**Comprehensive Assessment of Soil Health: VT PES WEBINAR 10/28/2019**

**Presenter:** Heather Darby

**Background on Presenter:**

Heather is an agronomy and soil specialist with UVM Extension. She has extensive experience using and developing soil health tests such as the Comprehensive Assessment of Soil Health (CASH, previously Cornell Soil Health Test).

**Key Takeaways:**

* CASH is the **best, longest-standing, and most comprehensive** soil test
	+ It is guided by 20 years of scientific research, development, and use
	+ It is a **user-friendly** tool for farmers
		- easy and reproducible to collect samples
		- straightforward to decipher results
	+ it is an ideal tool for informing **management decisions**
		- **NOT designed for assessing ecosystem services**
* It is an ASSUMPTION that improvement of soil health would achieve both agricultural and environmental outcome goals, e.g. improve environmental resiliency and decrease runoff and CO2
	+ Soil health is currently **not that poor** in VT
		- Many samples have been submitted to Cornell over the years and VT seems to not have that bad soil health, but there are insufficient data
	+ We don’t know **what effects improving soil health would have on other outcomes**
		- Need to know that before paying for it
* A **pilot study** would be necessary to use CASH for PES, in order to connect the dots between soil health “rankings” and the desired outcomes (unless the public are content with organic matter)
* PES needs to go above and beyond existing baselines (e.g. RAPs) because there is already funding to get farmers there/to make improvements
	+ Focus on finding an appropriate threshold for PES incentives, rather than improvements

**Comprehensive Soil Health Assessment:**

* Soil Health means: “Integration and optimization of the soil’s biological, physical, and chemical processes of the soil that are important for sustained productivity and environmental quality”
* CASH ranks soils on physical, chemical, and biological indices
	+ Calibrated to soil type/texture
	+ Links indicators to potential outcomes/management changes
	+ Indicators are sensitive to short-term and long-term changes in the soil, so reflect changes in management practices
	+ Lets farmers know what is constraining their system
		- Different farms, regions, etc have different constraints
* CASH has been around long enough to work out the test development questions
	+ Well-selected indices
	+ Attainable protocol for standardized sampling
* Opportunity to purchase different packages of tests, analyses, and/or add-on indicators.

**Questions to ask:**

* Who takes the samples, when?
	+ Need sampling procedure that is appropriate for skillset and resources available
* What score allows for a payment?
	+ Set a threshold of “this farm is doing a good job and our desired outcomes are met”
		- we already have the RAPs, so this needs to exceed that
	+ What score is the threshold? Should it be in every category?
		- E.g. everyone should be green in all the categories for all the indicators
	+ There are other programs in place, e.g. BMPs, EQUIP, FAPs, etc that help farmers improve
		- These need to stay in place
* What additional work/tools are needed to close the loop?
	+ RAPs need to be a base for the program to cover broader landscape factors and to ensure that the desired (e.g. water quality) outcomes not measured by CASH are still being achieved by the farms
		- CASH does not capture manure application rate, timing, buffers etc
		- RAPs are already in place and a lot of effort has gone into making them work
	+ Additional water quality models could be built on top of the soil tests, eg RSET, FarmPREP
* What is the formula based on?
	+ T, RAPs, RSET, CASH?
* How complicated do we want to make this?
* How much money can we spend, and how much will we have left to give to farmers?
* Are there opportunities in other spheres, e.g. the private commodity markets for ES?
	+ Indigo Ag added 1000 staff in the last year, out collecting carbon samples around the country: a testament to the private market. `

**Potential Pilot Study:**

* Look to Cornell for current data/baseline
	+ See what it tells us about VT soil health and what information is missing
* Select fields with varying CASH scores on a range of operations in VT as pilot sites
* Do extensive, intensive, expensive in-field, physical monitoring on those fields.
	+ You can’t target management or provide payment without verification of actual impact and connection to soil health measurements
	+ Once the pilot is over you would stop doing this because it is expensive, but important to know results at the beginning to justify the ongoing PES expense
	+ e.g. double-head infiltrometers, lysimeters, edge-of-field measurements
* Develop a good model (if possible) to predict other outcomes based on CASH
	+ Current examples include FarmPREP, RSET. These could be beefed up, or you could create new ones.
* Associate CASH values/ranking with % of time that desired outcomes are met
	+ Determine standard for payment according to results of pilot