Benchmark Soils have already been addressed in this paper. The remaining sections follow.
****

1. 630.01 Policy and Responsibilities

   MO Leaders

   - exchanging information on benchmark soils with state offices,
   - maintaining the benchmark status of soil series in the soil classification database,
   - maintaining a narrative record for benchmark soils that are on the MLRA list,
   - coordinating benchmark soils with the state soil scientists in states that share the major land resource area, and
   - focusing long-range plans for soil survey investigations on benchmark soils and their characteristics.

State Soil Scientists

- proposing changes and additions to the benchmark soils list,
- ensuring interdisciplinary input in the selection of benchmark soils,
- ensuring input from cooperators in the selection of benchmark soils, and
- encouraging the use of benchmark soils in organizing and planning the research by state agricultural experiment stations and other agencies.

The National Soil Survey Center

- providing guidance in the selection of benchmark soils,
- assuring that internet access and query routines for benchmark soils are available to researchers in experiment stations, highway departments, and other organizations that conduct research on soils,
- performing laboratory characterization, and
- maintaining the laboratory database.

The National Geospatial Development Center

- Develop web-based geospatial analysis tools for use in analyzing and revising benchmark soils by MLRA,
- Develop web-based map products useful for marketing purposes.

2. 630.04 Maintaining a Record of Benchmark Soil Data Needs

Each MLRA Regional Soil Survey Office Leader, in consultation with the State Soil Scientists and research institutions:

Maintains a narrative record of the disposition of each benchmark soil in regard to kinds of data and information that are useful in predicting the soil behavior relative to the MLRA. The record helps to facilitate long range planning, and is useful for discussing ventures with research institutions. Discuss the kinds of special studies and soil properties needed. Include literature references of research studies on the benchmark soil. Refer to Exhibit 630-1 for an example of a narrative record.

3. Exhibit 630-1 Sample Narrative Record for Benchmark Soils

BETA SERIES – a member of the fine-loamy, mixed, superactive, frigid Typic Argiustolls family. It dominantly occurs in the Rolling Soft Shale Plains, Major Land Resource Area (MLRA) 54, but it also extends into the Southern Dark Brown Glaciated Plains, MLRA 53C. The Beta series is about 105,000 acres in extent.

Beta soils are 40 to 60 inches deep to soft bedrock and formed in material weathered from sandstone, siltstone, and shale.

Information needs: In MLRA 54, knowledge of the properties, qualities, and behavior of the Beta soils is useful in understanding (1) the effect of cropping systems and management practices on dynamic soil property change, (2) the penetration of roots and the movement of water into the soft bedrock, (3) pesticide and nutrient fate and transport for surface water and groundwater assessment, (4) the use of soils with soft bedrock for septic tank absorption fields, (5) the Silty range site, (6) and the use of soils with soft bedrock for building sites. The Beta soils are underlain by strippable coal, and the knowledge of soil properties, qualities, and behavior is important for the development of effective soil reclamation measures.

Data needs: The following dynamic properties and morphological attributes are needed across the common crop management systems: saturated hydraulic conductivity, soil bulk density, organic carbon, surface roughness, consistence, structure, and macropore characteristics

(geometry, frequency, distribution, and continuity). It is intended to integrate the macopore characteristic with structure, particle-size distribution, and mineralogy in order to develop a pedotransfer function that predicts saturated hydraulic conductivity.

Laboratory data:

NRCS NSSC Soil Characterization Database:

User Pedon ID
82STATEFIPS031005
84STATEFIPS021002
87STATEFIPS005001
91STATEFIPS007007
97STATEFIPS013011

ANYSTATE University pedon data
(List sources and contacts where information can be acquired)

Join Policy Proposal

State Soil Scientist Mtg
Jim R. Fortner, Soil Scientist, NSSC

Join Policy - Background

- Proposal from MOs to change NASIS such that interps are not in DMU to facilitate map unit joins – April 2000
- New join policy approved by Division 2002, and incorporated into NSSH, to only require joining of basic soil properties

Progress to date

- Business requirements document drafted
- Routed to states for comment
- Comments incorporated
- DRS submitted to ITC for consideration and development of implementation alternatives
- No feedback yet

Plans

- Business side to consider alternative scenarios, weigh pros and cons and impacts; then pick best one
- Implement changes to NASIS, likely with NASIS Redesign release 2007

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What States Are Doing to Develop Custom Interpretations and Their Use

Karl W. Hipple, National Leader-Soil Survey Interpretations, NSSC

The basis of this report is a questionnaire that was sent to State Soil Scientists seeking responses to the following four questions:

1. What process is used to request custom interpretations?
2. Who are the dominant customers for the custom interpretations used in your state?
3. What are the custom interpretations your state has developed and are using?
4. What is the process used to validate these custom interpretations?

There were 19 states (38%) who responded to the questionnaire.

Most requests for new interpretations originate in house or from Natural Resources Conservation Service (NRCS) soil scientists making soil surveys. Soil scientists within the National Cooperative Soil Survey (NCSS), mostly at the State Office or Major Land Resource Area Office level, develop custom interpretations based on requests from other NRCS discipline specialists. Most of these interpretations are not entirely new but instead contain adjusted criteria that better fit a perceived need/locality. Additional custom interpretations are developed at the request of other NCSS partners and are identified and listed in the Memorandum of Understandings. The National Park Service (NPS), Bureau of Land Management (BLM) and US Forest Service (USFS) have and are increasingly requesting custom interpretations to meet their agencies' needs. However, two states reported that hey are not using any custom interpretations at this time.

The process to request custom interpretations seems to be flexible and meet the needs of NCSS users and customers but it also seems to be internally focused. No state identified a formal process for nontraditional customers to use to request custom interpretations. I noticed at a recent State Program Appraisal that even some interviewed soil scientists didn't know how requests for customs interpretations from a landowner, county planning board, or a real estate developer would be handled. A formal process may not be needed but this issue should be developed as part of NCSS marketing efforts.

Responses to the question regarding identifying the customers who request custom interpretations indicated that a wide variety of users request custom interpretations. Other federal agencies such as the NPS, BLM, and USFS are all interested in custom interpretations. State, County, and local governments are all users of custom interpretations. Indian Tribes, consultants, timber companies, land trusts, builders, realtors, city planners, homebuyers, and regional planning groups have all requested and received custom interpretations. A newer customer is the Technical Service providers who are now part of program delivers of technical services within specific USDA programs.

The kinds of custom interpretations requested and developed can be broken into seven categories. The categories are: 1) agriculture, 2) forestry, 3) rangeland, 4) construction/engineering, 5) urban, 6) military, and 7) interpretations for other federal agencies.

Responses to the question regarding validation of interpretations were extremely variable. In fact, from the responses it could be argued that many of the custom interpretations are not tested or validated at all. Responses indicated that the State Soil Scientist validates interpretations when s/he signs off on them and/or places soil data on the Soil Data Mart (SDM). A formal process to test, validate, and/or certify was not identified in any of the responses. There was also no mention of field verification, recording observations, or maintaining records of the custom interpretation's performance once it was applied to a map unit or map unit component. However, some states did mention that some custom interpretations had been used for several years without problem which infers validation through successful use over time. Also some states mentioned that the custom interpretations were developed with other discipline specialist's input which strengthened the interpretation although field verification was not mentioned.

Interpretation testing, validation, and certification are an area where the NCSS needs to review current policy and focus a renewed effort.

The National Soil Interpretation Advisory Group (NSIAG) is currently developing an issue paper with recommendations for the NCSS that deals with soil interpretation testing, validation, and certification. This effort will provide a good starting point for clarifying NCSS validation and certification policy. NSIAG also is developing a catalog of custom interpretations from the NASIS database that will be released in FY05. This will assist users who are looking for a specific interpretation or a starting point for developing a custom interpretation by modifying an existing interpretation.

The following lists are custom interpretations that were reported by state soil scientists broken into the seven categories mentioned within the paper.

Agricultural Interpretations

1.Irrigation
- drip, furrow, trickle, and basin/paddy

2. Nitrogen loss potential
3. Corn suitability rating (non-NASIS)
4. Land application of animal waste
5. Manure site stacking limitations
6. Agriculture value groups
7. Crop yield model

Forestry Interpretations

1. Forest value groups
2. Harvest – period of logging operations
3. Log landing suitability
4. Road suitability – natural surface
5. Soil rutting hazard
6. Mechanical planting suitability
7. Mechanical site preparation
   - surface and deep

Urban Interpretations

1. Septic systems
2. Storm water runoff systems
   - detention and retention
3. Roads and streets
4. Paths and trails
5. Picnic areas
6. Playgrounds
7. Lawns, landscaping, gold fairways
8. Off road motorcycle trails

Construction/Engineering Interpretations

1. Pond and reservoir areas
2. Construction materials
   - sand source
   - topsoil source
   - gravel source
   - reclamation
3. Shallow excavations.
4. Animal mortality disposal – catastrophic

Rangeland

1. Pipeline – shallow excavations
2. Ranch access roads
3. Prescribed burning
4. Disking, Chaining, Dozing
5. Root plowing

Military

1. Bivouac areas
2. Suitability for vehicle fighting positions
3. Helicopter landing areas
4. Suitability for individual fighting positions
5. Trafficability – 7 vehicle classes
   Wet or dry conditions for 7 vehicle classes
   (ATVs, semi trucks, tracked vehicles)

Other Federal Agencies

BLM – Regional Interpretations

1. Chaining – CO Plateau
2. Contour furrowing – CO Plateau
3. Medussa Head invasion risk – Great Basin
4. Roller Chopping – CO Plateau
5. Yellow Star Thistle potential – CO Plateau
6. Rangeland plowing and disking – CO Plateau

National Park Service

1. Soil Restoration Potential – Pacific NW
2. Desert Tortoise – CA, AZ
3. Pygmy Rabbit - WA

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Breakout Workshops

Soil Scientist Position Descriptions
Employee Development Proficiency Model
Break-out Session Notes
Russ Kelsea, National Leader, for Soil Survey Technical Services

West comments

- Need a national soil scientists workshop
- Re-evaluate position classification
- Need to describe scope and effect
- Define position structure in organization first, then write PD's and let classification fall where it may
- need to update classification standards to Factor Evaluation System
- Need to incorporate mapping responsibilities
- May need to have specialists in forest, range, etc.
- MLRA project leaders perform both mapping and RSS responsibilities
- Work on update of OPM Classification Standards

Central Comments

- Need to update classification standards
- RSS need to be field mappers first
- All soil scientists must work on all aspects of soil survey program
- Employee Development Proficiency Model – okay, but needs to be expanded to cover all aspects of soil scientist position, not just technical services
- RSS serve region, but have statewide responsibility
- Must be more integrated in agency program delivery
- Bring some consistency to organization

East Comments

- Need adequate field mapping, especially for licensing
- Eliminate 5/7/9 RSS positions, must have mapping background
- RSS with regional responsibilities ideal, but may not be practical
- State Conservationist can control classification (by influence over local HR staff)
- 19700.0002 Tw (RSS Tf 0.8p0.41 (–)Tj dDTresclentisaaa.nd0D90 Tt( ) Ru000Washf 0t0F4 1gc 0 1 Tf3.40f 0.4605

Program Accountability Training - Conservation Information System (CIS) -an Accountability Tool

The presentation was conducted via net meeting with Ken Lubich as the on-site presenter with Ken Tootle and Debbie Curtis joining by net meeting.

Introduction – Ken Lubich

Powerpoint presentation – Ken T and or Debbie
Why is the CIS important to me?
- Background on direct charge

CIS and TCAS Net Meeting – Ken T and or Debbie
What information is included in the CIS?
- Brief overview
- Costs – Define salary, benefits, support (direct and indirect)
- Go to TCAS - Review TCAS activities by programs
- Obligations, Outlays - Define

CIS and Points Net meeting – Ken T and Ken L
Performance
- Section 6 and POINTS soils reports

CIS – Ken T and Debbie
How do I use the information in the CIS to manage my program?
- Review of reports series 2, 1, 4, 6 and 8
- Series one, explain costs
- Emphasis on cost accounting, managing activities
- Explain benefits-all accounting
- Explain how to use section 1 and section 4 reports

Powerpoint – Ken L
Example of comparing performance to costs/obligations

Net Meeting - Ken T
Misc –
What do I do if I can not see all of the CIS reports?
- Required permission and access
- How to check your permissions.

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Implementing the MLRA Approach for the National Cooperative Soil Survey

Dennis Lytle, MLRA Coordinator

Background:

In 1995 NRCS reorganized the National Cooperative Soil Survey (NCSS) mapping program to a Major Land Resource Area (MLRA) basis in order to develop a seamless, high quality digital soil survey of the U.S. Today soil surveys are being completed, updated or maintained by MLRA in parts, but not all of the U.S.

Profile and Status of the National Cooperative Soil Survey:

Profile of the NRCS Soil Survey Staff

There are about 946 soil scientists in the NRCS Soil Survey Program. The table below provides a more detailed breakdown. About 555 of these scientists are in the field mapping and about 105 are in area offices and 250 in state offices are assisting customers or managing and supporting the soil survey. The remainder of them are in other support locations. These 550 soil scientists are mapping an average of about 50,000 acres per soil scientist per year. About 175 are eligible to retire, and about 435 will be eligible within 5 years. About 1.7 percent are American Indian/Alaska Native, 1 percent are Asian, 7.5 percent are Black, 13.2 percent are Hispanic, 76.6 percent are white, 14 percent are female and 86 percent are male. Project soil survey is the entry point for most soil scientist in the agency and about half of those hired are lost in the first few years to conservation jobs, other agency jobs and the private sector.

NRCS Soil Scientist Staffing (November 2004)

Grade`	Location				
	West	Central	East	NHQ/Centers	Total
5	4	4	5		13
7	28	27	13		68
9	57	56	54		167
11	80	116	107	2	305
12	62	119	113	7	301
13	9	7	17	17	50
14	5	5	5	15	30
15				10	10
SES				2	2
Total	245	334	314	53	946

Status

Soil Survey mapping is complete for 92 percent of the United States. About 83 percent of this area is available in hard copy, about 72 percent is digitized and about 71 percent have some data available via the Web Soil Survey. Current technology, funding and staffing will enable NRCS to complete mapping of private lands in about 15 years and update and modernize soils surveys approximately every 70 years. In order to get to a refresh rate of once every 30 years using current the organization, technology, and processes staff would need to triple their current mapping rate to 150,000 acres per year or staffing will need to increase to 1500 scientists.

Where we want to be:

We want a nationally consistent, seamless, digital soil survey. We want to complete all lands and coastal areas and begin a continuous maintenance and update. A mix of improv lanontinuoSddi natio tus

resources, re-directed resources, and changes in data gathering and in the publication product and publication media are necessary in order to achieve a 30 year refresh rate. A major step in this will be the full implementation of the MLRA Concept. This includes;

1. Establishing MLRA Soil Survey Management Area Offices (MMA's) in (125 to 175) locations
    a. These offices are responsible for conducting soil surveys and related inventories for assigned MLRA's (see map attached map for MLRA 136). These areas will often cross state lines.
    b. These offices are permanent which reduces relocation costs and increases productivity by allowing staff who are expert in the soils and landscapes of an area and thus highly productive mappers to stay.
2. Adding 250 GS-5 to GS-7 field soil scientists at these MMA's and 50 range conservationists, foresters and biologists, or contractor equivalents, over 3 years. This represents an increased staffing cost of about $5.0 million per year for a total of 15 million in three years.
3. Ensuring that these offices have the appropriate technology such as GIS, GPS, GPR, Soil Landscape Inference Model (SoLIM), and other models, and are exploiting it to reduce workload, increase production and improve data quality.
4. Funding by MLRA
    a. Funds are allocated ensure maintenance of 4 to 5 staff at each MMA to cover their multi-county/state areas of responsibility.
    b. Agreements established by states with cooperators are equitable and ensure that products are delivered as promised.
    c. Staffing these offices with scientists from other federal, state and local agencies such as Forest Service, BLM, USFWS, Universities, State Department of Natural Resources or Conservation and other NCSS cooperators and agencies who complete natural resource inventories
5. Developing and making these data available via the internet.

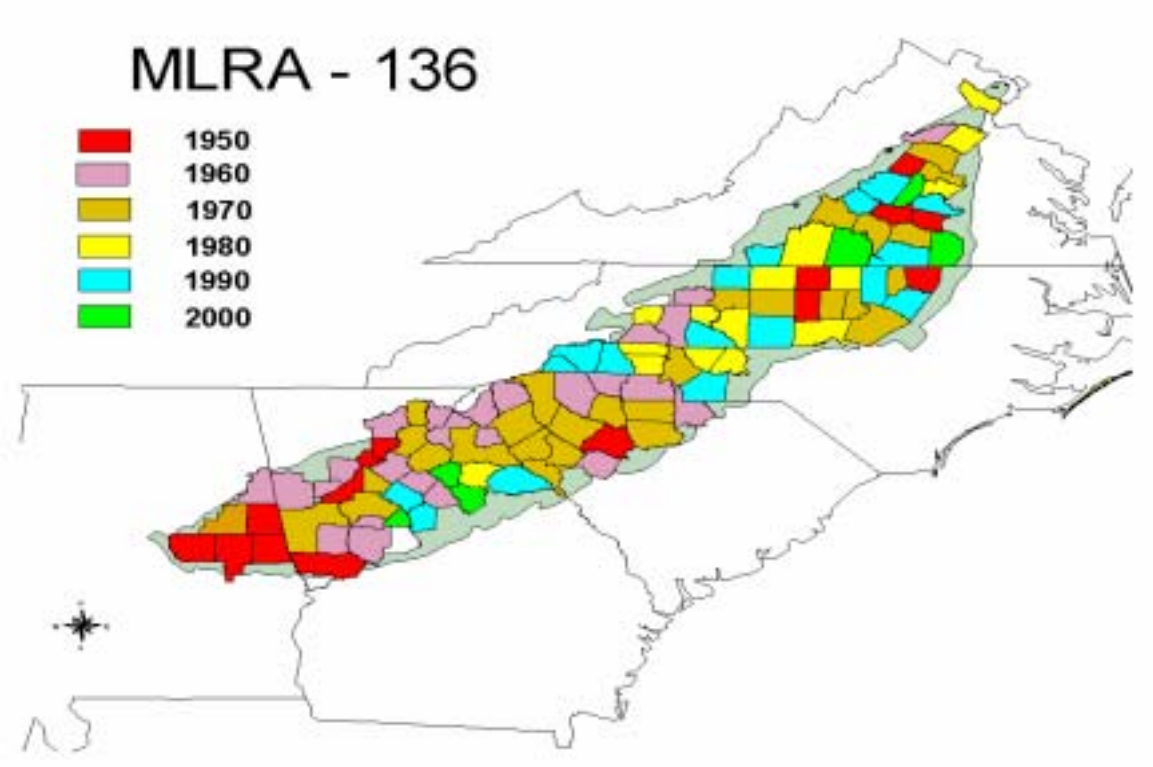
How do we plan to accomplish our objective?

Preliminary efforts were begun in 1995. Some offices have been established and others proposed.

1. We will work with agency national leadership and State Conservationists and to develop an implementation plan that includes MMA locations, staffing and funding processes. We would like to have this plan complete by July 30, 2005. Offices would be established over several years according to the plan.
2. Acquire $5.0 million in additional funds for staffing in the first year increasing to $15 million in the third year.
3. Develop a strong recruiting and hiring process to hire about 200 soil scientists a year in each of the next 3 years to replace projected attrition and net 100 additional soil scientists.
4. Develop new technology and tools at NGDC, NSSC, ITC, NCGC and State Offices for staff to use in the field.

How will we measure our accomplishments?

2. Percent of MMA offices established.
3. Increased in productivity of field soil scientists and other inventory specialists.
4. Number of Web Soil Survey's published and other inventories made available.
5. Increase in number of customers who access soil surveys and other inventories.



"The traditional Soil Survey Project Office does not go away, but the boundaries of the project area change from an administrative boundary to a landscape boundary."

Criteria for locating MLRA Soil Survey Management Area Offices

1. **Workload**
    a. **No soil survey or very old surveys**
    b. **Update and maintenance requirements including range, forestry and wetland needs.**
    c. **New data needed**
        i. **Riparian areas**
        ii. **Order 2 in Order 3**
        iii. **Sub aqueous coastal areas**

2. **Demographics**
    a. **Co-location with offices with high speed internet, IT and administrative support and technical specialists such as range, forestry or wetland biology.**
    b. **Existing or potential cooperator co-location with districts, BLM, FS, university, state agency.**
    c. **Road system from office to areas served**
    d. **Cost of living – locate in low cost communities**
    e. **Location of existing staff**
    f. **Airport Access**

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