

RFAC Meeting Summary – January 24, 2023

Committee Business: Stefanie Baxter opened the meeting, and Anthony Preucil (RFAC Liaison) read the security statement. Brenan and Kelly nominated Jen for chair and Hoss for vice chair. After the nominations, a unanimous vote by the committee members confirmed the new positions. Jen took over as chair and proceeded with the meeting.

Kristen Bowman Kavanagh (DRBC Deputy Executive Director) updated meeting attendees on details for the upcoming DRBC Climate Change Forum, an event sponsored by the Advisory Committee on Climate Change (ACCC). The event is scheduled for Tuesday, January 31st, at Harrah's Resort in Atlantic City, and is co-hosted by ACCC and the Partnership for the Delaware Estuary (PDE). This Forum is happening as part of the PDE biennial Science Summit, featuring keynote speaker Dr. Philippe Hensel who will speak on land movement as it relates to Sea Level Rise (SLR) in the mid-Atlantic region. There will be two technical sessions (one mid-morning and one late afternoon), as well as a high-level government panel after lunch. Registration may still be open for those who are interested in attending. Please visit <https://delawareestuary.org/delaware-estuary-science-and-environmental-summit/> for more information.

Jennifer Garigliano (NYCDEP) discussed the upcoming Delaware Aqueduct Repair. After the system refill as normal at the start of the Release Year on June 1, drawdown mode will begin to decrease DRB reservoir levels. Contractors are predicting a 5-8 month shutdown to make the final connection. Jen also mentioned the new Director of Water Supply Outreach who has been doing a lot of internal work thus far, but is planning on going around to stakeholder groups to schedule meetings and answer questions in the spring. Meetings will also take place after the shutdown, so everyone is aware of the conditions and how the repair went. Garth Pettinger asked if there has been any change in the proposed Neversink drawdown amount, to which Jen replied that there hasn't been any change, but it will be assessed based on hydrology at the time.

Jacob Zwart (contact: jzwart@usgs.gov) presented on using machine learning to predict temperatures of streams in the upper basin. He explained that NYC makes decisions every day to mitigate high temperatures by releasing cold water from reservoirs, and this product is helpful because it makes longer range forecasts and enables NYC to make forecasts ahead of time for weekends. He discussed how the forecast products are created by using deep learning (process guided) and incorporating temporal and spatial relationships to improve accuracy. He also explained that the model is taught physics by using thermodynamic equations and translating weather information into stream information which also improved accuracy. The forecast is done every day and posted on a public website with median as a white line and uncertainty visualized as blue bars surrounding the white median bar. The forecast is also provided to NYC in spreadsheet form. He mentioned that the model does a good job at 1 day lead time with 90% confidence and most observations are within this range. He also mentioned that the accuracy decreases with lead time. He discussed two thermal exceedance days on June 29 and June 30 and how well the model anticipated them. Though the model is not perfect, it has more information than other methods of forecasting and quantifies the increased chance of exceptionally high temperature on a given day. The model will be expanding to 70 sites in 2023 and forecasts will begin again in May 2023. Carol Collier asked if the temp forecast includes tributaries or just the main stem, to which Jacob replied that in 2023, it will include tributaries going into the main stem.

Brenan Tarrier (NYSDEC) discussed the Thermal Release Determination for 2022. Brenan gave credit to Diane English and Madeline Petcu for assisting with the design of the releases. The Thermal Mitigation Bank (FFMP) has a capacity of 2500 cubic feet per second days (cfs-days) and they used 1754 cfs-days, leaving 746 cfs-days remaining until May 31. The definition of cfs-days is the amount of water discharged in 24 hours. He mentioned that West Branch has not been an issue since FFMP 2017 flows. He discussed the main factors that are considered while making the releases, such as streamflows, time of travel, and air temperature. Other contributing factors include some memory of previous water temperature, sky cover, precipitation, length of day, sun angle, and ground water flux. Factors such as wind speed and humidity are also being researched to understand their impacts on temperature. He explained that thermal problems only occur below 1600 cfs. However, low flows don't necessarily lead to thermal problems and hotter days don't necessarily result in thermal problems.

He then discussed the 2022 experience and results. He mentioned that the thermal bank was used on May 31, although May was not included in this release year. The Delaware River Basin had a wet June, but low stream flow towards the end of the month triggered the use of the bank in late June. July was a more active month for releases. The subcommittee on ecological flows (SEF) notes that above 72 starts being a problem, so days greater than 72 but not greater than 75 were highlighted in a different color. Two days exceeded 75 at Lordville in July, likely due to greater sun intensity.

For August, he mentioned that a release on Aug 8, just barely not enough, led to an additional exceedance the next day which had a forecast for rain so they had determined release was not needed. However, the rain didn't happen and a thermal stress day occurred. Releases are a gamble as perfect meteorological forecast is not available. The remainder of August had more flow, River Master began directed releases which increased the flow. For September, there was one request based on forecast, which kept stream temperatures low. He also mentioned that anyone who wants more details should reach out to him.

Molly Hesson (Contractor for Philadelphia Water Department) discussed the results of the salinity model that has been in development. She mentioned that past presentations on the topic are available on the website (<https://water.phila.gov/sustainability/watershed-protection>). Today's presentation was focused on the Salinity Model Phase 1 simulation results. She reviewed how salinity is responsive to flow and how the model should inform 2028 conditions in order to maintain protection. She explained that water increases in chlorides for a variety of reasons, and that this model focuses on increase due to intrusion of ocean salt.

The salinity metrics used to quantify intrusion events were explained, such as the salt front (7-day average 250 mg/L isochlor), maximum location, and maximum 30-day average. She also discussed DRBC metrics such as the Zone 3 maximum 30-day average 180 mg/L isochlor exceeding River Mile (RM) 98 and the Zone 2 maximum 15-day average 50 mg/L isochlor exceeding RM 108.4. The latter could not be used to inform results because of the constraint of the ambient criteria. She also mentioned that spring tide leads to higher salinity and that the model takes about 40 to 50 days to stabilize.

She then discussed the results of the simulation. She explained that each simulation set Trenton Flow constant and varied Schuylkill Flow. The salt front is sensitive to incremental flows at Trenton (200 cfs = 1 mile of movement) and releases added to Schuylkill are not equivalent to releases added to Trenton, it is half as effective (400 cfs = 1 mile of movement). She also mentioned that all low flow metrics led to exceedance of DRBC criteria since the area of concern being studied is at a location at which the criteria

would be violated. In conclusion, flow targets manage salinity intrusion within a narrow range. Note that when the salt front is greater than RM 100.5, it means that ocean salt has reached further upstream to RM 110. She also mentioned that FFMP is capable of maintaining salt front between RM 97.8 and RM 101.2 at its current flow target combinations.

Further interpretation of the results - Additional cubic feet per second (CFS) at Trenton matters and that any reduction in upstream reservoir releases must be offset with new sources so flow at Trenton is not reduced. She also stated that the idea of TEFO (Trenton Equivalent Flow Objective) combining Trenton and Schuylkill Flow is flawed reminded attendees that the current flow targets allow ocean salinity to reach locations in the upper estuary under the worst cases. She also discussed the next steps such as adding compounded risks from wind, and researching the timing of salinity response. Additionally, understanding the co-occurrence of specific Schuylkill and Trenton flow combinations using the DRB-PST (Planning Support Tool) model.

Brenan Tarrier asked why Trenton is twice as effective. She explained that it is likely due to the “Tidal Prism” and the volume of the river where Schuylkill enters is larger. She used the analogy of a drop in a bucket (Trenton) vs a drop in a bathtub (Schuylkill Confluence). Fanghui asked why 2014 was chosen for the model study. Molly responded that the model used data from 2014 as it was the best data available. In response to another question, she also discussed the reason for using 12 psu (parts per thousand) at reedy for sustained intrusion and explained it was used to force an event that brings salt to Chester. She also discussed the flow and tide interplay, and how not enough water is being put in to alleviate the condition of the salinity intrusion.

She mentioned that each model run was the same except for the flow at Trenton and Flow and Schuylkill. She also discussed the idea of modeling runs that add flow to Schuylkill before the salt front passes Schuylkill and agreed that if the salt front is already upstream of Schuylkill, sending water down there doesn't do anything. She also mentioned that the salt front tends to creep up towards/past Schuylkill before flow targets are activated.

Public Comment:

During the public comment session, Garth Pettinger asked if there was any update on whether the OST calculation is under consideration. Jen responded that they would have a response sent to him shortly.

Closing the meeting

Steve Domber (NJDEP) made a motion to adjourn, which was seconded by Stefanie Baxter (DGS)

Committee Members in attendance:

Jen Garigliano, NYCDEP
Stefanie Baxter, DGS
Patty Murray, DNREC
Hoss Liaghat, PADEP
Joseph Miri, NJDEP
Kelly Anderson, PWD
Steven Domber, NJDEP
Laura Bittner, USACE

Brenan Tarrier, NYSDEC
Kendra Russell, USGS