Chesapeake Bay Program
Watershed Technical Workgroup (WTWG)
Meeting Minutes
Thursday, November 2nd, 2023
10:00 AM to 11:20 AM
[Meeting Materials](#)

Summary of Actions and Decisions

Action: If jurisdictions have questions about comments on their QAPPs, they should reach out to Auston (smith.auston@epa.gov).

Action: If you have questions about Tom's presentation, please reach out to him at thoward@resolvehydro.com.

Action: If anyone sees issues on the updated BMP verification page, they should reach out to Auston (smith.auston@epa.gov).

Meeting Minutes

10:00   **Introductions and Announcements** – Auston Smith, EPA (20 min).
- **Decision requested:** Approval of October Meeting Minutes.
    - The October and November meeting minutes will be emailed to the WTWG distribution list when they are complete for approval.
- 2023 Progress Schedule – Auston Smith, EPA
    - Auston provided an update on the 2023 Progress Schedule. Olivia was present to address these.
    - The team has been working since September 1st to ensure QAPPs are up to date and Point Source/BMP data are submitted. Jurisdictions have until December 1st to finalize all of these submissions. Olivia will cover these in greater detail later so Auston is focusing on QAPP submissions and BMP analysis.
    - Jurisdictions should have already received an email from Ruth, Durga, and Auston if they had any outstanding issues on your QAPP and the team needed further insight.
    - **Action:** If jurisdictions have questions about comments on their QAPPs, they should reach out to Auston (smith.auston@epa.gov).
    - The team will try to get BMP analysis done two weeks following the December 1st deadline in advance of the progress meetings being scheduled by Helen Golimowski.

10:15   **High Resolution Remote Sensing of SAV** – Thomas Howard, Resolve Hydro (30 min).

Thomas provided an overview of his company's high resolution/high frequency remote sensing data which can be used in SAV monitoring and other water quality characteristics of interest. He also went through some examples of use cases, followed by discussion.

Discussion:

Olivia Devereux: Stu Blankenship recently did the VA tillage survey and I'm wondering if this might be more cost effective in terms of time, money, and staff in for addressing tillage. Stu has a deep background in these sorts of methods and I'm wondering if its something that might work for VA or other states.

Thomas Howard: I think one of the things that need to be tested is how individual pixels can be used to understand and estimate the degree of residue and the degree of tillage in these different plots of land use. Initially in these time series you can see that this dataset provides high resolution imagery that can be used to describe at least qualitatively what's happening on the land.

Bill Keeling: I would think there is a high potential or there should be a way to remote sense residue. I don't know if it means bringing in more bands to look at but there's got to be a better way than surveys etc.

Stu Blankenship: I agree with that, for sure.

Thomas Howard: The literature shows that there has been success in using aerial imagery to estimate tillage. I believe that with the higher resolution afforded by this constellation there could also be success.

Bill Keeling: I talked to a group with NRCS about 10 years ago where we started to look at this using Landsat, but I don't think there were enough bands or spectra to do it with Landsat at a 30m resolution. I'm hoping things have improved enough that we can.

Thomas Howard: Yes, at a 3m resolution hopefully.

Mark Dubin: We've worked over the years with the Conservation Technology Innovation Center in Indiana, and they've been involved with crop management surveys for many decades. One of the things that came out in discussions I had with them earlier this year was that they've been working with a contractor to look at the use of remote sensing imagery for diagnosing crop management across the country. They feel that they've been successful at last and were preparing to publish the data that stretched over quite a number of years. I think we're going to start seeing that information come out to address these questions.

Jeff Sweeney: You had a slide in there that showed what looked like the Bay Program's assessment of how SAV area changed through time possibly for the entire watershed and I'm, curious if it's possible to do a side by side with what the remote sensing data would say, or are you just able to use this technique with current sets of data and you can't use old remote sensing data to get at the whole aerial extent of SAV across the watershed. Is it possible to do that through time?

Thomas Howard: Yes, the methodology I've developed using Planet SuperDove data is applicable to datasets beginning in March 2020. I pulled, over the last two days, all these images that we see from June, July, August, September, October because they've been collected back to March 2020. This SAV outline is just from the VIMS dataset, so we can do that apples-to-apples comparison, but to go back to 1984 would require different sensors which don't have the same spectral properties or spatial resolution. That said, calculating SAV for the entire Bay is actually quite simple and the cost of collection for PlanetScope imagery using the standard price, which could very well be negotiated down, is only $20k as opposed to $40k for aerial imagery.

Jeff Sweeney: You're not using any of this monitoring data from the Bay Program, using the aerial imagery, as any way of calibrating your method?

Thomas Howard: I did not present this work today, but the method that I've developed takes about 45 lakes in Florida and it extracts spectral information for individual samples that were collected there. That data is used to feed a machine learning model which can then be used to estimate presence or absence and give bio volume estimates. That data can then be overlaid, and the processing methodology can be very easily adapted to using Bay Program estimates, which have sample collection and aerial extent to estimate bio volume, percent of the water column, as well as to some degree the speciation.

Jeff Sweeney: That would apply to Chlorophyll-a as well, it's not specific to the aerial extent of the SAV?

Thomas Howard: Exactly. For the virtual buoy, for any given plot, we can measure SAV, but we can also drop virtual monitoring points at different locations to estimate Chlorophyll-a. Those estimations can be applied to the whole Bay, or they can be locally constrained so you don't have to pay for extra commercial data.

Auston Smith: Scott Heidel from PA asks what watershed and jurisdiction is this SAV?

Thomas Howard: This is where the Susquehanna feeds into the top of the Bay. We're looking at this black box in the mouth of the Gunpowder River around Baltimore.

Auston Smith: You have two graphs detailing wavelength versus reflectance. It has a bunch of asphalt or roads, water, I was wondering if you had a method to tease out what dry grass might look like, because plant life is a lot more variable than what flat water or limestone might look like. I just wanted to know what sort of extra detail you could tease out from that green line.

Thomas Howard: Measuring dry grass versus wet grass can be done in different ways. There are spectral indices that exist which take ratios between individual band measurements. So, if we have dry grass we might see a similar shape but a difference in individual bandwidths. That's quite common and very simple to do. The same concept is applicable to Chlorophyll-a concentration as seen in this other graph. If we look at the difference in ratios for different bands, we can make estimates of the overall concentration of Chlorophyll-a.

Olivia Devereux: I wonder if that's a way to sense cover crops, because the amount of times that you can get the Planet data is multiple times a week in which case you could see if there was an immediate die off from phosphate or something so you could probably get cover crops that have been killed off as opposed to winter crops planned for harvest.

Thomas Howard: Yeah, typically we'll use NDVI to estimate those kill offs. If you looked at an individual plot and calculate that spectral ratio for NDVI throughout time, you would expect a gradual increase when the plants are growing and a sharp decrease when they are dying off. With Planet data, since it's daily, you're able to map different points with sub weekly frequency and that can capture the change in crops.

Thomas Howard: Over the next 10 months I'm participating in Planet's startup program. Planet has provided me access to a lot of free data to develop models and research use cases, which allows me to pull together presentations like this. If there are individual use cases that you're interested in exploring, for example trying to match crop data that you have access to with

some of this satellite imagery over the next 10 months I have access to the data to facilitate that. If anyone has a use case that they're interested in explorer I'm happy to talk about it.

Auston Smith: Kevin DuBois asks if you work at all with satellite elevation data.

Thomas Howard: Satellite elevation data can be derived in two different ways. The first is through even higher resolution imagery than I'm dealing with, and it's captured in stereo. A satellite passes over an area, and it takes a photo from one angle and another photo from a different angle and uses the geometric differences to calculate changes in elevation. That can't be done with this data but there are other processing methods or satellites that can do that. The other way is to use synthetic aperture radar (SAR) data which is using microwaves or radio waves to estimate the number of cycles that a radio wave passes when it's emitted from the satellite to the ground and back. Those two methods I do some work with and there have been some compelling use cases and successful. Here's a presentation on how displacement mapping can be used. So yes, I do work on this but with a different constellation of satellites.

Auston Smith: Follow up on tidal wetland elevation because in the past it was difficult due to water at different tidal stages throwing off the results.

Thomas Howard: There is a revolution coming in remote sensing. There was a satellite launched about a year ago, and the data will be available soon and provide water surface elevations for almost every single waterbody in the entire world. So that use case is about to have a lot more data to support it once they release that information. One other point regarding tidal elevation, you can also estimate water quantity using this method. If you look at this plot you can see that over time the area of this waterbody is changing and so you can estimate inundation extent and use the data to prove that its changed.

Action: If you have questions about Tom's presentation, please reach out to him at thoward@resolvehydro.com.

10:45 **BMP Verification Page Updates** – Auston Smith, EPA (15 min).

Auston provided an overview of the recently updated BMP Verification page on Chesapeakebay.net including everything that has been updated and refreshed.

Action: If anyone sees issues on the updated BMP verification page, they should reach out to Auston (smith.auston@epa.gov).

11:00 **Progress Data Submissions Update** – Olivia Devereux, Devereux Consulting (15 min).

Olivia provided an update on Progress data submissions. This is the last WTWG meeting before submissions are due on December 1st so jurisdictions will have the opportunity to ask any questions they have. Olivia's notes are below.

- **NRCS and FSA data provided Monday and Tuesday.**

- **Progress Data Submitted Update**
    - No jurisdictions have submitted BMP data since last week.
    - DE completed their point source dataset, which Jessica will review.
    - DC Blue Plains wastewater is done, and Jessica and Megan have a meeting with DC's insignificant wastewater person next week. We receive a Blue Plains split between DC, MD, and VA each year, but have not received the split yet so Jessica will request it from Diran Adalian.

- **Status of Progress Meetings**
    - All states' progress meetings have been scheduled with the exception of VA.

- **Weekly emails** to let you know when reports are run and available on CAST-NEIEN portal. Using data submitted by noon Friday. Can always do a special run, but will definitely do it weekly.

<mark>Next Meeting:</mark> **Thursday, December 7ᵗʰ, 2023, from 10:00 AM – 10:40 PM.**

Participants

Alicia Ritzenthaler, DC DOEE	Kevin DuBois, DoD
Ashley Hullinger, PA DEP	Kimberly Dagen, SRBC
Auston Smith, EPA	Lori Brown, DE DNREC
Bill Keeling, VA DEQ	Mark Dubin, UMD
Chris Brosch, DDA	Matthew Kofroth, LCCD
Clint Gill, DDA	Nicole Christ, MDE
Dave Montali, Tetra Tech WV	Normand Goulet, NVRC
Dylan Burgevin, MDE	Olivia Devereux, Devereux Consulting
Elizabeth Hoffman, MDA	Ruth Cassilly, UMD
Emily Dekar, USC	Samuel Canfield, WV DEP
Eric Hughes, EPA	Sarah Lane, MD DNR
Eugenia Hart, Tetra Tech	Scott Heidel, PA DEP
George Doumit, DE DNREC	Stu Blankenship, VA DCR
Helen Golimowski, Devereux Consulting	Sushanth Gupta, CRC
Jeff Sweeney, EPA	Thomas Howard, Resolve Hydro
Jessica Rigelman, J7 Consulting	Tom Butler, EPA
Kendall Tyree, VASWCD	

Acronym List

[DC] DOEE: DC Department of Energy and Environment
[DE] DNREC: Delaware Department of Natural Resources and Environmental Control
BMP: Best Management Practice
CAST: Chesapeake Assessment Scenario Tool (user interface for the CBP Watershed Model)
CBP: Chesapeake Bay Program
CRC: Chesapeake Research Consortium
[VA] DCR: Virginia Department of Conservation and Recreation
DDA: Delaware Department of Agriculture

DoD: [US] Department of Defense
DEP: [PA] or [WV] Department of Environmental Protection
[VA] DEQ: Virginia Department of Environmental Quality
[MD] DNR: Maryland Department of Natural Resources
EPA: [U.S.] Environmental Protection Agency
LCCD: Lancaster County Conservation District
MDA: Maryland Department of Agriculture
MDE: Maryland Department of the Environment
MWCOG: Metropolitan Washington Council of Governments
NDVI: Normalized Difference Vegetation Index
NVRC: Northern Virginia Regional Commission
QAPP: Quality Assurance Project Plan
SAV: Submerged Aquatic Vegetation
SRBC: Susquehanna River Basin Commission
TA: Technical Appendix
UMD: University of Maryland
USC: Upper Susquehanna Coalition
VASWCD: Virginia Association of Soil and Water Conservation Districts
WTWG: Watershed Technical Workgroup