



WISCONSIN ASSOCIATION OF PROFESSIONAL AGRICULTURAL CONSULTANTS

WAPAC December 13, 2017 - New Horizons Seminar Summary

Eric Cooley, Discovery Farms Co-Director, spoke on methods of determining soil depth to bedrock. Currently, for a less than 5 foot depth determination, the Soil Survey is a good resource. However, it is not meant to be site specific, and depth ranges don't conform to 1 foot intervals. Also, there is variability of soils within a soil map unit. Another resource is Wisconsin well construction reports, which report depth to bedrock, but are very limited spatially. The Discovery Farms website has links to current research methods in depth to bedrock determinations.

Dave Hart is a hydrogeologist / geophysicist for the Wisconsin Geological and Natural History Survey, and professor of Environmental Sciences at UW-Madison. He also spoke on using maps for determining soil depth to bedrock. Wisconsin statewide maps are available, but are of large scale, as are USGS Regional Maps, and WI GIS maps. Smaller scale maps in Wisconsin include an Eau Claire County Depth to bedrock map, which is derived from well report data. The Town of Byron in Fond du Lac County also has a smaller scale map, derived from well report data. According to Dave Hart, maps are an interpretation of data, and as such, are only as good as the data they are derived from, and the mapmaker's interpretation of the data. An example is the Kewaunee County, Town of Lincoln, which produced a soil depth to bedrock map using well reports, borings, NRCS soils maps, farmer made maps, and LIDAR. The map produced is more accurate than a previous town map that was being used, which has caused controversy over which map should be used. Other maps available are GIS LIDAR maps, which show high resolution elevations, and GIS aerial photos, which can give ideas for depth to bedrock, such as quarries, fracture traces, etc.

Other mechanical methods to determine soil depth to bedrock include a backhoe (good to about 15 foot depth); a geoprobe; a pushrod (which can be mounted to a loader bucket); and a drill rig. Any of these methods can produce false positives from the presence of glacial till (stones).

Geophysical methods to determine soil depth to bedrock include Passive Seismic, which record noise frequencies in the ground. This takes about 20 minutes per location, and has a +/- 20% depth error at a 5 foot depth reading. Electrical Resistivity Imaging (ERI) measures resistance of electrical current between electrodes when placed in the soil. Water and clay content of the soil will affect the measurement. A Veris machine is one example of this, which works well to 1 to 2 foot depths. Refraction Seismic is another method that is very expensive, but with good accuracy. Ground Penetrating Radar is another method.

Art Fromm, is a professional geophysicist, and owns Geophysical Services, a company that encompasses geophysical determinations for many industries. His website is

www.GeophysicalServices.com. Art explains that one should use 2 or more geophysical methods of determining soil depth to bedrock, so as to decrease / limit errors. Surface methods for determining depth to bedrock include the EM31 (an Electrical Conductivity method, best with sand & gravel, good to 15 to 20 foot depths); EM34 (good from 25 to 200 foot depths); and EM38 (good from 1.5 to 5 foot depths). Other Geophysical methods are ERI; geometrics Ohm-meter (works best in clay, large areas, consistent soils. It took 1 week to do 75 acres); seismic refraction, which uses P wave velocities; seismic reflection; Ground penetrating Radar (not good in clay soil, or if water table is above the depth to bedrock); MASW, which uses shear wave velocities (this can also measure lateral variations in soil. Probably costs \$2500-\$3000 / day and take 2 days to do 20 acres). In sum, one can rarely rely on just one geophysical method to make a determination.

Alfred Hartemink is a professor of soil science at UW-Madison. His research focuses on digital mapping of soil morphology, soil carbon, and other soil chemical properties. An “app” available to the public is the SoilExplorer.net, which is a geographic map tool for Wisconsin and other parts of the U.S. According to Alfred, there is much variation in soils, and mapping it can be costly. One method his team uses is a X-ray Fluorescence handheld sensor. This instrument can instantly tell you the analysis of at least 36 elements in the soil. It costs about \$45,000.00. Another method is V-NIR spectroscopy, used to map soil carbon, pH, CEC, etc. It also is expensive, but a fast method.

Soil maps need to contain the “probability” of what the map shows is accurate. If we don’t know this, we don’t know how accurate a given map may be. This simple solution to soils map accuracy is more samples, but this also increases cost.

In his current study near Oregon, Wisconsin, soil carbon is being measured vertically and horizontally using transects in the soil profile, on a Mollisol soil. This showed great variation of soil carbon within even 1 meter of soil, both vertically and horizontally.

In the afternoon session, a panel of land conservation specialists was convened to discuss how various county Land Conservation Departments work with private agronomists on nutrient management. Amy Callis is the Dane County Conservationist. In Dane county, they are cost-sharing new practices such as using manure injection toolbars. The Yahara-WINS Watershed Initiative provides some of the funds for the cost sharing. The county deals with soil phosphorous issues and TMDL’s, as the county LCD’s are required to implement the TMDL rules made by Wisconsin DNR. Amy stressed a desire to improve on working relationships with farmers and landowners, and to get the general public to better understand the positive aspects of conservation that is going on in Dane county agriculture.

Sheila Smith is the County Agronomist for Winnebago County. She takes the approach of meeting with farmers and walking their farms, especially for the Farmland Preservation Program, to start a relationship and offer solutions to any conservation problems found. The county is working with a few farmers on trial projects, such as cover crops, to show the rest of the counties producers what does and does not work. She stressed a desire to improve on relationships with private agronomists in her county, and the need for more nutrient

management plans to be used and followed. She said that landowners especially need to realize that conservation needs to be applied to their property.

Matt Repking is a conservationist for Marathon County. He convenes a no-tillers group of farmers that has discussions and farm field “walks” of each other’s fields, to gain knowledge and ideas from each other. In his role with the Farmland Preservation Program, he looks for low cost fixes of conservation issues found during his farm visits. He desires to better relationships with the county’s farmers and agronomists.

All 3 counties expressed that they would allow flexibility in implementation of NMP’s, if deviations from the plans are made with good reason, and / or data to back up the changes. Dane county deals with phosphorous issues the most, while Winnebago and Marathon counties deal with P and Nitrogen issues.

The last session of the conference was with Jordan Lamb of the law firm DeWitt, Ross & Stevens. Jordan is WAPAC’s lobbyist, and since late last winter, has been working on our behalf, representing us before the state legislature, the governor’s office, the Wisconsin DNR, and Wisconsin Dept. of Ag, Trade and Consumer Protection. She detailed the issues worked on in 2017, including reducing the WI Fertilizer Fee, increased funding for fertilizer research, keeping the recent changes to the Implements of Husbandry law, getting funding for 2 more DNR staff for review of CAFO permits, getting Watershed grant funding, keeping the WI Livestock ID Consortium, protections for existing high capacity well permits, getting DNR to not regulate Calf Hutches, re-allowing the use of Vegetative Treatment Areas for feed storage runoff by the DNR, getting rid of onerous proposals concerning the Livestock Facility Siting Rule from DATCP, commenting on proposed revisions to NR 151 rules regarding manure applications on soils over Silurian bedrock to reduce pathogens in groundwater, commenting on wetlands reform legislation recently proposed, and commenting on the governor’s proposal to move the CAFO permitting program from DNR to DATCP. Jordan is doing great work on our behalf.