**APPENDIX D**

**SAES-422**

**Project/Activity Number:** NCERA3

**Project/Activity Title:** Soil and Landscape Assessment, Function and Interpretation

**Period Covered:** January 1, 2018 – December 31, 2019

**Date of This Report:** June 8, 2020

**Annual Meeting Date(s):** April 8, 2020

**Participants:**

The following participants attend the annual meeting on April 8, 2020, which was hosted virtually by D. G. Schulze, Purdue University.

Hopkins, David G., David.Hopkins@ndsu.edu, North Dakota - North Dakota State University

Jelinski, Nicolas, jeli0026@umn.edu, Minnesota - University of Minnesota

McSweeney, Kevin, mcsween@illinois.edu, Illinois - University of Illinois

Moorberg, Colby, moorberg@ksu.edu, Kansas - Kansas State University

Schulze, Darrell G., dschulze@purdue.edu, Indiana - Purdue University

Slater, Brian K., slater.39@osu.edu, Ohio - Ohio State University

Turk, Judith, jturk3@unl.edu, Nebraska - University of Nebraska

Osterloh, Kristopher, Kristopher.Osterloh@sdstate.edu, South Dakota – South Dakota State University

Ransom, Michel D., mdransom@ksu.edu, Kansas - Kansas State University: AES (administrative advisor)

Ackerson, Jason P., jackers@purdue.edu, Indiana – Purdue University (guest)

Burras, C. Lee, lburras@iastate.edu, Iowa - Iowa State University (unable to attend)

**Brief summary of minutes of annual meeting**:

The 2020 meeting of NCERA3 was convened online via Zoom at 1:30 PM on Wednesday, April 8 with 11 members (listed above) in attendance. After brief introductions, each participant spent about 10 minutes providing an update of their respective programs. This was followed by considerable discussion of delivery and sharing of online course materials. A number of participants were already teaching online as a result of the corona virus pandemic and most participants anticipated teaching portions or all of their fall classes online. The group discussed various strategies and plans for virtualizing part or all of the field components of their classes. Just how the fall semester will play out remains to be seen. Of particular concern to the group was whether and/or how fall soil judging activities will occur.

There was discussion of recruitment of new members. Kristopher Osterloh (South Dakota) was a guest for this meeting and has since formally joined the group.

The group discussed the need for a new plan for rotation of the meeting to the various states. Although a concrete plan was not adopted, Nic Jelinski (Minnesota) was asked and subsequently agreed to chair the committee and host the meeting in 2021.

**Accomplishments:**

All participants in the project are active contributors to the National Cooperative Soil Survey as participants on various national and regional committees, as contributors to soil survey activities in their respective states, and as educators training the next generation of soil scientists.

All of the individuals involved with this project are contributors to the Soil Explorer project and have created, or they are currently are creating, Dominant Soil Parent Material maps for their respective states. These maps are available to anyone anywhere via a web browser (SoilExplorer.net) or via apps for iOS and Android devices. Support for the parent material maps is provided by a project titled, *Completion of the Isee Soils Database for the North Central Region*, funded by the Natural Resources Conservation Service ($100,000, 8/28/2017 – 8/27/2020). Currently, completed parent material maps are available for IN, OH, IA, MI, WI, KY, WV, MD, and TX, and draft maps are available for ND, SD, NE, KS, MN, and MO. We anticipate completing all the parent material maps during the 2020 calendar year. In addition, a new project titled, *Leveraging Soil Explorer for Soils and Ecological Training*, funded by the Natural Resources Conservation Service ($52,295, 8/28/2019 – 8/31/2021), was awarded to Purdue University to expand the maps available on Soil Explorer. This project will “mine” the entire US Soil Survey database (the SSURGO database) to produce maps for the entire area covered by the US Cooperative Soil Survey, which includes the conterminous U.S., Alaska, Hawaii, Puerto Rico, the US Virgin Islands and the Pacific island territories.

**Impacts:**

Project participants are actively publishing their research work in the scientific literature as indicate in the publication list below.

The SoilExplorer.net website had 5.5K users and 8.6K sessions between 1/1/19 and 12/31/19 according to Google Analytics. The Soil Explorer iPad app was downloaded by 130 Apple IDs between 1/1/19 - 12/31/19 and there have been 938 total downloads since its launch on 5/30/15 through 12/31/19. A new Soil Explorer app for Android devices was published on May 14, 2019. There were ~ 500 installs by the end of 2019.

**Publications:**

Peer reviewed journal articles, book chapters, and books are reported for the 2018 and 2019 calendar years.

Matthees, H. L., D. G. Hopkins, F. X. Casey. 2018. Soil property distribution following oil well access road removal in North Dakota, USA. Canadian Journal of Soil Science 98(2):369-380.

Wu, W., W. A. Norvell, D. G. Hopkins, G. Christakos, M. P. Bohn, and J. Wu. 2018. Spatial Distribution of Cadmium and Zinc in Soils of Northern North Dakota. Agronomy Journal 110 (5): 1666-1680.

Bagnall, D.K.\*, P.M. Crespo Gutierrez, Y.T. Yimam, C.L.S. Morgan, H.L. Neely, and J.P. Ackerson. 2018. Effect of air- and water-filled voids on neutron moisture meter measurements of clay soil. Vadose Zone J. 17:180137.

Ngunjiri, M. W., Libohova, Z., Owens, P. R., & Schulze, D. G. (2020). Landform pattern recognition and classification for predicting soil types of the Uasin Gishu Plateau, Kenya. Catina, 188, 104390. https://doi.org/10.1016/j.catena.2019.104390

Ngunjiri, M. W., Libohova, Z., Minai, J. O., Serrem, C., Owens, P., & Schulze, D. G. (2019). Predicting soil types and soil properties with limited data in the Uasin Gishu Plateau, Kenya. Geoderma Regional, 15, e00210. https://doi.org/10.1016/j.geodrs.2019.e00210

Carvalho, G. S., Oliveira, J. R., Curi, N., Schulze, D. G., & Marques, J. J. (2018). Selenium and mercury in Brazilian Cerrado soils and their relationships with physical and chemical soil characteristics. Chemosphere, 218, 412 – 415. https://doi.org/doi.org/10.1016/j.chemosphere.2018.11.099

Wang, Xin, Yanling Wang, Kevin McSweeney and Zhenqi Hu. 2019. Improving hydraulic conductivity pedotransfer functions using recursive elimination a feature and random forest. Ann. Mtg. Am. Soc. Mining & Reclamation. Big Sky, Montana.

Gong, Yuling, Kevin McSweeney and Zhenqi Hu. 2019. ‘Soil profile reconstruction for reclaiming subsidized land with coal gangue. Ann. Mtg. Am. Soc. Mining & Reclamation. Big Sky, Montana.

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Hansel, F., D. Diaz, A. Rosa, and C. Moorberg. 2019. Phosphorus fertilizer placement and rate affect soybean root growth and nutrient uptake in soil with high fertility. Agronomy Science and Biotechnology 5(1): 62. doi: 10.33158/ASB.2019v5i1p62.

Neumann, R.B., C.J. Moorberg, J.D. Lundquist, J.C. Turner, M.P. Waldrop, et al. 2019. Warming effects of spring rainfall increase methane emissions from thawing permafrost. Geophysical Research Letters, 46:1393-1401. doi: 10.1029/2018GL081274.

Angelini, M.E., B. Kempen, A. Temme, G.B.M. Heuvelink, and M. Ransom. 2020. Extrapolation of a structural equation model for digital soil mapping. Geoderma Vol 367, 15 May 2020, 14226. https://doi.org/10.1016/j.geoderma.2020.114226.

van der Meij, W.M., Reimann, T., Vornehm, V.K., Temme, A.J.A.M., Wallinga, J., van Beek, R., Sommer, M. Reconstructing rates and patterns of colluvial soil redistribution in agrarian (hummocky) landscapes. (2019) Earth Surface Processes and Landforms, 44 (12), pp. 2408-2422

Calitri, F., Sommer, M., Norton, K., Temme, A., Brandová, D., Portes, R., Christl, M., Ketterer, M.E., Egli, M. Tracing the temporal evolution of soil redistribution rates in an agricultural landscape using 239+240Pu and 10Be. (2019) Earth Surface Processes and Landforms, 44 (9), pp. 1783-1798.

Moorberg, C., editor. 2019. Soil and Water Conservation: An Annotated Bibliography. New Prairie Press, Manhattan, KS.

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Salas, E.A.L., Subburayalu, S.K., Slater, B., Zhao, K. Bhattacharya, B., Tripathy, R, Das, A., Nigam, R., Dave, R. and Parekh, P. (2019): Mapping crop types in fragmented arable landscapes using AVIRIS-NG imagery and limited field data, International Journal of Image and Data Fusion, December, 2019. DOI: 10.1080/19479832.2019.1706646

Burgos-Hernandez, T., Slater, B.K., Shaffer, J. (2019). Characterizing minimally disturbed soils in a highly disturbed urban environment. Agrosystems, Geosciences & Environment. 2(1). doi:10.2134/age2019.07.0053.

Tirado-Corbalá, R., Slater, B.K., Dick, W., Bigham, J., and Muñoz-Muñoz, M. (2019). Gypsum amendment effects on micromorphology and aggregation in no-till Mollisols and Alfisols from western Ohio, USA. Geoderma Regional. Volume 15. eOO217. doi:10.1016/j.geodrs.2019.e00217

Burgos Hernández, T.D., Slater, B.K., Tirado Corbalá, R., Shaffer, J.M. (2019). Assessment of long-term tillage practices on physical properties of two Ohio soils. Soil and Tillage Research, 186, 270-279. doi:10.1016/j.still.2018.11.004

Massawe, B.H.J., Kaaya, A.K. and Slater, B.K. (2019). Involving small holder farmers in the agricultural land use planning process using Analytic Hierarchy Process in rice farming systems of Kilombero Valley, Tanzania. African Journal of Agricultural Research. 14 (7), 395–405. https://doi.org/10.5897/AJAR2018.13714

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Kagiliery, J., S. Chakraborty, A. Acree, D.C. Weindorf, E.C. Brevik, N.A. Jelinski, B. Li, and C. Jordan. 2019. Rapid quantification of lignite sulfur content: Combining optical and X-ray approaches. International Journal of Coal Geology, 216: 103336 https://doi.org/10.1016/j.coal.2019.103336. [4].

Jelinski, N.A., M.J. Sousa, A. Williams, E. GreyBear, K. Finnesand, D. Mulligan, C. Cole, M.D. Stillinger, J.M. Feinberg. 2019. Cryoturbation and carbon stocks in Gelisols under late-successional black spruce forests of the Copper River Basin, AK. Soil Science Society of America Journal 83(6) 1760-1778.

Burras, C.L., Yu. G. Chendev and T.J. Sauer. 2019. Ch. 1, Plenary Reports: Chemical properties in USA loess-derived Chernozems, 1950-2010: Ramifications for the forest-steppe of Russia. In: Marina A. Poland (Editor). Proc. VIII Intl. Scientific Conf. Env. Problems & Env. Situation in European Russia, Belgorod State University, October 22-25, 2019. p. 10-14.

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Miller, B.A., E.C. Brevik, P. Pereira, and R.J. Schaetzl. 2019. Progress in soil geography, I. Reinvigoration. Prog. Phys. Geog.: Earth & Environ. 43:827-854.

Apps:

Schulze, D. G. (2019, May 14). Soil Explorer app for Android devices. Google Play. https://play.google.com/store/apps/details?id=edu.purdue.ceris.soil\_explorer