James Doolittle

During this fiscal year, I only completed 12 geophysical field assignments in eight states (CT, IL, MA, MD, MT, OH, PA, and VT). The focus of these field investigations included archaeology, hydropedology, subaqueous soils, soil health, stratigraphy and lithology, and soil salinity. Some noteworthy accomplishments were

1. Completed GPR bathymetric surveys across Lake Champlain's St. Albans Bay, Vermont. The GPR data will be used to identify differences in substrates and subaqueous landscape units based on bathymetry, slope, landscape shape, sediment type, and geographical location.
2. Provided geophysical assistance to the Department of Ecosystem Science and Management at Pennsylvania State University in hydropedological studies within the Shale Hills Critical Zone Observatory (CZO) and the Klepler Research Farm in central Pennsylvania.
3. Assisted the Illinois NRCS Staff and MLRA 115C soil scientists characterize the variability of soil properties across several reclaimed surface-mined areas located in central Illinois. The objectives of this research are to assess spatial differences in soil properties that affect land use and to improve interpretations of soil materials that have been excavated, replaced, and graded during surface mining operations.
4. Working with the Ohio State NRCS Office and the Findlay MLRA Soil Survey Office explored the potential of using ground-penetrating radar to detect drainage pipes in several very poorly drained to well drained soils formed in moderately-fine and fine textured tills of western Ohio.
5. Working with NRCS State Office Staffs and partners, provided GPR and EMI technical assistance to archaeological projects in Connecticut, Maryland, Montana, Vermont.
6. I hosted a seminar entitled "*Use of Ground-Penetrating Radar in Soil Investigations*" for the Department of Earth & Environmental Science at Temple University. I discussed the use of EMI on serpentine soils during the preconference tour of the 2013 National Cooperative Soil Survey National Conference (Annapolis, Maryland). I also hosted a two-day salinity workshop at Great Falls, Montana, for about 20 NRCS employees.

The following articles that I coauthored were published this fiscal year:

1. Reuter, R., L. Dlugolecki, J. Doolittle, and P. Pedone, 2013. Chapter 15, Using Remotely-Sensed Soil Conductivity to Monitor Restoration Activities on Vernal Pools, Northern Great Basin, USA. 237-250 pp. *In*: Shahid, S.A., Abdelfattah, M.A., Taha, F.K. (Eds.), Developments in Soil Salinity Assessment and Reclamation: Innovated Thinking and Use of Marginal Soil and Water Resources in Irrigated Agriculture. Springer, The Netherlands.

2. Zhu, Q., H.S. Lin, and J.A. Doolittle, 2013. Functional soil mapping for site-specific soil moisture and crop yield management. *Geoderma* 200-201: 43-54.

3. Doolittle, J., J. Chibirka, E. Muniz, and R. Shaw, 2013. Using EMI and P-XRF to Characterize the Magnetic Properties and the Concentration of Metals in Soils Formed over Different Lithologies. *Soil Horizons 54(3): 1-10.* doi: 10.2136/sh13-01-0009.

4. Shaffer, G.D., R. Hall, and J.A. Doolittle, 2013. Applying archaeological techniques to conserve a historical cemetery in Ripley, Maine. *The Maine Archaeological Society Bulletin* 53(1): 1-25.

5. Doolittle, J.A., O. Vargas, A. Langer and R. Dobos, 2013. Crossing the Lines with GPR. *Soil Horizons 54(4): 1-3. doi: 10.2136/sh13-02-0010*.

The following paper has been accepted for publication:

1. Libohova, Z., J. Doolittle, T. Villars, and R. Sims, 2013. Mapping the Subaqueous Soils of Lake Champlain's Missisquoi Bay using Ground-Penetrating Radar, Digital Soil Mapping and Field Measurement. *Photogrammetric Engineering & Remote Sensing.*