

**Joint Committee Meeting Minutes
2020 NADP Virtual Fall Meeting
November 4-5, 2020**

NOS Chair: Melissa Puchalski (USEPA)
NOS Vice Chair: Winston Luke (NOAA)
NOS Secretary: Ryan McCammon (BLM)

Motions Passed:

Motion: Joint will extend the Mercury Litterfall Network as a provisional network for two years, to allow for refinement and incorporation of improved measurement methodologies. Method development will be left to the HAL/PO and will be presented to and discussed in MELD (Spring 2021) before presentation to Exec, to consider adoption of Litterfall as an official network of NADP. Moved by Melissa Puchalski, seconded by Ryan McCammon. Motion carried.

Motion to nominate Linda Geiser/USFS as incoming NADP Secretary. Moved by Doug Burns. Ryan McCammon second. Motion carried.

Action Items:

NOS: In spring 2021 PO will present results from bag vs bucket comparison study at Eagle Heights and present an update on the design and testing of the wet-side total nitrogen and phosphorous samplers

NOS/Joint/TDep: In spring 2021 continue discussions on the use of Brahney Dry Side bucket collection, and the possibility of implementing a 12-point plan

MELD/Joint: In spring 2021 continue discussions of the disposition of the Mercury Litterfall Network and outreach efforts to the Tribes to offer fish/hair Hg analysis as an informal screening method and possible ties to MDN expansion.

MELD: In January 2021 host a virtual workshop on alternate/low-cost mercury measurement methods. The Mercury Measurement Evaluation Team will present findings and recommendations to MELD in spring 2021.

Await Minamata monitoring guidance and provide comment January-February 2021

QAAG: DQO Summit – January 2021

Joint: Discussions of HAL/CAL/PO virtual audit in 2021

EOS: Monthly meetings starting January 2021. EOS will propose final draft of the NADP Governance Document to Exec in spring 2021.

Joint Subcommittee Meeting Agenda, 2020 NADP Virtual Fall Business Meeting

First Session (November 4th, 11:00 AM – 1:00 PM, EST)

- 11:00-11:10 AM Introduction (Greg Wetherbee/Jamie Schauer)**
- 11:10-11:15 AM Meeting Logistics (Melissa Puchalski)**
- 11:15-11:45 AM State of NADP (David Gay/Mark Olson)**
- 11:45-12:15 PM Strategic Planning & MDN Network Viability Discussion (David Gay)**
- 12:15-12:35 PM Update on CLAD Products – (Mike Bell)**
- 12:35-1:00 PM COVID-19 Sampling Analysis (Janice Brahney)**

Second Session (November 5th, 2:00 – 3:30 PM EST)

- 2:00 – 2:45 PM Subcommittee/Science Committee Recap (Chairs)**
 - TDep/CityDep (Greg Beachley/Katie Benedict/Greg Wetherbee)**
 - CLAD (Linda Geiser/Jeff Herrick)**
 - MELD (Rick Haeuber/Colleen Flanagan-Pritz)**
 - AMSC (Andy Johnson)**
 - QAAG (Camille Danielson/Martin Shafer)**
 - DMAG (Bob Larson)**
 - NOS (Melissa Puchalski)**
 - EOS (Chris Rogers/Catherine Collins)**
- 2:45 – 3:05 PM PFAS Update (Martin Shafer/John Offenburg)**
- 3:05 – 3:30 PM USGS External QA Program (Greg Wetherbee)**

Third Session (November 5th, 4:00 – 5:30 PM)

- 4:00 – 4:20 PM AMNet/MDN/Litterfall Network Update (Mark Olson/Doug Burns)**
- 4:20 – 4:35PM Eagle Heights/WSLH Special Study Projects (Mark Olson)**
 - **KJJ Sampler Procurement Update**
- 4:35 – 4:55 PM COVID19 Impacts on Data/Networks (PO/Sponsors)**
- 4:55 – 5:10 PM Data Quality Summit (Camille Danielson/Martin Shafer)**
- 5:10 – 5:15 PM Nomination of NADP Secretary (Doug Burns)**
- 5:15 – 5:20 Fall 2021 Science Symposium (John Walker)**
- 5:20 – 5:25 Spring Meeting (Winston Luke)**
- 5:25 – 5:30 PM Wrap Up**

First Session (November 4th, 11:00 AM – 1:00 PM, EST)

Introduction (Greg Wetherbee/Jamie Schauer)

- Greg opened the meeting and welcomed everyone
- We had a very successful 2020 Scientific Symposium
 - 324 attendees from 17 countries
 - 62 presentations
 - More women were in attendance than last year
 - 44% of attendees were women
 - This compares to 13% on 1983
 - Shows progress, but we can and should do even better
- Dr. LaToya Myles (NOAA) delivered a terrific keynote address.
- Richard Tanabe will post recordings of the talks to the NADP website
- Thanks to everyone at UW for their hard work, and to Melissa as well
- Question for the NADP community - how will NADP and other networks meet future challenges to monitor important pollutants in a changing world?
 - Covid pandemic has turned the world upside down and successful monitoring programs are needed now more than ever
 - But we are faced with an uncertain financial future due to the pandemic
 - Greg asked the group to take these developments into account and to help NADP evolve and transform to ensure a sustainable program going forward
 - What will you do/sacrifice to keep NADP going?
- Dr. Jamie Schauer welcomed the participants to a productive meeting
 - Jamie is the Principal Investigator of NADP
 - Stressed resilience, especially in how we move forward
 - Partnerships
 - International partnerships
 - Many challenges but many opportunities – PFAS, reduced nitrogen, etc.

Meeting Logistics (Melissa Puchalski)

- Melissa opened the virtual meeting by highlighting the meeting logistics and online etiquette protocols for the virtual meeting, and shared call-in numbers and the Zoom meeting ID
 - Melissa praised the efforts of the PO, committee chairs, presenters, etc. for their efforts to plan the meeting
 - Encouraged us all to stay focused on the meeting despite distractions and challenges
 - Requested that subcommittee reports be brief given the compressed time schedule
 - Melissa thanked the WSLH for maintaining the supply chain and sample processing activities during the COVID-19 pandemic and praised the dedication of site operators in keeping the networks up and running.

NADP Program Office Report (David Gay/Mark Olson)

- David Gay presented an overview of the Program Office report
 - With COVID and lockdowns, the PO worked right through all weeks
 - At worst, about 13% of sites were not operational
 - We will have some data loss, but not nearly what it could have been (~580 samples of 13,000, or ~5%)
 - Two sites are still not back up

- Overall, we weathered this storm quite nicely.
- Financial Notes
 - Financially doing fine
 - Budgets prepared for 2021 (July 1, 2020 to June 30, 2021 -Wisconsin FY)
 - PO is working on AMON measurements to reduce costs; more details later
 - MDN costs in line with previous operations (Eurofins Frontier Geosciences)
 - Budgeting is somewhat different now
 - All networks are combined in one budget now (at WSLH)
 - No subcontractors now
 - No meeting costs since Covid-19 pandemic
 - Saving about \$45,000 by not holding fall meeting live last week
 - Spring 2021 - Another \$30,000 saved
 - Meeting costs, PO travel costs combined
 - No travel costs
 - No AMNet travel
 - Meeting to speak, represent NADP - cannot do with Covid restrictions
 - Employees
 - Richard Tanabe is full time at PO
 - PO will hire two ½ people, focus on site problems, keeping sites running, equipment
- Map Summary
 - A bit late this year
 - AIRMoN data are presented on the cover to commemorate the network's 2019 wrap-up
 - How should the summaries be distributed this year?
 - Printing costs are in line with those at UI, \$2500-\$3000 for 1500-2500 copies
- NTN Update
 - 262 sites, holding steady or a slow rise over the last few years
 - Bag Sampling in the NTN
 - First bag sample came off October 8, 2020
 - Transition to all sites over the next few month
 - We have been making "kits" at the PO/CAL
 - As sites need supplies they will be brought into the bag world
 - Have lots of bags on hand (CAL uses same bags as Canadian Supplier)
 - More details in NOS
- MDN Update
 - Slow loss of sites over time (down 30-35% from its peak)
 - Results in significant holes in the map summaries, esp. in the Western U.S.
 - PO is developing a plan to stop site loss
 - Will present details here and in Exec
 - PO is developing a new MDN report
 - Meant as a year-end report to supervisors to make their data meaningful and more useful, and enable site supervisors to encourage continued site support
 - Muge Kafadar is leading this
 - Sections of the report
 - Concentration, deposition, ppt
 - Current Year Measurements
 - Versus previous years
 - Timelines

- Comparisons to nearby sites for spatial context
 - Mercury emissions nearby
 - Trends over time
 - Back trajectories of select weeks
 - Correlation of results with NTN for co-located sites
 - Will go to sites automatically and annually
- AMoN Update
 - AMoN continues to grow
 - Controlling and reducing site/network operation costs is needed and is ongoing
 - Reuse bodies and maybe cores?
 - Lots of QA work to do
- AMNet Update
 - Continued site loss – very expensive startup and operational costs
 - Hard to keep it going, but PO will redouble efforts
- Data Highlights
 - PO broke out data availability for precip amount for first time this year, treating as its own; PO is caught up on data review for precip
 - NTN data has flowed through the lab through the end of May
 - MDN and AMoN data reviewed through end of June
 - Some sites do not submit data in a timely fashion
- Archive Plan
 - New plan in place to realign with reduced freezer space at UW
 - No additional money needed
 - Plan envisions using refrigerators and one large freezer
 - Can easily store 3 years of NTN, 2 years AMoN data (refrigerated rather than frozen)
 - Further details in Amy Mager’s presentation at NOS, and in Exec
- New Website
 - NADP will be getting a completely redesigned website
 - Work will start ~ Tuesday, November 10, to last about 3 months (?)
 - UW “DoIT” in charge of the fundamental restructuring
 - Goals:
 - Easier to use
 - Multiple people can adjust the website
 - Utilize more current techniques/programming
- PFAS in NADP Samples
 - Participating sites will send in regular NTN samples, and will include a 50 ml methanol bucket rinse
 - NTN sample processed as normal
 - If excess precip is available (need ~ 500 mls) it is analyzed along with MeOH bucket rinse
 - analyzed at WSLH Organics Lab
 - WSLH makes up wash kits, bottles, methanol, and sends to sites
 - No impact on normal operations
 - Started ~ Sept. 1, 2020
 - Sites include NY98 (Whiteface Mtn.), NJ99 (Washington Crossing), NC30 (Duke Forest), ME96 (Casco Bay)
 - Two additional QA sites to be added at Duke Forest, will include NTN collection

- Additional QA samples
- o Funds completely separate from NADP
 - \$20/sample is collected by NADP for expenses related to PFAS
 - Reporting goes from PFAS Lab to funders
 - Funded by US EPA ORD
- Push to create new sampler for Total N and P
 - o A separate sampler is attached to the NTN bucket and fits under the sealing lid
 - Sampler consists of a 250 ml bottle with 2.5” opening PVC funnel, 6-inch holding capacity. Bottles used without cleaning
 - o Should provide very inexpensive measurements of total N and P
 - o If it works, it could be added the regular NTN operation with no interference
 - o Add as inexpensive standard or stand-alone option to NTN measurements?
 - o More info in NOS with Chris Worley
- Talks and Travel
 - o PO is still under a travel ban
 - o David recently spoke with the Eagle Heights Preserve Board of Directors

Discussion:

Selma Isil asked if the NTN bags are or will be recycled? Amy Mager - Lab is trying to identify ways to do this. Cheryl Sue noted that CAPMoN bags are recycled. Camille noted that the lab will be using fewer bags now than before - as each bucket was placed in a bag.

Colleen Flanagan-Pritz commended the new MDN site reports.

Regarding the sample archive plan - Camille noted that UI was refrigerating most of its samples as well.

Greg Wetherbee asked if the new website will include all the site photos? DG assumes so, but this has not been discussed - it is an option.

Ann Mebane asked if the new website will allow provision of new map services for users? Specifically to reduce the need on the part of the user to import the data and create their own maps (errors). Bob Larson indicated that provision of map services is unrelated to the new website –a different server and software would handle these services. It will be a challenge – there are few ArcGIS experts in the PO. Jaime noted that students are implementing products like the MDN reports, and map services might be an area to explore using student help. Bob noted that data retrieval issues have not been discussed with UWDoIT – they may ask the PO to write web services that can be consumed in the new website, allowing web-based data services to be provided to the public. Richard Tanabe noted that a forthcoming survey would query what content the users want to see on the site.

Rodolfo Sosa indicated interest in collaborating on the implementation of the new total nitrogen methodology in wet atmospheric deposition.

John Offenbergs asked -can more than one total N and P collector be deployed on a single bucket? DG said this is dependent on lid size - a larger lid can accommodate more samplers. Mark Olson commented that the current configuration (NCON) collector could handle up to two such additional collectors. Greg commented that lid centering and adjustment would be very important with this new sampler. That is not easy with N-CON lids. In addition, an ACM can be used along with the dry side Brahney bucket, and

would be his choice for total N and P (both wet and dry). Ann Mebane offered to weigh in with trial sites for the TN/TP samplers in the western U.S.

Strategic Planning & MDN Business Development Discussion (David Gay)

- SP effort began with the move to UW
 - Both SP and MDN business plans were altered by Covid and its financial implications
- Strategic Plan: Review
 - During 2018 and 2019, a strategic planning exercise was developed.
 - From Boulder, a short list of 9 general areas was accepted as the basis of planning.
 - David summarized these in a short write up in May 2020 – will be discussed in Exec.
- Strategic Plan: Points Identified
 - NADP Governance and Organizational Changes
 - Networks and Network Initiatives
 - Expansion of NADP Participation and Audience
 - Using New Technologies
 - New Products to Increase Scientific Relevance
 - Research and Scientific Developments
 - Develop Strategies for International Engagement and Capacity Building
 - Sustainability of NADP Networks
 - Actions to Change and Improve the PO and Laboratories
- Strategic Plan: Next Steps?
 - What David will recommend to Exec
 - I do not think we can “focus” on all nine of these areas – prioritize
 - What about COVID/no travel, etc. How does this affect things?
 - Formulate a small committee (3-4) to review the document
 - Review the document and the original document for ideas
 - Either Exec or the Subcommittee needs to choose 3-4 short term priorities
 - Write up and defend their position.
 - Have Exec pass or not pass these priorities
 - And then move forward

Discussion:

Greg Wetherbee and David Schmeltz like the approach. DS suggested prioritizing low-hanging fruit among the nine SP elements and focus on that, with an eye toward financial constraints/implications as well as focusing on those areas where NADP members have specific interests/energy. David Gay responded that the planning need not be solely a PO/Lab function, and that some elements are already receiving scrutiny.

Greg noted that USGS has re-allocated unused travel money to equipment, etc., and perhaps that concept could be applied to the SP. Those interested in David’s SP write-up can contact him for the document.

- MDN Business Plan
 - Mike Olson put together a plan in 2017/2018, with some good ideas.
- David Gay added a few ideas
 - 13 elements/ideas to stabilize, promote, MDN

- Top Priorities (as per David Gay) to serve as a kickoff to discussion
 - Retention of existing sites by adding value
 - Automated station –specific reports
 - Develop on-line products that present NADP data in ways to facilitate research
 - Automated dry deposition calculations
 - MELD/Minimata Convention Needs
 - Other monitoring /new monitoring configurations
 - Focus on California by engaging CARB (TMDLs?)
 - Low-cost sampling options
 - Reduce costs of existing measurements/collecting samples
 - Engage the Water Quality community though TMDLs
 - TMDLs? Clean Water Act 303d?
 - Tie-in with CLAD?
- Secondary Priorities
 - Continue travel meetings (impossible now due to Covid)
 - Work with CityDep to demonstrate a need for mercury deposition monitoring in cities
 - Move Federal MDN sites/resources to western US
 - Engage other Groups
 - Fish hatcheries
 - Anti-Asia group
 - Stores
 - Commercial fishing operations
 - Minimata needs
 - Better connect monitoring with Minimata Convention needs
 - Research grants to fund samples or develop a foundation fund
 - Private funding?
- Low Priority
 - Formulate a plan to promote Federal funding of MDN sites.
 - Difficult proposition

Discussion:

Donna Schwede commented on the importance of measurements for model evaluation – how important are models to stakeholders? David replied “very important” and that many states are supportive of models so that data feed into the models for predictions. How do we get the modeling community to advocate for measurements? Donna: Internal support for CMAQ development for mercury has been sparse, but there have been many recent advances from other groups to improve representation of mercury in other models. Donna proposes exploring the need for measurement/model fusion for mercury. David Schmeltz: Funding mercury research in EPA is tough – the agency’s position is that the mercury problem in air and water has been “solved”. Support for Hg in EPA has been more bottom-up than top-down. Perhaps collaboration with agencies interested in Hg for international issues (GOS4M, State Dept.) may build EPA support for measurements and modeling studies. Donna suggested engaging water community with model estimates of deposition of Hg to watersheds rather than focusing on air concentrations. David Schmeltz said that building in monitoring and modeling to the TMDLs is important, and sees a role for NADP and USGS (QA) to support GOS4M and Minimata effectiveness evaluation. Emphasis on

harmonizing data, comparable methods, etc. – QA needs to be a part of that, and NADP and USGS can provide support here.

Greg Wetherbee: Suggest re-ordering low cost sampler options to secondary priority. What about petroleum industry – the move to natural gas is reducing Hg deposition. Wildfires as a source of Hg can be a hook for CA interest. David agreed that literature demonstrates natural gas's role in reducing Hg deposition. Wildfires can contribute 20-50% of global inputs. Melissa suggested building support among the tribes (lots of fish consumption, so Hg is important).

Greg Wetherbee: Cities are not going to have any money for years post-Covid. CityDep is going to have challenges gaining sites, and MDN would probably be considered a "nice-to-do" activity in cities as well.

David Gay cautioned that we are in for tough times as MDN lost support from the states (esp KS and OK) as Covid-imposed financial constraints hit.

Jamie stressed resilience, and urged creativity in expanding the stakeholder base (a group effort). There was broad agreement with this point. Greg suggested assembling an interstate coalition (e.g. fires in CA liberating Hg which is deposited downwind. Can this be a drive to build multi-state coalitions? David Schmeltz: This approach is used in Great Lakes research consortium (LADCO) and may serve as a model for cooperation among Western states. John Walker suggested the Western Regions Air Partnership (WRAP) as well.

John Offenberg: Is there a desire to also include 'Contaminants of Emerging Concern' in this planning focus discussion, rather than existing or established contaminants/pollutants (e.g. N, S, Hg, and the usual suspects)? Is there a match-up with UCMR efforts (water) for exploring 'new contaminants'? John Walker: John O - The strategic plan does include some discussion of emerging contaminants/issues.

Colleen Flanagan-Pritz: Wildfires can be a significant source of Hg emissions. I would add also that oil and gas operations may be, as well. Between all of the engines used for drilling and what goes on prior to production, truck traffic, etc., I think you have non-trivial sources of Hg. Greg Wetherbee advocated for more industry involvement – e.g., illustrating the benefits of increased gas production on Hg deposition – and sponsoring sites to do so (deep pockets)

Ann Mebane: WRAP has the intermountain air quality study which helps with ozone monitoring as well as serving as the data warehouse. Could expand this to mercury. This is joint work between feds and states, but money is still an issue.

Catherine Collins: The other option might be to reach out to some conservation groups as well.

Ryan McCammon: I agree with Ann, we could try to leverage WRAP and the Intermountain West Data Warehouse.

Colleen Flanagan-Pritz: WRAP and WESTAR might also be interested in Hg contributions from oil and gas operations.

Update on CLAD Products/CLAD WG-3/CL Synthesis (Mike Bell)

- Critical Loads of Atmospheric Deposition (CLAD) Science Committee
 - Facilitate technical information sharing on critical loads topics within a broad multi-agency/entity audience;

- Fill gaps in critical loads development in the US;
- Provide consistency in development and use of critical loads in the US;
- Promote understanding of critical loads approaches through development of outreach and communications materials.
- Critical Load
 - A quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge. (Nilsson and Grennfelt 1988; UBA, 2004)
 - Deposition effects can take on a number ecosystem responses
 - Some species induce a positive ecosystem response until the CL is exceeded then induces a negative response
 - Some species induce a straight decrease in ecosystem outcomes
 - Multivariate effects induce a complicated, multidimensional response shape
- CLAD WG-3 | CL Synthesis
 - Objective
 - Develop standards on how to use critical load data to assess risk within federal land units
 - Determine how to synthesis all relevant critical load data to assess total risk to a land unit
 - 2020 Products
 - Completed Bridger-Teton National Forest case study report
 - Held monthly meetings to advance discussions on BTNF report and how to integrate new CLs
- Rocky Mountain National Park: Continuum of Impacts to Ecological Health
 - A range of ecosystem responses (e.g., change in aquatic plant species composition, Increase in Alpine sedge growth, change in foliate chemistry, etc.) is considered as a function of N load.
 - At the current wet dep N load (2.7 hg ha⁻¹ yr⁻¹) and total N load (5.8 kg ha⁻¹ yr⁻¹) a number of ecosystem component responses are already seen
- Case Study Report: Bridger-Teton National Forest
 - Focus in EOS tomorrow is how to publish the report as an NADP document, and in using the report as a template for future reports
 - A variety of figure table and maps ion the report focus on specific ecosystem responses to deposition of specific compounds (N, S, etc.)
 - Predictions of magnitude and severity of various ecosystem responses gives federal land managers tools to gauge effects of increasing./decreasing deposition
- Methods Appendix
 - Dataset
 - Deposition Data
 - Analytical Methods
 - Uncertainty
 - Application of Critical Load
- Critical Load Application Handbook
 - Develop an agreed upon process for how to apply a critical load to federal lands.
 - Will be dependent on what data is available within the area and how it compares to the data used to set the critical load.

- Will provide direction to agencies and interested parties in a consistent way to evaluate risk to ecosystems from air pollution based on current knowledge.
- CLAD started pulling data together to apply these tools to all national forests and parks, detailing Min and Max Total N deposition and CLs for a number of ecosystem responses in a color-coded table to denote which responses are affected at current levels of deposition
- Also created a summary plot looking at a time series (2002-2018) of critical load exceedance across all national forests and individual forests, and specific ecosystem responses (e.g. Lichen Species Richness Exceedance, Herbaceous Species Richness Exceedance) across all parks over time.
- WG-3 Next Steps
 - Finalize outputs across parks and forests
 - Incorporate FWS and Tribal Lands
 - Develop standards of critical load application and exceedance calculation to go along with management priorities

Discussion:

Doug Burns: Ozone likely co-varies with N and S deposition – how confident are you that ozone effects are not contributing to the N and S effects that are the basis for your CL assessment? If this is true, does it matter or not? Mike: The team is uncertain in its confidence that ozone effects are/are not influencing these results, but is performing a new analysis on tree responses to acid deposition including ozone considerations, and looking at the responses regionally. If an ozone effect is seen, we can re-evaluate herbaceous responses. Ozone effects are of great importance in the Ag community. CLAD is also trying to pool more herbaceous data into relevant data sets, which should allow this issue to be addressed.

COVID-19 Sampling Analysis (Janice Brahney, Utah State University)

- Dust Enhanced Survivorship of Viruses
 - Does the association with particles enhance virus survival?
 - Very little is known about the long-range transport of viruses in the atmosphere
 - The association with dust particles may enhance survival and travel distance, due to:
 - Shielding of UV radiation
 - Moisture
 - Provisioning of host cells
 - Studies from the 1980s and 1990s
 - Chen et al. (2010 Env. Health Persp.) looked at transport of Influenza and Avian Flu virus in Taiwan
 - On dust days – X10 increase in Influenza A in samples, Avian Flu detected (transport from China to Taiwan?)
- Long range transport of Viruses on dust
 - Reche et al 2019, ISME
 - Saw more viruses associated with particles than free viruses in air masses influenced by Sahara and Marine environments
- Air Pollution to human transmission of COVID-19
 - Does the association with particles enhance survival?

- Evidence suggests that it can, but needs controlled study in lab to better understand
- Can we measure SARS-CoV-2 in aerosols within cities?
 - What are the best techniques?
- Do cities with more particulate pollution problems have greater ambient concentrations of SARS-CoV-2?
- How far can the virus be transported?
- How does dust composition influence survivorship of the virus?
- Recent study in Italy (Coccia, 2020, STOTEN)
- Density of inhabitants vs number of infected individuals
- Infectivity rates higher in cities with higher air pollution levels, controlled for interpersonal contact.
 - Air pollution is a better predictor of infection
 - Air pollution – to – human transmission?
 - This is suggested by the data, but measurements of viral loads on particles were not made
- Brahney et al - pilot study in CityDep Network
 - SARS-CoV-2
 - Urban sites: Denver, Ann Arbor, Washington DC, New York, Boston
 - Remote sites: Niwot Ridge, CO (NW of Denver)
 - CASTNET sites in Urban Centers: WSP-144 (NJ), BEL-116 (Beltsville MD), ANA-115 (Ann Arbor, MI), OXF-122
- ~ 30% of NADP samples (limited study) tested positive for SARS-CoV-2
 - Test period saw declining case numbers in general
 - Denver 33%, Ann Arbor 22%, Washington DC 29%, New York 50%, Boston 25%
 - Two successive rain events (20 min apart) in Lakewood (G. Wetherbee's backyard) both tested positive
 - 50% positive rate at Niwot Ridge
 - CASTNET sites: WSP-144 42%, BEL-116 33%, ANA-115 25%, OXF n =1 100%
 - Evolution of methodology (better cooling of samples prior to analysis led to more positive results)
 - Suggests that concentrations of viral particles in samples were higher than when analyzed
 - Not enough data for comprehensive stats at most sites, but data analysis from Denver suggests
 - Correlation of increased # positive results with max wind speed, positive case rates in the area in the sampling week, inversely correlated with sea level pressure (low SLP leads to greater windiness?)
 - For co-located sites, windier conditions yield more positive results at the NADP sites, but calmer conditions yielded more positive results at the CASTNET sites.
- Next Steps
 - Reinstate sampling in key cities with different ambient levels of pollution
 - Monitor virus concentrations in aerosols through temperature changes and population infection rates
 - Conduct longevity experiments using nebulizers and different substrates
 - Clays
 - Organics
 - Microplastics
 - Water
 - Mixtures of above

- Use new Bio Safety Level-3 facilities to test infectivity of aerosol samples
 - Are there infectious levels of virus on aerosols in cities with high aerosol loading and high case rates?

Discussion:

Greg Wetherbee: In Italy - What about the fact that people are likely more impaired from urban air pollution, making them more susceptible to having symptoms? Janice: Definitely seems like a confounding factor, not clearly addressed in the cited paper. One would expect that the population would be more susceptible to infection in areas with high pollution, but the study tried just to tease out ambient pollution from interpersonal interactions.

Martin Shafer: What gene markers are you using and how many gene copies are you quantifying? Janice: Gene copies are typically less than 100 per ml. Gene markers are Keith Roper's (USU) purview

Martin Shafer: Do you spike a virus for recovery estimation? Janice: Keith was initially operating under BSL-2 facilities. BSL-3 facilities at USU are being used for animal vaccine studies, so all samples had to be decontaminated. Keith has since upgraded to BSL-3 facilities so he can look at infectivity and conduct experiments with live virus. Keith has participated in a number of inter-lab comparison studies with CDC and Water Research Network to demonstrate that his lab results are similar to other official laboratories because he participates in a study to monitor wastewater treatment through the states. He has demonstrated adherence to QA/QC protocols at least for BSL-2 facilities.

James Schauer: Can you clarify the methods that you are using and the implications for the viability of the SARS-CoV-2 virus that you are measuring in the air samples? Janice: For NADP samples, we requested filters from precip samples as well as unfiltered samples themselves and measured virus levels in both. Tried to use dry-side samples but required same-day shipping was too expensive. CASTNET samples were from the DI elution of aerosol samples. Gloves/masks were supplied to NADP site operators to avoid contamination.

Second Session (November 5th, 2:00 – 3:30 PM EST)

TDep 2020 Fall Meeting Summary (Greg Beachley, USEPA)

- **Motion to nominate and approve Ryan Fulgham (EPA) as the new TDep Secretary to replace outgoing Selma Isil.**
- Kicked off meeting with an overview presentation, that recapped some of the progress over the year, identifying projects and accomplishments that will be included in the 2020 Annual TDep Report. Covered website status.
 - TDep used a Google registration form developed by co-chair Katie Benedict to assist with attendance and to solicit some feedback on member involvement, research interests, and their ideas for TDep products and focus.
- We then moved into the workgroup updates and had a few presentations. Kristi Morris and Chris Rogers are our EOS representatives, we discussed a soon-to-be-issued TDep White Paper Fact Sheet and gave a recap of the successful Monthly TDep White Paper Webinar Series.

- Greg Wetherbee updated the group on City Dep, highlighting an NSF Research Coordination Network grant proposal in the works to connect urban deposition disciplines in connection with environmental health to develop urban deposition.
- John Walker updated the group on Stakeholder workgroup, first walking through the summary document of the Fall 2019 Agricultural Workshop held in Boulder. That is available on the TDep Reports webpage.
 - Anne Rea presented the framework of developing a Stakeholder Engagement Plan and a call will held in the next couple of months to discuss next steps.
- Mike Bell gave an update on Deposition Uncertainty highlighting a study (in-review) on impacts to CL using deposition estimates from different models. Also highlighted a Washington State study on deposition determined from lichen tissue to modeled deposition.
- Greg Beachley went through the TDep MMF script conversion product.
 - The script is completed (ArcPy) and grid evaluation is taking place.
 - A few more minor issue fixes are needed prior to issuing the final version.
 - Expect completion by the end of the year.
 - Old grids will be archived and still available, along with the new grids.
 - Next step will be incorporating the CMAQ v5.3 time-series.
- Greg Wetherbee presented on adding urban deposition data to TDep maps to derive estimates of urban fractions of N deposition to the South Platte River watershed using the SPARROW model.
- Meeting ended with a productive open discussion on TDep issues.

CityDep Summary (Greg Wetherbee)

- Meeting of half of the membership
- Discussion of using Ion Exchange resin columns as a way to get wet dep numbers and problems associated with that technique
- No real change to City Dep sites – 2 sites will shut down in Denver, 2 in Boulder soon.
- Working on NSF Grant Proposal for research network coordination for atmospheric monitoring in municipalities and cities
- Greg gave a brief history of the origins City Dep and its current status as an ad hoc group in TDep.
 - City Dep is currently an ad hoc group in TDep, but considerations are underway to make it a TDep subgroup.

CLAD Summary – Jeff Herrick, USEPA

- **Motion Passed: Elected Justin Coughlin as the new CLAD secretary (Joining Emmi Felker-Quinn & Linda Geiser on exec.; Jeff Herrick moves to Advisory Board)**
- Accomplishments. Finalizing the annual report
- Report updates from the 5 Working Groups
 - Jason Lynch – CL Database updates
 - Chris Clark – will restart CL uncertainty process
 - Mike Bell – synthesis of CLs and deposition uncertainty
 - Jen Phelan and Melanie Pitrolo – Outreach and Education. They are finalizing the Critical Load Videos. Online content early next year will give overview of CLs, ecosystems affected, etc. Will post links to this.
- Mike Bell talked about the initiation of CLAD monthly seminar series starting in January (modeled on TDep white paper seminar series)

- Mike Bell & Melanie Pitrolo reported on the FLAG workgroup – (Federal Land Managers' Air Quality Related Values Work Group)
- Jason Lynch updated us on the Critical Load Map Summary - CL maps on website next year
- Mike & Jason Lynch discussed having the CLAD Symposium in an in-person NADP Fall meeting.
- Tara Greaver discussed the EPA NO_x-SO_x-PM recent release of Integrated Science Assessment
 - <https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=349473>
- Jen Phelan and Chris Clark discussed the status of the Critical Load Mapper (<https://clmapper.epa.gov/>)
- Great round-robin session of updates from CLAD members - captured in an online form

MELD Summary (Rick Haeuber/Colleen Flanagan-Pritz)

- First meeting as a Science Committee
- Objectives of Fall 2020 Meeting (~60-70 Participants)
 - Update MELD community on Minamata Convention on Mercury-related activities, including the effectiveness evaluation and multi-level engagement strategy.
 - Present plans and approach for the Mercury Measurement Workgroup and participants.
 - Provide a lightning session including talks and discussion on Mercury Emissions and Wildfire, in the context of the historic-setting 2020 wildfire season across the western US.
 - Share relevant research, studies, and talk teasers for the NADP 2020 Fall Meeting and Scientific Symposium.
- Preparing for 4th Conference of Parties Meeting -COP-4 (2021)
 - Convention Secretariat has been hiring consultants to develop monitoring guidance for Hg in air, biota, and humans
 - Oct.-Dec. 2020: Drafting meetings with Nominated Experts
 - Initial Comments from Parties
 - Initial Comments posted online
 - MELD will be called upon ~ Jan.- Feb. 2021 when monitoring guidelines have been better formulated and will interact with
 - Minamata Monitoring Team (MMT)
 - Lead: Terri Keating (EPA)
 - Air Lead: David Schmeltz (EPA)
 - Biota: Collin Eagles-Smith (USGS)
 - Multimedia Modeling: Elsie Sunderland (Harvard)
 - Mercury Interagency Group (MIG)
 - Dave Krabbenhoft, Chair
 - Coordinate relevant scientific activities across US government to detect & understand changes in key Hg indicators (concentrations, speciation, etc.) of changes attributable to the Minamata Convention actions
 - Identify needs and opportunities to improve relevant scientific capacity
 - Provide scientific support to the MMT and other relevant U.S. government international engagement efforts
 - Multi-level engagement strategy for Minamata Convention
 - Way for MELD to interact with subgroups – the work will eventually feed up to the Secretariat for final decisions and implementation
- Kristi Morris presented efforts of the Mercury Measurement Evaluation Project
 - Address gaps, budget concerns, low-cost methodologies

- Progress and Next Steps
 - May 2020: Mercury Measurement WG formed
 - September 2020: Mercury Measurement Evaluation Team (MMET) formed
 - October 2020: Discuss candidate technologies and evaluation criteria w/MELD
 - MerPass
 - UNR passive and active GOM techniques
 - USGS isotope measurements
 - Japanese gold trap method
 - Others?
 - November 2020: Call with Mercury Measurement WG and MMET
 - January 2021: virtual MELD workshop on mercury measurements
 - More detailed presentations by representatives and discussions
 - Assess need for co-located study
 - Spring 2021: MMET present findings and recommendations to MELD?
- MELD Lightning Session – Mercury Emissions and Wildfire
 - Overview of the 2020 Wildfire Season – Richard Schwab, NPS/National Interagency Fire Center
 - Estimating wildfire-generated mercury emissions from forests of the Western U.S. – Jack Webster, CSU Chico
 - Forest Floor Fire Severity Index Relationships with Soil Mercury Pools – Randy Kolka, USFS
 - Airborne Mercury Measurements in a Canadian Forest Fire in 2018 – Sandy Steffen, Environment Canada
 - A first glance at what four measurement systems tell us about atmospheric Hg downwind of large fires – Mae Gustin, UNR
- MELD Fall Meeting Wrap Up
 - Await Minamata monitoring guidance and provide comment – January/February 2021
 - Follow up with Hg measurement workgroup and Hg measurement evaluation team, and prepare for January 2021 workshop
 - Fire is intricately tied to environmental mercury, and wildfires are only expected to become more frequent and more intense. This is an important research direction, particularly considering efforts to reduce global emissions from anthropogenic sources
 - Plan for Spring 2021 meeting

AMSC Summary (Andy Johnson)

- Increased participation this Fall (there was no Spring 2020 Meeting)
 - Virtual forum improved participation
 - 18 participants
- Andy called for Co-Chairs of the Committee
 - No takers
- Andy will be able to devote more time on AMSC and aeroallergens for Maine Climate Council's upcoming report to the Governor and Legislature (Dec. 1) recommending Aeroallergen monitoring in every county in Maine. Andy will need to respond to this report.
- Dan Katz gave a talk on a modeling study (process-based approach) of allergenic pollen at a municipal scale (e-version will be made available), and had built a low-cost (\$25) aeroallergen sampler.

- Offer from Dan Coates (Canada Aerobiology Research Lab, Ottawa) to make their samplers available and to look at pollen/aeroallergens on Greg Wetherbee's City Dep filters from the site near National Jewish Hospital in Denver.
- Andy is trying to revive a modest (\$25K) grant proposal (D. Gay and Mike Olson) to establish an aeroallergens monitoring study (multi-state) by leveraging established sites, and will reach out to the WSLH to help shop it around.
- Andy wants to reach out to members/volunteers to re-energize work on priority task areas for AMSC.
- This is AMSC's 4th year as a science committee and needs to determine its approach and direction for continuance and direction going forward. Approach Exec to renew another 4 years?

QAAG (Camille Danielson/Martin Shafer)

- **QAAG Motions**
 - **CAL/HAL Quality Assurance Plan** Approved 6/24/2020
 - **Quality Assurance Reports (QAR)** Approved 8/24/2020
 - CAL 2019 QAR
 - HAL 2019 QAR
 - AMNet 2017 and 2018 QARs
 - All Posted on Web <http://nadp.slh.wisc.edu/lib/gaReports.aspx>
- 2020 QAAG Members, Affiliation, Primary area of responsibility/interest
 - Martin Shafer (WSLH CAL/HAL/PO) – QAAG Co-chair, Systems QA
 - Camille Danielson (WSLH CAL/HAL) – QAAG Co-chair, CAL/HAL QA Manager
 - Mark Olson (WSLH PO) – PO and HAL Manager; AMNet
 - Chris Worley (WSLH CAL) - CAL Lab Manager
 - Amy Mager (WSLH CAL/HAL) – Sample and Data Processing Manager
 - David Gay (WSLH PO) - PO Coordinator
 - Richard Tanabe (WSLH PO) – Site Liaison; Field QA
 - Bob Larson (WSLH PO) – Information and Database Manager
 - Zac Najacht (WSLH CAL/HAL) –Assistant Data Manager
 - Dana Grabowski (WSLH CAL/HAL) –Assistant Data Manager
 - Na Zhang (WSLH CAL/HAL) – QA Assistant HAL/CAL
 - Greg Wetherbee (USGS) – NADP QA, Field QA
 - Eric Hebert (EEMS) - Site Survey Contract; Field QA
 - Maria Jones (EEMS) - Site Survey Contract; Field QA
 - Tim Sharac (USEPA) – AMNet; HAL
 - Melissa Puchalski (USEPA) – AMoN; CASTNET Program Manager
 - Greg Beachley (USEPA) – AMoN; CASTNET
 - Cheryl Sue (ECCC) – QA/QC
 - Marcus Stewart (Wood) - CASTNET QA Manager/QA/QC
 - Winston Luke (NOAA) - AMNet; HAL
 - Always looking for new members
- QAAG Meetings
 - New approach with more focused, somewhat shorter, meetings!
 - August 24, 2020
 - October 20, 2020
- August 2020 QAAG Meeting Items

- Siting Criteria
 - What are the consequences of failing site criteria?
 - Of the sites surveyed ONLY 21% in 2017, 15% in 2018, & 24% in 2019 met all network-siting criteria (collector and rain gauge criteria are ~all over 70%) [from Annual Reports of Site Surveys –EEMS]
 - Tim Sharac leading Siting Criteria Team to:
 - Determine what siting criteria really matter?
 - Revise the criteria to include most meaningful requirements.
 - Decide how to encourage or require sites to meet criteria.
 - Flagging of sites/data?
 - Involve operators somehow in more frequent assessments?
 - Set annual goals and assess % of sites meeting criteria.
- Data Quality Objectives (DQO) Summit
 - Discussion and planning – incorporate siting criteria
 - Gathered list of people interested in contributing
- October 2020 QAAG Meeting Items
 - E-rain gauge calibration method proposed
 - Bob Larson – guided accuracy method
 - PO, EEMS to work together on implementation
 - Siting Criteria Update
 - Tim reported on data assessment work
 - MS Teams is being used to collaborate
 - Site Support Improvements needed
 - Operator complaints regarding communication
 - Training concerns especially with new operators
 - Richard and others formed workgroup to address
 - Ideas include identifying new operators from Field Observer Report Form, sending welcome package, enhanced communication etc.
 - EEMS update
 - Site surveys on track except Canada and Alaska (due to COVID 19)
 - AMoN Studies
 - Goal to reduce network operational costs
 - Core recoating (with dilute phosphoric acid)
 - Large potential \$ savings, can we meet QA objectives?
 - Diffusive Body reuse
 - Move from 5 to 10 reuses?
 - Citrate packing filter
 - Keep using
 - USGS QA Program Proposed changes
 - Concern expressed by QAAG members over several of the proposed modifications (e.g. moving to surface water PTs, less frequent PTs, and losing field QC data before we have time to assess the need).
 - Continuation of programs until DQO process complete would be best case
 - Virtual Audits
 - Suggestion that HAL/CAL/PO be audited by a team, virtually, in 2021
 - Richard, Camille and Greg to discuss

- Need volunteer auditors
- The “q” Notes Code
 - Qualifier “flag” (notes code) to indicate possible problem with an analyte
 - result - More information for data users
 - Working on addition of “q” code to NTN and AMoN
 - MDN was built with “q” note code at WSLH
 - Will data users even look at this? Shouldn’t they?
 - Indicates analytical QC issue which leads to quality rating of “B”
 - Lacking this in NTN entirely – LAB issue = QR “C” (invalid) or no flagging
 - The entire NTN sample rated B
 - Currently lacking way to flag individual analytes
 - Have to look at notes to determine which analyte had issue
 - Detailed notes only on reports not on web
 - QA Input?
- Do any of these issues/ideas interest you?
 - Are you passionate about data quality?
 - Do you want to join QAAG, the DQO Summit or help with the virtual audit?
 - Do you have questions or concerns?
 - Please contact us!
 - Camille Danielson Camille.Danielson@slh.wisc.edu 608.224.4333
 - Martin Shafer mmshafer@wisc.edu 608.217.7500

DMAG Update (Bob Larson, NADP PO)

- Reviewed Data Status
- Discussed new weekly meeting (Data Team meeting) at WSLH – brings together data screeners/reviewers, as well as site liaisons and others
 - Faster feedback to sites on correcting issues
 - Used to exist at UI, proving successful at WSLH
- Greg Beachley gave an overview of the TDep script conversion
- Discussed issues related to NADP website conversion to Wordpress.
 - Kick off next week.
 - UWDoIT is getting started soon
 - Will need input on web content from interested parties fairly soon
- Changing listserv software next week – old listservs are disappearing and will transition to Google Groups platform
 - Old listserv addresses will remain – emails will get forwarded to Google Groups
 - NADP community will get a final message from the old listserv to remind users to look for new alerts
 - Look for email from UW on this – check spam folder if necessary
- If messages are mistakenly sent to UI, they will not be forwarded, but Bob will receive notification

NOS Update (Melissa Puchalski, USEPA)

- **Motion to elect Tim Sharac as incoming NOS Secretary - Passed**

- CAL has switched over to bag sampling
 - Sites will receive bags as bulk bucket supplies are returned to the lab
 - Significant costs savings
 - Will have 9 weeks' worth of supplies for each site (as opposed to 6), shipping less frequently and in smaller boxes - means shipping costs will decrease.
 - In spring 2021 PO will present results from bag vs bucket comparison study at Eagle Heights
- CAL is performing several AMoN studies to reduce costs (recoating, etc.)
 - Results promising
- HAL has fully transitioned to WSLGH
 - Continue to renovate labs and workspace as needed
 - Plans for further equipment and processes testing
- Update on design and testing of total N and P samplers
 - Will be deployed at Eagle Heights
 - Results will be presented in spring 2021
- Lots of discussion on improving training and operator engagement, and better using survey results to improve data quality
 - Will feed into DQO summit in January 2021
- Bob continues to work on a smarter system for battery loading at high elevation solar sites.
 - Several participants had hands-on experience with battery systems and gave feedback.
 - Ongoing discussions/collaboration on this issue
- USGS gave an update on NGWOS study in the Delaware watershed
 - Biscuit Brook site is up and running
 - Soil and flux measurements at Claryville NY Mesonet site
 - Future plans to install PurpleAir PM sensors
- Janice Brahney gave an update on the dry side bucket study (dust)
 - Received an NSF grant to continue the work.
- Janice gave an update on microplastics study
 - Her recent publication in Science created a lot of interest.
 - An upcoming international meeting will discuss additional measurements needed to investigate sources, transport, and fate of microplastics

EOS (Catherine Collins, FWS)

- Spring Meeting minutes were approved via survey
- Governance Document added EOS changes, will add Meld changes and propose final draft for Exec in spring 2021
- Wikipedia page is up
 - Content will be reviewed twice per year (Spring/Fall)
 - Content was added for CLAD
 - NADP members are encouraged to add to the page.
- Foundation Letter
 - Work was paused due to Covid pandemic
 - Letter is on webpage, EOS will work on outreach for seeking donations
- Education and Outreach
 - Work was paused due to Covid pandemic

- EOS will meet monthly starting January 2021
- Mercury in Rain Brochure – under final review, almost ready to go
- AMoN Brochure – under final review, maps to be updated then will be ready
- Robust discussion on Social Media
 - Plan – Science/Technical and Site Operation Tracks
 - Social Media point person in each committee/lab group to be on lookout for material to be posted
 - It's important to like and share posts on Facebook, LinkedIn and Twitter sites
 - Ideas for Posts –
 - Goggle Scholar for papers using NADP data
 - Postcards from the field/Site of the month/Sampling Selfie/TikTok?
 - New volunteers: Nathaniel, Margaret and Eric will help with posts
- Web Page - Wisconsin DoIT is migrating to the new platform; EOS to support
- Fall 2020 Symposium – evaluation of 9 student papers, 10 student posters
 - Outstanding papers will be highlighted on social media
- Committee/Lab Outreach Forum
 - Small group to develop process plan for:
 - Fact sheets/brochures/reports/plans/paper review and publication
 - Keep the process simple – outline steps and who is involved
 - NADP Cover sheet if it is an NADP product

PFAS Update (John Offenberg, USEPA, Martin Shafer, WSLH)

- PFAS initiative is a collaboration among WSLH, Wisconsin DNR, several groups at EPA
- PFAS Dispersal & Atmospheric Processing
 - Atmospheric transport, processing and deposition is underappreciated and under-studied
 - Many unknowns in PFAS research but Precip/Wet Deposition is an excellent matrix to begin with
 - Sources include both point and area
 - Industrial sources:
 - Paper mills
 - Metal finishers
 - Textile mills
 - Foam factories
 - PFAS factories
 - (manufacturing aids)
 - Major entry points
 - Industrial Sites
 - Fire Fighting Training
 - Commercial Fugitive Emissions
 - Landfills
 - Wastewater treatment plants
- PFAS Compounds
 - > 4500 compounds known/suspected
 - 220 with authentic standards
 - 150 identified in EPA/NIEHS high-throughput toxicity work
 - 50 with “routine” robust methods

- 18 in EPA 537.1 (drinking water)
- 3-5 with regulatory limits (States)
- Our understanding of PFAS is continually evolving
 - Legacy compounds
 - Emerging compounds of interest
- Speciation: Neutral vs. Ionizable
 - Neutral compounds: (volatile, longer lived - long range atm. Transport)
 - Fluorotelomer alcohols; FTOHs (6:2, 8:2, 10:2)
 - Fluorotelomer acrylates; FTAs
 - Perfluorooctane sulfonamides; FOSAs (Me- Et-)
 - Perfluorooctane sulfonamidoethanols; FOSEs (Me- Et-)
 - Many others
 - Ionizable compounds:
 - PFAA (PFCA, PFSA)
 - More Volatile: TFA, PFPrA, PFBA (regional background, LRAT)
 - Less Volatile: >C6 (local sourced)
 - diPAPs (polyfluoroalkyl phosphoric acid diesters)
 - Many others
- Targeted and non-targeted analyses
 - Decide which compounds need to be targeted
 - Developing a method for assessing total amount of organo-fluorine compounds will allow a better grasp of PFAS problems
 - Tools exist that allow us to assess the pool of transformable PFAS
- Atmospheric deposition of PFAS via precipitation
 - Effort began 2 years ago – can we use the NADP infrastructure to investigate?
 - Goals of the 2019/2020 NADP/WSLH Pilot Study
 - Assess the efficacy of the NADP infrastructure and current sample collection methods, for PFAS studies
 - Broaden the number of PFAS compounds evaluated
 - Few studies quantify more than 20 compounds
 - Initiate an overview study of PFAS concentrations in precipitation across the US
 - Extant data is quite limited
 - Improve the Quality Assurance documentation of PFAS precipitation studies
 - limited QA in many of few published studies
- WSLH PFAS precipitation analytical method
 - Methods are challenging, complex, costly and require highly trained analysts
 - Analytical methods:
 - ISO Method 21675 (PFAS in Water by LC-MS/MS). 36 PFAS compounds. 28 isotopically labeled surrogates
 - 500+ mL sample volume; entire sample extracted
 - Automated SPE (Oasis-WAX; 8-station Promochrom Tech.)
 - Sciex QTRAP 5500 LC/MS/MS, Waters Acquity UPLC
 - Contamination control:
 - QC'd polypropylene collection bottles
 - Gloves worn during sampling
 - No Teflon or related materials
- PFAS method performance outcomes in precipitation

- LODs typically 0.05 to 0.2 ng/L
- Spike recoveries typically 90 to 110%
- (4 ng/L spike)
- Outcomes of efficacy study: Blanks
 - The entire NADP sampling process was essentially contamination-free
 - System blanks:
 - Both bucket & bag collectors
 - Both lab & field deployments
 - 7-day trials, run in triplicate
 - High purity water (7-day field conditions)
 - Bags: no detects for 36 species (except PFOA, 0.23 ng/L, one sample)
 - Buckets: no detects for 36 species (except PFOA, 0.44 ng/L, one sample)
 - NTN bottle: no detects for 36 species
 - Methanol rinses
 - Buckets: no detects for 36 species
- Outcomes of efficacy study: Retention studies
 - PFAS retention/loss studies
 - Both bucket & bag collectors in lab & field deployments
 - Both MQ & precipitation matrices
 - Kinetic studies (0, 1, 3, 7-day samples)
 - Spiked with 36-PFAS compound mixture
- Outcomes of efficacy study: Summary
 - Loss of PFAS is minimal for compounds of carbon number <10 under current and planned NADP protocols
 - For most compounds < C10 we can quantify recoveries
 - Losses are observed for longer-chain (> 10 carbon) PFAS compounds
 - Largely recoverable with 50 ml methanol rinse of bucket
 - Based on 7-day exposure, 10 ng spike into 2L MQ water
 - The current NTN protocols are “CLEAN” for a broad range of PFAS compounds.
 - Alternate handling/collection protocols can be implemented to address losses of longer-chain compounds (MeOH rinsing).
 - Precipitation (and air) are effective monitoring matrices for detection of trends (likely better than other environmental receptors (e.g. fish))
- Pilot synoptic study: Key findings
 - 30 NTN sites, 37 samples, summer & spring 2019
 - Levels of many PFAS compounds were low (1 ng/L), though the Σ exceeded 4 ng/L at several sites.
 - Sites in the mid-Atlantic states generally had the greatest # of detectable PFAS species and the highest concentrations.
 - PFHxA, PFHpA, PFOA and PFNA were each present in nearly 70% of all samples.
 - C6,7,8,9
 - The carboxylic acid compounds were by far the most frequently detected and largest class contribution to the total targeted PFAS.
 - Transformation products of volatile precursors are transformed into carboxylic acids and scavenged
 - Deposition fluxes:

- Concentrations of 0.2 to 6.0 ng/L equate to a wet deposition PFAS flux of 0.7 to 21 ng/m²/day (at an annual precipitation volume of 125 cm/year).
- Non-trivial – can supply significant loadings to a number of large lakes over time
- WSLH-NADP PFAS toolbox
 - Developed a standardized robust protocol (SOP) for PFAS wet-deposition measurements using the NADP-NTN infrastructure
 - Incorporates optimized analytical methods
 - Will support site-specific, state, regional, and national PFAS wet-deposition efforts
 - Model (process) for other emerging contaminants
- Atmospheric processing of PFAS - Major unresolved issues
 - Collaborate with WDNR, EPA/ORD
 - How important are “air pathways” to PFAS dissemination?
 - The role of point, regional, and global emission sources at a given location
 - The role of atmospheric transformation processes
 - Can sources be identified and reduced to decrease the impact of air pathways?
 - Primary emission source versus secondary (reactive transformation) pathway.
 - Emission factors from major classes of emission sources.
 - Is source reconciliation possible from compound “fingerprint” profiles?
 - Measurement uncertainties (ambient distributions, chemical transformations, phase partitioning, wet/dry deposition, transport)
 - Composition of PFAS pool: unaccounted for fraction, oxidizable fraction, C2, C3, >C12?
 - Can we model (CTM-CMAQ) that which is observed?
- Wisconsin Precipitation PFAS Intensive
 - All 7 NADP-NTN sites in Wisconsin
 - WI06 UW Arboretum (pseudo urban)
 - WI08 Brule River (rural, N. Wisconsin near Lake Superior)
 - WI10 Potawatomi (rural, NE Wisconsin)
 - WI31 Devil’s Lake (rural, most popular state park)
 - WI35 Perkinstown (rural)
 - WI36 Trout Lake (rural – NSF LTER site)
 - WI37 Spooner (rural, near Duluth, MN)
 - 14 Weeks (April – July 2020)
 - Precip samples, field method blanks, field matrix spikes, methanol trip blanks, and sample splits for duplicate processing and analysis (if excess volume available)
 - WDNR funded: NADP, WSLH partners
 - Optimized PFAS sampling protocols with MeOH rinsing
 - Comprehensive analytical protocols
 - 36 Targeted PFAS (LC/MS) – WSLH
 - Total organic fluorine (CIC) – WSLH
 - Non-targeted analysis (LC/MS) – EPA/ORD
 - This initiative incorporates further method enhancements for neutral PFAS species that are very important to atmospheric transport and transformations
 - An MOU between WDNR, EPA R5 and EPA-ORD is in place to exchange a selection of these samples for non-targeted PFAS analysis.
 - Collected 70 samples = 71% of max possible (14 weeks x 7 = 98)
 - Compounds showed similar concentrations, rural and urban sites
 - Spring data: 4-15 PFAS compounds identified across the network

- Spring data: Sum of PFAS concentrations ranged from <1 to >22.3 ng/L
- Dynamic variability at many sites event-to-event
- Frequency of detection: 36 species looked at, 8 species are in >50% of samples
- 6 species (C6-C9) show up in 75% of samples
- PFOA and PFOS are regularly detected: legacy sources, atmospheric transformations
- Wet dep fluxes (sum of PFAS compounds) at 7 sites range ~2 to > 40 ng m⁻² day⁻¹
- Local sources and regional background are evident
- Initiation of Sampling for PFAS in Eastern US.
 - John H. Offenberg, John T. Walker, Melissa Puchalski, Doug A Burns, Andy Johnson, Martin Shafer
 - Largest/longest-term monitoring program of its type
- PFAS in wet deposition: Sampling started September 2020
 - 4 sites along East Coast
 - Weekly samples for 2 years at each site
 - Casco Bay-Wolf's Neck Farm, Freeport, ME (ME96). Site Sponsor: ME DEP. 2-years.
 - Whiteface Mountain, NY (NY98). Site Sponsor: USGS. Partner: SUNY Albany. 2-years.
 - Washington's Crossing, NJ (NJ99). Site Sponsor: EPA/OAP/CAMD. Partner: NJDEP. 2-years.
 - Duke Forest, NC (NC30). 3 years of wet deposition - single sampler for targeted PFAS
 - Including 1 year of co-located multiple samplers PFAS wet deposition
 - Triplicate samplers (both NTN & PFAS dedicated analysis)
 - Address QA issues, best practices development, etc.
 - Plus 1 year of PFAS throughfall under hardwood & pine canopies.
- Collection at existing NADP National Trends Network (NTN) sites
 - Important buy-in & coordination w/ NADP Site Sponsors & Site Operators
 - Integration with existing NADP NTN sample protocols
 - Limit disruption to standard NTN operations
 - Coordination with NADP Central Analytical Lab (supplies, QA)
 - Apply NTN PFAS tool-kit: bucket rinse (MeOH) & optimized lab processing
 - Weekly PFAS data. Samples pooled across weeks if <500mL of precipitation
- PFAS Analysis by Wisconsin State Lab (WSLH) after NTN processing
 - 36 PFAS compounds by isotope dilution, SPE-LC/MS/MS
 - EPA-ORD interest in adding Non-Targeted Analysis (NTA) - dependent on analyst & instrument availability
 - Working towards collaboration with other state efforts.
- Regulatory Limits and Reference Concentrations
 - EPA Reference Concentration: 70 ng/L (PFOA+PFOS)
 - State drinking water limits: 5 – 70 ng/L
 - WI proposed 20 ng/L WQL, 2 ng/L action level
 - Research suggests biological impacts at < 1 ng/L

Discussion:

Doug Burns: Martin is there any information available in the literature about dry deposition on PFAS and what levels would you expect? Martin: There is limited info on dry dep, a couple of studies using surrogate surfaces, some modeling studies. Most of these studies were done in contaminated areas and wet dep dominated. Donna commented that EPA has used CMAQ to model wet and dry deposition. The amount and the transport distances are important. A small fraction of PFAS is deposited close to sources,

much more LRT – distance of transport is an important consideration. John Offenbergs commented that with the broader range of compounds about which we know very little, we have made some best guesses in this regard, but there is much to be learned. Martin responded that analyses of physical processes of PFAS compounds will be needed to inform the models.

Doug Burns: Would it be possible to get ^{13}C measurements from some of the peaks for use in source attribution? John Offenbergs commented that we do not understand the list of compounds well enough to address this issue. There are many unknowns in PFAS generation from industrial processes and atmospheric transformations.

FY-21 USGS Precipitation QA Project (Greg Wetherbee, USGS)

- The USGS PCQA Project
 - Started in 1978
 - Requirement to QA data that USGS funds and uses
 - PCQA has always been independent and external to NADP as a USGS in-kind service.
 - PCQA funding can be (and has been) used for other purposes (e.g. field instruments, research studies) – QA program support can fluctuate
- FY20 PCQA Programs
 - NTN Interlaboratory comparison
 - Standards circulated to N. Hemisphere precipitation and AQ monitoring network labs
 - US, Canada, Mexico, Norway, Japan
 - 11 labs, monthly samples
 - MDN Interlaboratory comparison
 - US, Canada, Sweden, Japan, Thailand, Taiwan
 - 9 labs, monthly samples.
 - NTN Field audit and MDN system blank
 - Send solutions to the field – they are processed in the field
 - Investigate contamination/sample stability
- Some History
 - Before 2010, PCQA had up to 2.5 FTE + 0.5 student FTE.
 - Now, it supports 1.1 FTE
 - Salaries account for 94 percent of the project cost
 - Co-located program had 4 sites/year. Only 2 today.
 - NCON Collector deployed at select USGS NTN sites to collect co-located data for replicate samples to quantify overall variability of NADP data
 - Haven't done in a few years- samplers have been used for deployment elsewhere in the Colorado USGS network, but sites will disappear in January 2021 and co-located sites will be moved out into the network (date TBD)
 - NTN interlab shipped 4 samples every 2 weeks.
 - Today, we ship 4 samples/month.
 - MDN programs were implemented in 2004 although there is only 1 USGS Hg site at PR20
- Fraction of useable PCQA funds as labor and FTEs
 - Number of FTEs has declined from ~1.5 in 2020 to ~ 1.1 today
 - Labor fraction thus consumes a larger share of the program (95% now)

- USGS Headquarters began charging overhead to the program in 2020
- Proposed changes for core PCQA projects to reflect constrained funding
 - Transfer the field audit and system blank programs to CAL and HAL by FY22.
 - Update: Funding issues at CAL may not be able to support new programs right now
 - Will be discussed at the DQO Summit
 - Bi-monthly NTN interlaboratory comparison samples and quarterly MDN samples. Labs will now pay for shipping. – Start Jan. 2021
 - Offer all NTN and MDN labs participation in USGS Standard Reference Sample Program
 - Surface water samples, 6X per year
 - High analyte concentrations – will need to be diluted
 - Resurrect the co-located sampler program at 2 sites depending on travel restrictions
 - Candidates - OK00, TX56, FL14
- NUANC research sites
 - Began in 2017
 - Shutting down January 2021:
 - CO13 (CSU-Fort Collins) and new CO83 (Timnath).
 - CO84 (Betasso Reserve) and CO85 (CU-Boulder).
 - Operating with other sponsors:
 - CO86 - USFWS and operated by CDPHE
 - CO06 - City and County of Denver, operated by CDPHE.
- Other Activities
 - Help NPS with potential new RMNP site?
 - Work with Richard Tanabe and Camille Danielson on virtual lab reviews.
 - DQO Summit – Camille and Martin
 - Siting Criteria re-evaluation – Tim Sharac
 - Help to relocate OK00 and OR09.
 - Possible co-located site at OK00?
 - Other QAAG items
 - Evaluate cost-effective ways to augment or change the ways that NTN and MDN data are collected for network sustainability.
- Products
 - Completed FY20
 - USGS SIR – 2017-2018 External QA Report was approved but not yet published.
 - Updated PCQA web site. Adding FY20 publications soon.
 - In progress – publications
 - Atmospheric Nitrogen Deposition along an Urban-Remote Elevation Gradient in the Colorado Front Range, USA – Heindel, Murphy, Repert, Wetherbee, Liethen, Clow
 - Urban Atmospheric Nitrogen loading to the South Platte River – Wetherbee, Novick, Weizorek, Robertson, and Saad
 - Planned
 - $^{15}\text{N-NO}_3$, $^{18}\text{O-NO}_3$, $^{15}\text{N-NH}_3(\text{g})$, Paper(s) with E. Elliott and J.D. Felix.
 - Rocky Flats NWR N deposition USGS Open-File report.
 - Microplastics in Rocky Mountain Snowpack samples.
 - USGS SIR: 2019 – 2020 External QA Report
 - USGS Data Release for 2019 – 2020 QA data.
- Dry deposition studies

- Dry deposition was proposed to be reinstated when reliable sampling techniques have been developed
- Proposal discussion to use Brahney Bucket/Dry Side collection
 - Implement 12-point plan?
 - Discussed in spring 2021

Discussion:

Camille Danielson: Your QA program is valuable as it gives us confidence in our data.

Chris Worley: Greg, in your transfer plan are you still performing the statistical work and data report?

Greg: Yes, I can still help with that. Much of it has been automated, and it should be simple to continue.

Donna Schwede: Greg - you need to define dry deposition. Janice's method won't give the same values as flux measurements. John Walker: I think we need to have a conversation about NADP measuring dry deposition and what methods are recommended/accepted by the dry deposition community. Needs to be a discussion of what constitutes dry dep and how to measure/characterize this, and how to use the data.

Needs to be the subject of wider discussions within the community. Donna: Effort initiated at Duke Forest to compare flux measurements and throughfall to better understand the processes, and compare with model results. John: The methods we apply and which are accepted by the dry dep community will differ depending on the compounds being measured and the questions we want to answer. Dry dep measurement is extremely complicated but it is time for NADP to begin to address this issue. Dry side bucket has limitations, but Dr. Brahney is doing outstanding work here and we need to match appropriate methods to compounds being looked at. Greg agreed with the broad sentiment, but it is important to determine the role played by the dry site bucket. The 12-point planning process is meant to provide a critical look at what we want to do and is no guarantees of moving forward. Melissa suggested discussion further in TDEP/City Dep. Broad agreement with this approach.

Martin Shafer suggested that NADP can do more than just generating data – part of the mission should be involving university students and their participation in the program. Greg pointed out that TDEP is an NADP product and fuses measurement with modeling. Also, we are using the wet and dry side measurements to provide a total phosphorous measurement – this is probably a very appropriate technique for P, and there is likely demand for total P deposition estimates for lakes and for water quality management. Microplastics require further refinement of methodologies, though.

Greg Beachley: I'll put this discussion on the list for TDep Steering Committee to hash out a bit better before next spring 2021.

Camille Danielson: Greg, thanks for delaying the move of the blanks programs for a while - we will discuss all the field QC more at the DQO meeting so if anyone has input on that please let us know or join the effort.

Third Session (November 5th, 4:00 – 5:30 PM)

AMNet/MDN/Litterfall Update (Mark Olson, Doug Burns).

- AMNet Update 2020

- Down to 13 sites, peaked at 26
 - 4 GEM only, 9 Speciation sites
- Lost IN21 and NY43 in 2020
- NY06 (Bronx) moved to NY98 (Whiteface)
- MS12 will move to Barrow, eventually
- 4 GEM : 9 Speciation units
- Last site visit was December 2019
- Loaner program being used for repairs, 1135 to OH02 and NJ30
 - Sites that close donate equipment to NADP
 - Particulate units (1135) have been shipped to replace failed modules (NJ, OH)
- 2017 and 2018 Quality Assurance Reports have been complete
- 2019 data has been validated and QAR is near completion
- AMNet International Work
 - Asia Pacific Mercury Monitoring Network support
 - Scheduled to install GEM monitor in Jakarta, March of 2020 - canceled
 - Scheduled for Taiwan site visit on Jakarta trip – visit postponed
 - Supporting wet and dry deposition Network in South Africa
 - Next International Conference on Mercury as a Global Pollutant, scheduled for July 2022 in Cape Town South Africa
 - Invited to hold a workshop, wet and dry deposition sampling
- MDN Update
 - For details see HAL Update from NOS yesterday –extensive report on MDN
 - How do we increase site numbers?
 - Could strategically placed sites in the West fill in the map?
 - Gaps along west coast, UT, AZ, NM, TX, NV, ID, WY
 - Target specific groups? Fisheries, Tribes, Environmental organizations
 - Include passive sampling option
 - What do we need to grow/maintain the network?
 - NADP will move forward trying to expand the MDN
- Expand MDN by trying to Mercury Mines and Native American Reservations
 - High affinity of Hg with gold – legacy gold mines in the west pose significant Hg load
 - Native American Reservations in the Continental US – highest in the west where we need sites
 - Low hanging fruit to target and leverage Tribal input and buy-in
- Offer fish and hair Analyses to expand MDN?
 - Link to mercury ingestion in humans is through fish –
 - Use a Direct Mercury Analyzer (purchased for Litterfall network) for ancillary/ad hoc analysis?
 - Excellent for Mercury in solids
 - Target areas, reservoirs, subsistence fishing
 - Offer free (12) fish analyses a year
 - If mercury levels are elevated, use this to “sell” MDN sites?
 - Hair analysis to assess community Hg levels (e.g., at ICMGP)
- Litterfall Update
 - 2007 Litterfall initiative approved as pilot project for 3 years
 - 2010 Litterfall data published (Risch et al.)
 - 2012 Approved as transition network for 5 years

- 12 Point Plan approved in 2012
- 2017 Approved as full network by Joint, failed in Exec
 - Approved as transition network for 2 more years
- 2018 Approved for 2 more years as transition network
- 2018 Fall transition to WSLH approved
- 2020 Need to decide what/where to go
 - Approve as full network? Continue as transition network?
- Litterfall Transition to WSLH
 - USGS ran Litterfall Initiative through 2019 sample collection
 - Responsible for shipping collectors and receiving samples
 - Analysis of 2019 samples was performed by WSLH
 - Analysis and data reporting is close to completion
 - From 2020 on, WSLH responsible for sampler preparation, deployment, sample collection and analysis
 - 12-Point plan approved in 2012, still relevant? Need review?
 - Do we need advocates for Network status?
 - Exec needs to at least approve an extension as transition network
- Litterfall at WSLH
 - Smooth transition from USGS
 - Collectors cleaned and shipped by WSLH
 - 22 sites in 2020
 - Lost last 2 sites in PA, gained two, OK99 and CAXX
 - Reduced annual fees from \$2,800 to \$2,000
 - One problem several sites expected return shipping,
 - This was not clear when we estimated costs
 - SOP states Sponsors responsible for return shipping
- Litterfall moving forward
 - Not the most efficient method to collect and analyze samples
 - 4 collectors, each approximately 0.5 m² in area
 - Collected monthly, bagged, and freeze dried; yields ~ a kilogram of material with different moisture levels
 - Analyze ~ 50 milligrams of freeze-dried material
 - Drying and grinding is labor intensive
 - Subsample large samples and freeze dry, then oven dry the surplus to get dry weight?
 - Reduce costs, expand initiative, bundle with other Hg measurements
 - Need to evaluate collection techniques, timing, species
 - Now focus is on deciduous trees, but Daniel Obrist's work suggests that coniferous trees have a greater influence on litterfall than deciduous trees, but harder to collect
 - WSLH current side studies
 - 8 living species collected, 4 conifers collected using litterfall techniques
 - Effects of wet deposition on leaves, collect wet after rain, rinse with DIW, collect dry
 - Effort underway to improve measurements, reduce costs
 - Next steps? Transition network extension presented to Exec?

Discussion:

Doug Burns is in process of publishing 2017-2018 data release. Data are in three different locations with permanent DOIs since 2009. Doug thought Joint and Exec voted to approve Litterfall as a permanent network but Kevin O'Brien at University of Illinois objected and reversed the Exec vote.

Greg Wetherbee noted that there has been lots of investment in purchasing a DMA and renovating the HAL, and that it would make perfect sense to continue the Litterfall network – is there interest in running the sites by sponsors/operators? Mark Olson: There is interest but it is a regional network in the NE U.S., and it's uncertain where it will expand. Need to talk to sponsors and data users to improve and stabilize the networks. Doug Burns: The Litterfall network has never been large, but stable with ~20 sites. Greg: Network is paying for itself, so let's grow it, not mothball it. Mark: There is no intention to mothball. Moving to more regional coverage with TX and OK sites. Need to push on a variety of fronts – litterfall, MDN, hair and fish analyses.

Ryan McCammon asked about Litterfall costs. Costs have been reduced to \$2000 per year. Ryan also asked about siting criteria for Litterfall – this document was prepared by Marty Risch. Litterfall was designed to co-locate with MDN sites.

Martin Shafer: Litterfall network fits in nicely with the intent to focus on dry deposition.

Colleen Flanagan Pritz: Mark - your mention of analyzing fish Hg speaks directly to the L in MELD.

Donna Schwede: Mark - have you given any thought to analyzing the litterfall for more than Hg - e.g. total N?

Emmi Felker-Quinn: Litterfall C:N or N:P would be an interesting dataset to add with all of the excess material.

David Gay supports the Litterfall network but WSLH needs to improve methods to reduce work required to process and analyze the litterfall samples. Camille Danielson: Lots of work is required to analyze samples now, but need to improve efficiencies to make it a worthwhile network – given the work to process samples, WSLH wants to ensure that the data are used and useful.

David Gay: Litterfall network is not widely “advertised” in NADP outreach, so there needs to be greater effort here to promote discussion and use of data.

Doug Burns: We need a good model for mercury to drive and justify/support the NADP Hg networks. We should work to get to a total Hg dep value.

Melissa Puchalski: Do we need a motion to bring this to Exec – to extend as a transition network, with the understanding that continued effort be given to making the network more efficient and bringing in new users?

Motion: To accept the Mercury Litterfall Network as an official network of NADP – moved by Greg Wetherbee, Andy Johnson second.

Discussion:

Doug Burns: With sample processing and analysis methods evolving, is it the right time to make Litterfall an official network? Mark Olson echoed that concern. David Gay suggested that he, Mark, and others write a revised SOP and circulate to Charlie Driscoll, Daniel Obrist, Eric Prestbo, and MELD for feedback – if meets with approval that gives us more confidence to move forward. Greg Wetherbee: Joint

accepted Litterfall as an official network in 2017 – why backtrack now? Donna Schwede: Did Joint change the motion to keep as a transitional network because Kevin O’Brien’s rejection? Doug: Yes.

Mark Olson advocated for method improvement first, before proceeding with a motion to make Litterfall an official network.

Richard Tanabe read the Exec minutes from Louisville (Spring 2017): The motion to convert the Litterfall network from a temporary network to a permanent NADP network failed – concerns were raised about the availability of sufficient PO staff to make this a permanent network at this time. Note that further discussion resulted in superseding this motion with another to continue the network as transitional for two more years. The latter motion passed.

Melissa: Greg do you wish to add a friendly amendment?

Greg retracted the motion

Motion: To extend the Litterfall network as a transitional network for two additional years to allow for method development and improvement. Moved by Melissa Puchalski, second by Ryan McCammon.

Discussion:

David Gay suggested that MELD be involved in this process. Colleen Flanagan-Pritz expressed interest in the disposition of the network and commented that anything related to mercury should be folded into 1MELD. This issue predated MELD, however, so we should defer the matter to Exec and continue discussions. Doug Burns agreed that this is a good approach.

Kristi Morris: Any method development should be left to the WSLH Lab, and widespread admiration for the effort of Lab staff. David Gay agreed. Camille Danielson suggested that MELD assist with data interpretation and use. This will be put on the agenda for the spring 2021 meeting.

Motion passed

David Gay: We are looking for feedback on fish tissue sampling and tie-in with MDN is this a good idea? Colleen and others agreed that it is a good idea, particularly with respect to the tribes whose diet relies on fish.

Greg Wetherbee: Has the method used for fish analysis been published? We have to be careful. David Gay: NADP could offer fish concentration measurements to tribes that join MDN – the data would not be official data published on the web. Colleen recommended refinement of methodology to decide on sampling strategy and study design.

Martin Shafer: There is already an available USGS database containing data on mercury in tens of thousands of fish, so the NADP approach should be more targeted.

David Gay: It would be worthwhile to sample fish from near MDN collectors to allow the data to be put into local context.

Greg Wetherbee liked the idea of offering fish tissue analysis but cautioned that elevated mercury levels might prompt the tribes to take the issue to court. If so, NADP therefore must be sure of the sampling and

analysis methodologies and can stand behind them so that it is not put into an untenable situation. Must be prepared to defend the measurements.

Mark Olson reminded Joint that this a fledgling idea and is just a suggestion. The expertise exists in the WSLH and NADP, and the idea must be fleshed out.

Colleen: This issue can be explored and refined in MELD in spring 2021.

Kristi: Perhaps offer the measurements as a screening tool only, to prompt further study if need be?

Catherine Collins: FWS collects data for and issues advisories for water bodies. EPA also issues advisories for Hg in fish, so it may not be news to the tribes.

Nomination of NADP Secretary (Doug Burns)

- Doug formed an ad hoc committee with Kristi Morris and Andy Johnson - selected Linda Geiser (USFS) to be the next NADP Secretary.
- Doug opened the floor to entertain other nominees. None were advanced.

Motion: To approve Linda Geiser to be the incoming Secretary of NADP. Moved by Doug Burns, second by Ryan McCammon. Motion passed.

Eagle Heights/WSLH Special Study Projects (Mark Olson)

- Mark presented a map of the Madison WI area, denoting the location of special study locations/testbed (QA) sites at WI93 (Eagle Heights) and WI06 (Arboretum)
 - WI93 is surrounded by community gardens, hiking trails, etc.
 - Site is near Madison Well# 19 (underground drinking water tank)
 - Vegetation was cleared to establish WI93
 - (10) Cement posts 4 feet deep were installed
 - Posts are fitted with stainless steel rods and flanges to allow different gages and collectors to be mounted
 - Good site security - 24h surveillance
- Equipment at Eagle Heights (WI93) is laid out in two parallel rows
 - West row
 - Ott Pluvio 2 L
 - AMoN 4 bucket (16 collector capacity)
 - ETI Noah IV with wind shield for snow/ice – shields will be installed on other gages
 - Ott Pluvio 2S
 - Spare 2” flange not in use
 - East Row
 - MDN ACM
 - MDN NCon dual chimney
 - NTN NCon
 - NTN ACM
 - NTN KJJ
- Power and Communication
 - AC power at each of the 10 posts – GFI, dual-circuit
 - 4 pairs wire from each post to common communication box to allow for

- Event recorder for sampler opening
- Power to gages emanate from common source
- Data Logger in communication box
- KJJ Sampler
 - Installed October 2020 and is now operational
 - Will start sampling January of 2021, compare with ACM and NCon collectors
 - Need to replace KJJ lid seal as it came with an open cell foam with no covering
 - Need to design flexible backing for installation – Teflon wrap, semi-flexible plastic etc.
 - Final mods will need to be done in the factory if used in the networks
 - UW Madison Capstone project
 - Mechanical engineering students looking at ACM linear actuator retrofit
- Future Studies at Eagle Heights
 - NTN collector comparison ACM vs NCon vs KJJ vs Modified ACM (linear actuator)
 - Look at chemistry, lid opening closing (catch)
 - NTN collector comparison NCon with TP/TN Sampler vs Standard NCon
 - MDN collector comparison ACM vs NCon
 - Precipitation gage comparison ETI Noah IV vs Ott P 2L vs Ott P 2S
 - AMoN accommodates up to 16 samplers – recoated vs factory dipped cores
 - Future sensor studies
 - Low cost sensor testing
 - Low Cost Precip Sensors to capture low-precip events
 - ETI alternative
 - ETI Upgrade, bucket base
 - Ott Upgrade
 - Preliminary results are promising
- Site Upgrades
 - ETI Wind Shield “shake” issue
 - When wind blows the legs of the shield shakes and shakes the gauge - induces feedback with load cell, hard to determine if we see precip at low rates
 - PO will test an improved ETI wind shield base plate designed to reduce shake
 - Designed to be a field-ready conversion/upgrade to ETI gauges
- Additional Upgrades
 - NCon motor shims – when lid over bucket the motor can wobble
 - NCon 3-D printed motor shims
 - EEMS can install if needed
 - Hach/Ott Remote Monitoring Module gaskets
 - Gaskets in the weather tight boxes can degrade and leak
 - PO has found a retrofit and will distribute to EEMS for deployment as needed
 - AMoN gasket upgrades
 - Try to eliminate leakage around the tops of the inverted buckets with wider gaskets
 - Will be included with new buckets
 - ACM sensor boxes
 - Need to have new boxes machined (photo degradation – some date to the late 1970s)
 - WSLH Remote Monitoring Module, WiFi equipped
 - Install with new Ott gages that are replacing Belforts
 - Battery and CR3000 with WiFi
 - Eliminates Bluetooth dongle, connects directly to Android phones
 - ACM clutch disc
 - PO is low on these so will have more machined (CNC)

- Network Equipment Depot
 - Physics Department Senior Electronics Research Tech has been helping with difficult ACM motor box repairs
 - ACM clutch discs CNC machined locally
 - ACM sensor boxes in need of repair/replacement
 - ETI optical sensor rebuild/repair, about 10 in need
 - We need staffing help in the NED

Discussion:

There were numerous praises for UW departments in interacting with the NADP PO and WSLH.

Data Quality Objectives Summit – Martin Shafer

- NADP is in need of data quality objectives (DQOs) and criteria
 - Networks may not be suitable for this kind of analysis
 - But we should revisit this topic for due diligence
 - Need to define DQ needs should be a formal process
 - What are the goals/needs for data quality?
- Why a DQO process?
 - Evaluate possible options for study implementation
 - Sets expectations as to efforts, costs, outcomes
 - Defines tolerable error/uncertainty rates and decision risks
 - Establishes the quality and quantity of data needed to support decisions at a pre-specified level of statistical confidence
 - DQOs define the performance and acceptance criteria that limit the probability of making decision errors by considering the purpose of collecting the data; defining the appropriate type of data needed; and specifying tolerable probabilities of making decision errors (USPEA, 2002)
- Need an objective process for defining what are acceptable uncertainties in NADP products
 - A DQO process can facilitate that
 - Is such a process practical, or even possible, for the NADP networks?
 - CASTNET implemented a formal (pseudo-traditional) DQO planning study, so in theory it can be done for any national monitoring program
 - DQO Planning Document, EPA, Wood Environmental 2019
- The formal Data Quality Objectives process
 - A systematic planning process for efficiently generating environmental data sufficient for an intended use
 - State the problem & identify study team members and resources
 - Overarching - Identify goals/decisions (study questions)
 - What is network designed to do?
 - What is specific goal of monitoring?
 - Identify information inputs (study variables)
 - Establish design constants (study boundaries – where? when?)
 - Critical performance element, develop decision rule
 - Design target levels of each parameter given study goals

- How will the data be used?
 - Define statistical methods
 - Specify performance/acceptance criteria (limits on decision errors)
 - Develop/optimize the monitoring plan
- Are NADP networks amenable to a traditional DQO process?
 - Were the NADP networks initially established with specific QG objectives (decisions) for trend and spatial analysis?
 - Not to our knowledge
 - Can the DQO process for trend and spatial analysis be applied to current data users?
 - Establish the quality (e.g., via DQOs) and quantity (spatial/temporal resolution) of data needed to support the needs (decisions) of the most “critical” data users?
 - If the number and spatial distribution of NADP sites precludes such a formal analysis, what measures/approaches will allow us to define acceptable uncertainties in NADP products?
 - If not “top-down”, use “bottom-up (Method Quality Objectives)” to develop criteria?
- Options in lieu of a formal DQO process
 - To what end? Will the data users care and be able to better define the limitations and uncertainties in their studies?
 - Enhanced use of existing field-based and inter-laboratory Data Quality Indicators (DQIs)
 - Reimagining of protocols outlined in the 2007 NADP DQO document
 - Development of data quality metrics
 - Detailed assessment of the sources of uncertainty, using either existing data or limited new evaluations
 - Evaluation and reporting of uncertainties on all NADP data products
 - A robust data product is one with a well-defined error term
- Method Quality Objectives/Data Quality Indicators
 - Quantitative stats and qualitative descriptors used to interpret the degree of acceptability or utility of data to the user
 - Comparability
 - Assessed from USGS Interlaboratory Comparison Program (PT)
 - Completeness
 - Fraction of data that is valid (limits established by NADP PO)
 - Representativeness
 - Collection efficiency
 - Regional representativeness of emission sources
 - Siting criteria compliance
 - Sensitivity
 - Network maximum contaminant levels (from USGS field audit/system blanks)
 - Uncertainty
 - Assessment from co-located monitoring sites (from USGS co-location program)
 - Precision
 - Bias
 - Components
 - Methodology - relevant data, algorithms, assumptions
 - Decision rule
 - Frequency of evaluation and remedial actions
 - Supporting analysis and historic performance

- Plans and preliminary steps
 - Marcus Stewart has joined as a planner/facilitator
 - He led Wood effort for CASTNET
 - Substantial interest in the DQO Summit. A volunteer team (> 20 members) is in place
 - 6 ECCC, 2 EPA, 2 USGS, 3 NPS, 1 NOAA, 1 Wood, +7 WSLH
 - Poll for best dates in January for kickoff meeting
 - Identify NADP data users to survey regarding their DQOs
 - Prepare a targeted, short survey for data user - what do they need?
 - Review and summarize historical/relevant documents
 - Share survey results and historical summaries with DQO team
 - DQO Summit will inform next steps
 - **Report back at Spring meeting.**

Fall 2021 Science Symposium (John Walker)

- Fall 2021 Meeting –Planning Status
 - Thanks to Nathaniel for his help with planning
 - Raleigh, NC (NC State) and Knoxville, TN (UT) have been researched
 - Raleigh (meeting on campus, lodging within walking distance/short shuttle ride)
 - Cannot confirm availability of Oct. 25-29 or Nov. 1-5 until March 2021
 - Both are possible Homecoming weeks
 - Registration system does not allow for transfer of funds to NADP
 - Lodging capacity adjacent to campus may be an issue
 - Room space and A/V setup \$1485/day + \$900/day for breakout rooms
 - Knoxville
 - UT will allow modification of 2020 contract
 - Can book Oct. 25-29 now, Nov. 1-5 not available
 - Hotel attached to conference center can honor federal per diem rate
 - Registration system fits NADP needs
 - Room space and A/V setup \$900/day including breakout rooms
 - John Walker leaning toward Knoxville
 - Take advantage of contracts/planning already in place
 - Less expensive than Raleigh
 - Logistically easier than Raleigh (registration system, etc.)
 - Seemed like a good location for Fed/State participation in the CLAD workshop
 - The likelihood of an in-person meeting is unknown. Significant effort required to establish contracts and plan for Raleigh may be for naught.

Discussion:

David Gay and Greg Wetherbee: Knoxville makes sense from the budget perspective - costs are more reasonable. Greg floated the idea of moving the Fall meeting back to September (could not do previously because this necessitated paying for two conferences in same fiscal year). Covid presents the opportunity to fix that by moving the Fall meeting to September 2021 with better weather and potentially better locations in the future.

David Gay: Is there danger of feds running out of money at the end of the FY? Greg: No, it was something opposed by Admin Officers who are trying to close out the books at the end of the FY. If we

meet early enough in September (by 2nd week) this may alleviate some strain on the system. This may be a way to spend leftover end of year money.

John: Maybe we can circle back and ask about the possibility of a mid-September meeting? David Gay will ask Nathaniel to investigate.

2021 Spring Meeting (Winston Luke)

- Due to Covid, a virtual; meeting is the only viable option
 - Early-mid May?
 - End of April?
 - One or two weeks (science committee meetings Week 1, business meetings Week 2)?

Discussion:

There was more interest in breaking the meeting into two weeks, especially if virtual. Mike Bell: The other advantage is that this will allow us not to overlap science committee meetings.

Winston/PO will reach out to the community regarding timing and meeting topics. PO will send a survey next week to gauge responses/desires.

Andy Johnson: If the meeting is over two weeks, and if the fall meeting moves to September 2021, it may be better to move spring meeting to late April-early May to get good separation between the two meetings.

Melissa thanked all the speakers and noted that there were fewer motions at this meeting due to the PO's taking on more tasks without the need for subcommittee action. Melissa also thanked the PO for all their work, and for hosting the meeting, and thanked Greg for hosting the Science Symposium.

Andy asked about participant lists for the meetings. Richard Tanabe will send those along with Zoom recordings, etc.

Greg Wetherbee: Kudos to the PO and WSLH for all their hard work, ideas, and innovation, and to Melissa for her efforts.

Motion to Adjourn: Moved by Donna Schwede, Catherine Collins second. Approved.

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