Q&A from 8/12/15 EOF Monitoring Webinar

18. Where in NY?
- Answered during webinar – Genesee basin.

19. How do you account for sediment deposition trapped by the wingwall?
- Answered during webinar – very little deposition typically observed.

20. So, the "H" flumes appear to be the most versatile for edge of field monitoring?
- Answered during webinar – yes, they are sensitive at both high and low-flow, and allow for a fairly high maximum discharge.

21. Any thoughts on using drone aircraft for field monitoring?
- We presume this could be used for periodically observing field conditions/crop canopy, etc. Not really sure how it would be useful for flow and/or the water-quality side of things?

22. So, for power needs you use solar with a batter back-up?
- Large batteries are used to store the energy gathered by the solar panels. Not necessarily as a backup, but rather the way power is transmitted to the equipment as needed. (Without batteries, solar power wouldn't work at night!) Also, the power demands of the refrigerator and/or heat tapes can exceed the total outputs from the solar panels at any given point in time – even during daylight hours. Having that power capacity stored in the battery is what makes things work during those situations. Having the right mix of battery capacity and solar panels is the real challenge. Sure, you can go big with both, but the costs start to escalate quickly!

23. Is suspended sediment loss all soil lost from the field? Or is there additional as bedload that you are not able to measure?
- Yes, for the most part. Our sample intake point is just above the floor of the flume, so it is likely capturing the heavier particles that may be bouncing along the bottom. Matt is doing a study looking at use of a DISA (Depth Integrated Sampling Arm) to determine if flow is well mixed in the flume or if there can be significant stratification. Stay tuned.

24. Are there links to monitoring you have done on fields with summertime flood irrigation?
- Nope – not a big thing here in Wisconsin.

25. Do you observe any problems with sediment deposition upslope of the monitoring flume, where water may pond?
- See # 19 above.

26. How do you measure "Particulate P"?
- Answered during webinar – Total P concentration minus OrthoP concentration.

27. Have any of your studies looked at subsurface vs surface connected tile?
- Subsurface tiles with surface inlets – we haven't looked at these specifically, but we have observed blowouts (large vertical hole running from the tile to the surface) in every tile system we've monitored so far. Our interpretation is that the connectivity between surface and tile is much more direct than most people think, and that is one of the reasons why we see surprisingly high levels of sediment and P in our tile data. Despite this, we still see nitrate as the dominant form of N in tiles, which is not the case with surface water. This could be due to conditions in the tile that quickly convert organic N and/or ammonia to nitrate, or just that, despite the fact that some water is directly getting into the tile (no soil filtering), the amount of water traveling through the soil (creating suitable conditions for N conversion) is still significant, or both (or other!).

28. When you say frozen ground is that at the 4" depth, 6", etc.?
- Answered during webinar – frozen at any depth.

29. I guess that a reason why the tile lines flow year round is that the tiles are below the frost line in most cases?
- Sure, that's true. It also highlights the fact that tiles aren't just removing water that percolates downward from the surface. This is especially important Seems like a simple concept, but we've found that different folks have different perspectives on how tiles operate.

30. Are slides available for download?
- We may post online. It is our understanding that you can rewatch as well. If you really want or need the presentation or parts thereof, just contact us directly.

31. Is a soil health assessment being completed on these monitoring sites?
- Answered during webinar – yes for GLRI.

32. Open dialogues are very important, especially with partners.
- Couldn't agree more!

33. What have you learned about conservation practices and the impacts that they have on the various runoff variables?
- We are still in the infant stage of many of our true BMP evaluation projects. Historically the projects we have been cooperating with had a goal of trying to understand ag's impact on water quality. Not to say we don't have the data, but the initial evaluation of the data look at water quality impacts from varying farming operations and practices as well as avenues of runoff. Through this work we have started to build a solid database to start to understand the relationships between farming practices and runoff as well as what type or how conservation practices may influence those results. We currently have several projects built around the evaluation of BMPs, but as we mentioned, they are only a few years in.

34. Are you doing anything with the use of cover crops to help keep the nutrients from running off?
- Cover crops are a hot topic in the realm of conservation these days. They can provide cover from raindrop impacts and keep soil in place (think roots, too) when fields don't have crops and are more vulnerable to soil loss. We have several current monitoring projects evaluating the water-quality benefits of cover crops. Stay tuned.

35. Your O&M costs, are they based on a paired watershed project or single site?
- Answered during webinar – costs are for a single site. As we mentioned, everything is site dependent, so more difficult sites (low slope, clay soils, long distance from the office, for example.) might cost more, less difficult sites less…Cost savings can be found for multiple sites in one location, etc. We have projects where cooperators do almost all of the field work (sample collection, etc.) and that brings costs down to the lower end. Depending on the USGS office and the funder you're working with, cost-share dollars may also be available.

36. Please elaborate on your before/after change detection analysis methods, as opposed to paired.
- Answered during webinar – we do a stepwise regression with individual log-transformed storm loading data as dependent variable and our measured "ancillary" variables (antecedent moisture, precip, precip intensity, seasonal term, etc.) as explanatory variables, and compare pre-post regression residuals. This paper has an example of what we do http://pubs.usgs.gov/sir/2011/5119/pdf/WalkerSIR2011-5119_021612.pdf

37. Has cover crops been used in your testing areas to see any changes with and without cover crops?
- See #34 above.

38. How big of an impact could tile drainage structures have on reducing nutrients losses?
- We haven't evaluated the water-quality benefits of these devices in Wisconsin. They are not nearly as prevalent here as they are in flatter landscapes. That said, there are a number of published studies out there online that should have the answers you're looking for.

39. What BMPs are you considering for Feb and March?
- At this time, we feel like we don't really have conservation practice solutions for dissolved P in snowmelt runoff (or any other time period, for that matter). Until good solutions are found, a focus could (should?) shift from a "hard" or "soft" practice solution to that of improved management. This involves producer education. For livestock farms in Wisconsin, the major discussion points revolve around winter manure applications. When is ok? When is not ok? What do I do if I have to spread manure but the runoff is imminent? Lots of other stuff on this can be found on the Discovery Farms website *http://www.uwdiscoveryfarms.org/OurResearch/ManureManagementConsiderations.aspx*

40. How do you correct the data when you have frozen conditions that affect discharge measurements?
- Answered during webinar – direct discharge measurements are ideal, but very difficult. Frequent site visits during ice-affected periods are the most common way we deal with this. Once ice is cleared, we know the flow at that moment in time, and then we can correct the previous erroneous data accordingly. Correcting the data isn't always cut and dried, however. There can be a bit of judgement involved. We use direct observation, comparisons to nearby sites, ancillary data (weather station we talked about), and draw on our experience to make the best decisions we can during the really difficult data situations.

41. *tile drainage control structures

42. Can you elaborate on how in-stream phosphorus measurements are obtained?
- We're testing the Sea-Bird cycle PO4 sensor.

43. Excellent information and helpful presentation - will the slides be available to participants in the webinar, in ppt or pdf

format?
- See #30 above.

44. Is there a method to locate tile drains if you do not have a map?
- Aerial photography during specific field conditions can be a big help. We've seen divining rods used. Most of the time when we have to find one to install a monitoring station, the producer has a general idea of where a main might be. Then it's a matter of excavating until we find it.

45. How do you correct for surcharge/backwater at tile sites?

46. This presentation was great! Thank you very much. My question is about the data corrections used for freezing and other corrections needed. I'm needing to make these corrections for my research as well. How did you go about calculating freezes? Is there any published data that I can read? I'm using ISCOs and have had to throw out all my data when it froze because I didn't know the bubbler lines were frozen.
- See #40 above. Frozen bubble lines are a challenge, and one that can't be monitored very easily remotely. As Matt mentioned, we use heat tapes to reduce this problem. Also, when we are at the sites clearing them in preparation for snowmelt, we always check to see if the bubble lines are clear. If we have runoff and it freezes at night, we try to get people to the site the next morning to clear any ice that may be there, and to check bubble lines again. We try to do this before runoff occurs again. This is one reason why winter is so challenging, and how it can get expensive with people time!

47. Tried recording turbidimeters, with a relationship between turbidity and SSC (reducing bottles to analyze?
- Correct, that's something we are testing. If a good relation can be established between turbidity and SSC, then there is the possibility of not having to collect samples at a site in the future. The thinking is that cost-savings could be found. Currently, real-time sensors are relatively expensive, and there is still plenty of time spent keeping them operating properly and to work up the data.

48. Is it hard to call steeper slope surface runoff sites representative? In other words do you expect flatter slope fields to have different chemical make ups?
- When we use the term "representative", we mean "are the fields we are monitoring similar to a majority of the other ones in the basin? We don't necessarily want to be monitoring fields that are "outliers", so to speak, because the value just isn't there. As far as "do different sloped fields have different chemical makeups?" To some degree, sure, you'd expect less sediment to move in a flat field than a steep field. I would say though that unless you're talking extreme slopes or extreme flats, the soils, crops, conservation practices, management activities, etc. combined probably all have a larger role in the water quality outcomes than do the slopes alone.

49. Are there any statistical methods for a paired watershed design when only 1 watershed has run off observed?
- Yep, it does happen. If it's really bad, where one site runs off frequently and the other one doesn't at all, you've got to back to the drawing board (from a paired-basin perspective). Remember how we said that picking pairs is easier said than done? In this case, I would be working awfully hard to find out why there was such minimal runoff in that basin! There must be something to learn there! Our sites pair fairly well, and only have the occasional value at one site and nothing at the other. I should rephrase that – zero at the other site. Zero is a data point. Include that pair in the analysis.

50. How have you integrated graduate students into longer term monitoring projects?
- For USGS specifically? No. But other collaborators have had grad students working on EOF monitoring. That said, there aren't too many grad students that want to stick around for 7 years while we're doing a project!

51. Do you have any sites where you are looking at vertical manure injection as one of the manure management practices?
- Answered during webinar – not currently, but something we are really keen to look at. It holds a lot of promise, especially getting manure subsoiled on no-till fields.

52. How do you correct the tile data during surcharge conditions? What equipment are you using for stage measurements >>> area velocity probes?
- Partially answered during webinar – we use a nonsubmersible pressure sensor to measure stage. In sites where backwater can be an issue, A/V probes can sometimes be helpful, but not always. We've been fortunate that our backwater situations in tiles have been relatively short-lived (generally a few hours), but in situations where backwater might be more pervasive, use of a velocity meter would be a requirement for sure.

53. Do you have much data comparing your in lab compositing of samples versus in field flow weighted composite? Do the two methods of sampling differ significantly?
- Answered during webinar – we have some, and are generating more at the Alternative Monitoring Methods sites Matt

mentioned. From a technical standpoint, and all things considered equal, we believe that from a lab data perspective (final concentration), there should be insignificant differences between the two methods. We went through the practical field challenges that make the assumption of “all things considered equal” a real concern.

54. How do you define subsurface watershed boundaries with pattern tiling? Do you use a certain buffer out from the outer tile boundaries?
- Answered during webinar – we first look at surface-water boundaries. If water can flow overland from any area and end up directly over the pattern tile location, then it’s IN the watershed boundary of the tiling. A word of warning – we have heard and seen where trenches have been dug across watershed boundaries to allow tile to be installed, connecting the tile to areas that normally wouldn’t be connected from a surface-drainage standpoint. This is something you’d never know unless you knew the producer, or the person who installed the tile (or had a good map). In addition, if the tiles are draining “regional” groundwater, the flow paths of that water could conceivable come from a fair distance away. This muddies the watershed boundaries, and makes it awfully challenging to make cause-effect observations when you may not even know where the source of all the water is. Bottom line of tile watershed boundaries is that it can be VERY difficult to determine them. For this reason, one should always be wary of computing any runoff statistics that include watershed area (runoff in inches, yield (pounds per acre) unless one is confident.

55. Any vineyards been looked at so far?
- Answered during webinar – no, but we’d love to visit!

56. Subsurface injection of manure can have quick pulses to the tile line. You need to inject manure between tile lines and not inject across tile lines.
- From our experience, most folks don’t know where tile lines are. This is a good idea in theory, but, in practice it may not be reasonable everywhere.

57. How do you back calculate flume overtopping situations?
- Answered during webinar – measurements best, but really hard to get. We typically have to use surveying and various weir equations to do our estimates.

58. Have you seen any evidence that increased vegetative cover is increasing dissolved phosphorus in runoff?
– Not really, but that doesn’t mean we don’t have the data to show it. Over the next few years we’ll be trying to do some more “cross-cutting” of the data to look for things such as this. We have seen increased DP after alfalfa kills, so there is definitely P contributed by plant senescence in the “pool” of P.

59. Would nitrification inhibitors help address these leaching problems you have measured??
- Inhibitors could help to some degree. How much? Uncertain. It certainly wouldn't eliminate nitrate leaching.

60. Will a pdf of today's presentation be made available for download?
- See #30 above.

61. During our surcharge tile conditions, water velocity slows so much within the agri drain that we are unable to get accurate and consistent velocity readings. We do not have open intakes. Do most of your tile monitoring sites have open intakes?
More discussion in #52 above – loss of sensitivity (low signal to noise ratio) is a common problem for very low velocities like that, and that’s the case for all velocity probes. Since you have “noisy” data, you could either assume 0 flow until you start to get some better data that you had more confidence in, or estimate some sort of very low flow. We have tools that we can use to do this for time-series data, so it’s pretty easy for us. If you don’t have something like that…yeah, that’s not going to be fun. Most of the tiles we have been on did not have open intakes, but again, all of them had “blowouts” – direct conduits to the atmosphere.

62. Will today's presentation be available for download?
- See #30 above.

63. Correct undercutting?
- Answered during webinar – although as we read it now, we’re not sure if you’re referring to correcting the data or correcting the problem of undercutting. We think we answered from a data correction standpoint. From a physical standpoint, if it’s a small hole, Bentonite might work. For larger holes, digging down and over-excavating and putting a tarp backfilled with soil has worked. Yeah, that doesn’t really provide a good description – follow up with us if you need clarity.

64. Some of the low cost monitoring solutions offer significant cost savings over the USGS method of monitoring. Do you have an estimate of program cost savings using the high cost monitoring?

- We’re not really aware of what the costs are for any other monitoring program. We’ve certainly heard the term “low-cost” over the years. This typically is in reference to the equipment costs, and not necessarily O&M (staff) costs, which are the often the dominating factor in long-term monitoring projects.

65. I would love a copy of the presentation as well when available. Thanks!
- See #30 above.

66. Do you ever put core trenches in under the flume? Core trenches in ponds prevent undercutting.
- Never heard of that, but we’ll look it up!

67. Thank you.