

# Soil Resource Inventory Tool Box (SRITB)

State Soil Scientists' Meeting  
March 17 – 20, 2008

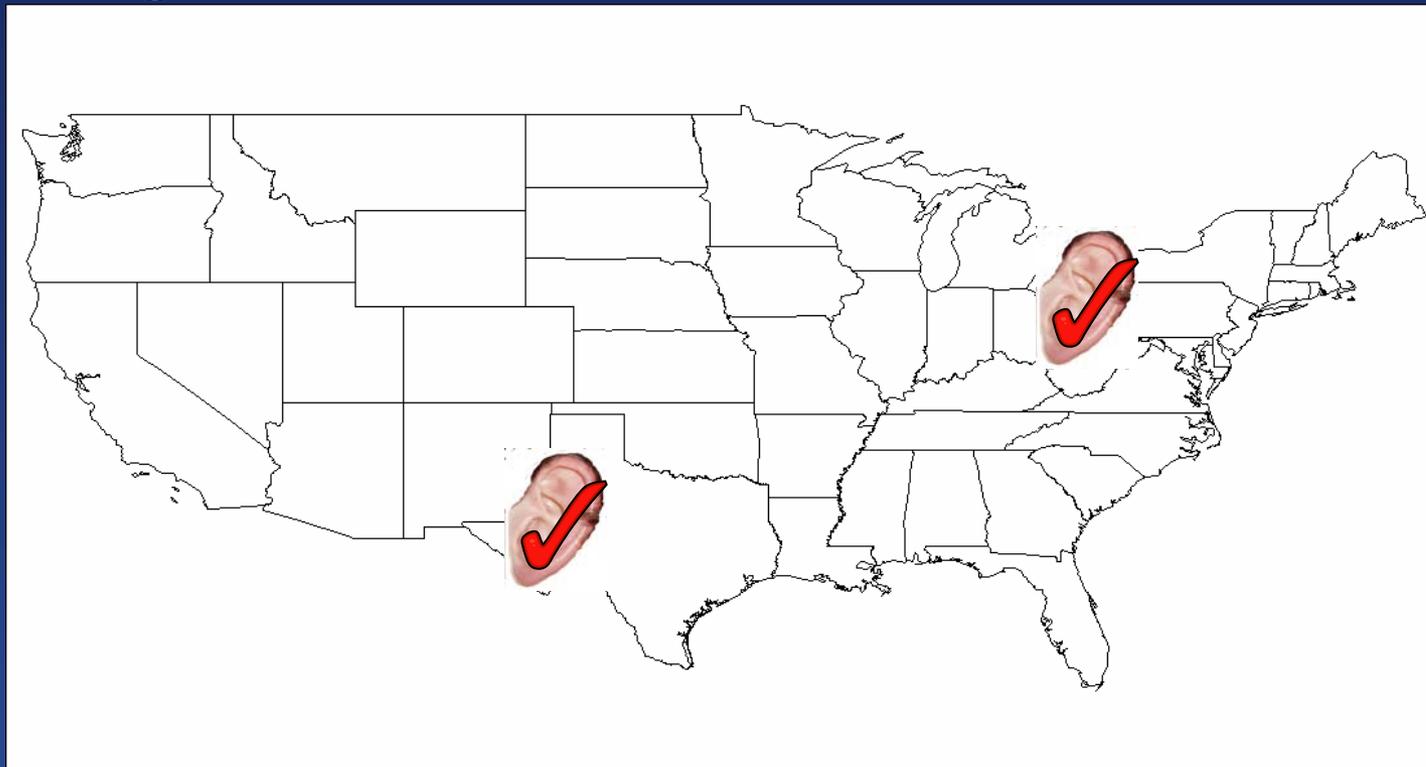
# What is SRITB?

- Soil Resource Inventory Toolbox
- Initiative by Soil Survey Division to provide automated tools for field soil scientists

# SRITB components:

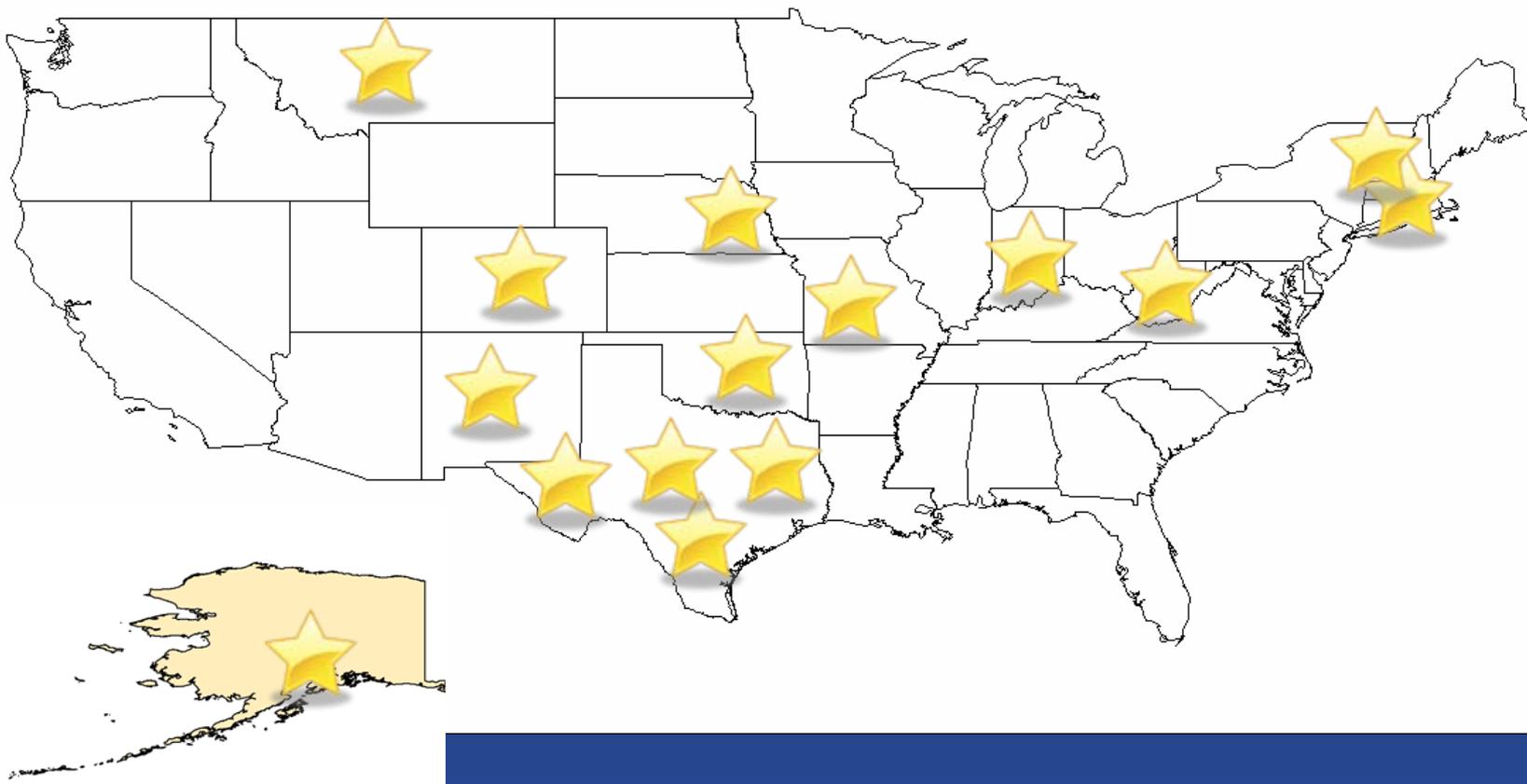
- Pedon PC
- Analysis PC
- Lab Database Entry Program
- Editing Toolbar (ArcMap extension)
- Soil scientist's "My Toolbar" (desktop)

- Funded primarily by Congressional earmarks from West Texas and West Virginia



# 2005 – Point Data Collection Team/Development Team

**One of six teams and subset of 89 + individuals**

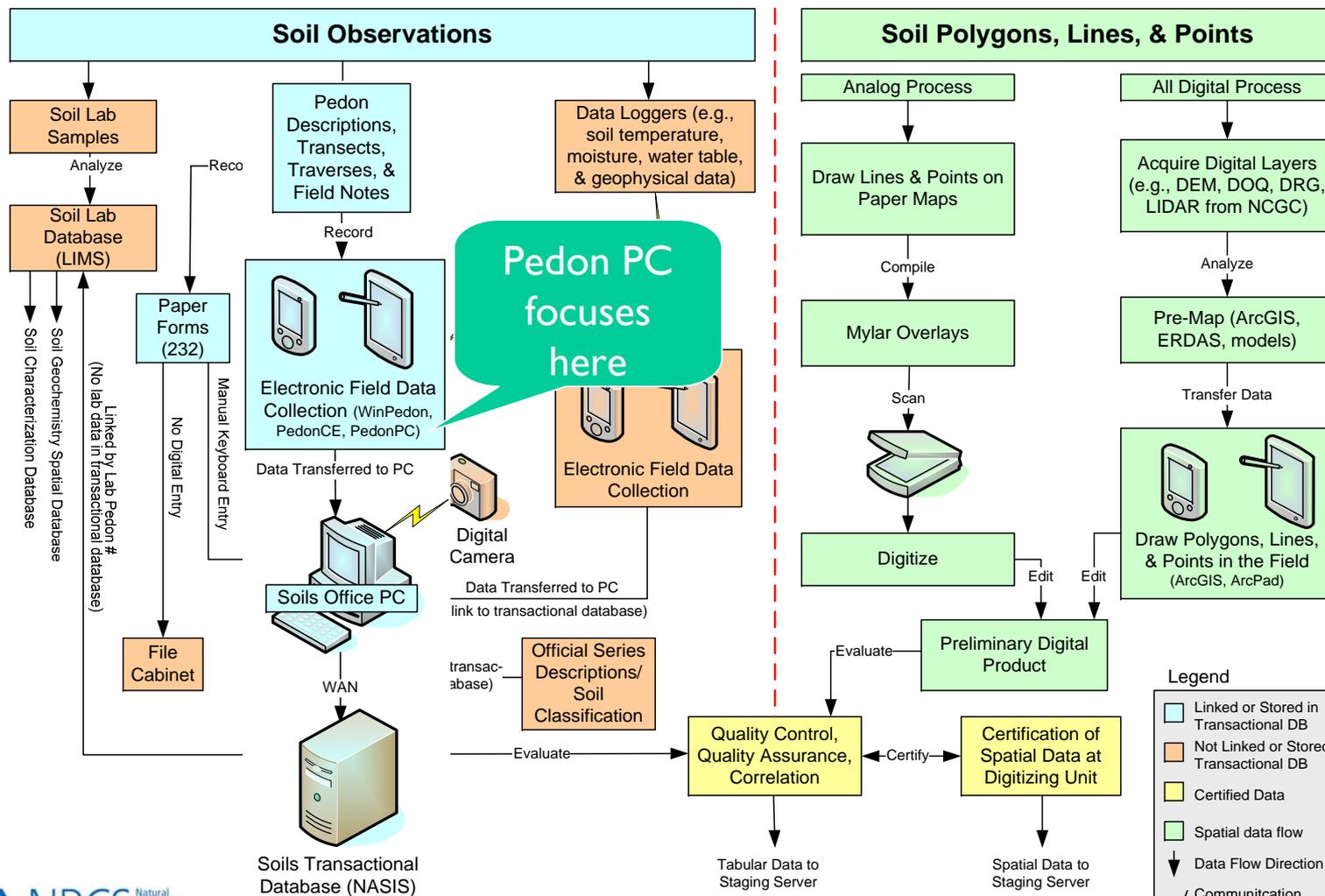


# Communication – National Bulletins

- SOI – Pedon PC Software Release 430-6-2 April 18, 2006
- SOI – Development of a Soil Resource Inventory Toolbox March 28, 2007
- SOI – Pedon PC 3.0 Software Release May 11, 2007
- SOI – Pedon PC 3.0I Software Release February 29, 2008
  
- **And - Beta Test Announcements**
  - Pedon PC 3.0I Beta Test Nov 26 - Dec 10, 2007
  - Pedon PC Job Aids added to NSSC Training Website
  - SRITB 1.1.17 Beta Test Dec 12 – Dec 20, 2008
  - Analysis Tools Beta Test March 3 – March 12, 2008

# Inventory & Interpret Soil Resources: Data Flow Diagrams

2/2006



# Pedon PC

- Prototypes were developed in the field (Montana Migrator/Pedon PC Plus and Pedon CE)
- Field soil scientists were major players in the appearance and functionality
- Forms are designed for use in Microsoft Access
- Pedons are uploaded to NASIS via the Soils Hotline

- Task /Purpose

Emulate the (historic, and future) workflow in an electronic environment to increase efficiency and reduce the potential for the loss of data.



- Included the evaluation of hardware



**Soil Sampling**

**IDAHO**

**MISSOURI**

**WEST VIRGINIA**

**NEW HAMPSHIRE**

**ALASKA**

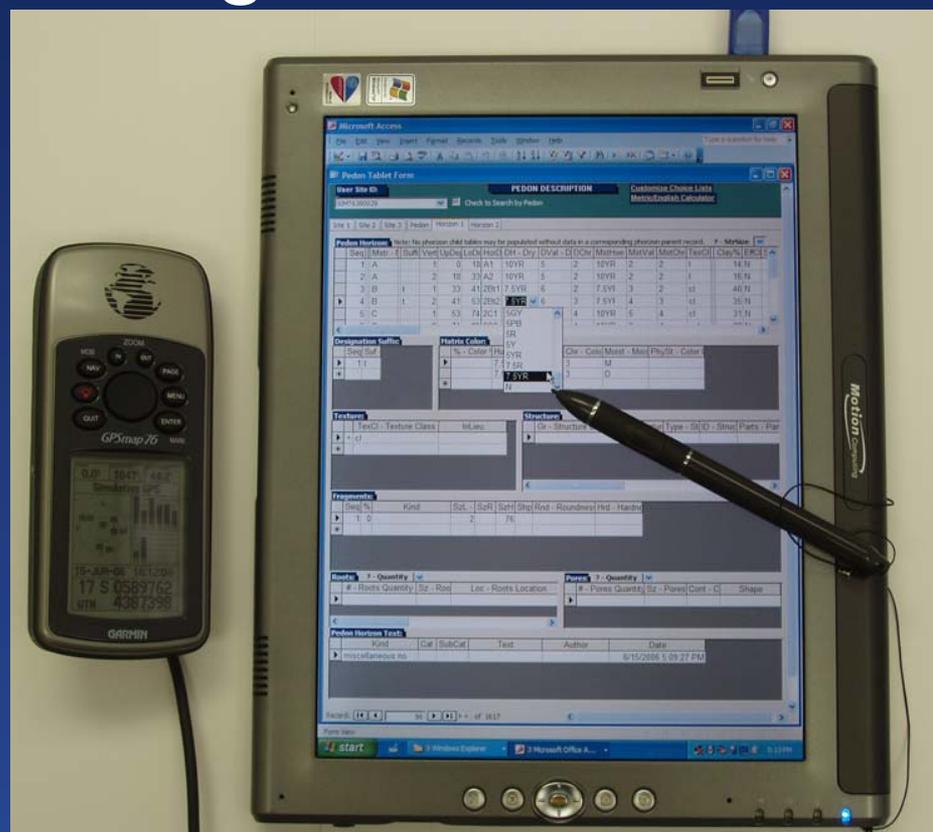
**MISSOURI and INDIANA**

**UTAH**

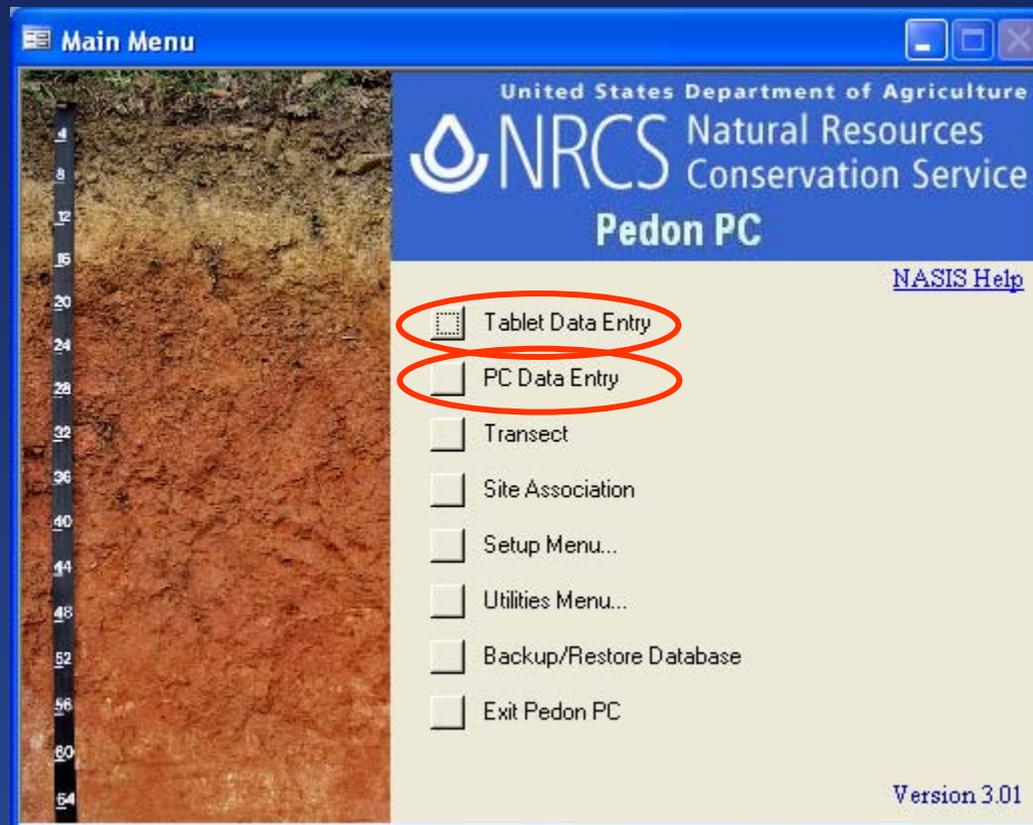
**WEST VIRGINIA**

**DISTRICT OF COLUMBIA**

- Development of form based data entry application (Pedon PC) for tablets which includes the integration of GPS for recording locations



# Pedon PC has two layouts:



# Pedon PC layout for PC (landscape)

PC Form

USDA-NRCS PEDON DESCRIPTION Search by User Site ID:   Check to Search by Pedon

Table hierarchy: site->siteobs->pedon->phorizon You are currently on site record:  with a User Site ID:

# Pedon PC Tablet layout (portrait)

Pedon Tablet Form
\_ □ ×

**Search by User Site ID:**
**PEDON DESCRIPTION**
**Customize Choice Lists**
**Metric/English Calculator**

Check to Search by Pedon
 **Copy a Pedon**
**Calculations**

Site (Part 1)
Site (Part 2)
Site (Part 3)
**Pedon**
Horizon (Part 1)
Horizon (Part 2)
Reports

Note: Double-click a value in the Pedon table Transect ID, Soil Name As Sampled or Subgroup columns for special features. Selecting a pedon record will affect the horizon tabs because pedon is the parent table. If no pedon record is shown, the wrong site observation record may be selected on the Site (Part 1) tab or you may need to add a pedon record.

**Pedon:**

Rec ID	UPEDID - User Pedon ID	SoilName - Soil Name	CorrSoil	PSCS Top	PSCS Bot -	PedOr - Pedon	TempReg - Ter
▶	Sanpedro	Sanpedro		5	28		

**Pedon Text:**

Seq	Kind	Cat - Category	SubCat -	Text
▶				

To add horizon data please use the Horizon (Part 1) and Horizon (Part 2) tabs.

**Pedon Horizon: (Read Only)**

HorDes - H	UpDep	LoD	Seq	Horizc
A	0	5	0	
▶ Bt	5	18	0	
Btk	18	28	0	
Bk	28	43	0	
R	43	100	0	

**Pedon Diagnostic Features:**

Kind	TDeg	BDeg	ThkL	Thi
▶ mollic epipedon	0	43	0	
argillic horizon	5	28	0	
lithic contact	43	0	0	
calcic horizon	7	43	0	
*				

**Pedon Taxonomic Moisture Class:**

Seq	Moist - Moistur
▶	

**Pedon Taxonomic Mineralogy:**

Seq	Mineralogy
▶ 0	mixed
*	

# Both are customizable

Pedons Added to NASIS since:

April 2005 162,275 ( Very rough)

Year 1 39,481

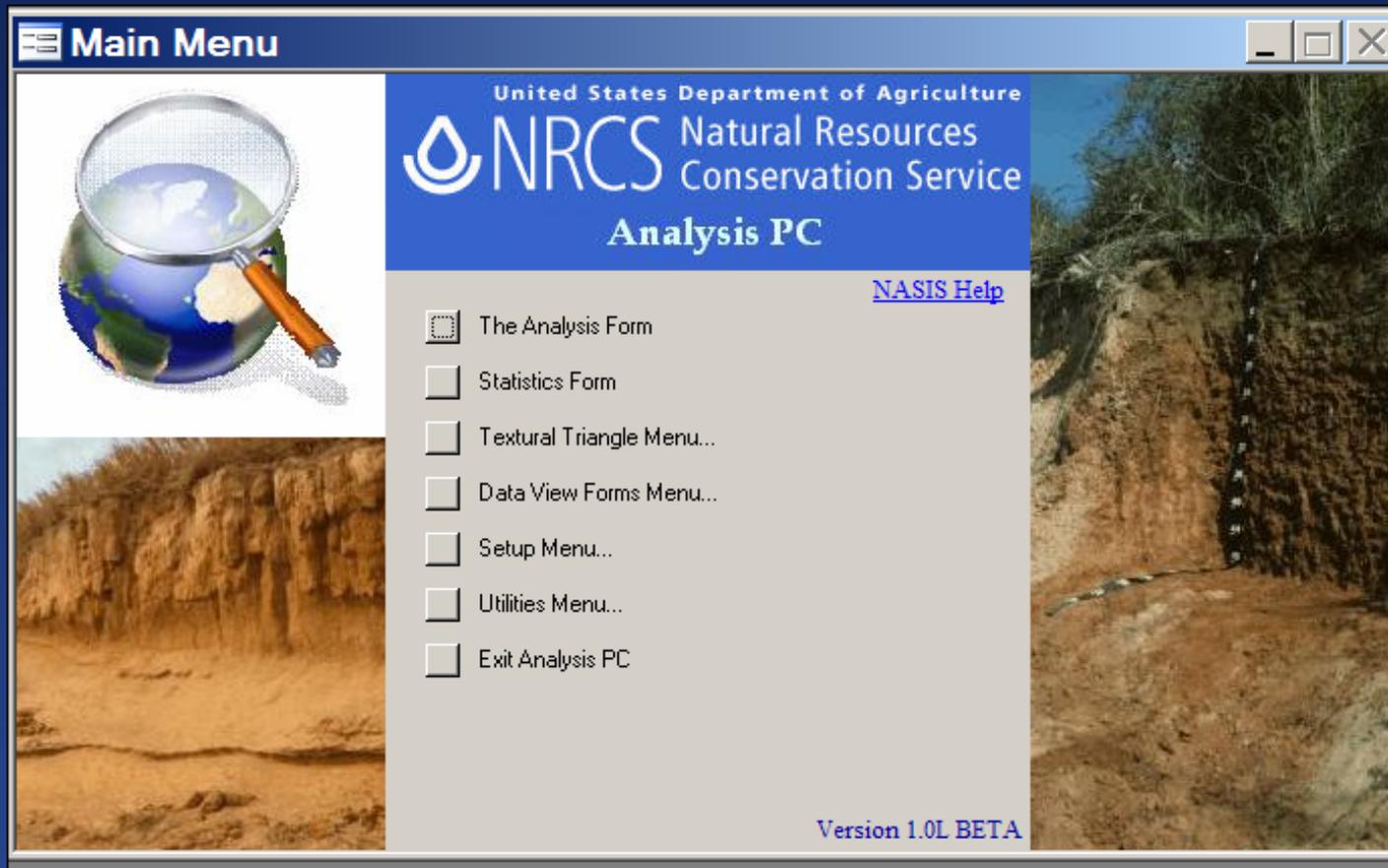
Year 2 59,401

Last 6 months 27,578

# Analysis PC

- Prototypes developed in the field (Montana Pedon PC Plus)
- Forms built in Microsoft Access
- Links between Access and ArcMap

# Analysis PC main menu



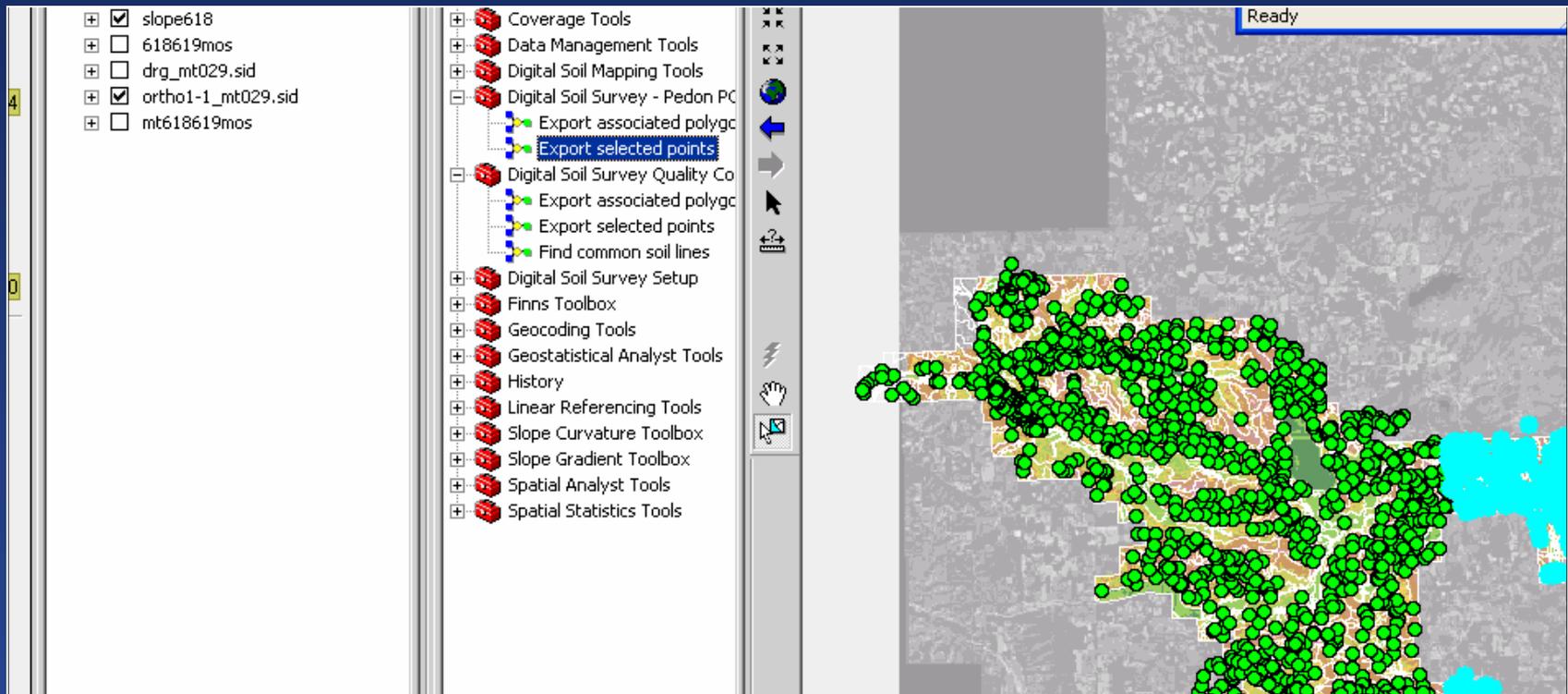
# Analysis PC:

I. Analysis form: uses Access built queries to display selected sets

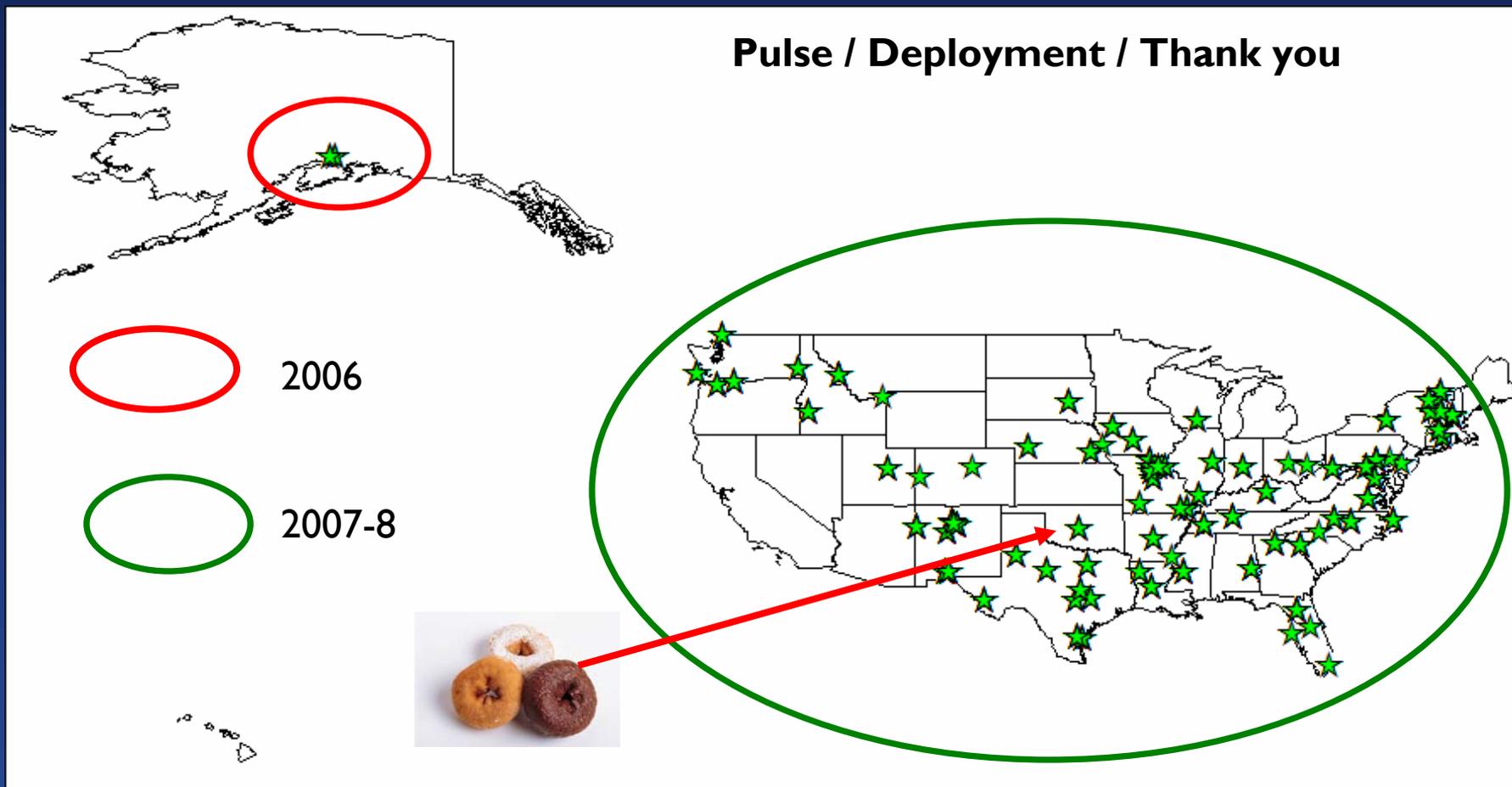
The screenshot shows the 'Analysis PC' application window. The main window is titled 'The Analysis Form' and contains a table with the following data:

Query Name	Source	Has Points?
all soils and plot	NGDC	Yes
mapunit elements and plot	NGDC	Yes
Site - slope, elev, USLE length, aspect	NGDC	Yes
Site - slope, elev, USLE length (aggregate)	NGDC	No
Site - aspect, 16 directions (aggregate)	NGDC	No
Site - aspect, 8 directions (aggregate)	NGDC	No
Site - geomorphic description	NGDC	Yes
Pedon - taxonomic classification	NGDC	Yes
Pedon - horizon sequence	NGDC	Yes
Horizon - texture	NGDC	Yes
Horizon - texture class mod lieu	NGDC	Yes
Horizon - elements	NGDC	Yes
Horizon - matrix color	NGDC	Yes
Horizon - sand silt clay pH ec sar	NGDC	Yes
Horizon - structure	NGDC	Yes
Horizon - concentrations	NGDC	Yes
Horizon - fragments	NGDC	Yes
Horizon - roots	NGDC	Yes
Horizon - pores	NGDC	Yes
<input checked="" type="checkbox"/> -270584 04LA017MOR_3	-269725 04LA017MOR_3	Meth
<input checked="" type="checkbox"/> -270583 04LA017MOR_3	-269724 04LA017MOR_3	Meth
<input checked="" type="checkbox"/> -270582 04LA017MOR_3	-269723 04LA017MOR_3	Cuthbert
<input checked="" type="checkbox"/> -270581 05LA017MOR_3	-269722 05LA017MOR_3	Keithville
<input checked="" type="checkbox"/> -270580 05LA017MOR_3	-269721 05LA017MOR_3	Keithville
<input checked="" type="checkbox"/> -270579 05LA017MOR_3	-269720 05LA017MOR_3	Keithville

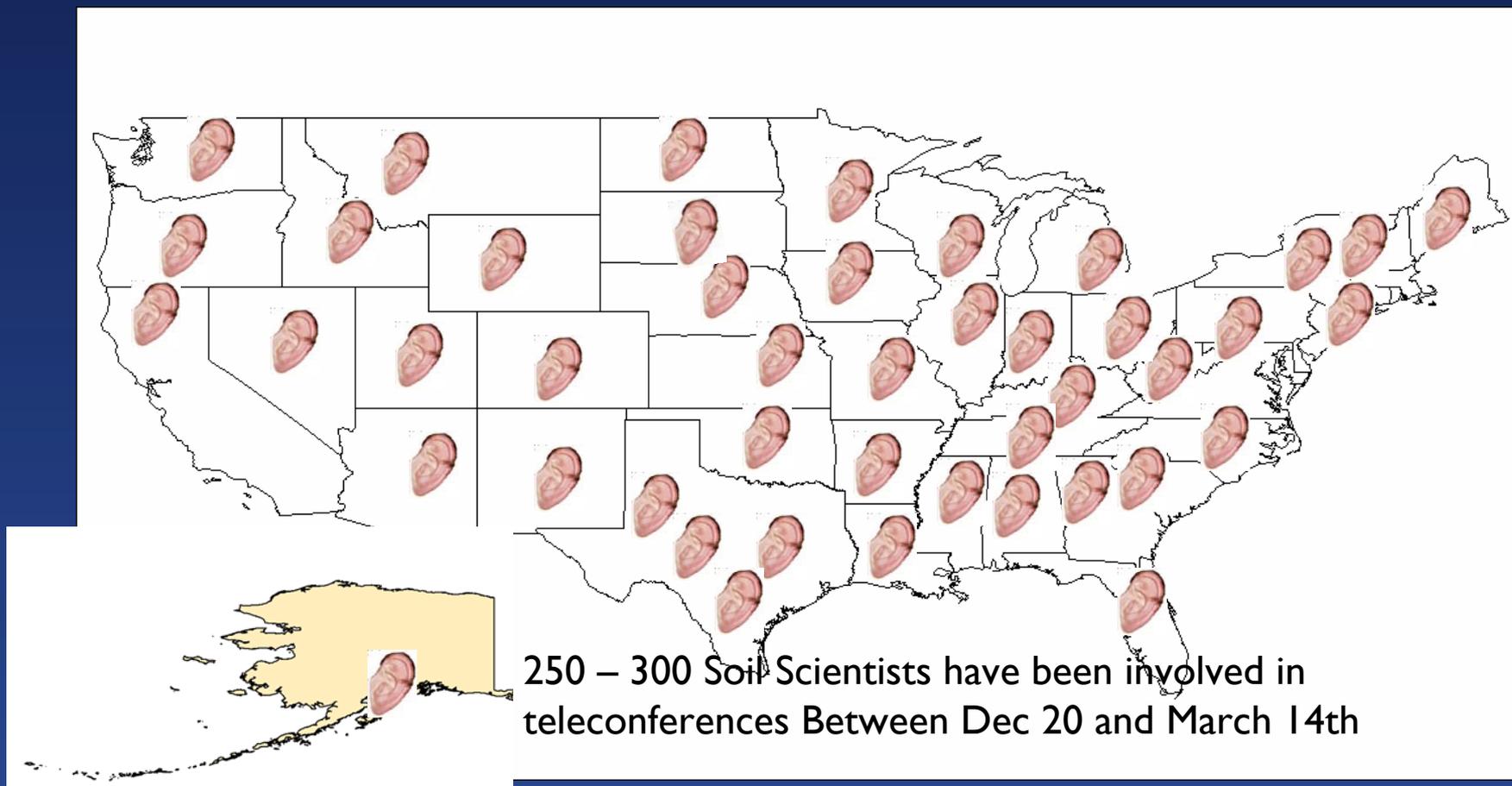
- Allows the user to send data to ArcMap



# Pulse / Deployment / Thank You's

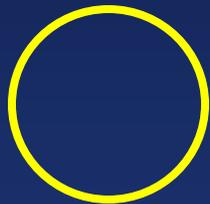


# 2008 - Deployment



(Hawaii)

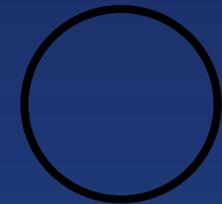
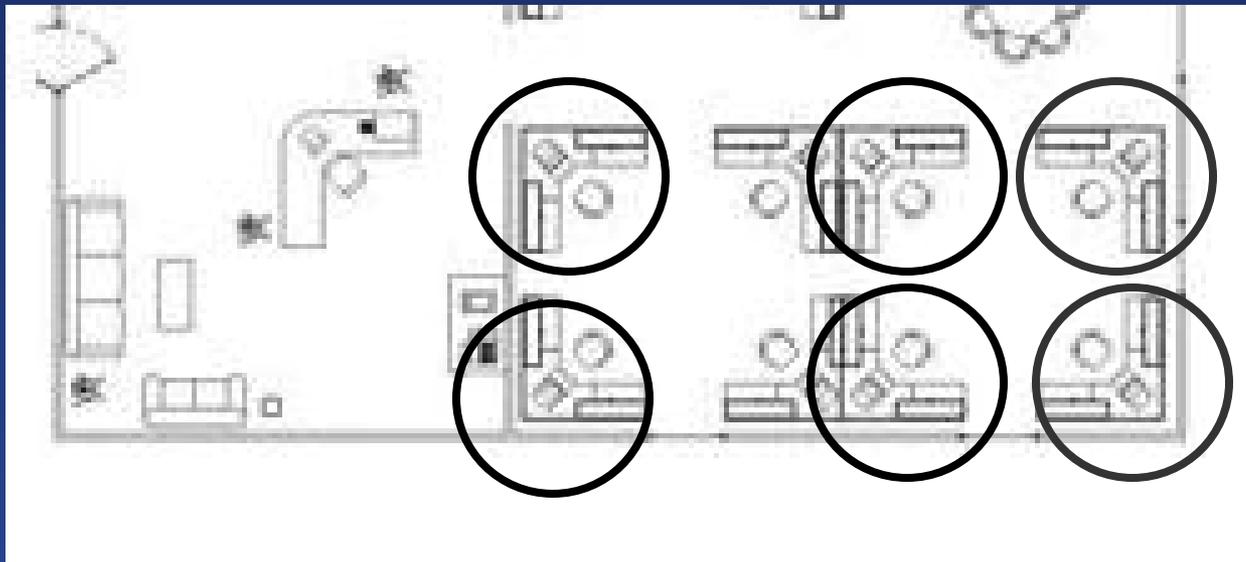
# Deployment Within Offices



**PEDON PC**

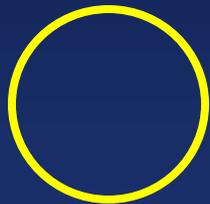


**SRITB TOOLBAR**



**NOT REACHED/  
NOT ADOPTED**

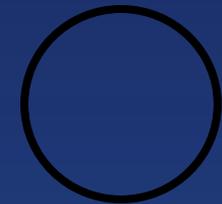
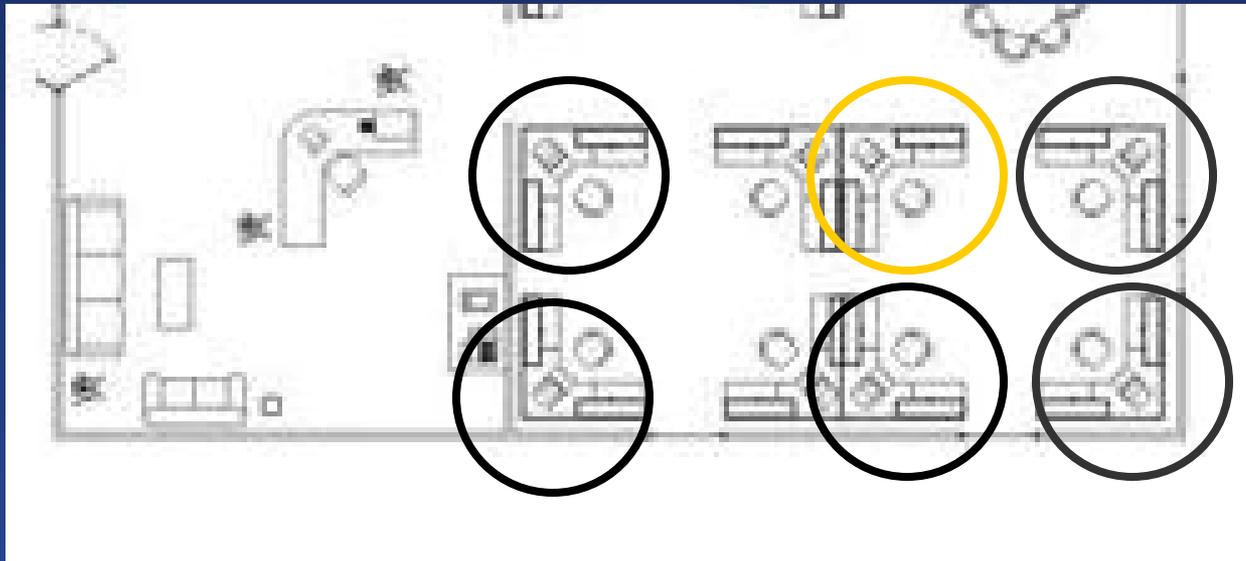
# Deployment Within Offices



**PEDON PC**



**SRITB TOOLBAR**



**NOT REACHED/  
NOT ADOPTED**

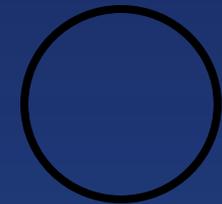
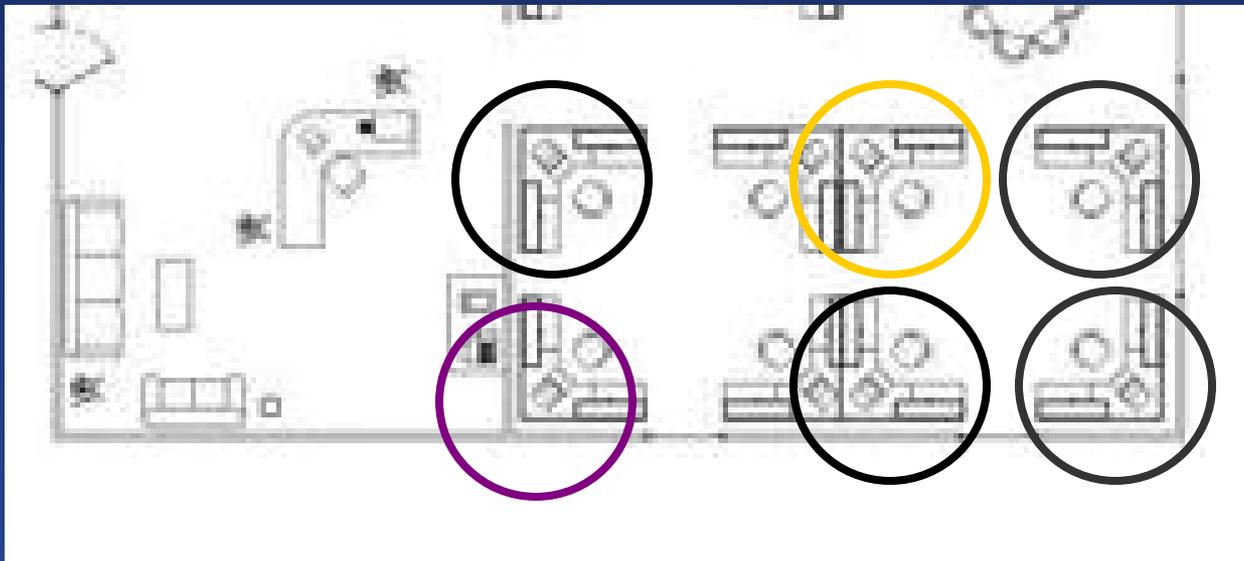
# Deployment Within Offices



**PEDON PC**

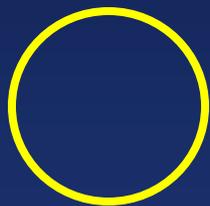


**SRITB TOOLBAR**



**NOT REACHED/  
NOT ADOPTED**

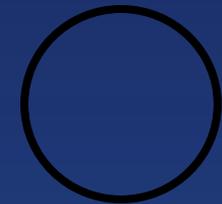
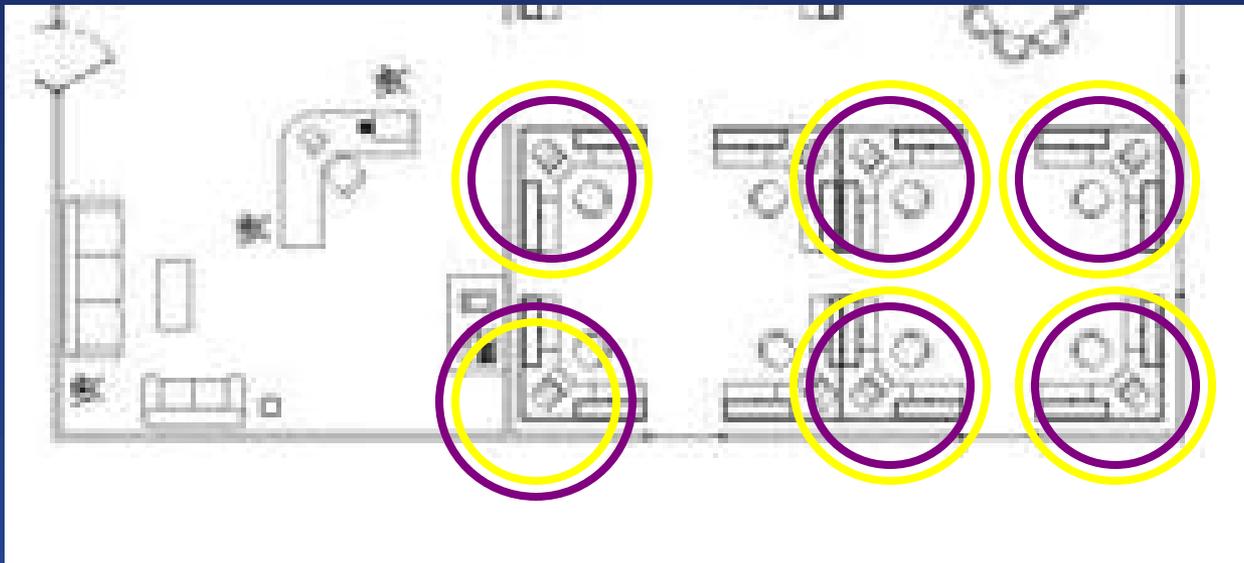
# Deployment Within Offices



**PEDON PC**



**SRITB TOOLBAR**

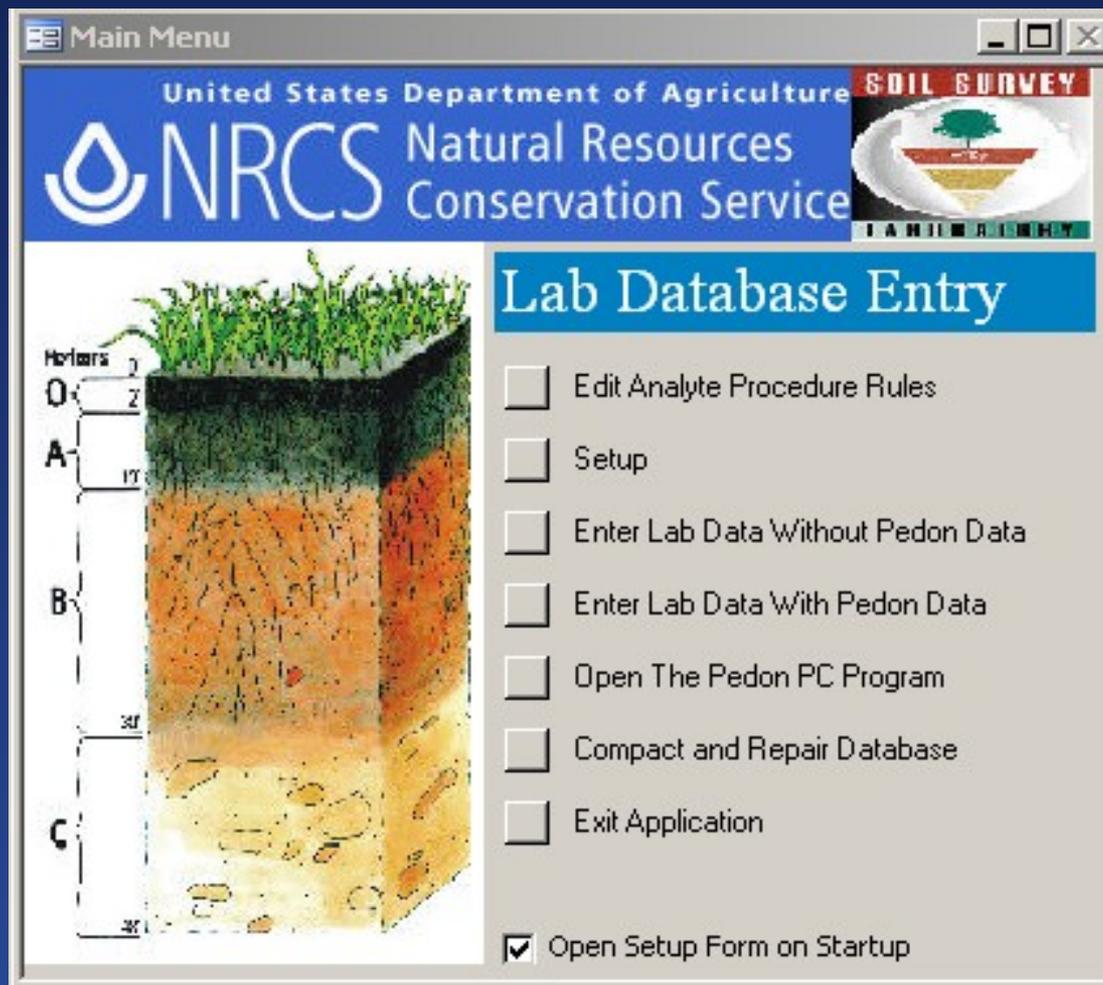


**NOT REACHED/  
NOT ADOPTED**

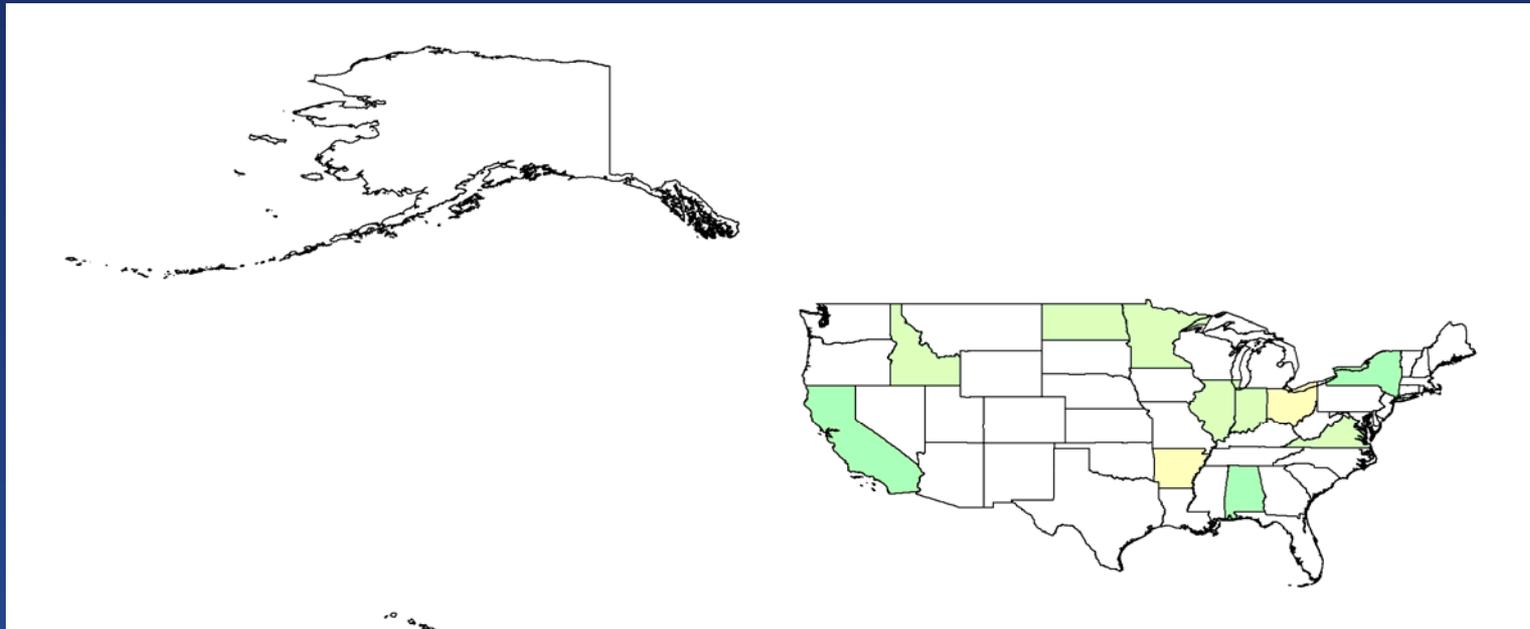
# Laboratory Data Entry Program

- Numerous universities, states, and other entities collect and store soil data
- Lab Database Entry Program is an attempt to centralize this external data into our system

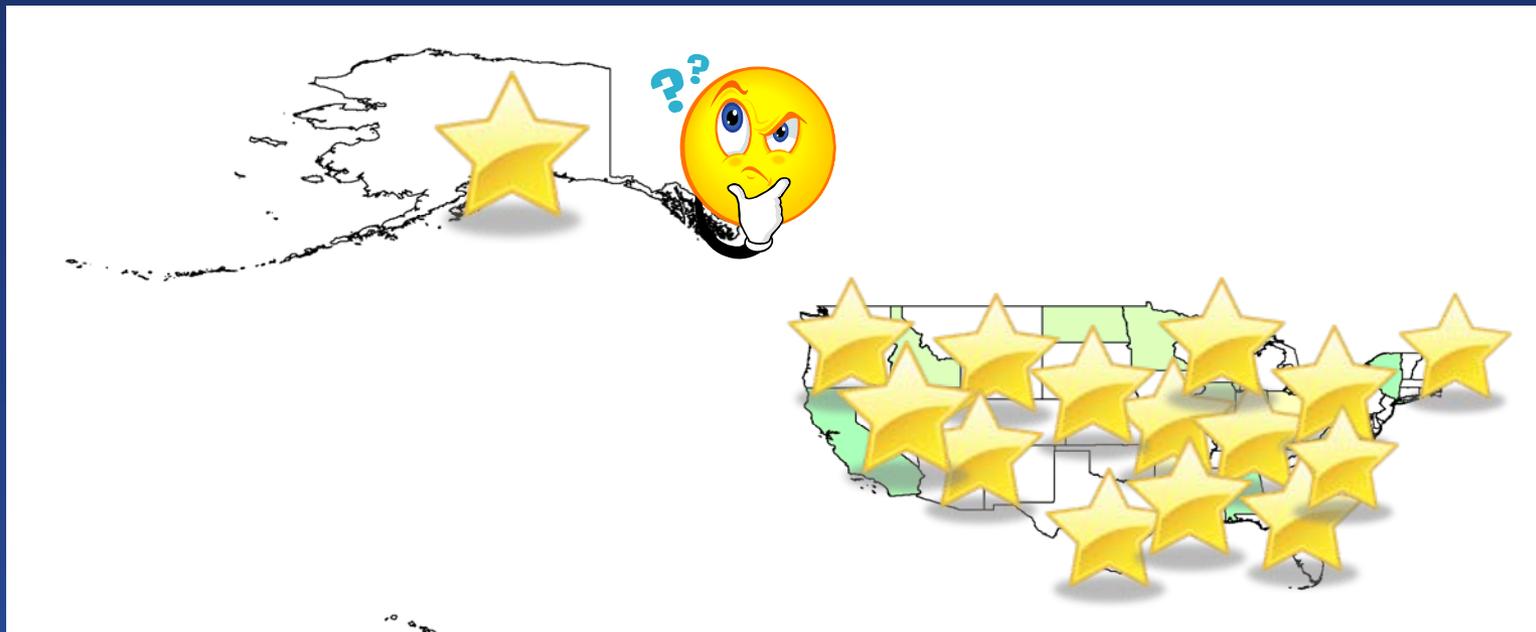
# Lab Database Entry main menu



# University Laboratory Data Project involves nine universities +

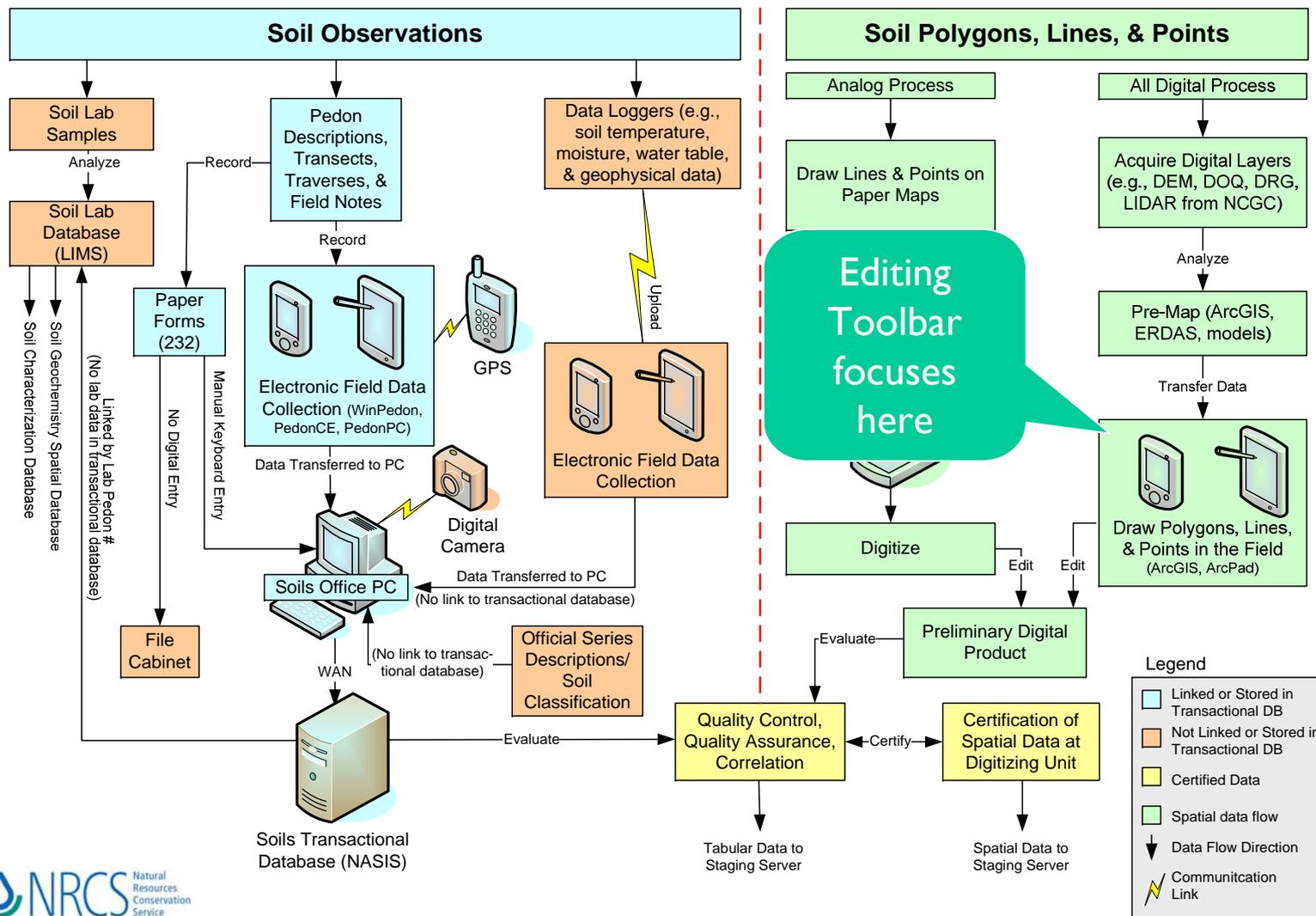


Additional Data is Available from  
Multiple Universities / Agencies in  
About Every Corner of the Country,  
The Question is “Where is it?”



# Inventory & Interpret Soil Resources: Data Flow Diagrams

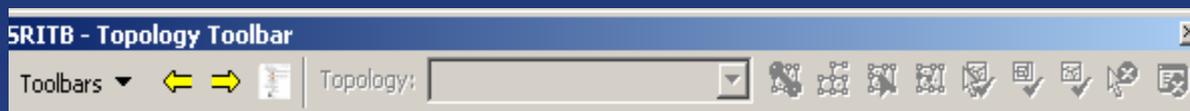
2/2006



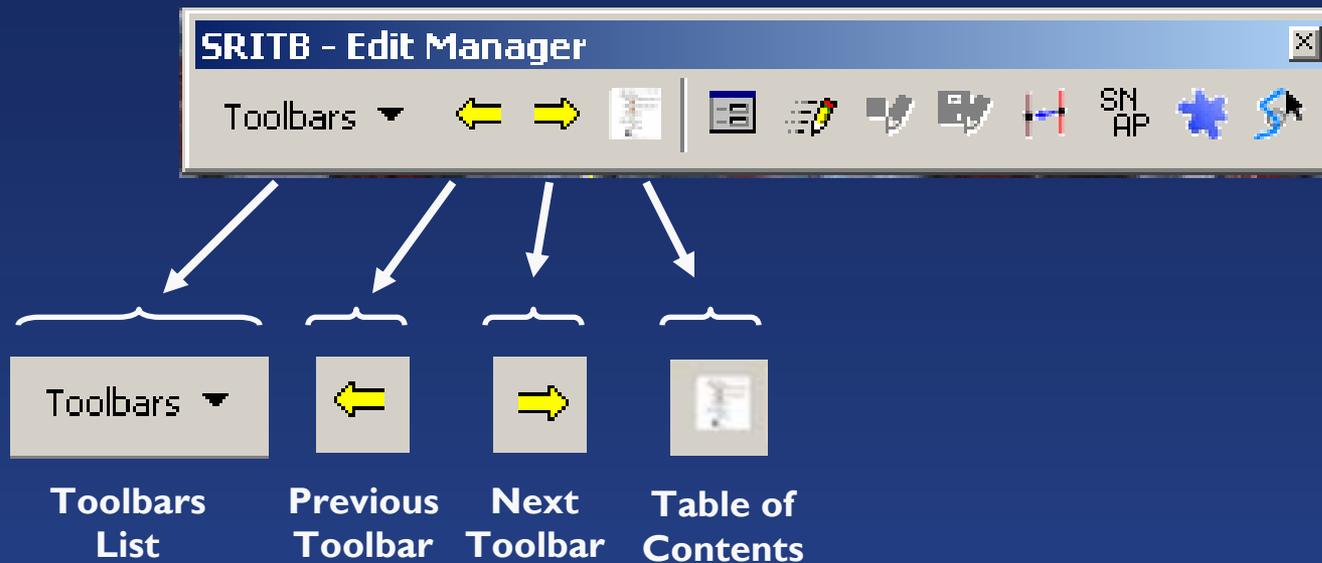
# Editing Toolbar

- Adds a suite of toolbars to ArcMap (loads as an extension)
- Programmed to simplify GIS digitizing procedures and data capture.
- Developed to increase the efficiency of field digitizing and data collection.
- Designed to maximize screen real estate
- Provide field scientists with enough GIS capability to make informed decisions *in the field*.
- Digitizing standards are pre-set as the defaults so user does not have to know or understand all the details of these standards

# Six toolbars in one:

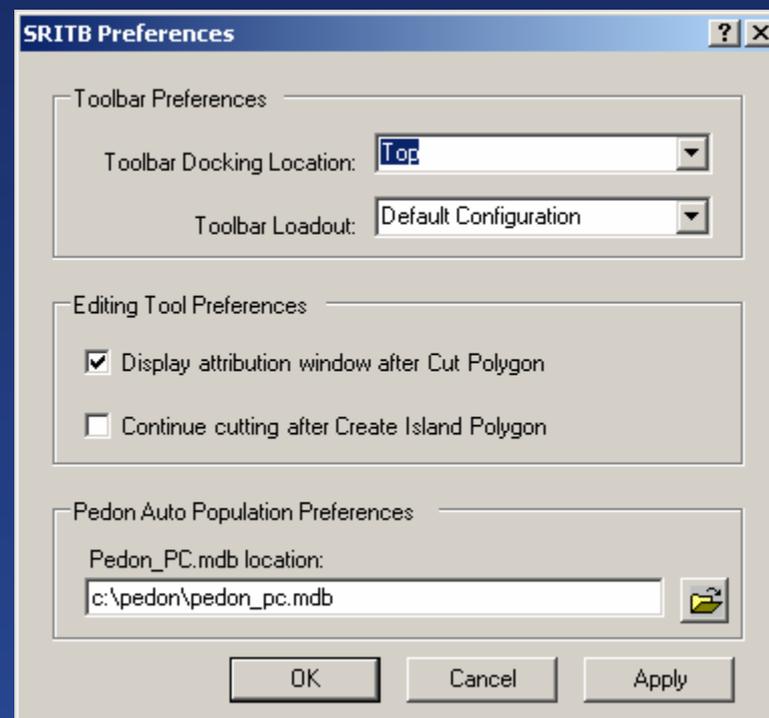
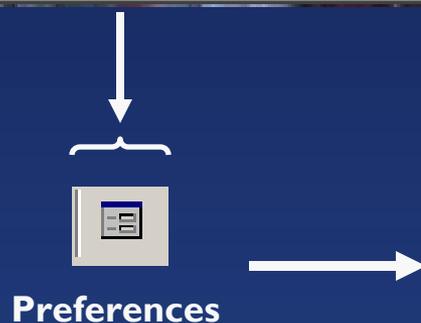


# Tools common to all toolbars:



The Toolbars, Previous, Next, and TOC (Table of Contents) Tools/icons are displayed on all edit toolbars.

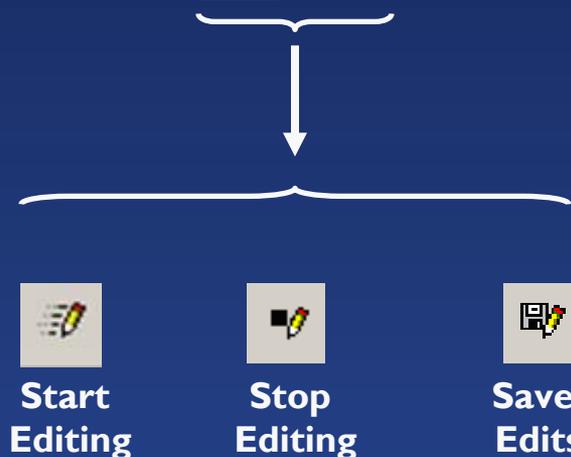
# Edit Manager (preferences settings)





# Edit Manager

Editor icons



# Edit Manager

Tolerance Settings icons



Snapping environment



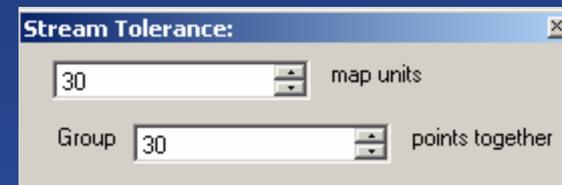
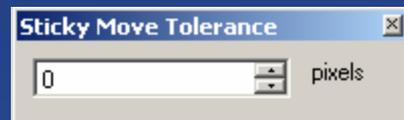
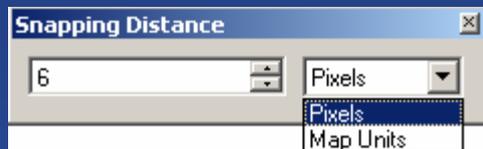
Set Snapping Distance



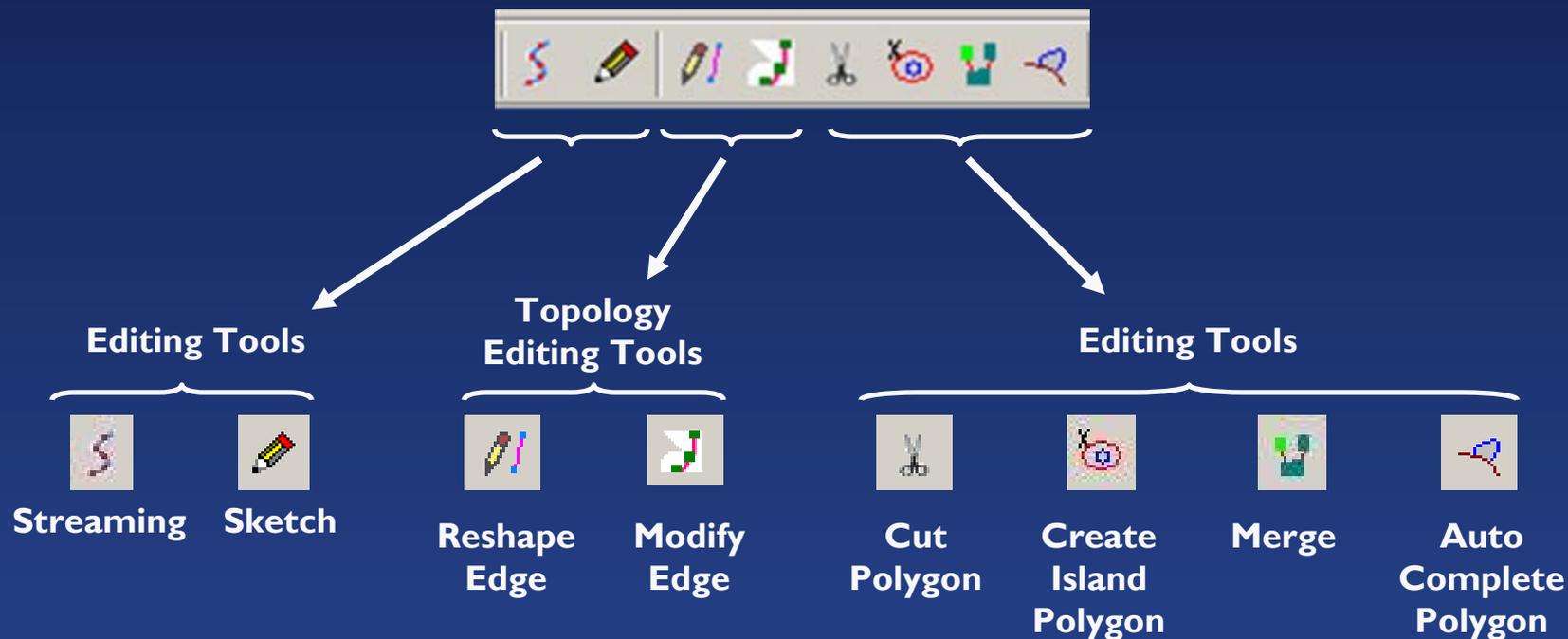
Set Sticky Move Tolerance



Set Stream Tolerance



# Edit Toolbar



# Custom Edit Tools

## Saving Keystrokes (Ex: Cutting Polygons)

### Out-of-the-Box ArcMap

1. Start Editing
2. Set task to Cut Polygon Features
3. Activate Select Features Tool
4. Select features
5. Activate Sketch Tool
6. Make cut
7. Explode multi-part features
8. Label features

### SRITB Cut Polygon Tool

1. Activate Cut Polygon Mode
2. Select features
3. Make cut
4. Label features



**Cut  
Polygon**



# Custom Edit Tools Improving Quality

- Proper tools to perform task are automatically selected
  - Using the wrong tools creates errors
- Quality control is built-in

# Sketch Toolbar



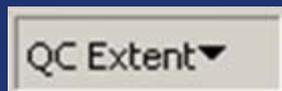
# Topology Toolbar



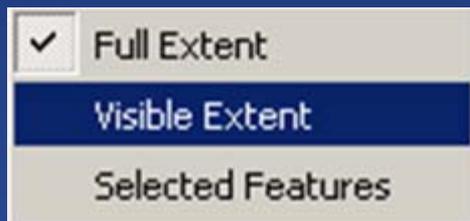
- Construct Features
- Planarize Lines
- Topology Edit
- Show Shared Features
- Validate Topology In Specified Area
- Validate Topology In Current Extent
- Validate Entire Topology
- Fix Topology Error
- Error Inspector

**! Topology is critical for data quality and integrity !**

# QC Toolbar Coming soon in Version 1.1.18



Extent  
Selection



Find  
And Fix  
Inspector



Finds  
Minimum  
Sized  
Polygons

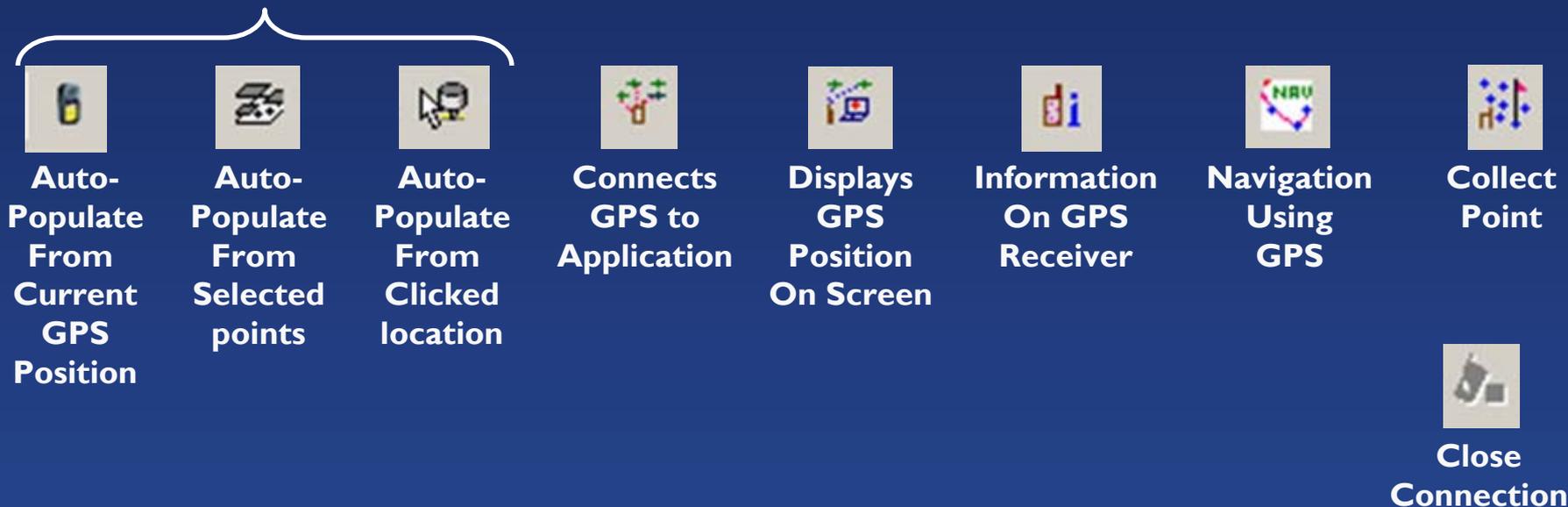


Finds  
Common  
Lines

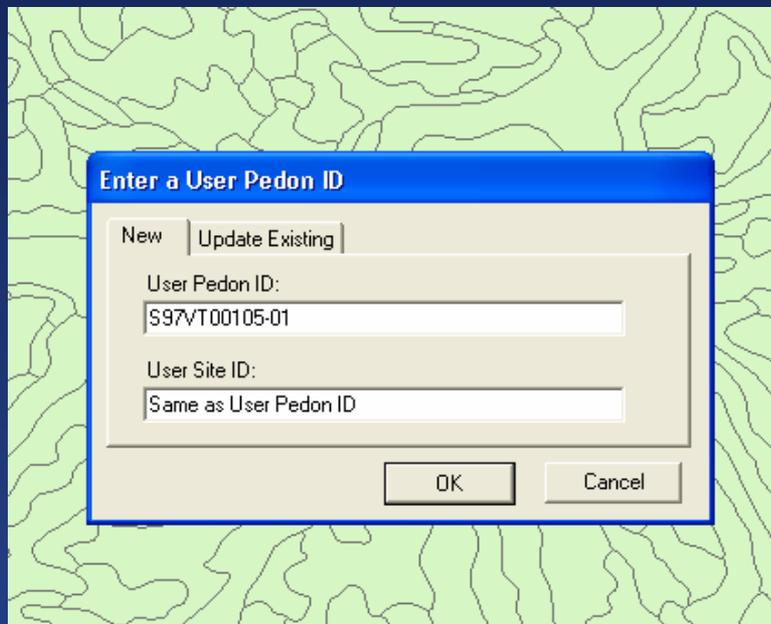
# GPS Toolbar



## Pedon PC Applications



# Autopopulation of Location



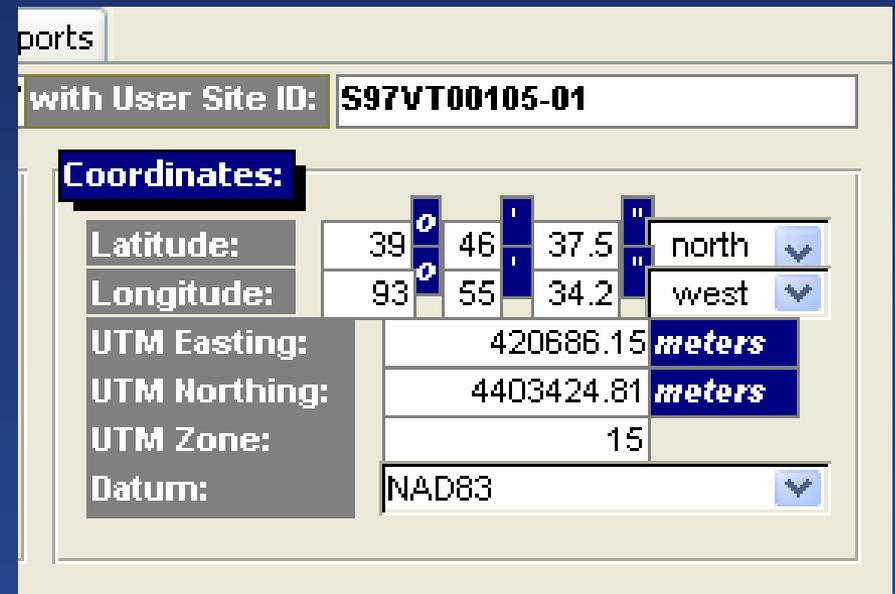
**Enter a User Pedon ID**

New | Update Existing

User Pedon ID:  
S97VT00105-01

User Site ID:  
Same as User Pedon ID

OK Cancel



ports

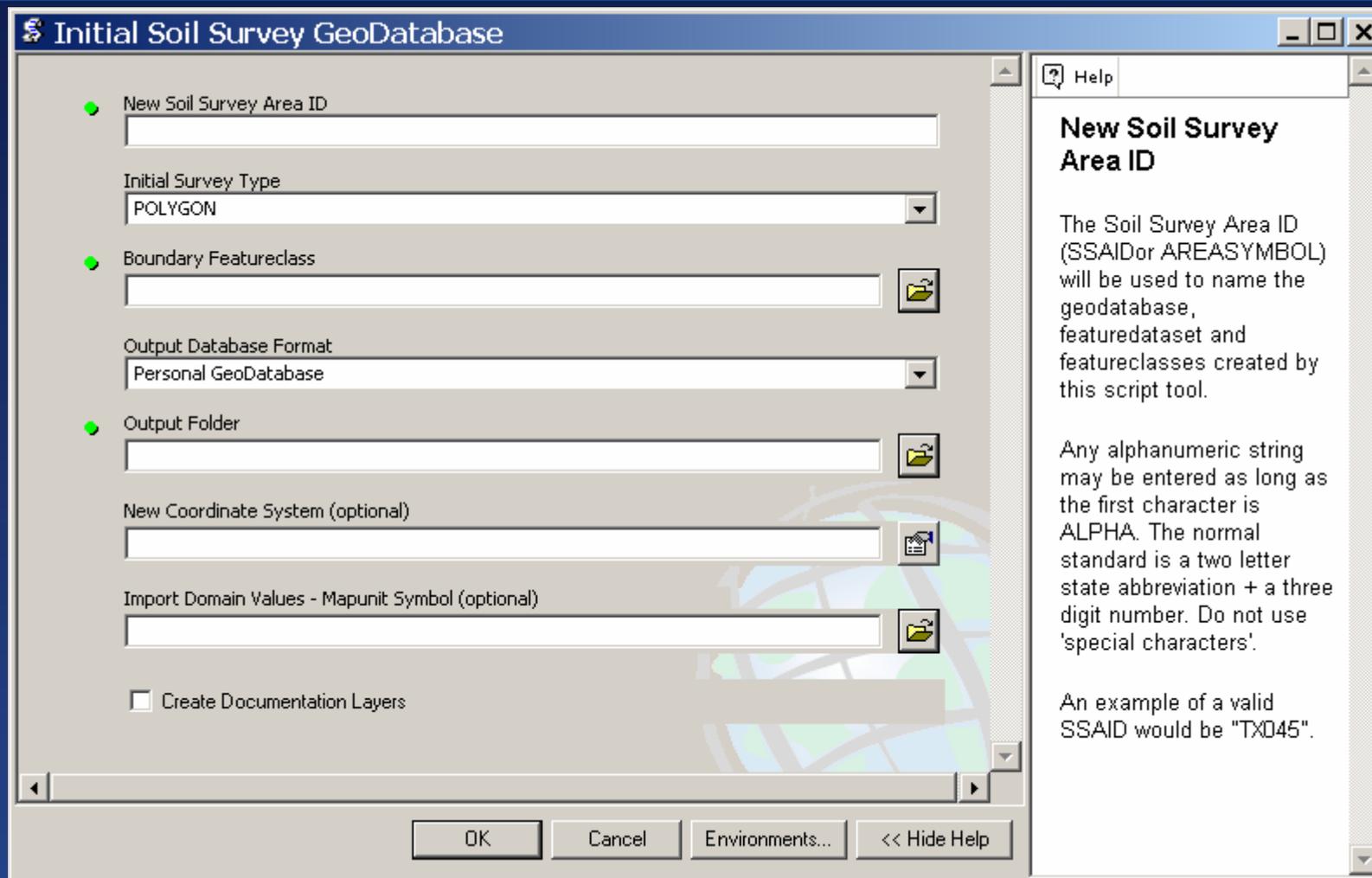
with User Site ID: **S97VT00105-01**

**Coordinates:**

Latitude:	39	0	46	'	37.5	"	north	▼
Longitude:	93	0	55	'	34.2	"	west	▼
UTM Easting:	420686.15						<b>meters</b>	
UTM Northing:	4403424.81						<b>meters</b>	
UTM Zone:	15							
Datum:	NAD83							▼

# Setup Tools

- Proper setup is critical to data quality
- Setup Toolboxes simplify and bullet-proof setup and offer standardization
- Two Options - initial or update survey
- Options within options for different types of setup
- Packaged separately from SRITB



The screenshot shows a software dialog box titled "Initial Soil Survey GeoDatabase". It contains several input fields and options:

- New Soil Survey Area ID:** An empty text input field.
- Initial Survey Type:** A dropdown menu with "POLYGON" selected.
- Boundary Featureclass:** An empty text input field with a folder icon to its right.
- Output Database Format:** A dropdown menu with "Personal GeoDatabase" selected.
- Output Folder:** An empty text input field with a folder icon to its right.
- New Coordinate System (optional):** An empty text input field with a globe icon to its right.
- Import Domain Values - Mapunit Symbol (optional):** An empty text input field with a folder icon to its right.
- Create Documentation Layers**

At the bottom of the dialog are buttons for "OK", "Cancel", "Environments...", and "<< Hide Help".

A help window is open on the right side of the dialog, titled "New Soil Survey Area ID". It contains the following text:

**New Soil Survey Area ID**

The Soil Survey Area ID (SSAID or AREASymbol) will be used to name the geodatabase, featurdataset and featureclasses created by this script tool.

Any alphanumeric string may be entered as long as the first character is ALPHA. The normal standard is a two letter state abbreviation + a three digit number. Do not use 'special characters'.

An example of a valid SSAID would be "TX045".



# My Toolbar (in development):

Provides links to web  
and client applications  
that are relevant to soil  
science on a desktop  
toolbar



# Questions?





1985

**Soils with a lighter surface**

1995

**Soils with a darker surface**

Read the [magazine story](#) to find out more.



Hills on the Skogstad family farm in western Minnesota have light-colored hilltops where topsoil has eroded and darker low spots where soil has been deposited.