Ranked research topics for the Western Region Cooperative Soil Survey.

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The following topics were identified as important research topics by the research needs committee. These topics were then presented to the entire Western Region Cooperative Soil Survey meeting and all participants were polled and asked to rank the research topics from 1 to 6 (1 = highest priority) based on their perceived need and interest. Following the poll of all participants, the research committee again met and further discussed the feasibility of the topics given anticipated budget and time constraints and derived the following ranking. The numbers in the parentheses indicates the average ranking of each topic by all respondents. Lower ranking = higher need.

Of special note however; is the following topic:

SSURGO Data gaps (2.55): Many SSURGO data gaps in the western USA (excluding AK) actually have existing soil maps/data; mostly from Forest Service surveys. What would it take to get this data into SSURGO? Could a research project develop the methods to expedite this process?

This topic was ranked as significantly more important than the other topics, but after further discussion by the research committee we decided that this topic, although obviously very important, wasn't suitable for research. However; we strongly recommend that the soil science division prioritize the translation of existing data to SSUGO.

1. Dust (3.17)

Key question: What soils, landforms, and ecological sites/states are most vulnerable to become future dust sources?

Dust production presents substantial hazards to human health and environmental degradation. Quantifying the distribution of soil-landscapes at high risk for dust production is critical to land management in the western US. A number of questions remain to identifying these high risk landscapes including: What are the key soil and landscape parameters for predicting high risk landscapes? Do SSURGO data on its own, or in combination with other data products, provide the requisite data for predicting high risk landscapes? How effective are existing dust production indices at predicting high risk landscapes across the greater western region? Can we predict future "hotspots" of dust production? Do we need to incorporate dust production risk into ecological sites and/or state-transition models?

2. Soil health (3.62)

Key questions: How do you assess soil health in forested ecosystems? Can soil health measures developed in rangelands and croplands be translated into dry and humid forests?

Soil health in forested ecosystems is a largely unknown concept. What is a healthy forest soil under different management practices? Is it possible to develop risk indices in terms of resistance and resilience of dynamic soil properties to management practices on major western forest soils? Do soil pH and microbial systems have predictable relationships? Are soil microbial systems affected by different

management practices? Do soil microbial systems recover with time (state-and-transition models)? Current chemical and biological metrics seem inadequate for assessing soil microbial systems. Is it possible to develop inexpensive and rapid methods for assessing forest soil health?

3. Permafrost (3.79)

Key question: How do environmental factors such as aspect, slope position, gradient, and vegetation affect permafrost presence and depth?

The Alaska NRCS and National Park Service currently have data on approximately 3000 soil pedon observations from soils with continuous and discontinuous permafrost. Can this data be used to describe patterns of permafrost occurrence and depth? Analysis could inform resource management and industrial development decisions. Many researchers are attempting to address this key question. What can soil survey add to this discussion?

Many burned sites show evidence of prior permafrost such as thick O horizons, redox features, and cryoturbated materials, but no actual permafrost. How do you classify a soil that once had permafrost, but then rapidly lost it?

Note: Although rated as less important than other topics we discussed that this topic is highly amenable to a research project since it mostly involves analyzing existing data.

4. Data delivery and citizen science (4.31)

Key question: How does soil survey engage with citizen science such as the LandPKS tool?

Citizen science engages nonprofessionals in the process of generating and sharing scientific knowledge while expanding access to science-based interpretations. With near completion of initial soil survey, NCSS should explore creative and interactive methods of delivering soil survey produces to the public. Citizen soil science research includes developing tools of citizen engagement to collect and interpret natural resource information with the potential of crowdsourcing QA/QC of soil information, ecological sites, and soil survey interpretations.

5. Ecological scale (3.31)

Key question: What variables drive vegetation dynamics across scales.

What specific variables drive vegetation dynamics at MLRA, LRU, and finer scales? Are there variables that transcend scale? Western ecosystems are likely governed by water and temperature and the way that these are modified by geomorphology and soil properties. Can we quantify which variables (e.g., precipitation timing and amount, soil AWC, soil EC) drive vegetation dynamics at MLRA scales? How are these different than the variables driving vegetation dynamics at LRU and smaller spatial extents?

Note: While ranked highly by the participant poll, the research committee thought that this question was fairly vague and we had difficulty deciphering what would be the deliverables. Many ecologists are attempting to address this question, often with long-term datasets. What could analysis of soil survey data add to this discussion?