November 24, 2020

Dear Data Integrity Workgroup committee members:

The next meeting of the Data Integrity Workgroup (DI) of the Chesapeake Bay Program Scientific and Technical Analysis and Reporting (STAR) will be Wednesday, December 2, 2020. This meeting will be a virtual meeting in place of our normal face to face meeting due to the COVID 19 restrictions. Meeting logistics are below:

Join by Webinar

Meeting Link:
https://umces.webex.com/umces/j.php?MTID=m21c3abe1c36a77be220ff90a47a6af6e

Meeting number: 120 994 2404

Password: DIWG

Or Join by Phone

Conference Line: +1-408-418-9388

Access Code: 120 994 2404

CBP calendar web page:
https://www.chesapeakebay.net/what/event/data_integrity_workgroup_december_2020_meeting

The meeting will be held from 10:00 AM to 1:00 PM. A draft agenda is attached. If you have any additions to the agenda, please bring them to the meeting.

Sincerely,

Bruce Michael

Cindy Johnson

DI Workgroup Co-Chairs

AGENDA
Data Integrity Work Group (DI)

Virtual Meeting

Wednesday, December 2, 2020
10:00 - 1:00

Announcements, Meetings, Conferences, Webinars:

- Maryland Water Monitoring Council Annual Conference, December 3 – 4, 2020. Virtual.
- Behavior, Energy and Climate Change Conference, December 7 - 10, 2020, Washington, D.C. Virtual.
- American Geophysical Union Fall Meeting, December 7 - 11, 2020. Virtual.
- Sustainable Agriculture Conference, February 3-6, 2021. Lancaster, PA. Virtual.
- CERF, November 7 – 11, 2021. Richmond, VA.
- A Community on Ecosystem Services (ACES), December 13 - 16, 2021. Bonita Springs, FL.

Action Items

- ✓ Caroline Donovan and Liz Chudoba will give a more detailed update on the Chesapeake Monitoring Cooperative at a future meeting.
- ✓ Liz Chudoba will give a more detailed presentation on the Hack-a-thon at a future meeting.
- ✓ DIWG will discuss the operation of field audits once they are allowed again due to a growing list of groups needing them.
- ✓ Preview Informational Training Videos at next meeting if available.

Summary on Current State of Monitoring and Laboratory Analysis During the Pandemic: Tidal and Non Tidal – All

Bruce Michael said the monitoring program can do almost everything they were doing before the pandemic shutdown. The biggest problem is if they come into contact with someone who had COVID they need to self-quarantine. Therefore, they cannot go out into the field and do work. In MD, there is a hard hiring freeze, and if people leave for job transfers or retirement, it is hard to fill the position. Department of Budget Management is starting to look at the requests to fill in vacant positions.

Kristen Heyer gave updates for MD and working in the field. She said terrible weather coupled with people quarantining has made it difficult. They have gotten most of their work done from the end of May to the beginning of June. They are down staff numbers, so they are hoping to get more people hired before they ramp back up in Spring with continuous monitoring and data flow. They are good at following protocols and doing as much as they can to accomplish the work.

Cindy Johnson gave an update for VA. There have some regional offices closed due to exposure to COVID, but they have been able to continue their field workers outside of the office. They did upgrade their boating protocols so that people can be under the canopy together because otherwise it would have been very cold for them.

Tammy Zimmerman spoke for USGS in PA. From March 16th – April 27th, their state lab was closed so they could not submit any samples. Starting April 27th, the lab was open at limited capacity for two days a week. They have nontidal sampling sites (15) that the USGS samples but also 21 nontidal network sites that Susquehanna River Basin Commission (SRBC) samples. In addition, they have statewide water quality sites that they cover for a total of 137 sites for USGS and 21 for SRBC. With the lab first being closed and then opened at limited hours until July 12th, they were able to do all the routine monthly samples at all the statewide samples. They fell short of some of the storm samples due to the drought and the pandemic. Since the lab opened back up July 13th, they have been running at full speed and on track for 2021 to get all routine samples and storm samples assuming the drought lifts and the protocols do not get stricter with the pandemic.

Betty Neikirk spoke for the Virginia Institute of Marine Science (VIMS). They have been able to keep up with their work. They finished up the data flow and continuous monitoring deployments in November. They were able to accomplish all of their shallow water monitoring work.

Cindy Stevenson with the Maryland Department of Health said they never closed during the pandemic. They did have some staff reductions to reduce density in the labs. They have been able to analyze everything.

The Chesapeake Bay Laboratory (CBL) opened in May. CBL is operating as best as possible under the conditions. We are still not entering buildings until 10 AM but otherwise working almost normally.

Dough Moyer stated the USGS sample collection in VA has been able to go without any modification to the schedule along with the protocols set in place to keep everyone safe. They would not have been able to without VA Division of Consolidated Laboratory Services (DCLS) staying open and being able to take the samples. Jay Armstrong said they plan to continue to have DCLS stay open.

AQUARIUS Helping Transform Data into Information and Actionable Insight - Chris Heyer and Tom Jurenka

The AQUARIUS software is used to help manage environmental data. It helps customers collect, cleanse, and diversify their data while making it defensible. AQUARIUS has a “Data Production” and “Data Consumption” side. On the Data Production side, there is the AQUARIUS time-series component. This shows calculations and analysis of discrete or continuous data. The time-series server has API to allow other software such as ArcGIS to be pulled into it. The data can be edited in the time-series component through different tools such as adjustable trim, drift, and gap fill. These edit tools allow organizations to use more data because they no longer need to remove it by putting a note or grade next to it. Another component is

AQUARIUS Samples which allows the user to collect the data and manage the process and metadata around discrete data. Labs can get permission to automatically submit data into this system rather than dealing with a report from them to upload. On the Data Consumption side, there is the WebPortal which allows one to display, analyze, and report on analytics, and it uses the information from the time-series components and configures the information to be viewed through the portal. The WebPortal is viewed by different users based on the permissions accepted. It also has alarms and alerts for different variables to inform things such as if there are peak thresholds being passed. They did a live software walk through.

Bruce Michael stated there are multiple CBP partners already using some form of the AQUARIUS. He asked if the agreement with USGS is with all of USGS or only with certain water centers. Chris Hyer said USGS is a national customer so there is a single AQUARIUS system managing the nation's water. They do not have the WebPortal module because they chose to use their own tool.

Durga Ghosh asked from a Quality Assurance (QA) perspective, she asked if the public had access to the QC data and is that put into consideration for the QC flags. Chris Heyer stated the time-series flags comes into the WebPortal, but the qualifiers in the discrete data do not come over. That is something they are working to change. Tom Jurenka also mentioned that the user can decide what the public sees compared to internal groups in terms of data.

Elgin Perry asked about censor data and how the package handles it. Chris Heyer said they can take in any censored data. When combining the time-series data with discrete data, users have the capability to do computations on both data sets. Elgin also asked for clarification on censored data such as data below the detection limit where the lab reports a threshold. Chris Heyer said there are some setting controls on how people handle non-detect and minimum detection limits. They do flag non-detect and minimum detection limits. There are a couple of different choices based on what the standard workflow are for users. They will follow up with Elgin on this topic to show him more details on the software.

QA Updates – Durga

Durga went over how they are looking at QA samples currently and the timeline for going over them. The external quality assessment includes the Blind Audit Program, Coordinated Split Sample Program, and USGS Standard Reference Sample Study. Moving forward, Durga plans to have the blind audit program results summarized at the last quarterly meeting of the year. The internal quality assessment includes the precision from replicates, bias from blanks, and completeness of sampling. Durga understands she needs to put the pandemic into consideration when looking at the completeness of sampling. She would show all the results during the second quarterly meeting which is the summer timeframe.

The plan while it is still unsafe to have multiple people together in the same room is to analyze the QA samples more rigorously. Critical analyses of the samples are important because it identified issues groups were having such as with uploading data. Work on the proposed Informational Training Videos has begun, and they should have a preview early 2021.

Durga asked if Doug Chambers could comment on an observation. She noticed the ammonia data was only being reported up to the second decimal starting around 2013. Doug Chambers said he will look into it.

Doug Moyer said it would be helpful in the next presentation to include a list of when the last audits occurred. This list will let people know who is first priority once audits begin. Kristen thought there was a list that was compiled for tidal, nontidal, and lab audits. The list is available at this link.

Developing the Roadmap for Updating the Tidal monitoring and Assessment Program – a STAC Workshop Proposal Outline – Peter Tango

This is a draft Scientific and Technical Advisory Committee (STAC) proposal and edits are welcome to format it. The outline is for establishing a sustainable, cost effective monitoring and assessment recommendations to fully address Chesapeake Bay TMDL water quality standards assessment.

Peter went into the successes and challenges faced by the monitoring network which is driving the reason for a STAC proposal. One major challenge is that there have been unassessed criteria for 17 years which helps states delist decisions for water quality standards. On top of it, there are now financial stresses to sustain the current level of monitoring in the Chesapeake Bay. Data collections remain "marginal" for Bay criteria assessment and "adequate" for the watershed loads estimates.

From the SRS meeting with the Management Board (MB), the Water Quality Standards Attainment and Monitoring Outcome leads expressed wanting help from STAC and STAR to work with the Bay science and management community to extend monitoring capacity through the commitment to adopt data from nontraditional monitoring sources into assessments, incorporate data from new technologies into assessments, update analysis approaches to accommodate new data sources, and update decision protocols for evaluating analysis results.

The proposed structure of the STAC workshop would open with presenting 6 or more options to address the monitoring and assessment challenges and enhance capacity in monitoring and assessment. One theme could be to have no new data and sustain the program as is by changing the rules or approaches. The second theme could be to integrate new data and new tools. The workshop would address the pros and cons of each option. A second workshop would review if the options from the first workshop make sense for the program and produce recommendations for adopting and implementing the options. New opportunities to explore includes using satellite imagery to assess SAV distribution or using citizen monitoring and non-traditional partners to assess restoration.

Bruce Michael stated this work would not replace the long-term monitoring program that has been in place, but it would supplement it and build upon it to supply better and additional information.

Matt Stover said they are willing to be volunteers, and they are proponents of using citizen monitoring. He does not know how to get away from enhancing the amount of data they are

collecting. It may be tough to justify. Tom Parham and Mark Trice have been talking about some of these options and discussing a pilot segment to implement them and understand what works and what doesn't work. They want to make sure they are getting enough data to answer questions but not collecting too much data. Peter Tango said it is timely to benefit from VA and MD and how they have been exploring to better use the new approaches to address the short-term duration criteria.

Bruce Michael said having the STAC workshop is the appropriate venue to gather people on the monitoring side and analysis side to sit down and understand what is the best option to proceed with in the future.

Gary Shenk said he supports this STAC proposal. Gary commented on Peter's presentation about the interpolator that multiple people did work on it, but it is about 30 years old. Bruce Michael said with the advancement of technology now available there is plenty of room to improve the interpolator. Peter Tango said at minimal there is the question of if they invest the time and money to update the underlying coding to make it more usable with new datasets.

Peter Tango is open to hearing about more insights on developing the proposal. The STAC proposal is due February 16, 2021.

New Advancements in Continuous Water Quality Monitoring - Jimmy Webber

- How to operate a CWQ monitor/network
- Operation of continuous-nitrate analyzer and other evolving technologies

Jimmy Webber looks at nutrient and sediment transport, loads, and trends across the Chesapeake Bay watershed. He is trying to explain those trends and understand management implications. Jimmy is presenting on how USGS are utilizing continuous water-quality monitoring data and the benefits of it.

Continuous water-quality monitors are devices that provide frequent, near real-time measurements of water-quality constituents. Water quality can change frequently over time and it is valuable to capture this change. More people are using this technology because the technology is evolving, and they can monitor more variables now such as Nitrate or Dissolved Phosphorous. However, each instrument is used differently and has their own limitations and challenges. Some challenges with currently available instruments are that it measures dissolved phosphorus using wet chemistry techniques which involves a lot of moving parts. Also, some produce a waste product that should be stored on site and not released into the stream.

Effective deployments prevent a loss of data. Deployments have a power requirement, and most instruments are powered on site through a solar panel and battery. This requires a computer on site to tell the instrument when to measure and relay measurements to a satellite system. The data collected on site needs to be available to the organization near real-time so measurements are transmitted to the internet to allow data access. Deployed instruments can be fouled by sediment, debris, or organic material. This requires routine service visits which will never be replaced, but

the number of necessary site visits will reduce. To reduce instrument fouling, deployments are refined through time.

They use the AQUARIOUS software that was presented earlier in the meeting.

The cost of these monitoring instruments depends on multiple variables such as what constituents will be measured, what instruments will be used, how frequently data will be updated online, and condition of supporting resources in the area. Jimmy Webber provided some cost estimates in the presentation. USGS can offset some of these costs through fund matching programs.

Gary Shenk pointed out that the CBP exists for restoration, and another way to phrase it is to break the regression models. The regression models are continually updated, but the CBP wants to change the relationships. Gary Shenk knows Jimmy Webber and others are constantly looking at the analysis to change it, but Gary wanted to raise the point again. Jimmy said it is true how they are continually analyzing how the relationships change over time because it is important to their trend and load work.

Peter Tango commented there is a wave of interest in water temperature patterns in space and time as a keystone variable influencing the success of many CBP outcomes (living resource distributions, management effectiveness, etc.). There is interest in temperature monitoring. Peter Tango knows there are the routine stations, storm sampling, and the ConMon multi-sensors. Than Hitt has engaged citizen scientists in distributing and retrieving sensors for temperature. Peter Tango asked if he could comment on the quality of such instruments and what instruments might be suitable for use/deployment and management by volunteers to produce reliable, dependable, robust, cost effective water temperature data? Jimmy Webber said someone from his office can comment on that issue. He did note there are instruments that are not $10,000 that can still provide high quality data. Kelly Knock said she could follow-up with him also on temperature loggers. They use standalone temp loggers for the Regional Monitoring Network.

Citizen Monitoring Update – Liz Chudoba & Caroline Donavan

Liz Chudoba provided an update in Citizen Science in 2020. Luckily, most of their citizen science groups are up and running and generating data. In 2020, they are more than doubling the amount of data in the Chesapeake Data Explorer, and they were able to get data in the data explorer from all seven jurisdictions. There was a slight shut down in April and May, but they are now up and running at the same levels before COVID. Citizen Monitoring Cooperative (CMC) switched their training sessions to virtually and reduced contact with volunteers.

From August to September 2020, they held a Hack the Bay event. This was their first opportunity to look at the data in the system Chesapeake Bay wide and comparing it to the Chesapeake Bay Program data set. They wanted to see where there were still gaps and where CMC data could fill it. Other goals included exploring innovative approaches to problem solving with CMC data.

The Hackathon included 430 participants in 37 countries with a total of 20 team submissions. The CMC had 4 challenges to choose from for the participants. The challenges included:

- Challenge 1: Develop a Restoration Case Study
- Challenge 2: Identify Data Gaps
- Challenge 3: Model Water Pollution
- Challenge 4: Design a Water Quality Report Card

If anyone is interested in one of the submissions, CMC is happy to connect the creators with CBP GITs so that they may present at a meeting. The CMC website has more videos on all of the Hackathon challenges: https://www.chesapeakemonitoringcoop.org/hackthebay/

Caroline Donovan gave an update on the Tier 3 groups. They have already had data coming in from the Tier 3 groups Nanitcoke Watershed Alliance, BlueWater Baltimore, and Arundel Rivers Federation. They recertified Natnicoke and BlueWater in Spring 2020. For Arundel Rivers Federation, it is coming up in early 2021, and it doesn't require in person meetings so they should be able to still do this while working from home. The Arundel Rivers Federation expanded, and the Tier 3 applies to the South River sites. The plan is for the sites at West Road to become Tier 3 easily since they already have the QAPP in place. There are some questions on having different equipment for different rivers.

New groups in Tier 3 in 2020 could not move forward due to COVID mainly because field audits could not be done. ShoreRivers is on the list of potential groups. The Severn River Association has been working closely with the CMC, and they think this is good potential group. Caroline Donovan also commented that she would like to discuss how field audits should be done during this time and how things are going to operate once field audits are scheduled again.

Durga Ghosh asked Caroline to provide her a list of potential field audit candidates.

Coordinated Split Sample Program – Mike Mallonee

Mike Mallonee noted there was no additional tributary sampling since the meeting in July. He was able to add the September sampling to the mainstem presentation.

No issues were discussed during the meeting.

Blind Audit Program Update

Blind Audit Program Update as of December 1, 2020

Blind Audit Spring 2020 Make-Up samples were sent out on August 26. Despite many members operating under COVID restrictions, fifteen laboratories submitted results, achieving almost full participation. All results have been received, are under review, and the FY20 final report in being prepared. Look for distribution on or before December 15.

The first round of samples for FY21 (what would have been the Fall 2020 samples) will not go out this calendar year as planned. They will be shipped out in early January.

As always, please feel free to call or email (frank@umces.edu) with any questions or concerns regarding the CBP Blind Audit Program.

USGS Reference Sample Update – Breck Sullivan

No issues were discussed during the meeting. All the labs were not able to participate due to COVID.

2020 Summer Hypoxia Summary – Bruce Michael

The Chesapeake Bay had the second least amount of hypoxia this summer on record, and only one cruise had above average hypoxia. This was the late July cruise, and it was the hottest July on Maryland record. The hypoxia for 2020 seems to follow the forecast. Here is a Press Release from the Chesapeake Bay Program (CBP).

Topics for Next DI Meeting

Liz Chudoba will give a more detailed presentation on the Hack-a-thon.

Participants: Michael Casey, Breck Sullivan, Bruce Michal, Durga Ghosh, Caroline Donovan, Liz Chudoba, Cynthia Stevenson, Tom Jurenka, Betty Neikirk, , Racheal Pan, Peter Tango, Mike Mallonee, Doug Moyer, Elgin Perry, Dough Chamber, John Jastram, James Webber, Becky Monahan, Chloe Obara, Chris Heyer, Heather Wright, John Jastram, Kelly Krock, Kim Blodnikar, Tammy Zimmerman, Keri Maull, Jesse Illiff, Heather Wright, Jay Armstrong, Cindy Johnson, Jaclyn Mantell, Kevin Minga, Kristen Heyer, Pamela Higgins, Suzanne Doughten, Beth Wasden, Claire Buchanan, Gary Shenk, Jaclyn Mantell, Carl Friedrichs, Leah Etterna, Jaclyn Mantell, Tammy Domanski, Laura Phillips