Pedon Data Survey Results

02/18/2020 | Kyle Stephens
Survey Overview

• Survey was completed in December, 2019
• Used ESRI desktop version of Survey123
• 22 questions about pedon collection and pedon data entry
• Focused on current tools
• Sent to all SPSD staff, State Soil Scientists
  • Shared with other State staff and NCSS partners
Survey Participants

- Participation was very high and we received results from the target demographic
  - 194 participants
  - 157 were SPSD staff
  - 92 were MLRA Soil Survey Office Staff
  - 54 were MLRA Soil Survey Office Leaders
## Survey Participants

### Participants by title

<table>
<thead>
<tr>
<th>Role</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLRA Soil Survey Office Soil Scientist (Not an office leader)</td>
<td>86</td>
<td>44.3%</td>
</tr>
<tr>
<td>MLRA Soil Survey Office Leader</td>
<td>54</td>
<td>27.8%</td>
</tr>
<tr>
<td>Area Resource Soil Scientist</td>
<td>11</td>
<td>5.7%</td>
</tr>
<tr>
<td>State Soil Scientist</td>
<td>8</td>
<td>4.1%</td>
</tr>
<tr>
<td>MLRA Soil Survey Office Ecological Sit Specialist</td>
<td>6</td>
<td>3.1%</td>
</tr>
<tr>
<td>Other State Staff</td>
<td>5</td>
<td>2.6%</td>
</tr>
<tr>
<td>Assistant State Soil Scientist or State Resource Soil Scientist</td>
<td>4</td>
<td>2.1%</td>
</tr>
<tr>
<td>Soil Data Quality Specialist</td>
<td>4</td>
<td>2.1%</td>
</tr>
<tr>
<td>Senior Regional Soil Scientist</td>
<td>4</td>
<td>2.1%</td>
</tr>
<tr>
<td>USFS Soil Scientist or other USFS Staff</td>
<td>4</td>
<td>2.1%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.6%</td>
</tr>
<tr>
<td>Regional Director</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>Other NCSS Staff</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>University Staff</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>Other non-NRCS Federal Employee</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>Private Contractor</td>
<td>1</td>
<td>0.5%</td>
</tr>
</tbody>
</table>
Survey Participants

- Participants by GS grade

![Survey Participants Chart](chart.png)
Survey Results

• Results are separated into 4 categories
  1. Knowledge of pedon data system
  2. Current data collection methods
  3. Current data entry methods
  4. Field staff wish list for future technology
Survey Results - Knowledge

I received **adequate training** from a USDA-NRCS employee to **collect pedon descriptions** in the field?
Survey Results - Knowledge

I received **adequate training** from a USDA-NRCS employee to enter pedons into the NASIS database?

![Bar chart showing responses to the survey question.](chart.png)
Survey Results - Knowledge

Do you use the instructions and guidance in “Chapter 23 – Pedon Data Entry Guide” of the NASIS training materials when entering pedons into the NASIS database?
Survey Results - Knowledge

What is the standard coordinate system used by the NRCS when entering coordinates for a pedon?

- The correct answer is WGS84
- 74% of our field staff answered correctly
- 26% chose “NAD83” or “UTM”
Survey Results - Knowledge

• **Summary of Knowledge Results**
  
  • The NSSC should remind Regions and MLRA SSOLs that field staff need to be trained in how to collect a pedon description.
  
  • The SPSD needs to improve our NASIS Pedon Data Entry training
  
  • The NSSC should clearly communicate that the guidance in Chapter 23 should be utilized when pedons are entered into NASIS
  
  • NSSC should clearly communicate the standard coordinate system for point data
  
  • NSSC should provide training on coordinate systems and how GPS units actually collect X and Y data
### Survey Results – Current Data Collection

**What kind of GPS enabled device do you use to collect coordinates?**

<table>
<thead>
<tr>
<th>Device</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS only device, such as a Garmin Oregon or Garmin 76</td>
<td>134</td>
<td>69.1</td>
</tr>
<tr>
<td>Tablet</td>
<td>26</td>
<td>12.4</td>
</tr>
<tr>
<td>GPS/PDA, such as a Trimble Juno</td>
<td>16</td>
<td>7.7</td>
</tr>
<tr>
<td>Smart phone</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td>Toughbook</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Laptop</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>N/A</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>
Survey Results – Current Data Collection

Have you ever used the “Import GPS Site Data” function of NASIS to upload coordinates that were collected with a GPS-enabled device?
Survey Results – Current Data Collection

Have you *ever used Pedon PC* while working in the field?

<table>
<thead>
<tr>
<th>Answers</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100</td>
<td>51.55%</td>
</tr>
<tr>
<td>No</td>
<td>93</td>
<td>47.94%</td>
</tr>
</tbody>
</table>

*Hide table*
Survey Results – Current Data Collection

Have you ever used ArcPad while working in the field?

<table>
<thead>
<tr>
<th>Answers</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>67</td>
<td>34.54%</td>
</tr>
<tr>
<td>No</td>
<td>125</td>
<td>64.43%</td>
</tr>
<tr>
<td>N/A</td>
<td>2</td>
<td>1.03%</td>
</tr>
</tbody>
</table>
Survey Results – Current Data Collection

Have you ever used Survey123 or Collector while working in the field?

![Bar chart showing survey results]

<table>
<thead>
<tr>
<th>Answers</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>17</td>
<td>8.76%</td>
</tr>
<tr>
<td>No</td>
<td>175</td>
<td>90.21%</td>
</tr>
<tr>
<td>N/A</td>
<td>2</td>
<td>1.03%</td>
</tr>
</tbody>
</table>
**Survey Results – Current Data Collection**

*How do you typically record a full pedon description while working outdoors in the field?*

<table>
<thead>
<tr>
<th>Answers</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I record the information on a <a href="#">paper form</a> 232.</td>
<td>164</td>
<td>86.3%</td>
</tr>
<tr>
<td>I use <a href="#">Pedon PC</a> to directly enter the information into a computer while in the field.</td>
<td>17</td>
<td>8.9%</td>
</tr>
<tr>
<td>I use <a href="#">Pedon PC</a> only to capture the site location information (coordinates &amp; areas) with the Pedon PC Autopopulation tool. I fill in the rest on a paper form 232.</td>
<td>4</td>
<td>2.1%</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1.1%</td>
</tr>
<tr>
<td>I use a smartphone or tablet to record the information using Survey 123 or Collector.</td>
<td>2</td>
<td>1.1%</td>
</tr>
<tr>
<td>I use NASIS client in disconnected editing mode</td>
<td>1</td>
<td>0.5%</td>
</tr>
</tbody>
</table>
How do you typically record a full pedon description while working outdoors in the field?

I record the information on a paper form 232.
**Survey Results - Current Data Collection**

- **Summary of Current Data Collection Questions**
  - Simple Garmin GPS units are by the main tool used to collect coordinates
    - From my personnel experience, I imagine this is related to ease of use in the field, as they are not complicated and they are reliable
  - 88% collect pedon descriptions on a piece paper
    - By far the preferred method
  - While over half of our staff have tried Pedon PC, only 11% use the application, and only 9% use it to record pedons
    - I believe PedonPC use is concentrated in Region 09
  - Very few people have experience with Survey123 and there is room for growth and experimentation
## Survey Results – Current Data Entry

**How do you enter pedon data into the NASIS database?**

<table>
<thead>
<tr>
<th>Answers</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I manually type this information into NASIS.</td>
<td>144</td>
<td>77.4%</td>
</tr>
<tr>
<td>I manually type this information into Pedon PC, and then I upload the Pedon PC data into NASIS.</td>
<td>12</td>
<td>6.5%</td>
</tr>
<tr>
<td>I use <strong>Pedon PC in the field</strong> to directly capture the information, and I upload this directly into the NASIS database.</td>
<td>11</td>
<td>5.9%</td>
</tr>
<tr>
<td>I manually type this information into the NSSC 232 Excel form, and then I upload the Excel form into NASIS.</td>
<td>9</td>
<td>4.8%</td>
</tr>
<tr>
<td>I use Pedon PC in the field to only capture site location information (coordinates &amp; area) and I upload this data directly into the NASIS database. I enter the rest of the pedon and site description into NASIS directly.</td>
<td>4</td>
<td>2.2%</td>
</tr>
<tr>
<td>I use Pedon PC in the field to only capture site location information (coordinates &amp; area) and I upload this data directly into the NASIS database. I enter the rest of the pedon and site description into Pedon PC and then upload the Pedon data into NASIS.</td>
<td>3</td>
<td>1.6%</td>
</tr>
<tr>
<td>I use ArcPad/Collector/Survey 123 in the field to directly capture the information, but I still must type the information into NASIS, Pedon PC, or the NSSC Excel 232 form.</td>
<td>2</td>
<td>1.1%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>I use ArcPad/Collector/Survey 123 in the field to directly capture the information. I’m able to automatically load this information into NASIS.</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Survey Results – Current Data Entry

How do you enter pedon data into the NASIS database?

- I manually type this information into NASIS.
Survey Results – Current Data Entry

If you manually type your pedon information into NASIS, do you use NASIS forms?

![Bar chart showing survey results](chart.png)
Survey Results - Current Data Entry

• **Summary of Current Data Entry**
  
  • **94.1% manually enter the pedons**
    • 81% directly enters them into NASIS and other 13% enter them into a secondary application or spreadsheet and then upload
    • Less then 6% are capturing pedons in the field and auto uploading to NASIS
  
  • **There is room for growth in auto uploading of pedon data into NASIS but I don’t think any of our current tools or systems are what we want to support**
  
  • **NASIS Forms are not being utilized**
    • Clearly people are able to easily enter pedons into the database
Survey Results – Future

**PAPER vs DEVICE:** Do you think it’s better to use devices instead of pencil and paper to collect pedon descriptions in the field?
Survey Results – Future

Main reasons for preferring Paper:

• Paper ensures QC occurs when data is manually entered into NASIS
• Simple and easier to use
• Faster than device after accounting for time spent managing hardware and software
• 232 is too complicated for a device
• Need to jump around on 232 while describing a pit and it’s hard to do on a device
• Can add any notes I want and put them anywhere, including sketches
Survey Results – Future

Main reasons for preferring Paper:

- No issues when muddy or dirty
- Don’t have to worry about hard to see screens
- Don’t have to worry about batteries
- Creates a physical permanent record
- Doesn’t break down or lose data in the field
- Lightweight
- Only reliable option for working in remote conditions
- Paper shows entire 232 at one time
- No constant learning curve
- Many people said they have tried devices and they went back to paper
Survey Results – Future

Main reasons for **preferring Device**:

- Saves time!
- Standardizes data
- Don’t have to worry about hand writing
- Digital data is produced immediately and is readily available
- Paper can be destroyed or lost
- Can still record data in the rain
Survey Results – Future

Which of the following problems, if any, have you encountered when using computers, GPS/PDA, GPS, smart phones, or tablets to collect pedons while working in the field?

- Screen hard to see
- Couldn’t see entire pedon description on small screen
- Screen too small
- Full pedon description is too complicated
- Battery life of device was too short
- Starting and logging into device took too long
- Slow response time
Survey Results – Future

If the limitations you identified in the previous question could be removed, and the NRCS could develop a new smart phone or tablet application to collect a full pedon description do you think you would:

- 42% begin using the device
- 34% still just use paper
- 13% would test the device
- 5% continue using PedonPC
- 1% continue using Survey123
- 1% continue using other method
Survey Results – Future

Would you like the National Soil Survey Center to pursue the development of a smart phone or tablet application that could collect full pedon descriptions in the field and upload into NASIS?

Yes

No

N/A
OPTIONAL:  **Dream big** and think outside the box.  **Please describe your ideal method** for collecting full pedon descriptions in the field and entering them into NASIS.  What improvements to existing methods can be made?  What part of the process should be removed?  What new functionality would you like to see implemented?  You can include devices, applications, implementation of existing software, development of new software and applications, and improvements to the NASIS data model.
Survey Results – Future

• **Voice recognition** was by far the top requested new solution
• **Scanning paper and auto uploading into NASIS** was second most requested new solution
• Tablets are top option but software should work on phone too
• Need dedicated field devices, meaning you don’t take your main machine to the field with you
• Scan soil profile for color and other information and have the results populate the form/database on the device
• Data must directly upload into NASIS, ideally it could happen wirelessly
  • Need QC to occur during upload
• **Easy to customize long choice lists**
• **Forms should be easy to customize**
• **Single device solution**
  • GPS
  • Data recording
  • Camera
  • Upload from device straight into NASIS
• **Device must be light weight**
• **Device must be durable**
• **Device must start up fast and not lose single or require constant logins**
Survey Results – Future

- Must be large enough screen to see entire pedon descriptions
- No otter boxes or other addons for ruggedizing
- Shapefile is automatically created at some point
- Allow for pdfs pedon description creation on the fly for viewing pedon descriptions outside of app when needed
  - This helps with QC
- Automated backup to cloud so data isn’t lost
- Dynamic user controlled cell size adjustment
- Allow for users to create diagrams
- See yourself on soil map and other digital base layers
- Stylist must be an option because touch screen may not always work in tough conditions
- Record photos and then upload and store photos in NASIS
- Upgrade Pedon PC but few specifics provided
- Build a Survey 123 form and use it on Ipads or other tablets
Survey Results – Future

- Create an app that works on multiple platforms
- Create a cloud storage system that allows for non-NRCS users to upload pedons. This will allow students to enter pedons.
- Digital transect forms
- Autogenerate sample labels from pedon description.
- Use signature recognition software so hand written forms can be recognized
- Create a process for entering legacy pedons and converting PLSS data into points
- Work outside the CCE environment
- Create a digital front/back form that completely mimics paper 232, with drop down lists for each domain controlled field
- Method must be efficient and not distract from field work
- Photos associated with GPS point
- Need to be able to say “same as” to copy last pedon or pedon horizon and start editing existing data
- Auto soil coloring and other auto scanning similar to what is done with IRIS tubes
- Writing on the screen just like you do on paper
Survey Results - Future

• Summary of Future
  
  • Paper will likely be the main method of data collection for the foreseeable future
    • Simple, doesn’t break, 232 is too complicated for devices and allows for QC of data
  
  • Staff do support NSSC continuing to develop a NEW mobile data collection system
    • We won’t have a 100% usage rate anytime soon but there is definitely interest in testing and using a new mobile data collection system
    • New system should include voice recognition and scanning of hand written notes
    • New system should be a single solution, simple to use, rugged, lightweight, durable, have a long battery life, and easy to customize
    • Mobile data collection must have a QC system and must allow for viewing of pedon description in word or pdf
Questions?