Barriers to Progress on Soil Health:

- The most critical barrier is the inherently complex nature of soils – and how little we actually know.
- The lack of clarity and consistency of soil health metrics across the region and cropping systems, and measuring the benefit of improved soil management over time.
- Sociology/psychology of adoption: major barrier is the individual’s mindset – particularly as it relates to the difficulty of correlating management investments with measurable outcomes.
- The economic incentive at the farm level is often unclear. We need to better understand ROI (return on investment) of soil management practices.
- The disconnect between producers and consumers as it relates to management of soils. Producers don’t get paid to manage soils, they get paid for a crop.

Resources, Tools & Opportunities:

- “Sustainability audits” for various crops.
- Address the dwindling human capacity issue with good hires (i.e. research, extension, crop advisors, agency / CD staffing, etc.).
- Focus on utilizing current resources and create a clearinghouse for new innovation.
- Enhance the research and technical support connectivity between researchers and innovative producers.
- Explore opportunities for accessing data-bases on soils collected by the private sector.
- Building a road map for soil health to drive all other soil health investments.

Ideas relating to formal (university) education:

- Add capacity to teach soil health-related courses
- Need a broad base of knowledge, encourage cross-disciplinary training for students (no silos).
- Encourage training in more effective technical communication, (e.g. or soil scientists)
- Re-introduce conservation ethics and add more training in social sciences part of soils courses and standard curriculum.

Develop statewide roadmap across sectors and stakeholders:

- Start with the goals, what is the purpose. What is the end goal and does it differ between systems
- What is SH/what are the factors
- Main impacts on peoples bottom lines
- Timeline (little overlap short-term but more long-term)
- Linking triage goals priorities
- Need buy in
Ideas relating to research:
- Taking data already collected on farm, and analyzing it in meaningful ways to develop regional best practices. (This should be seen as low hanging fruit, but needing some clarity about what the questions are first, think about a comparative score card approach?)
- Stable funding pool from state and industry (pooled cross-industry where possible for common issues) to invest in soil health research (drives hires, what people study, esp. given funding at public universities).
- Create soil industry directed faculty positions/Industry directed endowed chairs at WSU representing top five crops (cropping systems).
- Consider a multi-disciplinary cluster hire to build more scientific capacity and encourage cross/multi-disciplinary collaboration (Incentivize farmer-researcher collaborations).
- Support transformational work and long-term projects. Consider mini long term agroecosystem research on top five productive regions in WA.
- Basic biology needs to be looked at (plants & soils).
- Research repressive soil mechanisms – why some plants don’t die when others do.
- Pool resources for more money and investment in soil health. Need money to support programs.
- Soil health committee funded by commission, support research.
- Address facility issues (especially outside of Pullman) - proximity location of university, university has strong attachment to wheat - cannot staff Othello or Prossor research center; Re-org ag research stations (Othello Prosser) to better be able to emulate commercial operations (so there’s not as big a gap between research and implementation).

Ideas relating to extension/implementation:
- “The goals of our consumers should be our goals”; Bring more stakeholders (i.e. those who eat) to the table= more $$$ for research.
- Discussion of funding to support soil health over time e.g. Soil health checkoff? Fertilizer tax? Carbon tax? Soil erosion tax? Establishing public, private partnerships – successful in Midwest.
- Invest in recognizing (award program), validating (replicated studies) and sharing practices that innovative producers are implementing successfully.
- Invest in and fund long-term, on-farm, research and demonstration projects. Involve growers with operations of different scales, researchers, industry.
- Invest in dedicated, multi-disciplinary soil health science positions. Fund a dedicated soil ecology center, endowed chairs, with state government leadership and industry support.
- Invest in a research and outreach team to collect stories on and market the benefits of soil health to producers and the public.
Appendix: Top Soil Health Issues with votes

- Diagnostic Tools/tests (11 votes (Five Research; Two ea Producer/Ag Industry/Leadership))
- Translating science/understanding to implementation (10 votes (four Research; two ea Producer/AG service; One AG Industry))
- Roadmap/strategy for investments (8 votes (Three Producer; two Leadership; one ea research/AG service/Extension))
- Understanding Soil biology/ecology (8 votes (two ea Research/Leadership/Ag Industry; One ea Producer/Ag Service))
- Understanding plant-soil interactions (8 votes (three ea Research/Producer; two Ag Industry))
- Long term research that gets to application (7 votes (three Research; two Leadership; one ea Ag Service/Ag Industry))
- Communicating public benefits- meeting public interest in soil health and communicating economics. (6 votes (three ea. Research/Ag Service))
- Crop-specific disease issues and relationship to soil health (4 votes (two Producer; One ea Ag Industry/Extension))
- Address human capacity for issues (NRCS crop advisors, extension, policy, science interface) (4 votes (three Research; One Extension))
- Support for practical ideas developed on farms (4 Votes (Two AG Service; One ea Extension/Producer))
- Capturing economic benefits of supporting soil health/covering added costs of soil health strategies (4 votes (Two Research; One ea Leadership/Ag service))
- Defining soil health (for public) communicating it as an asset and the ag industry drive to enhance sustainability (4 votes (Two Ag Industry; One ea Research/Ag Service))
- Economic bottom line-sustaining yield & quality (3 votes (two Research; One Ag Industry))
- Address erosion (3 votes (two Leadership; one producer))
- Reducing dependence on fumigation (cost, supply challenges, limitation on use) (2 votes (One ea Producer/Extension))
- Very forward-thinking rotation (plus support for market development) dryland (2 votes (One ea. Research/Ag Service))
- Stronger grower-research continuum and partnership (2 votes (one ea. Research/AG Industry))
- Perennial crop research capacity (1 Vote (Producer))
- Marketing/sustainability (2 votes (Research/Ag Service))
- Address impacts of ag inputs and reducing need for inputs (1 vote (Ag Industry))
- Fundamental awareness of importance of soil health (1 vote (AG Service))
- Making amendments transportable (1 vote (Research))
- Transformation change that addresses root causes (1 vote (Extension))
- Lack of "sustainable" value (esp. in conventional system) (1 vote (Producer))
- Economic structures that don't support sustainability (or integrate economics and sustainability) (1 vote (Ag Industry))

No votes-
- Better understanding of “whys” related to soil health
- Correlation between plant genetics and ability to withstand poor soil health
- Better strategies for increasing “good” soil biology
- Understand carbon cycle
- Understanding how urban people view soil (“soil degradation”?)
- Better processing and harnessing of data and technology
- Unifying definition (with variations for crops, regions) & common language.
- Understanding long term exploitation of soils.
- Quantification of tradeoffs.
- N&P preservation and recovery
- N sources (w. side organic production)
- Soil borne pathogens and nematodes
- Practices that improve soil health in some ways may be detrimental in other ways
- Profitable diversification crops
- Excessive P & K accumulation organic tree fruit
- Vigor management
- Replant – perennial
- Bitter pit-nutrition (tree fruit)
- Improving crop quality
- Difficultly defining soil health – perennial
- The unknowns are greater than we admit – perennial
- Water relationships to soils
- Food safety connections/concerns
- Finding the right people to build research capacity
- Need for long term goals and work
- Addressing increase in risk from some soil health practices
- Putting soil health in the context of other transformational drivers (eg. Economics, information world population, etc.)
- Making soil science relevant to policy makers (capacity to do this)