

Agricultural Modeling Team (AMT) Meeting

December 13th

09:00 AM – 11:00 AM

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This meeting will be recorded for internal use to assure the accuracy of meeting notes.

Summary of Actions and Decisions

Decision: The AMT approved the [November minutes](#).

Action: Candiss will work to get relevant aggregated NRI/CEAP data for the Chesapeake Bay watershed and distribute it to AMT group members.

Action: Tom will coordinate with Virginia representatives offline to gather the specifics of the proposed test of creating managed and unmanaged hay and pasture Land Uses in CAST.

Meeting Minutes

Statement of purpose:

To discuss pasture land uses, and agricultural inorganic fertilizer data alternatives for Phase 7.

Decision items:

1. Approve the [November minutes](#)

Decision: The AMT approved the [November minutes](#).

Introduction/Recap: 09:00-09:15 [15 min (Zach Easton, Virginia Tech)]

Zach began by walking the group through the agenda.

Pasture 09:15- 10:00 [45 min (15 min presentation 30 min discussion) (Tim Larson VA DCR, James Martin, VA DCR)]

We heard from the state of Virginia regarding deficiencies in pasture and hay nutrient application rates, and a proposal for changes to the hay/pasture land cover class and application curve groupings. **Informational.**

Discussion

John Fike: I am not completely clear on this reconciliation here. I've had a little conversation with James about tracking fertilizer applications to pasture. You've got a sense of sales, but how do we really know what's going on out there? To the question of over application of nutrients, doing back of the envelope calculations, if you figure a couple of tons of hay produced per acre and it's not terrible hay, not high-quality hay, you are probably talking about 70 pounds of nitrogen per acre. If you throw in something like urea as the fertilizer source and your efficiency level may be 50% or less even, I think that's kind of how we reached that land grant university recommendation. I'm not the person who generated those. Those have probably preceded me by a long time. Help me better understand some of this conundrum between the gap between the

recommendations versus what your models are currently showing, or being applied, and that sort of thing.

Jackie Pickford (in chat): To clarify, the only difference between these proposed land uses is that managed has fertilizer/NM applied and unmanaged/legacy does not?

James Martin: John, would you introduce yourself and your affiliation? You haven't really been a part of this group, but I think it's important for folks to understand where you are coming from.

John Fike: I am a faculty member in the School of Plant and Environmental Sciences at Virginia Tech, and for the past decade or so I have been the state forage extension specialist. I am not a huge fertilizer advocate. I don't work in the traditional spaces of forage production, generally, because I just have a little different perspective on this. If you ask me what my fertility recommendation would be, I'd say do as little as you can. I think there are a lot of producers out there that don't fertilize, that probably could benefit from it, and others that may be over-doing it. Most people are pretty sensitive to the cost of that, so I don't really have the best feel. Squaring my sense of what producers might do in terms of application versus your sense relative to the over application of nutrients. One of the challenges that I think we have is using something like Triple 19 which is probably fairly common and gets us an overload of phosphorous and an under supply of potassium, and probably nitrogen, that is not utilized as well. That's kind of my framing.

James Martin: Thanks, John. Tom, you had a slide from this morning's office hours that showed the nutrient management decision on pasture, and I think it's relatively consistent with hay. Would you mind showing that slide, I think that might help answer John's question.

Tom Butler: Everyone kind of got together to talk about this before and, in doing so, they said, ok, how do we deal with nutrient management on pasture? How do we deal with what goes down pasture? So, I looked at the existing land grant university nutrient application recommendations, essentially decided that the average condition should be about 15 pounds per acre of nitrogen on pasture, and in order to avoid what happens if you were to report nutrient management, you would traditionally get some type of a reduction. The way that it's set up is that it was deemed very difficult to determine how the management on pasture is happening. So, all pasture would get this single, very modified rate that is below land grant university's recommendation. So that would count, and essentially give a default credit of nutrient management, across all the pasture land uses. So, if you were to report more nutrient management, it wouldn't necessarily have the reduction on your load that it would if you were to say have 120, or even 60, pounds per acre application. Does that help, James?

James Martin: I think that helps with pasture, and hay is a very similar circumstance except the models assumed application rate is 35 pounds per acre per year on pasture. So, John, hopefully that helps kind of give you the background of how the model is set up now and why. It's this attempt to establish an expected application of nutrients that would be representative of an average of all pastures. So you might think of it as, and maybe this is how the group came to it, maybe 25% of pasture is applying at the land grant university rate and everybody else is doing nothing, so let's just set the average rate to 1/4 of what the Land Grant University recommended rate is. I don't know if that was the logic they used, but it could have been.

Bill Keeling: For Dr. Fike's edification, we need to remember that we're talking right now about the manure spread. So, it's not just fertilizer on pasture. We're talking about those pastures that are getting, shall we say, chicken litter, or biosolids, or other organic sources that may also be managed with fertilizer. Some percentage of existing pasture is being fertilized, it's just we're not sure how to quantify that. Right now, we're just asking for this test at 25% of the hay and 10% of the pasture, whatever the numbers were in the ask for some model runs, to see how this impacts overall nutrient impacts, particularly in the counties where organic sources are being used.

Elizabeth Hoffman (in chat): For MD: We support exploring this, in the spirit of sandboxing. We'd change those counties requested for data review - remove Caroline and Dorchester, we'd want to see Washington, Baltimore and Anne Arundel. Question: would these new LUs be like "constructed acres" or "harvested forest acres" in that they get reported by jurisdictions each year during progress?

Mark Dubin: Yes, there was a feeling that there's a number of producers who don't apply additional nutrients other than of course the manure that's being applied naturally by livestock on the pasture, for instance. So, it's not part of the collected manure nutrient that we represent. That is there in the background, but we looked around for available data at the time. We were able to work with Maryland Department of Agriculture and look at some of the data they have from the annual implementation reports they have for producers that provide information about their applications. So that was a core piece of information that was used to develop that average application rate that was represented. It wasn't a guess, but it was based on a limited data source we had available at the time. Part of the reasoning behind this was that in previous versions of the model, the university land grant recommendations were used as a basis for applications for these land uses, and it was felt at the time that there was an excess of especially fertilizer nutrients that were being applied on pastures, and that wasn't realistic with what the average management condition was. So that was an alternative to using a land grant for all acres recommendations.

Ken Staver: Initially it was everything with land grant, and everyone said that's way too much. We're using way too much fertilizer. Someone went out and did a survey and came back and said an awful lot of folks are not putting on as much as the land grant recommendations. On other hay right now, Virginia looks to be putting on 80-100 pounds per acre of N on other hay. Everyone's doing that real low number on pasture, but all of other hay acres in Virginia right now are getting what looks to me like pretty close to the land grant recommendations. Other states are not, but Virginia is. So, I don't know why it's that way, but that's the way it looks to me.

Jessica Rigelman: Ken, I'm not sure which scenarios you are looking at. I can look at it, but Virginia had put in a proposal that they wanted their hay and pasture application rates increased to those land grant universities. Since that request was made and was never retracted, I'm pretty sure most of the scenarios have been run with Virginia having that increased application rate for hay and pasture acres. It's one crop in the other hay and then the pasture.

Ken Staver: The pasture numbers look the same as everybody else's.

Jess Rigelman: I'm incorrect, it's just other hay. Virginia made a proposal to have other hay increase, and I don't have the numbers off the top of my head, but they were substantial increases. So, those scenarios were run that way.

Ken Staver: Those were the files Tom sent out recently for us to look at, right? Virginia was very out on their own. It was like 500,000 acres of other hay and they all got the 80-100 pounds of N. That's what I was looking at.

Gary Shenk: This is a super complicated thing, and I don't know how many people really truly understand it. To make a proposal, you've got to really get through it, so I am always encouraged by partners that really make the effort. So, thanks for that. With the requested tests, I just want to caution everybody that, when you are looking at nutrient application which is what these charts are doing, then it's a good test, and that is the effect we would see on nutrient applications from the proposed rules. But, if you're looking at the output of scenarios, we would have the calibrated the model a little bit differently had we had this set up in the beginning. So, the loads that you would get out are not necessarily what we would see had we done this for Phase 6 and not exactly what we would see for Phase 7, which is going to be re-calibrated anyways. The way that you're looking at it in the presentation is the right way to look at it, which is the applications to the land

not the loads off. You'll get some information about the loads off if we run these tests, but I caution people not to read too much into that. With that in mind, it doesn't seem reasonable that pasture that's getting 15 pounds and pasture that's getting 150 pounds would have the same amount of nitrogen and phosphorous off. So, was that part of the proposal, or are we getting to that later?

Tim Larson: No, it was not.

Gary Shenk: So, it is a proposal just to look at the application rate once you do this, and then we'll deal with the loading rate once we see how that works out. Is that the plan?

James Martin: That's what we were thinking, Gary. As you said, it's a complex, highly intertwined system, and taking it one step at a time, I think, is maybe our best bet. If we get our nutrient spread more representative of what could be happening out there on the landscape, I think we'll be in a better place to figure out what's the next step. I'm not even confident that the nutrient spread will have the effect I think it has. I thought I understood it when we ran the previous test that Ken was alluding to but, what happened was, we created more nutrient demand in Virginia only, so we ended up importing more fertilizer from that, Bay-wide stock of fertilizer. So, it opened our eyes that, no, this can't be a Virginia-only change, which is how we got to this point of bringing a proposal forward for these two additional land use classes that we are talking about.

Jessica Rigelman (in chat): VA increased the application rates for other haylage; grass silage and greenchop other managed hay from 35 lbs/acre to 120 for TN and 7 lbs/acre to 35 for TP

Gary Shenk: Thank you, I just wanted to clarify those issues.

Tom Butler: Jackie, then Dave, then Ken.

Jackie Pickford: I just wanted to clarify that the only difference between these two is that the managed would have fertilizer or nutrient management applied, and then the unmanaged would not? Is that correct?

James Martin: Not exactly. The difference between the managed hay and other hay would be that it is eligible for both fertilizer and manure nutrients at an anticipated application of 120 pounds for managed, and the other hay would have an application rate at the same as current, which is an average of 35 across the crops in the other hay land use. Yes, you are right as far as nutrient management goes that our thought would be that that would only be applicable in the managed classes, not in the parent land uses. The parent land uses really stay the same, it's just that there would be fewer acres in them because we are transferring some of that to the managed class.

Jackie Pickford: Ok, thanks. That answers my question.

Dave Montali: I appreciate the iterative nature of this. Let's see what happens with the spread. Ultimately, though, we've got to look at some way to look at existing case versus new proposal, relative to export. I don't know how its going to shake out. I can see that it may shake out differently for counties with excess or a lot of manure versus counties that don't. For the test counties for West Virginia, you've got a couple of ones that are on the excess chicken litter side, but we want to probably look at a county with less available manure. The other thing is, with respect to uptake and removal, how do we deal with that if we don't base our decisions on yields? It seems like if you create a land use that has a higher loading rate, that is based on how many tons of grass per acre come off, we don't have that now. So, what do we do? Is uptake the same everywhere because there's no variability in the inputs?

Gary Shenk: If we have this land use of managed pasture and one of the inputs is exactly the same everywhere, so uptake is the same everywhere, essentially it has the effect of not being one of the tracked inputs. The load that you get out of a land use is related to the change from the average of each input. So, if you have more than average manure applied, your load is higher, less than average fertilizer applied, your load is lower. If everybody has the same input, then everybody has the average export, all of the things being equal.

James Martin: Gary, is it fair to think about it this way- the model doesn't really think about uptake, it thinks about export? It's kind of the inverse of uptake if you want to think about it that way.

Gary Shenk: It uses uptake if uptake varies temporally and spatially across the watershed, and there are differences, regionally, in what is being taken up, and we have some defined sensitivity to it, then that consideration will be included in the load that you get out. But, if there isn't information on whether pasture is taking up a lot of nutrients and where it's not, or when it is and when it's not, then we don't have any information with which to make a differentiation. At the moment, I'm pretty sure pasture doesn't have an uptake sensitivity. So, if we wanted to talk about different areas that had different uptakes and years that had different uptakes, we'd have to figure that part out, but then also figure out what the sensitivity is to it. That's actually the modeling workgroup that has that decision, but it's usually informed my discussions here.

James Martin: The only places we have that is where we have yield based applications? Is that right, Gary? That's where we have uptake?

Gary Shenk: I think so, and I'm not 100% sure, but if we do have it in other places where we just have acres-based uptake, then it doesn't matter because it's all the same in all space and time, so it doesn't enter into the calculation. Everybody has the average value.

Jessica Rigelman: Gary's right. It would matter if the crops within a land use have different uptake values and the acres of those crops are going to change. So, in a situation like pasture, we do have a sensitivity. But, as Gary says, it doesn't matter because it's an acres-based thing and the uptake for both of the crops in pasture are the same.

Dave Montali: This is not step one, this is step two. In step one, if we put more nutrients on pasture and hay than we are now, you would think that these managed acres would have higher yields than the unmanaged acres. If we put a bunch more nutrients on and we give them a slight credit for nutrient management, that uptake part is going to seem light to me if it's just some kind of constant that doesn't recognize increased yield. Am I thinking right on that?

Gary Shenk: You are thinking right. I think the way it would be put in the model is that you would have a loading rate ratio like we're looking at on the screen, so the reference land use would be unmanaged pasture, and then you would have a managed pasture which would have a higher average export rate. But, if you have ten times the input, it wouldn't be 10 times the loading rate because, just as you said, you've got more uptake. So, I think that would be taken into account. I would suggest that this group takes that into account globally, rather than trying to explicitly say this managed pasture has more uptake than that managed pasture. That might be step three, which we wouldn't have to take. This is a step two conversation.

Ken Staver: Back to what we just looked at, the yields look the same. The uptake looks the same in all the states. Virginia is just putting on a lot more N. Somebody from Virginia said we're not sure how this is going to turn out for us. I'm pretty sure if they did the loads, it's going to turn out not too good for you, even if you are in a more realistic version than everybody else. The only thing I don't want to lose sight of in all of this is the big upturn from 2009-2020 in N use. We're still going to have in the last ten years much higher input rates per land use, however we decide to spread it around. That's what has got us in a jam right now. The question I would put to the folks looking hard at this pasture and hay issue is whether or not there has been an intensification of production, like how much grass land and the rates of N applied to grassland in the last ten or twenty years has changed. If we just hold it the same for the whole period, then we are going to be stuck with the same problem we had at the beginning which is that everything is going up and we don't have an explanation for it.

Tom Butler: Ken, that's a good one. Eric from the 4R alliance has got some experience dealing with this, and then I think we actually have an agronomist. Is Tim Hushon on who might weigh in?

Eric Rosenbaum: I'll defer to Tim on this.

Tim Hushon: I haven't been here, so I am really playing catchup, and I'm not entirely sure I have an answer right now without re-hearing everything. I think my brain is still spinning a little bit too much just trying to catch up on what's happening.

Tom Butler: I respect that. If I could boil the question down from what Ken asked, has anyone who works in the field seen changes over the last decade or so in regards to pasture and applications to pasture? I'll let that one sit, so don't feel the need to answer that right now. We can go on.

Tim Hushon: My gut reaction to that question is not drastically. I feel like they probably have gotten better. Hay varieties don't change as fast as corn and soybeans do, but I feel just some of the newer genetics are helping out in some of the drought-ier scenarios. So, they probably are increasing production slightly without really trying to go too much further on that fertility side.

Mark Dubin: I have a slightly different question for James. If there's others on here that have more to talk to about this particular topic, I would be willing to wait and come back in if that works. If not the case, I'll go ahead.

Tom Butler: Fine by me. We'll switch it up. Bill, then John.

Bill Keeling: Stepping back to some of what Gary was saying, Virginia has pointed out that the current model is not reflective of reality in terms of what we are doing with nutrient spread and pasture, at least in Virginia. So, in that calibration process, because of the decision-making in affect, all acres of hay and pasture are getting the benefit of nutrient management, which is not the case. We currently cannot get credit for things that we have been doing that, in previous models, we were able to get credit for. Phase 6 was a change to what was done with hay and pasture that eliminated the ability for us to get credit for acres of hay and pasture we do know are being managed, and have nutrient inputs, and we the state deem is beneficial in getting nutrient management. The genesis of everything we are getting at is how can we get credit for what we are doing, and also recognizing that the way we are currently simulating things is not reflective of reality either. What goes on in one part of ag can impact the other parts of ag. To Gary's point of calibration, this is a regionally calibrated model. So, in many regards, we don't need to think about what goes on on an individual farms. It's very large watershed scale impacts, and the calibration may be the difference between what's coming from point source, forest, and total ag, and then how you differentiate different ag. So, that's sort of what we're talking about here is how would that process go on in Phase 7 if we were allowed to have land use that more reflected reality and allowed us to get credit for what we've been doing for well over 20 years?

Tom Butler: Thanks, Bill. John?

John Fike: Part of me would ask if there's an opportunity for me to get some sort of training on how this model works to think about what the nitrogen or other nutrient flows are through these systems. I think that could be certainly informative, and maybe even helpful, at least for me to be able to give some qualified response to this. I don't know what you are doing relative to getting the estimates. So, with the risk of being redundant or silly, one of the questions I would ask is, if you're going to look at these specific counties and think about nutrient inputs from hay and pasture management, what's the potential to actually work with the local extension to survey farms to get a better sense of what they are doing? Maybe you've already got that, but it strikes me that, if you don't have that kind of ground truthing, that it's certainly doable. An extension could be very helpful to you in that regard. So, apologies for my questions out of ignorance, but that's where I am right now.

Bill Keeling: You'd also have to collect what they were doing in the 1980's and how they've been doing things throughout the years because the calibration will be over decades, and we need to reflect how things have changed over time.

John Fike: To go from today's landowner to the landowner from 20 years ago. I get it, but that may be possible. Again, you are saying we don't have to worry about individual farms. This is a watershed model. But, maybe you get enough of those farms that have some of that longevity in records. Maybe you can pull some of that together. I would guess that a lot of the farms that don't have records probably don't have as much in terms of fertility inputs in many cases. That's speculative. Anyways, just a thought here, Bill.

James Martin: We recognize we can barely distinguish hay from pasture in land use already. We rely on ag census to help us make that split, so we certainly aren't going to be able to differentiate from aerial imagery or ag census, managed hay from unmanaged hay. What we would propose is using nutrient management records as the basis for setting the number of acres in that managed class. Like with several other land uses in the model, states report how many acres of construction they have each year. That's based on their erosion and sediment control programs across the states, perhaps. We would report, similarly, the acres of managed hay or managed pasture based on our acres reported as having nutrient management plans on hay and pasture. That's how it would not be a survey of farmers. It would be either reliant on ag census as we have done historically or, in this case, to differentiate the managed class using our nutrient management records as the basis.

Hunter Landis: My question for Dr. Fike or other agronomists online is, if we look at average hay yield data across the state, to me, seeing those numbers of hay yield, it showed that they had to put down some nitrogen. I think we're putting down more than just 35 pounds of nitrogen per acres across the state, or across the bay watershed, to get those averages. So, is it agronomically or scientifically possible that we are really getting those yields by only putting down 35 pounds? Maybe that's one folks want to kick to somebody else, but thanks for the time.

Benjamin Hushon (in chat): Thomas, if you want more input on the hay and pasture in Maryland you can call on me. I have been listening but was not available to talk until now.

Tom Butler: Ben has just offered to talk about this a little in Maryland. Ben, can you take that one?

Benjamin Hushon: I'm going to go backwards just a minute on the managed and unmanaged pastures. So, we have agronomists in the field that work with growers, and it is interesting when you talk about through time. 23 years ago, when we opened our Ag retail business, triple 19 was normal. We did this calculation a year ago, we looked back, and one out of six people that we do soil samples and make a recommendation for actually follow through on any of it. I guess it's sticker shock on what the cost is going to be. So, I'm not sure how you manage that, and on the flip side, I know University of Maryland recs let us put 80-100 units on. 60 would probably be the top rate that we have ever recommended, and then a second application never gets put on in a pasture situation. As long as it's green, they're happy. In the hay side, it's the same scenario. University of Maryland says you can put 80, 100, sometimes 120, on managed hay, and anybody doing hay would tell you that if you put more than 60 units on in one pass, it's going to get too tall to rake, and you'll have trouble drying it down. They almost never get around to putting a second application of nitrogen on. Then there's the unmanaged, where we can drive by and see hay fields that we know haven't had lime or fertilizer in maybe 10 years. The final thing was an earlier question. I don't see any increase in hay or pasture acres in anything significant over the last 20 years. So, that's all I had.

Mark Dubin: I have a couple things now. One of those we did look at for Phase 6, but weren't able to move forward on it. USDA does have a natural resource inventory system and they look at, over time, specific management actions and applications of nutrients on those GPS locations across the country. Maybe that's something that would be worthwhile to take a second look at. With USDA, we weren't able to access the information before, but it would be worth maybe asking again. That might give you some good information about change in management over time on different agricultural land uses, so just a suggestion there. James, as you were saying, if you created these new land uses, they'd be based on the acres you had under nutrient management planning. The question I had for you is if we would set the application rate based on the land grant university recommendations on these new land uses. Did you think about the fact that implementing a nutrient management BMP on those acres wouldn't change the application rate, because you'd already had the nutrient management application rate as being your base rate. That's different, of course, than what we do with other acres where we have a higher rate that's reduced when you apply core nutrient management on it. I didn't know if you wanted to speak about how that view might work.

Tim Larson (in chat):

Tom Butler: I think James might have been off for part of that, so you might want to repeat that.

Mark Dubin: If the nutrient application rate on these new land uses would be based on the nutrient management rate. So, applying the nutrient management BMP against these acres wouldn't result in change, right? It would be the same rate. I just wanted to make a note about that that if we have a land use that's already set a nutrient management rate, applying the BMP wouldn't change that for coordination of core phosphorous, at least. Have you thought about that?

James Martin: Yeah, I've thought about it and recognize that there may be some modifications to the proposal needed as we see how things play out. You'll notice here on the table legume hay, for example, has a 1.2 non-nutrient management nitrogen multiplier. That is what we would propose using for the managed hay as well. I recognize your point that if the acres of the land use are set to equal exactly the acres by county that we have in nutrient management plans, the non-nutrient management acres in that land use would be zero. I recognize there may be an issue there, I'm just not quite sure how to solve it yet. I'm looking to get suggestions.

Tom Butler: I certainly hope to do that. Mark, the first part you said was about the natural resource inventory. I think we have Candiss online today and maybe she has some experience with that or the availability of that information. Mark, can you ask that to Candiss?

Mark Dubin: Candiss, I know that there's a national resource inventory survey system that has been in place across the country for years where they interview producers about specific GPS points about their management, nutrient application, things like that. That's utilized to look at trends nationally. That was something that we were interested in way back when we were working on Phase 6, but it didn't work out at the time. I didn't know whether or not that data would be helpful to maybe look at changes in nutrient applications over time on things like pasture or other hay that might help inform the discussion on this.

Candiss Williams: That's through CEAP, so you are right. They're not going to allow us to share point data, but aggregated data, which I think would be helpful. I know in earlier phases of this

Table 3-13: Non-nutrient management application goal multipliers

Land Use	Non-Nutrient Management Nitrogen Multiplier	Non-Nutrient Management P Multiplier
Full Season Soybeans	1.2	1.5
Grain w/ Manure	1.3	3
Grain w/o Manure	1.2	1.5
Legume Hay	1.2	1
Silage w/ Manure	1.4	3
Silage w/o Manure	1.2	1.5
Small Grains and Grains	1.2	1.5
Small Grains and Soybeans	1.2	1.5
Specialty Crop High	1.3	2
Specialty Crop Low	1.2	2
Other Agronomic Crops	1.1	1.5
Other Hay	1	1
Pasture	1	1

work, there was a specific project done with CEAP specifically on the Chesapeake Watershed. They did not do that this time around. I'm not sure if it was because they didn't collect enough data points or not, but that is definitely something we could ask, even if it's just providing the report. No interpretation of it, but just the data itself, we can get that. Just know that it's going to be aggregated.

Mark Dubin: I appreciate that, Candiss. That's exactly what we are looking for. We don't need the point information, of course, so we definitely recognize the need for privacy on that. I think that might be helpful. As you said, there was work done for the Bay region back a number of years ago on there. Even if there's new data that's on a national basis, if there was the opportunity to select data for this region to look and see what changes there might have been would be helpful, I think.

Candiss Williams: We can get it for just the Chesapeake Bay. The national is in the public report, which is already released, but specific to the Chesapeake Bay, we could pull that data.

Mark Dubin: Yes, I think that would be germane to this discussion if we looked at the Bay Watershed area for sure.

Candiss Williams: Ok, no problem.

Mark Dubin: Thank you, Candiss.

Tom Butler: James, I don't know if that's something that you would like to use and maybe compare to nutrient management over time to see if there was a useful relationship there. Just a potential data source to help out with the history part.

James Martin: Any lines of evidence that can inform the process, I would certainly welcome that. I saw in the chat from Maryland, and I heard Dave from West Virginia with a different list of counties. I just used the same list of counties from the presentations and data pulls that you guys had done previously, when we put together this proposal and suggested the outputs that folks could review. I am open to those changes. I don't know how much more work it would be to go back and re-create other counties with the previous analysis done and then adding this.

Olivia Devereux (in chat): Candiss, we would prefer to have data for the longest time period available for all the counties that intersect the states, even if some part of those counties are outside the drainage area of the Bay. Also, data at a county scale or HUC12 is best. Sometimes CEAP and other folks with data use HUC8, which is fine, but a little more difficult for us. Thank YOU!!!

Tom Butler: As Gary said, this is not easy to get into, so I really do appreciate the effort being made there and then the effort here to understand that from the group. To keep this going, I want to gauge how we might do this. It's a lot of work to make the new land uses. We've had some discussions in the past to get to that manure application strategy, and I want to make sure we're not deviating from some of the things that were said there. We had set up those four categories for manure based on what we thought would be preferential applications to certain crops over others, and I want to make sure that we aren't getting away from that in terms of input to move this forward. We talked pretty extensively about those manure spread groups. This is something that is also part of this proposal as well, to put managed other hay in that Group 1. We had discussed the prevalence of grains, particularly corns and wanting to apply manure to those first. This is a little deviation from that. Same for Group 2 with pasture. This is a little bit different than I think, and Curtis I am going to lean on you here, with what the intent may have been originally for setting up the groupings. Is this something that still registers as fine with people, or do we want to propose a slight alteration on how this is set up?

Curtis Dell: It sticks with our original intention. Back in the AMS, we were just trying to get that priority to corn first and then to go to the other hay. So, this is consistent with that idea.

James Martin: The manure that we're spreading on these crops is being gathered in animal operations where there's some period of confinement. Those operations are very often associated with hay fields because they need feed for those confined animals and pasture, because those animals aren't in confinement 100% of the time in many cases. That's why we thought it should definitely slide to the left in the framework. Obviously, moving manure down the road is an expensive proposition, so it's going to be, in all probability, applied in close proximity to where it's collected whenever possible. That's why we thought these hay and pasture managed acres, where we're suggesting higher application rates, would move to the left on the spread scheme here.

Eric Rosenbaum (in chat): How is Group 1 vs Group 2 differentiated?

Tom Butler: Just for some clarification here in general, this set of groupings, Groups 1, 2, and 3, were basically determined that those were the groups that would get the applications of manure first. There's a question in the chat about how we differentiate those group ones and twos. It's essentially the prioritization of manure and saying that the intent is really to apply to certain land uses that have specific crops in them before you would apply to other ones. So, kind of an evaluation of where that manure is going to work the most and where you are going to want to put that. Hopefully that gets at a little bit of the foundation of that. If people have more questions, please ask them. I want to make sure that we are on the same page for this as well.

John Fike: I guess I was reading the small grains and thinking about that in a silage context, so that was kind of my bad for not thinking about it in a grain context. I was thinking grain with manure and silage, but silage in a corn silage context or a small grain silage context, and that's often double cropped, too, right on dairy operations. I just wasn't thinking from the grain context. Apologies.

Ken Staver: I think that's an important point. This is a reporting thing. It's dairies and they're planting a winter cereal for a forage, but that gets lumped into a double-cropped land use. That land use gets manure at high rates. So, if silage acres with green chopped winter cereals are getting lumped into double-cropped, then they're going to drop down in the manure priority when, in fact, they shouldn't drop down. So, that was an important point he made.

John Fike: I'm just trying to think about what life was like on the farm when I was a kid. You get the corn off the ground in the fall, and you're trying to clean out the barn before you put small grains in, or maybe you can't do it. You get it on after the small grains are up. If you had a deficit of feed, particularly, you take that small grain crop again in the spring and then try to get manure out before you got the corn in the ground.

Ken Staver: I think in a big farm it's that way now, and it's pretty intense. My sense is, in dairy country, when that silage comes off, the manure gets spread, and something gets planted. I see a lot of that. I think that got ramped up maybe from when you were a kid, but it's the same general system.

Mark Dubin (in chat): I can personally support the recommendations that John and Ken are discussing on manure spread for small grains.

Bill Keeling: I want to be clear what the proposal is, because there's a slide that talked about the managed hay and pasture getting the non-NM multiplier and Mark's question about no benefit. If we use in proposed rates, we need to look at that a little different. I think there is a benefit if we use the non-NM multiplier. You're multiplying the land grant university rate by 1.2 and, therefore, the nutrient management would be at 1, so that would be the benefit. There would be a reduction. I think the proposal is you're not going to load to the land grant university for the manure etc., but at 1.2 of that for the other hay, right? Like you would for the other crops?

James Martin: I think that makes sense. Before the nutrient management BMP is applied to the nutrient acres, the load the application would have been 1.2 times the 120 lbs of hay, for example. When the nutrient management BMP is applied, it would come down to 1. So, the total acres of

managed hay was equal to the acres of the nutrient management. Ultimately, when the nutrients are applied, they'd be applied at 120, assuming we precisely hit our anticipated application. We won't. It'll be somewhere above or below that line, probably above. But, I think this discussion about the nutrient management ratio is an important one, and one that we want to resolve for Phase 7. Having almost 40% of agricultural acres across the watershed presumed to have nutrient management and, therefore, no quantifiable benefit from implementing nutrient management as a practice on those acres, is problematic, especially as more and more fingers continue to point themselves in the direction of non-point sources as our remaining challenge for Bay restorations. I guess what I would suggest is let's take these things one at a time. We wanted to give you the big picture of what we're trying to move forward, but let's think about this nutrient spread first. Particularly with nutrient management, these things are closely interrelated, and, in fact, I don't know for the graphics that you previously developed using 2020 conditions, if you assumed 2020 level of nutrient management when you were making those nutrients spreads, or if you even factored in the non-nutrient management factors on those data.

Lisa Duriancik (in chat): Just to clarify, NRI data would be on land use and soil characteristics at NRI points. A subset of NRI points has a survey on management and related conducted on it with a producer and by an enumerator. That selected survey is part of CEAP Cropland. Scale of aggregation will be determined by points available to represent the aggregation scale, so that may be larger (HUC 8) for the CEAP data because it is a subset of points of the NRI. Candiss will have to work with our Modeling Team to determine what scale of data can be shared as aggregated based on representativeness and number of points with a watershed. If you are looking for NRI data it may be able to be aggregated at a smaller scale, whereas CEAP Cropland may be a larger scale because it is a subset of NRI points surveyed. Hope that makes sense.

Tom Butler: I'd have to go look back at exactly what those were for the plots that you showed, just to be sure what's in there. I can check on that, especially as we go forward. We have a proposal here that the group seems to be OK working through, and I want to gather that. So, it seems like there is some level of support to look into how to deal with this because it's recognized an issue, and that's the big take away that I want to get out of today. There is a concern. We don't necessarily know how to deal with it yet. This is potentially one way to do it, and I want to get a feel for some of the other people on this call if this is a reasonable thing to be doing. It seems like Maryland has indicated that they're OK with doing it. I want to hear from some other people who have been a little bit more quiet today.

Lisa Duriancik (in chat): For the group also, just released last week are regional reports from the CEAP 2, but they are crop production regions, not water resource regions: <https://www.nrcs.usda.gov/ceap-ii-regional-reports>. The Bay is split among several regions.

Scott Heidel (in chat): if it increases accuracy, PA would support

Cassie Davis (in chat): I'm still taking it all in, I agree with Scott

Dave Montali: I do know that with regard to the issue about not getting credit for nutrient management, we know that our department of AG does some of the highest percentages of their nutrient management on hay and pasture in counties where there is an excess of chicken litter. So, I haven't heard grumbling back about not getting credit for nutrient management because they are indirectly getting it the way it's set up. I'd just like to see how this spread goes. Part of me says, in those excess counties, it's not going to change much. I would be concerned if in a non-excess county, the approach somehow violates reality based on what the gentleman from Maryland said that one out of six plans written for hay and pasture actually get the application. So, there's some worry about an unintended consequence. I'm fine with trying something out and seeing what we can get from step one. I think the real work comes down to are we approximating

reality best by this new approach by looking at result in loads, or how much more from the fertilizer bucket goes to a place that isn't getting it now? I'm willing to go along and see what happens here.

Elizabeth Hoffman (in chat): We won't be impacted as much in MD, less acres of these LUs, but we support a fellow jurisdiction and exploring this if it helps them communicate their land management efforts better in the system we all have to use. We'd prefer not to borrow concern until we see the impact of the decision.

Tom Butler: I want to be clear that this is not a trivial effort. We did talk about land use for about 18 months and agreed that we couldn't agree on changing them and that was to aggregate previous ones that existed. This is a different lift. It is still substantial. So, when we're talking about supporting the effort, I want to make sure that it's not just support to look at it. Obviously, we want to see what happens, but we are short on time in this group. We have until September, and we do have a lot to look at. I understand this is a big issue. I understand there's a lot of weight behind it. When we're looking at examining this, I'd like for people to also be thinking about supporting the outcome behind it. There's a lot that goes into this, and doing the work is going to pull from other things that we could be doing. So, I'm not saying we shouldn't do this. I support people bringing stuff. I support people getting improvements. As we think about this, I would like that members think more than just we're going to look into it, because it's not a trivial thing to look into the land uses. It's a foundational unit that everything else is based off of. It could have a big impact one way or another on jurisdictions, and it could be good in some and bad in others. We don't know that. But, it's important to have all that in mind as we look and not just that we're going to look to see what happens.

Candiss Williams (in chat): Thanks Lisa for clarifying it will be CEAP data.

Ken Staver: Are you talking about this slide, or are you talking about creating the different hay categories? What are you talking about?

Tom Butler: So, the first part of this is to make new land uses and to have associated rates and relationships of those land uses to what we currently have. That is foundational. That is what we had very good discussions about for 18 months. That led us to looking really heavily at the ratios that were currently there, potentially getting rid of them, creating new ones, and we couldn't agree on that before. I want to make sure that something has changed, so that we can move forward with this. That's the first part. The second part would be to assign those rates, and then Step 3 is going down there. The first part of this is changing the fundamental units of CAST, and we couldn't agree on that before. We need to now agree on it here. Maybe things have changed, and that's fine, but that's the first part of this.

Ken Staver: This was not a part of that original discussion about changing land uses, right? That one was more about getting rid of the manure land uses. So, this is a totally different version of that discussion of land use.

Olivia Devereux: Ken, this did come up when Helen and I presented on it back then. Bill had brought it up, and we talked about different ways of handling it. One way was through a BMP, and one was through the land uses. As long as it got handled, I believe Bill was OK with it. But, I think it got dropped. So, this was brought up back then.

Ken Staver: Well, it didn't get most of the attention I would say. It seems like Virginia has done a lot of leg work on it. Pennsylvania and New York are the other two with a lot of hay ground. All those three states are about the same 400-600,000 acres. So, it's a big issue for those states. It doesn't seem like it affects the other things so much, except that it will pull nitrogen fertilizer away from the other land uses which is what others were kind of alluding to with the unintended consequence. If we're really underestimating N applications on grassland, and it's acreage, and

we have this bucket, than what we have right now is a 60 lb increase per acre in corn acres, since 2010, watershed wide. So, part of that might be because we're not dealing realistically with the grassland in the watershed. So, overall, some version of this I support.

Bill Keeling: I guess there's a disconnect because I'm seeing things when I look at the applied nutrients in CAST, for CAST 23, looking at the 22 progress. I'm just picking Frederick County, Maryland, and it lists total application per acre of 97.68 lbs. I'm not understanding how that relates to the 15 lbs that pasture gets.

Tom Butler: Obviously things will vary by county. It doesn't inherently mean that you only get 15 lbs, and this was a discussion that we had for Phase Six about how nutrients spread. That is based on that application strategy that we talked about where you might meet your crops' needs for corn and double cropped and then you get to pasture and, because of elements of when that could go down or not, that may have shifted and pushed the manure and/or a little fertilizer on to pasture. So that is saying that you will have an excess manure, and it doesn't mean you can't have more than 15. It means it's calling for 15. But, if you have so much manure, you can theoretically apply that level of manure. So, in an area where you have a large amount of manure relative to some of your crops, and it's all crop specific for each county, you can theoretically get to that level.

Bill Keeling: No. I think part of the disconnect is the numbers in CAST reflect the direct deposition as well, and that's not really being factored in. So, we have the notion that there's no benefit to nutrient management on pasture. Maybe in reality, it's not getting all these nutrients, but what's going on in the model is that land use is getting hit by a lot of nutrients in places where there maybe aren't lots of animals. I don't think Frederick County, Maryland, is known for lots of animals, but maybe I'm wrong. Maybe it's just a lot of grazing animals. I'm just saying, there's a disconnect in what the model is doing and what you can get credit for. If we are in fact loading pasture well beyond what we can get credit for, then why can't we get credit for nutrient management on it? It just doesn't seem to make sense.

Tom Butler: I'm not going to argue on any of that, Bill. I totally understand where this is coming from. So, I just want to make sure understand how we want to move forward. I think this proposal is a good one. It's thought out. It's working. You put a lot of effort into it, so I want to make sure from other people on the call, that we are in agreement on how to do this. I think there's, obviously, refinement that needs to be made, so I'd just like to hear from some of the other jurisdictions and parties on how they think that could work.

James Martin: So, you've heard from Virginia, West Virginia, Maryland, Pennsylvania, and New York. Who are you looking for, Tom?

Tom Butler: I'd like to kind of get their input on how to change it, rather than just the support. I understand that, and I think that's important. So, that's kind of why I'm asking for how to alter the proposal if that's what we want to do. If not, that's fine, we can move on. I just wanted to make sure everyone got the opportunity because it has been quieter from Delaware. We heard from Scott and Cassie in the chat. I wanted to give them an opportunity to put their voices in, as well as some of the people from USDA who are on the call.

Ken Staver: Is the proposal that the breakdown of the current other hay and pasture into these subcategories would be a state reported data? Obviously, it's not going to be a NASS kind of data. So, the states are going to decide how they would break it down?

Tom Butler: I think James talked about using nutrient management plans reported by the states.

James Martin: Ken, that's there in number one. This is just a way we thought we could try and distinguish. If the AMT thinks we're better off using a default percentage of the total pasture categories that come out of the ag census, as we did for this proposal, it could be 10% of pasture

and 25% of hay. We could set it that way. Our thought was to use nutrient management as the guidepost and as the mechanism to determine the acres that would receive this higher rate. Open to other proposals.

Ken Staver: So, the other states, they'd have to do a survey like you guys did and come up with a number?

James Martin: I can absolutely say this with certainty that, here in Virginia, we have fewer acres of nutrient management on hay and pasture because the current state of the model does not provide you a quantifiable benefit by reporting that BMP. It has not been our focus to write hay and pasture nutrient management plans. We have some, but not nearly as many as we would if it got credit like cropland does. I suspect there may be that condition across the watershed. There are some areas, obviously, receiving poultry litter, receiving biosolids, that are required to have nutrient management plans. So, we have some for sure.

Clint Gill (in chat): Hay and Pasture are not a huge issue here in DE so we'll defer to the jurisdictions where this is an issue

Bill Keeling (in chat): Frederick County MD for 2022 had 25024 acres with zero manure N applied some biosolids and 437804 pounds of TN fertilizer applied as part of the overall 97 pounds per acre applied.

Alex Soroka (in chat): Could we get to the same answer without changing the land use categories? So instead of the "managed" categories we could change the overall rate? That rate modifier could be calibrated by the LGU recommended rates. So that 15lb would be modified differently for VA and MD. This modification would get a variable rate for pasture/hay with "managed" baked in, while reducing the work to run this scenario

Scott Heidel (in chat): I like the proposal and have no changes to recommend currently. Thank you for taking the time to analyze and bring to the AMT.

Alex Soroka: Because it would take an awful lot of work to change the land use category, could you get at the same answer without doing that? The 15 pound rate that is currently used for all pasture, for example, you could use a rate modifier for individual states. This would reduce the work needed to change land use categories, and you could get at the same answer. As long as we document that change, it could still be valid.

James Martin (in chat): Thanks Scott.

James Martin: That was the first test we ran, I think. It was just increasing the hay application rate or anticipated application need for hay. We increased it in Virginia, and it was not a successful experiment because we all rely on a common shared fertilizer bucket. So, doing the test absolutely did change the way manure was applied across those land uses because that stays in the county, but it also imported a bunch of additional fertilizer into Virginia. That was our indication that this can't be a one state only solution if we want to change the rate on hay in Virginia. To Alex's point, I wonder if, rather than going through the work of creating the land uses, could we just pretend that 100% of hay and 100% of pasture were managed and apply at these rates? It would be the opposite use case from where we are now but would certainly be easier to implement. I'm not sure it would be as instructive because I don't believe we'll ever get to the state where we have 100% nutrient management on those land uses. I have to rely on a modeler's brain to figure that one out. It seems like it might be a viable experiment, and an easier one to do, I'm just not sure we'd learn as much from it.

Tim Larson (in chat): the modifier won't change the manure application priority groups

Alex Soroka (in chat): James that's what I meant, each state would have a different "weight" for pasture.

Mark Dubin: For the proposal #2, are you going to go back and look at maybe that's a 1.2 application rate versus a 1 for nutrient management? That might be modified when you think about it and come back to the group, correct?

James Martin: I think that's a question for Tom and Jess. As I said, I don't know how they factor the nutrient management or non-nutrient management factors into their previous analysis. I would say we want to be consistent with that prior analysis so that you don't have to redo all of the work. Whichever way that was done is how this one should be done.

Mark Dubin: The other thing was that if we take a look at the NRI CEAP data, there may be a reason for us to go back and look at the base current application rate on these land uses as well. So, there's another opportunity for an adjustment there outside of the Virginia proposal.

Dave Montali: It's becoming clearer to me that this is a resource issue that may end up being of concern, given that we've got to be done by the end of summer on all the work of the AMT. So, I get the sense that maybe we need to hear back more from you about if a land use change is doable now, or at least doable to the extent that we need it for this first step. Are you in a position where, if the group wants this, we can do this without seriously jeopardizing all the other stuff that we've got to do, or not? We need to talk frankly about this, because I get the sense that maybe we can do some kind of scenario here to evaluate the spread, but it's going to take a serious amount of work to pull this off, I think.

Jessica Rigelman: It's a significant amount of work because land use is one of the fundamental pieces of the model and not even talking about loads. That's a different person's work in the modeling work group, but it's reassigning all the BMP's, all the land use groups, everything. It's not hard work; it's just very tedious and time consuming. It can be done. It's more just getting a feel for it this is a proposal that the group supports moving forward on because, if we end up backing out of it, we've lost a significant amount of time to go back to what we were doing. Doing a blended rate for nutrient management for managed hay and managed pasture is fine, but it doesn't address the concerns of the nutrient use priorities in the curves. So, the easiest way to address that is to have two different land uses. So, there's kind of a hybrid here in which we could have a blended rate where states report managed hay, managed pasture, and get credit for nutrient management on those. There would be a blended application rate of whether it's managed or not managed, but the nutrients spread wouldn't change. It would just have hay and pasture. You'd have to know that that's a blended rate, or we could just do the full on changing of the land use. My concern is that if we change the land use, you all decide it isn't exactly what you wanted, then we have to go back, because this is several weeks' worth of work. We would have lost that time. I don't mind doing it, it's just a resource and time constraint issue.

Elizabeth Hoffman (in chat): MD supports VA, we have no suggestions for changes to the proposal at this point as they've done the homework and are more familiar.

Ken Staver: Jess, when you say blended rate, you're just saying leave the land use the way it is, figure out the percentage of the managed and unmanaged, then do an average rate for all the acres in the current land use. Is that what you mean?

Jess Rigelman: Yeah, that's what's done now for nutrient management. We have corn with manure and we have a blended rate of whatever it is with nutrient management and without, so this would just have an extra component of it of the managed and unmanaged. So, yes, it would be hay, but hay would consist of managed and unmanaged nutrient management and non-nutrient management components of that one application rate, and then the spread would be the spread for hay.

John Fike (in chat): Need to run. Thanks for the opportunity to join you. I would like to learn more and am certainly open to helping if there are places where my help would be useful. One comment

relative to LGU recs for pasture/hayfield nutrient application rates...many of these were developed in small research plots that don't mimic long-term fields in hay/pasture. Thus, the response (both biological and economic) and the consequent recommendations probably overestimates the value of the nutrient inputs - which probably explains that 1 in 6 producers applying to the rate recommended.

Alex Soroka: To your point about September, that means we realistically have 8 meetings left or 16 hours left to get this done together, which is not a lot of time. So, what I want to do is satisfy the needs of the jurisdictions in flushing out this proposal but doing it in a way that we get answers quickly that doesn't tag Jessica too much. Would that modifier get us close enough to seeing if this makes a difference? Changing land use to go forward and backward could burn a lot of time that I'm not sure we have.

Tim Larson: Are you proposing setting the LGU rates for the existing hay and pasture units and then a modifier for the non-nutrient management that would be, instead of one, it would be less than one, like 25% or something like that? So that would apply the non-nutrient management rates at 35 lbs and 15 etc., and then everything that had nutrient management would be set at the LGU rates. Is that what you're thinking?

Alex Soroka: Yeah. Something like a blended rate like this where we don't touch the land use.

James Martin: What I would suggest is if we're going to try and find an alternate approach that does not create these new land uses, that we do it in a way to test as much of the rest of the recommendation components as we can. The only way I see doing that is if we treat the existing hay and pasture as though they are managed, and we apply the land grant university rates to all of the acres in those existing land uses, and we move those existing land uses to where we propose here. Hay would go into Group 1, pasture would go into Group 2, leaving Group 3 empty. I.e. putting us back to three groups, although different groups than we had previously. I don't know the workflow, Jess. That may be just as much work as creating the new land use. I do want to be able to test as much of it as possible through this scenario. If it's something unique about creating the land use, that is the cumbersome part, let's look for a solution to that by treating the existing land use as though it's 100% managed, sliding it from Group 3 into 1 and 2.

Candiss Williams (in chat): I like to his idea.

Jess Rigelman: That can be done. That's easy to do if we're not creating a land use.

Gary Shenk: I think that test would probably show what fertilizer manure is going to go on the crop of pasture, but I don't think it's a solution that we can do in the long term in terms of putting it into the model. If one county had all this nutrient management pasture that was getting a load that was 50 lbs higher than the watershed wide average, and you have a sensitivity to that of 20%, then you're going to have double the loading rate. Then another county has no nutrient management pasture at a loading rate that's 50 lbs lower than the average, then they're essentially getting a zero-loading rate. So those sensitivities are set up for land uses, which are all essentially getting a very similar loading rate. Maybe some counties are 10 or 20% higher than the others, but when you have these really disparate input rates for the same land use type, then we're going to end up having potentially some negative loading rates. I know there are checks for that in the model, but everything with nutrient management is going to have a really high export rate. Everything without it is going to be really low. So, that's one thing we have to deal with. Although, we can see what happens to the manure fertilizer if we run this test.

Dave Montali: I was just thinking, why does it have to be 100%? We have a blended rate now, although we don't know the documentation there. Like James said early on, maybe somebody thought that only a fourth of the land use was being managed, so we're going with a fourth of the recommended loading rate. Would it be possible to test higher constant values with the

regrouping of things to see if that makes it any better? In other words, instead of 15, 20 for all pasture, or 25 or something different? Why do we need to go to the drastic 120 for hay? Maybe just changing the average based on some assumptions about how much hay gets managed and whether people really put it down or not. Is that a possible way to judge the spread?

Olivia Devereux: Does the fact that we currently have a watershed wide fertilizer stock affect how this test is done? I know the next discussion will really be about how to take that fertilizer stock down to a state or some other scale. I am just not sure how that affects this test and want to make sure that the scenario works with our current constraint. Does it work with our watershed wide fertilizer stock?

Jess Rigelman: It'll work if everybody makes a change together. It doesn't work if states make drastically different changes. The reason Virginia's hay increase didn't work is because there is a watershed wide fertilizer bucket, and they attracted more of it. If everybody increased at the same sort of rate, then that wouldn't be a factor. That also depends on how people report their managed and unmanaged pasture, and if they say that there's no managed pasture and no managed hay, then they're going to have lower application rates anyways. Therefore, that fertilizer bucket is going to be an issue as well.

Ken Staver: Jess, have you done CAST runs on those datasets with Virginia having their much higher rates on their hay? Are there actual load calculations from that, or that hasn't been done?
Jess Rigelman: We can't do loads at this point because we're on an entirely different model, and the fact that we did grain splits and made other changes, the loading calculations don't work. So, I can only do it as far as inputs.

Mark Dubin (in chat): The pasture application rate was based on an analysis of actual producer reported data from the MDA NMP Annual Implementation Reports, not an estimate of a percentage of total acres.

James Martin: It just occurs to me that if we tried these workarounds and they produce a result that we think is favorable, we're still stuck facing the need to develop these new land uses. So, ultimately, it's likely to be a net sum game in terms of time. Whether we create the land use now as part of the test, assuming that we like the results and that there aren't unintended consequences, I think it would stay. I hope it would stay. If we use one of these other methods and we like the result, we're going to want to move forward with the next step of the test which is creating the land uses. But, we could potentially do so in a more informed way appealing to the time concern. I'm not sure, in the long run, it really matters because if things work through, we're going to have to do it eventually. I think there's general sense from folks I've talked to and who understand this that, if we run this test, it's going to have that effect of moving more nutrients away from the corn grain, corn silage, and other cropland uses, toward these managed classes of hay and pasture. So, that's an important part of what we are trying to accomplish. At least for that point, I would argue let's just bite the bullet and go forward with creating the land uses, in all probability, under some arrangement, we're going to need them anyways.

Dave Montali: Wouldn't, to some degree, a higher blended rate for all pasture and all hay and a shift from the order, make a step in that direction of moving nutrients from something else to the hay and pasture? You still wouldn't be able to get credit for nutrient management. I don't know how important that is for different jurisdictions. Isn't a higher blended rate for the regular old pasture and hay, and moving that order, a way to work around without changing the land use?

James Martin: It is a way, in my view, to see if in fact nutrients move the way we think they will move as a result. More will go toward the hay and pasture land uses with the elevated rates, and less will be applied above the identified or anticipated application rate for the cropland uses. Seeing exactly how that plays out in high manure versus low manure counties, is the part that is

harder for me to wrap my head around and guesstimate. If we're talking about Bay-wide loads in that chart that Tim had in the presentation, I feel fairly confident that in a Bay-wide scale that's going to be the effect. How it plays out at a county, is the part that I'm unclear about. Hence the desire for the test. Maybe it's a test that can be run, results sent out to the group, and folks can say, yeah, that seems to be moving in the right direction. We're going to give a thumbs up. Moving ahead with the land uses now and not having to wait a month to do the full separate land use test, that's a good approach. I don't think that just increasing the overall expected application on other hay uniformly across all acres or pasture uniformly across other acres would meet our desired goal that we're seeking to achieve with this set of changes. So, I can't see that as an end point, but would be a step toward the next test.

Zach Easton (in chat): would it be reasonable to reduce applications to the unmanaged hay and pasture. that might reduce the movement from the fert bucket, since several have said most unmanaged are not getting applications

Zach Easton: If one of the issues is the fertilizer bucket, if the unmanaged pasture and hay are truly unmanaged like several people have kind of indicated, could you reduce the applications to those to allow increases on application to the managed ones, therefore kind of avoiding that bucket problem?

James Martin: I would just say that they're each already at 1/4 of the land use grant recommendations and, as we've heard from some of the agronomists, you cannot sustainably harvest 2 tons per acre of hay without an application rate greater than what's in in the current state. That means even if they don't have a nutrient management plan, if the county wide or statewide average is 2 tons per acre of hay being harvested, that is not sustainable at 35 pounds per year. So, all acres need more because all acres go into that average. I hear you; I wondered about that as well. My inclination would be to try and hold those the same, just because we know those nutrients are needed in order to meet the yields that are being reported through NASS.

Zach Easton: Reality versus model but, yeah, I take your point.

Action: Candiss will work to get relevant aggregated NRI/CEAP data for the Chesapeake Bay watershed and distribute it to AMT group members.

Action: Tom will coordinate with Virginia representatives offline to gather the specifics of the proposed test of creating managed and unmanaged hay and pasture Land Uses in CAST.

Inorganic Fertilizer 10:00-10:55 [(10 min presentation 45 min discussion) (Tom Butler, EPA)]

We discussed possible paths for simulating inorganic nutrients in CAST for Phase 7. This included examining national scale nutrient inventories, and external modeling efforts to simulate inorganic fertilizer applications across the Chesapeake Bay watershed. **Informational.**

***NOTE:** We did not get to this discussion. The topic of inorganic fertilizer will be revisited at a future meeting.

Recap/Closing 10:55-11:00 [5 min (Zach Easton, VT)]

Action Items:

- Discuss: pasture and agricultural inorganic fertilizer for Phase 7.

Adjourn – 11:00

Up Next:

Office Hours: Friday, January 10th, 2024, from 8:00 - 9:00 am.

AMT Meeting: Friday, January 10th, 2024, from 09:00 - 11:00 am.

Participants

Zach Easton, VT

Tom Butler, EPA

Caroline Kleis, CRC

Eric Hughes, EPA

Tim Larson, VA DCR

James Martin, VA DCR

Gary Shenk, USGS

Olivia Devereux, Devereux Consulting

Dave Montali, Tetra Tech/WV/MWG

Mark Dubin, UMD

Cassie Davis, NYS DEC

Clint Gill, DDA

Scott Heidel, PA DEP

Jessica Rigelman, J7 Consulting, CBPO

Contractor

Hunter Landis, VA DCR

Ruth Cassilly, UMD/CBPO

Alex Soroka, USGS

Tyler Trostle, PA DEP

Bill Keeling, VA DEQ

Maya Korb

Benjamin Hushon, The Mill

Eric Rosenbaum, Rosetree Consulting/PA4R

Nutrient Stewardship Alliance

Jackie Pickford, USGS/CBPO

Karl Blankenship, Bay Journal

Elizabeth Hoffman, MDA

John Fike, VA Tech Cooperative Extension

Curt Dell, USDA-ARS

Emily Dekar, Upper Susquehanna Coalition

Kate Bresaw, PA DEP

Ashley Hullinger, PA DEP

Patrick Thompson, EnergyWorks

Arianna Johns, VA DEQ

Lisa Duriancik, USDA/NRCS

Candiss Williams, USDA-NRCS

Jeff Sweeney, EPA

Ken Staver, UMD Wye

Tim Hushon, The Mill

Tamie Veith, USDA-ARS

Seth Mullins, VA DC

**Common Acronyms

AgWG- [Agriculture Workgroup](#)

AMT- [Agricultural Modeling Team](#) (Phase 7)

BMP- Best Management Practice

CAST- [Chesapeake Assessment Scenario Tool](#) (user interface for the CBP Watershed Model)

CBP- [Chesapeake Bay Program](#)

CBPO- Chesapeake Bay Program Office (houses EPA, federal partners, and various contractors and grantees working towards CBP goals)

CBW- Chesapeake Bay Watershed

CRC- [Chesapeake Research Consortium](#)

EPA- [United States] Environmental Protection Agency PSC

– [Principals' Advisory Committee](#) (CBP)

STAC- [Scientific & Technical Advisory Committee](#)

TMDL- Total Maximum Daily Load

WQGIT- [Water Quality Goal Implementation Team](#)