Agricultural Modeling Team (AMT) Meeting

May 12th, 2023
09:00 AM – 11:00 AM
Meeting Materials

Summary of Actions and Decisions

Decision: The AMT approved the April meeting minutes.

Action:

Tom Butler will work to:

- Calculate the linear trend from historic yields data from both Ag Census and NASS survey for crops used in CAST.
- Examine which crops have irrigation data that can be used to calculate trends.
- Brainstorm ways:
    - To potentially incorporate soil productivity maps.
    - Potentially update N removal rates.

Meeting Minutes

Announcements:

- Fertilizer Expert Group meeting Monday May 1st. Discussion of Phase 6 inorganic fertilizer data sets.
    - Tentative recommendations here.

Introduction: Recap Previous Action items – 09:00-09:20 [20 min (Tom Butler, EPA)]

From the last meeting, we have decided to create an AMT specific version of CAST to test updates for the model. The first change to this version was to remove the timing of applications. There were several other requests for data visualizations including:

1. Determine if a sensitivity analysis on the relevant CAST topics has been performed which can guide the group's efforts in developing the phase 7 inputs
2. Visualize how fertilizer shifts across the watershed when timing is removed in the model
3. Determine the contributions to land area and load for specialty crops

- Ken Staver asks if the timing slides shown represented applications or loads.
    - Tom Butler clarifies these are loads.
    - Ken Staver asks if these changes in applications make a difference in loads.
        - Tom Butler says that he is not sure where we would expect to see changes in the loads. He would have to run the new application data through CAST and this hasn't been done yet.
    - Ken Staver asks why does changing the timing cause a change to application?
    - Tom Butler answers that for multiple crops there are elements of timing and eligibility which require a proportion of a crops nutrient needs to be met with organic fertilizer and a proportion to be met only with inorganic fertilizer. This limits the nutrient uses which

can be used to fill crop need. This forces sources such as manure to be disposed of on land uses such as pasture and inhibits the model from applying nutrients in a realistic way.

- Chris Brosch simplifies this more and states that the Ag Census records from 2-12 nutrient applications. The states have chosen, in the model, to turn on or off the eligibility of biosolids and manure for each of the crops reported in the ag census in addition to each of the nutrient applications for all these individual crops. Each of these individual applications has a percentage of nutrients, organic or inorganic, which must be met. By turning off this timing and eligibility it allows the crop need to dictate where nutrients go compared to the set eligibility numbers.
- Ken Staver says that this makes mechanistic sense and that we shouldn't be limiting the nutrients which can be applied based solely on these rules.
- Tom Butler adds that the move to change this for testing was not a formal decision but done so that we can see the impacts of such a change in relation to other changes that we make.
- Ken Staver says it is good to keep testing things to get nutrient applications correct. He asks if we know how these changes will effect loads?
- Tom Butler says that we have not done a full model run and that when it comes to overall load calculations that falls more to the Modeling Workgroup (MWG) rather then us. This is because the calculation and sensitivities are covered by this group.
    - Gary Shenk adds that a rough idea of how to think of the direction of loads is to look at the global average application of the model across the entire watershed. If the applications to a land use are higher then this global average then loads will be higher. You would also need to account for sensitivity which varies by land use and is relative to a general land use loading rate. This means that specific crop land use types have been judged to be higher when developing Phase 6 agricultural land uses. These more sensitive groups would have a greater sensitivity to inputs. Gary says that this is hard to predict because in certain areas loads may decrease but this is hard to predict with much certainty until scenarios are run.
    - Ken Staver asks if in this scenario pasture has a relatively low base loading rate. If you actually constrain application that reduces minor applications on grain and pushes these applications to pasture that's not very realistic. BUT since the pasture has a lower base load, the overall load impact of that manure being shipped to pasture actually reduces loads in the model.
    - Gary Shenk confirms this is really well put. The one add-on to this is that the pasture would need to be situated in an area that had a similar retentiveness of nutrients. If pasture all happened to be in a part of the watershed that had high ground water recharge, then maybe you would get higher loads.
    - Ken Staver asks if manure is getting pushed around without some documentation. Manure has to stay with some accounting because its where animals are.
    - Gary Shenk says yes but there are differential physical parameters within a county so each NHD catchment has the propensity for delivery essentially both with physical properties of the catchment and the stream network.

- Mark Dubin adds that another constraining factor could be the availability of the land use. For example some counties might not have a lot of pasture so the manure applied to them would be much higher due to a lack of available area.

- Gary Shenk says this is a good point and that this accumulation can certainly happen.
- Ken Staver asks what happens to manure at this point?
    - Gary Shenk says is has to go somewhere according to the application curves it will have to go on one of the land uses which is available in that county.
- Chris Brosch says that if the land uses were not spatially different across the watershed then loads would not change at all. In the last meeting we saw that this was not the case.
- Gary Shenk says the main point is that when you apply rules individually to counties you sometimes get very different results. It is similar to pushing down on 200 waterbeds, each representing a county. Whenever the rules are applied you will get a different change and some of the counties will change very drastically. When application rules are put in place this can lead to very high or low applications in certain counties depending on the available land uses.
- Lisa Duriancik asks about model sensitivity. She observes that the model is really sensitive to the land uses and changes in these land uses are going to be the primary drivers of changes in load. She asks if changes to nutrient management on a particular crop type will have large impacts on loads? Or would it be more beneficial to switch land uses entirely?
    - Gary Shenk says that this depends. Changing land use is a big hitter, there are constraints on what is realistic or desirable to change and the mass balance of nutrients that is available from fertilizer. Crop uptake also had a large impact on this. It ends up being a balance between what you know is available to change land use wise and what makes sense to change in land use wise. It is then what is available to make reductions through nutrient managment. He does not know these figures off the top of his head.
    - Lisa Duriancik asks what happens if producers do better with nutrient management and if this is well reflected in the model loads or if it is not terribly significant in terms of loads and figuring out how to get loads where they should be.
        - Gary says it is the latter., it is not terribly significant in terms of loads and figuring out how to get loads where they are desired.
        - Chris Brosch adds that it depends on the pressure of manure and the county. Manure that is generated in the county must be spread in the county unless a BMP like manure transport drives it somewhere else. In counties where there is an abundance of manure then fertilizer can be spread and drown out decreases in application caused by core nutrient management. Essentially, counties with lots of manure and lots of nutrient management will have a reduced effect of nutrient management compared to counties with little manure and high nutrient management. There are interactive effects where the core principles of nutrient management like split or precision applications act as a filter but the core rates change from a non-nutrient managment condition to the University recommended rates that are dependent on the relationship between total amount of nutrient management, the total amount of manure, and the county.
        - Lisa Duriancik was thinking that we would utilize manure nutrients first then meet any unmet need per recommendations with commercial fertilizer. She isn't sure if this is how its captured in the model or if its just driven by sales data from some year. She questions if the total mass is reflective of what's going on.
        - Chris Brosch says that it does work by satisfying organic need then meeting remaining need with inorganic sources. There are a handful of counties that have so much manure generated in the model that any amount of fertilizer

being applied is going to create an imbalance. The fertilizer is not adjusted based on these.
        - Lisa Duriancik asks for clarification if the nutrient availability of the fertilizer is based on the sales data amounts?
        - Chris Brosch this is limited more to the scenario in which application eligibility is set. This makes land uses ineligible to receive manure at various points throughout the season so manure it not able to be spread in counties with high amounts of manure. This impacts what is commonly called the disposal sequence. It creates a situation in which there is not enough need for the manure according to the control file and how things are distributed. This creates left over manure that distributed above 100% need. When this happens the excess manure will drown out the benefit of core nutrient management in the counties with an imbalance.
        - Lisa Duriancik thanks Gary and Chris.
- Dave Montali asks about drowning out nutrient management or the fact that poor nutrient management is magnified if manure goes more to pasture and hay. He notes that there is very little benefit of nutrient management on those land uses unless it drives transport out of the county. He notes that in WV there is very little effect on loads when manure is shifted to pasture or hay. He questions if this is correct.
    - Chris Brosch says that the core nutrient management values of hay and pasture were set by an expert panel at zero. This causes an over abundance of manure to trigger a disposal sequence for manure on hay and pasture. Two reasons cause this, one these land uses are close to animals, and two we expect farmers to know that those land uses have a high capacity to take these nutrients and retain them. In these cases, overabundance of manure on pasture and hay drowns out the effects of nutrient management since there has already been application to grains and legumes which are leakier land uses. A large issue is that we have no benefit of nutrient management on hay and pasture and with counties having an over abundance of manure the disposal is base for load.
    - Dave Montali says that if we do nutrient management on all crops then we see nice benefits. If this is changed to happening more on pasture, then the load benefits go way down. He questions if you had a change that directed more manure to different land uses this might be a good thing. He asks Gary if it is generally true that if we remove more constraints, we will have fewer counties with unrealistic data results? Or otherwise put, do more rules cause more spatial anomalies?
    - Gary Shenk says yes.
    - Mark Dubin adds that the recommendations for nutrient management were from a nutrient management expert panel. This prompted the decision to credit pasture and hay with an application rate below what would normally be a nutrient management recommendation. He notes that when future nutrient management is applied that should drive the process for transporting or using all available manure. An important part of this puzzle is to accurately track and report manure transport for alternative uses.
- Tom Butler asks Mark Dubin to clarify how the nutrient management rate for pasture is currently set up and how this impacts the application rates for pasture and crediting of nutrient management.
- Mark Dubin explains that a former nutrient management panel looked at the various land uses and saw the potential for pasture and hay to drive large amounts of nutrient applications across the watershed. This assumed that applications were set equal to the University recommendations for nutrient application rates. The group thus decided to set the application

rates for these pasture to be artificially below the literature values supplied by land grant institutions. A lot of the information that informed this rate was provided by Maryland at the time. It was then decided that the rate would be set below what is actually applied giving all pasture land uses a default credit that exceeded what it would be under traditional nutrient management. To avoid duplicate reporting of these there is no further acceptance of core nutrient management on pastured lands since the rate was already below nutrient management recommendations.

- CHAT Robert Shoemaker there has been a drastic drop in commercial phosphorus in VA that we assume is coming from transport of litter to a greater degree. This is not as much for nitrogen but they are getting a lot of transport of litter to hay and pasture outside of counties with a surplus.
    - Mark Dubin that this can be a part of the opportunity Gary and Chris mentioned. This would be to track and report the transport of manure out of the county to other counties or states or even out of the watershed. The states can provide this information to help remove manure nutrients from specific counties.
- Ken Staver comments that he thought the model applied fertilizers based on crop need and this wasn't constrained by the fertilizer bucket which is sales based. This would change when we have an actual amount of fertilizer. At that point we aren't assuming anything about a land use, it is all based on sales numbers.
    - Mark Dubin says there is a watershed wide fertilizer stock that constrains the amount when we have data for the entire watershed. We are looking at different application rates for land uses. One big factor in determining this is the influence of organic nutrient availability within each county. For Phase 5 we did not directly base fertilizer on sales data it was a reference for the model to adjust to based on where the needs were. The sales data gave a direct constraint to the fertilizer. This held Phase 6 back from applying more fertilizer then what was purchased.
    - Ken Staver recalls that this Phase 5 method called for fertilizer to be higher then it is now.
    - Mark Dubin says this is accurate based on his own recollections, the sales data causes a reduced application once it is bound to the sales data. They felt that a lot of the fertilizer in Phase 5 was being driven by pasture in the state of Virginia. This drove the decision to cap fertilizer since they can't let fertilizer keep getting applied since that isn't realistic.
- Cassie Davis asks if anyone looked at how the application data changed between Phases 5 and 6 or if there was just a switch.
    - Tom Butler says he does not have that historical perspective but his understanding is that Phase 5 used AAPFCO as a guide while Phase 6 was used directly with several other data sources to provide an actual backstop to the amount of fertilizer.
    - Mark Dubin says that it is hard to say what the exact changes are due to the differences in process which occurred for each phase version. He suspects that more fertilizer was used in Phase 5 vs Phase 6.
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Scenario Discussions: Crop Yields, and Land uses 09:20-10:55 [95min (20 min presentation 75 min discussion) (Tom Butler, EPA)]

We will discuss how to improve crop yield data within CAST and the impact this might have on how different crops are aggregated in the Phase 7 model.

- Tom Butler asks Candiss Williams how NRCS reduces variability for their modeling tools.

    - Candiss Williams says she will have to look into this since they model things at a field scale. Each field is modeled separately and yield information is a check and aggregate things from there. They are actually looking at a 30 year average.
- Eric Rosenbaum adds that nutrient management planners take into account yield trends through time. These data come from yield checks of and checks throughout the year. He notes that the trends over time appear to roughly follow a 2-3% increase each year. He advocates for a method which would account for the linear increase through time. He mentions that a different source of data rather then NASS might be growers associations.
    - Tom Butler thanks him and asks for more information about the growers associations data.
    - Eric Rosenbaum says there are several data sources, of data they could provide. There are contests for the highest yields. This isn't average across the watershed but the more extreme cases, this can help show the ability of yields to increase over time.
    - Mark Dubin says that we have looked at these data in the past and the average yields tend to be much lower then these experimental plots. He does acknowledge the more average trends in the data are increasing over time and this could give us a possible comparison set of data.
    - Ken Staver says NASS data pretty clearly indicate a 50% increase in corn yield since the Bay restoration effort started. He mentions that we should focus on things like the 5 year census happening on low yield years. This contributes to a somewhat lower trend over time compared to what is really happening.
    - Mark Dubin says that for Phase 5 we were using the average across all the years back to 1982. For Phase 6 they developed a way to emphasize the more recent years of data.
- Ken Staver asks about irrigation and how we can account for different yields since they wont be the same between irrigated and non-irrigated acres.
    - Chris Brosch clarifies that for Phase 5 we exclusively use the Ag Census, every five years, and due to analysis from several others we realized that these data captured a greater then normal occurrence of drought. This prompted us to move to the annual data. This moved us towards the largest 5 or 7 crops based on where you are in the watershed. It is still a valid question to ask if we resolved the question of drought occurrence. If we are in fact observing a 50% increase in corn yields throughout the simulation period vs a 2% increase per year. These two figures would lead to different trends with different yields. He then notes that with things like irrigation we have increased the efficiency of production in the real world. This is not well captured in the model and needs to be addressed.
    - Eric Rosenbaum appreciates the comments about NASS data and confirms that yields are going up through time. He mentions that in central PA while yields have gone up significantly over the past 20 years fertilizer use is not increasing at the same rate. In fact, it has remained almost stagnant since efficiency has gone up.
    - Mark Dubin comments that irrigation has been split out from non-irrigated relatively recently. We will have to find a way to deal with the lack if historic data going back through time.
    - Ken Staver agrees this is a challenge.

    - Chris Brosch agrees with Ken in saying that it would be a good thing to include these new data splitting out irrigated and non-irrigated data.
- CHAT Candiss Williams CEAP collects 3 year data from farmers, which includes yield. We also use NASS for checks for modeling because our reporting is based on a 30-year modeled average. Our trend data is the difference between CEAP periods, which is every 10 years.
    - Robert Shoemaker Not only are we getting increase in yields overall but I also suspect less variability in yields from year to year due to improvements in varieties etc. end result less nutrient loss in adverse years.
- Ben Hushon says that in his area of MD and southern PA everyone has made a shift from single applications to split applications. This has resulted in 50% of the sales of early liquid N fertilizers compared to historic trends. In fact they are also not seeing increased N sales. He also looks back at the previous 10 years and sees that P sales have been trending down. This is consistent with what Eric has seen in central PA.
- Gary Shenk specifies that we are using yield data to attract fertilizer and manure application. This is based on the expectation that producers will get specific yields that are not based on actual weather that occurred in that year. We also want to ensure that the removal rates which are used to determine nutrient runoff act similarly. The goal again is to ensure that nutrient loads are talked about in terms of long term average annual hydrology, NOT dependent on any particular year. Just to drive this home these calculations are being used to attract our applications, and then estimate the long-term effect of these with the weather being averaged out for the final calculations.
- Mark Dubin asks Ben about when he started seeing split applications since he recalls this happening since the 1980s. This may have been inhibited by a lack of equipment to some but others with access were doing this. Was the lack of access to equipment what Ben was referring too?
    - Ben Hushon says that they performed some testing of split application sin the late 1990s and results were not very exciting. It wasn't until 2014 when the did some corn trials that they saw big results. Some people were simply not splitting applications but just adding on. Ben says the reason for adoption in 2014 was that the ground could only hold so much N. They also saw improved access to technologies and improved accuracy of field monitors.
    - Mark Dubin says another place to look at N and P is through Pre Nitrate Soil Tests. These may provide a good historic trend for N and P in the soil.
    - Tom Butler says that we are really looking for improvements that will help us see changes over time.
- Tom Butler asks the group for ways that we might eliminate long term variations and help get at the averge behaviors of crop yields to help inform the models nutrient applications.
    - Eric Rosenbaum says that use the NASS data is likely the best bet but that potentially using soil factor maps on top of NASS data may be a good strategy.
    - Tom Butler asks for clarification that in CAST we currently account for hydrology at a county scale. Is there a way to link this to soil factor maps?
    - Gary Shenk we have county averages for yield data that varies within fields and different soils and factors into removal rates. This effects things such as transport of N as well as

what would draw fertilizer to be used. We have not done this but it is an interesting concept to look into.

- CHAT Candiss Williams NRCS soil survey uses NCPPI, National crop productivity index. It tells you the productivity of soils to produce a crop. Predicts yield based on soil. NCPPI is in gSSURGO.
    - Mark Dubin adds that we use physical geographic zones or regions but that's likely the finest scale we have soil information on is this correct?
        - Gary Shenk doesn't remember if we have any finer scale information beyond this off the top of his head.
    - Ken Staver adds that regarding soils in the Delmarva on the coastal plain irrigation was historically installed on soils that were the least productive with low stored nutrients and water holding capacity. If we do not bring up irrigation the in soil maps are risky since irrigation drastically changes the ability of a soil to grow crops on otherwise substandard soils. There should be an irrigation layer to any soil maps we employ.
- Ken Staver brings up the removal rates influence being influenced by yields. Since the difference between application and removal helps determine loads we should think about improvements in crop growing. For example the N content of grain has decreased but they yield has increased. We are seeing improved efficiency and reduced N content in corn, this is they type of thing we should be looking at.
    - Tom Butler clarifies that is valuable to know but also that we are not necessarily working with a plant growth model.
    - Ken Staver says that in order to accurately account for efficiency in any way we need to account for the N content in corn as well as the growth improvements in yield.
    - Tom Butler appreciates the comments and mentions that we have a single removal rate for corn that is unchanging but isn't sure what year the number is from so this is something to revisit.
    - Mark Dubin adds that we have seen a shift from max yields to improved economic output. This is another way to view this.
    - Tom Butler thanks Mark for the clarification that application goals and removal rates should both be looked at.
- Tom Butler asks the group if they might have some alternative to using survey data ve census data? Are there any other sources which people might be interested in?
    - Dave Montali suggests potentially simplifying the method to create crop yield history. It we see the long term trend and model this more simply that would be good. We could start by examining the long term trends for several crops. We could also look at the scale we wanted to do this for.
    - Mark Dubin suggests that we look at trends in different areas or regions across the watershed.
- CHAT Eric Rosenbaum Eric Rosenbaum corn yield increases in pa from 1993
    - Alisha Mulkey Eric, will you put a link to that PA survey and CGA data in the chat?
    - Eric Rosenbaum https://extension.psu.edu/pennsylvania-five-acre-corn-club You have to go into each year's program reports to get to the PCGA yield contest yield. The excel file is the data I gleaned from each of those reports + the NASS data
    - Alisha Mulkey Thank you

- Eric Rosenbaum discusses his chat post with corn yields from 1993-2021 for NASS and the growers association competition. He notes that the higher yielding line is really pushing the boundary of what is possible and the gap between high yields and the average is increasingly larger.
    - Mark Dubin wonders if this gap widening is due to the high yielding farms having the capital to invest in newer technologies that the average farmer simply cannot.
    - Eric Rosenbaum says this is likely reflective of technological adaptation leading to higher uniformity of emergence. This is roughly 5-10% higher uniformity of emergence which has a huge impact on yields later.
    - Mark Dubin says that if a farmer doesn't have the ability to buy the latest technology then they wont see the benefits of these new technologies in seed growth or nutrient application.
    - Chris Brosch adds that genetics seems to be linked to the highest performing farmers. The average farmers do not have the ability to invest in the technology to help bridge the gap between high and average producers.
- Tom Butler tries to summarize the group suggestions for examining crop yields over time by applying a linear trend for crops.
- Eric Rosenbaum states that in his provided figure the orange line or the yellow line is NASS, and that's Pennsylvania State average, and then the blue line would be the Pennsylvania Core Growers Association, 5 acre corn contest participants.
    - Mark Dubin thanks Eric for sharing the graphic since it is a great visual representation of the frustration many are having over changes in agriculture over time.
    - Tom Butler adds that if we were to replace our yields with something like the lines Eric showed for corn with higher yield we would see an increase in nutrient applications. This is in large part due to the way the model is set up to match crop yields with nutrients applied. This might be something we want to look into later on.
    - Gary Shenk clarifies that it's a raising of the rate relative to other crops which would attract more fertilizer to corn areas.
    - Mark Dubin summarizes that increased efficiency and yields are happening to higher yield producers. This leaves the lower yield producers to struggle with less efficient practices. This begs the question of how we deal with two different types of management which are largely governed by the economics of the farm.
    - Chris Brosch asks if Mark is saying that the poor producers are getting worse through time?
        - Mark Dubin clarifies that what he is saying is that the higher yielding producers are able to benefit from increased efficiency while the lower yielding producers are unable to and will not have the same increase in yields.
    - Chris Brosch would like to see how a change to nutrient removal has changed through time instead of keeping this static.
    - Mark Dubin believes this should be governed by the managment systems of producers where higher yielding producers have a different removal rate then lower yielding producers. We need to get away from a higher yield using a set ratio of nutrient use.
    - Chris Brosch agrees and says that this is skewing the model to be unrealistic.

- Eric Rosenbaum says the PA Core Growers association data is publicly available and shows both yields and N data. This allows you to calculate application rates and efficiencies. He suggests using the NRCS CPI as a possible overlay for soil data in the model.
- Ken Staver comments that at the end of the day the TMDL is driving everything and this requires us to look at reduced losses not efficiencies. The question ends up being not only how much nutrient is applied but where it is applied and how much is being lost. These loads are constrained by monitoring data so he asks where are the loads coming from and what are we going to do to change them? He is wary that even with more efficiency you are still adding in more N and this has the potential to be lost. We need to keep sight that this conversation is not about efficiency but about what drives loads from agricultural watersheds.
    - Gary Shenk says the CBP has recently developed indicators to compare the predictions of Phase 6 with monitoring data. In this group there are a lot of things we can do to improve the models operation. We just need to be looking across the entire watershed. We see our current N trends are pretty good and the accounting for reductions are on target with what we see in the monitoring data across the watershed. If you look at specific locations that does not hold true in every case. In the big picture we are being successful as matching reductions in N and P to monitoring data.
- Mark Dubin comments that the university agronomic recommendations are slightly dated and don't change over time. This is due to the requirement that rates must cover the average condition of the average management system. This is tricky to find.
- Tom Butler clarifies that moving forward we will be looking at yield data and the trends over time. We are on track to perform a linear regression on trends to show next time. We will do this on several crops from both the annual surveys and five year census from NASS. We will also have future discussions surrounding soil data, removal rates, and the current methodology for working with a fixed proportion of crop need per yield. Tom checks with Jess and Sucharith regarding the feasibility of this.
    - Jess Rigelman says we can change yield data for the 11 crops in the Ag Census. It doesn't mean that the other 90 crops will be used. The current yields for these will be held constant as they have been. The current rates will be held at lbs/acre.
    - Sucharith Ravi says they can change the domain of the NASS crops to the state level if that is helpful.
- Dave Montali asks if we can look into the static removal rates that we have for various crops.
    - Tom Butler says yes we can look at applications and removal rates but that might be getting into the modeling workgroups purview.
    - Gary Shenk says that we need to be careful since we are not working with a process based model. We are trying to incorporate studies and the effects these find to create rules for CAST. By changing something more process based that does fall into the modeling workgroup so that is something they would do.
- Alex Soroka comments on Ken's irrigation topic and says that DE runs variety trials and they may have a good record of N content over time. He wonders if MD and PA might have similar data.
- Ken Staver says that he always measured soil nitrate and grain content was secondary. He believe the information is out there. He says we should be cautious looking into everything since the impacts with new data in the current model framework can lead to unexpected results.

- CHAT Eric Rosenbaum would any of the regional feed mills have information on the long term changes in corn protein?
    - Tom Butler answers that he does not know but we can try to find out at our next meeting.

Meeting Adjourns

Participants:

- Gary Shenk USGS@CBPO
- Scott Heidel, PA DEP
- Zach Easton Virginia Tech
- Ben Hushon The Mill (ag retail)
- Jessica Rigelman, J7 Consulting, contractor to the CBPO
- Eric Rosenbaum - Rosetree Consulting & PA4R Alliance
- Cassie Davis, NYS DEC
- Dave Montali, tetra tech, WV, mwg
- Becky Barlow VA DCR
- Jeff Sweeney, EPA
- Alisha Mulkey, MD Dept Ag.
- Sucharith Ravi UMCES/CBPO
- Kristen Bisom, WV Conservation Agency
- Chris Brosch DE
- Tad Williams, Virginia Tech
- Mark Dubin, UM/CBPO
- Lisa Duriancik, NRCS
- Jeremy Daubert, VCE
- Curt Dell, USDA-ARS
- Kate Bresaw, PA DEP