DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
December 6, 2012

MEETING SUMMARY

The December 6, 2012 Regulated Flow Advisory Committee (RFAC) meeting began at approximately 10:00 AM at the Delaware River Basin Commission (DRBC) offices in West Trenton, New Jersey. Ms. Stefanie Baxter of the Delaware Geological Survey chaired the meeting. Introductions were made around the room and via telephone for those not attending in person.

Election of Committee Vice-Chair

Stefanie Baxter noted that the RFAC chair serves for two years and that her term was up after this meeting. She also noted that only decree party representatives can be chair of this committee and that each of the decree party representatives has been a chair over the past several years (rotation started with PA). She opened the floor for nominations for Vice Chair of the RFAC. There was a nomination for Hoss Liaghat of PA DEP and it was seconded. All committee members were in favor. Hoss will serve as vice-chair while Thom Murphy of NYC DEP will serve as chair, both for the two-year term that spans calendar years 2013 and 2014.

Update on USGS Water Census and IWRSS initiative

Bob Tudor gave an update on the USGS Water Census project. He talked about WaterSMART, a water use and water availability initiative from the USGS for the entire nation. The Delaware Basin is one of three focus areas that were selected for the initial cycle. This process started with a stakeholder meeting in September 2011 at Shawnee on the Delaware, PA. Stakeholder input from that meeting informed the project's work plan, which is focused on three modules: (1) acquisition, management, and integration of water-use and water-supply data; (2) development of ecological flow science; and (3) development of a hydrologic watershed model to evaluate stressors such as growth of population centers, effects of land use change, and effects of climate variability and climate change on water resources of the basin.

Bob said the webinar held a week ago was the first opportunity to report out on results to date. Ward Freeman of the USGS NY Water Science Center is the project lead. Ward gave an overview of the project and work done to date; the project team is composed of about 35 people from USGS (all over the US) that are contributing to the three modules. After Ward's presentation, the project leader for each module reported out on progress. Susan Hutson talked about acquisition, management and integration of water use and water supply data. The plan is to build a data clearinghouse for various water use sectors. Marla Stuckey and Kelly Maloney spoke on the issue of ecological flow science, including a decision-support system. Tonya Williamson reported on the water availability model that is being built for the Delaware using TOPMODEL, a rainfall-runoff model developed by USGS. Jeff Fisher of the USGS NAWQA program discussed how all the above components will fit together. For example, water availability estimates will inform some of the rainfall-runoff modeling and may inform ecological flow science.
Bob Tudor said DRBC is trying to be opportunistic and leverage resources from other organizations to advance water resources management in the basin.

Peter Kolesar said he attended the webinar and was very impressed with the various presentations. He said he is interested in eventually connecting the new tools to the existing ones

(OASIS and DSS). Dan Plummer also had positive comments on the webinar and progress made so far. Someone asked if the USGS team had access to OST and any OST data. Bob responded that Tonya Williamson of USGS has met with Amy Shallcross and Hernán Quinodoz of DRBC to talk about the linkage between the water model and OASIS and how they fit together. They are trying to make sure that these models can "talk to each other."

Bob Tudor discussed the Integrated Water Resources Science and Services (IWRSS) initiative, managed by NOAA. The Delaware Basin is part of their northeast pilot study. Stakeholder meetings will be held in the Hudson Valley, Delaware Valley, Susquehanna Valley, and Potomac Valley. Since various federal agencies are developing decision-support tools or models, DRBC is trying to work with them and avoid duplication of efforts. Bob said three federal agencies signed an agreement stating that USGS is the water science entity, the ACOE is the water management entity, and NOAA is the water prediction entity. Bringing those skill sets together it should be possible to build something that is useful over a period of time. There will be a stakeholder meeting for the Delaware Valley on December 13, 2012. The organizers listed 6-7 issues and asked the stakeholders to pick the three most pressing issues. The issues that came back with the highest rankings from the initial electronic polling were water supply, flooding and climate change.

Stefanie Baxter asked about possible overlaps between the Water Census and the IWRSS project. Bob said there was virtually no overlap. He said initial discussions with the IWRSS team focused on the inter-state flood task force recommendations. One possibility is to come up with reliable ensemble forecasts for all fifteen reservoirs in the basin. Another discussion was on Hurricane Sandy, which could have overwhelmed the landscape if it had followed a slightly different track with significant tidal surges. There have been tools developed in other places, like the Chesapeake Inundation Predictive System, that could be adapted to the Delaware. Bob said another issue is the need for additional tools to do climate change scenario planning that would back water supply needs and repel the salt line in the upper estuary. Marie Stewart said the Water Census is a USGS initiative, while IWRSS is a national, multi-agency initiative to look at the tools to do this sort of work at a larger scale. This is an opportunity to get some research done that might not have been done otherwise.

Overview of operational issues related to Hurricane Sandy

DRBC staff and Decree Party representatives reported on operational issues related to Hurricane Sandy. Amy Shallcross reviewed satellite pictures and NOAA forecasted and actual hurricane path. She said Atlantic City took a direct hit from Hurricane Sandy. National Weather Service (NWS) started warning people on the Atlantic coast really early that the hurricane was going to hit where it did. Higher amounts of precipitation happened in DE; lesser amounts were recorded in the upper basin and even NYC. Wind and coastal storm surge were the primary issues related to Sandy. Lewes, Cape May, Reedy Point and Washington Street gages almost reached their record stages. There was some moderate to major inland stream flooding, primarily in the lower basin. The hardest hit locations were White Clay Creek, Red Clay Creek, and the Brandywine and East Branch Brandywine.

Tom Murphy said NYC was preparing for as much as 10" of rain, as predicted by the early forecasts. Preparation work included setting up emergency operation centers, making all necessary deployments, and making the adjustments required to manage the reservoirs through the hurricane. In the end the hurricane was more of a wind event than a rain event. However, NYC and the other Decree Parties agreed on the 25th to put into effect a temporary agreement to make higher releases from the Neversink, which was having water quality issues caused by a

previous storm. Hurricane damage included lost power, a lot of trees down, and a lot of roads closed. Thom said the major impacts were in the City of New York. Also, wind-driven waves at Kensico reservoir caused a water quality event where turbidity exceeded 5 NTU (event lasted 105 minutes). Thom said the new UV facility that treats the Catskill and Delaware water was run at full capacity. Thom concluded that the overall impact of Hurricane Sandy on NYC was not as bad as Hurricane Irene in 2011.

Brenan Tarrier reported on NYS actions. Judging by actual precipitation recorded over the Delaware River Basin portion of NY State, this hurricane was not a big event. Most of the effect in NYS was due to storm surge and high winds, with extended power outages across a large part of the state. The storm surge caused flooding of residential homes and wastewater treatment plants, and coastal erosion. The Atlantic coast in NYS saw a lot of damage to the beaches. Hoss Liaghat reported on impacts on PA, where there were power outages, but no flooding. Kelly Anderson reported for Philadelphia. Overall effects were less severe than with Hurricane Irene, when river levels were higher and some flooding occurred. This time there was no flooding and all of Philadelphia's wastewater and drinking water plants remained online. There were power outages but did not affect operations.

Steve Domber reported for NJ. This was a coastal event, with the beach communities (barrier islands) hit the hardest. In the basin the main impact was lost power due to downed power lines. This affected water purveyors and wastewater treatment plants; the issue was getting power back power where possible and making sure there were diesel generators and a supply of diesel fuel, since this was an extended power outage. Steve said DEP staff is working on beach cleanup, oversight of landfill operations, and getting permits for some of the coast restoration and road repairs. Stefanie Baxter reported for Delaware. Impacts varied across the state, but were more severe along the coast. Rainfall ranged from 11" at the Indian River Inlet to over 5" in Claymont. However, flooding was limited because streamflows were low prior to the hurricane. At the coast there were nine record high tides. Damages were not as severe as in the NJ barrier islands; in DE the damage was mostly breach of dunes and a lot of over-wash.

Update on Decree Parties work towards next FFMP Agreement

Stefanie Baxter gave a brief update on the decree parties' work towards the next FFMP agreement. The principals have monthly phone calls and quarterly face-to-face meetings; the work group meets every two weeks to work on the issues that they are tasked with. Currently the work group is working on the following short-term priority tasks: (1) develop a new outline for the FFMP; (2) find a permanent solution for continuation of the NJ diversion increment; (3) CSSO discharge mitigation options, and (4) revised snow pack procedure as part of OST operations. Dan Plummer asked for clarification on the D&R canal diversion issue. Stefanie said the issue is finding a more permanent solution to the 85-mgd diversion rate during drought. While the Good Faith Agreement had 65 mgd during drought, the FFMP increased it to 85 mgd. The issue is resolving how this increased diversion gets offset and what the impacts are. Joe Miri offered New Jersey's point of view. He said during the discussions that led to the original FFMP this was presented as a restoration of the Good Faith Agreement cutback. The reason New Jersey thought that restoration was necessary was that the original cuts in the Good Faith Agreement were not equitable: cutbacks on a run-of-the-river intake cannot be on the same percentage as a reservoir system.

Garth Pettinger asked if there was any consideration given for when the Croton system comes back on line. Thom Murphy said the system will come on line in late 2013, but its potential impacts are not negotiated with the decree parties because Croton is outside the basin. Gail

Pedrick said her house was flooded in ’04, ’05, and ’06 when the reservoirs were well over 100% full. She said she was pleased to see that the FFMP has a 10% storage void target, but she and others are asking that it be increased to 20% and be provided year-round.

Presentation: Mitigating Summertime Thermal Stress in the Upper Main Stem of the Delaware

Professor Peter Kolesar of Columbia University made a presentation on current research that he is conducting in collaboration with Jim Serio and Naresh Devineni. A copy of his presentation is posted online on the RFAC page of the DRBC website. Their work is focused on the Upper main stem of the Delaware, from Hancock to Lordville. Their analysis shows that a 221-cfs release from Cannonsville will reduce water temperatures in this segment of the river by 1°C; mitigation of severe thermal stress on the average summer requires about 3,400 cfs-days from Cannonsville. Peter said his purpose was to persuade the RFAC committee to take action on this simple program of pulsed water release from the NYC dams on the Delaware’s headwaters. Such pulsed releases can mitigate the most severe thermal stress to trout in the Upper Delaware, without impacting water availability to any of the rivers’ stakeholders.

Peter introduced the issue of thermal stress for trout and discussed typical water temperatures recorded in the Upper Delaware. In line with several previous studies, he adopted the definition that trout are in “severe thermal stress” whenever the daily maximum water temperature exceeds 75°F or 23.9°C; each occurrence is counted as a “thermal stress day.” During the summer of 2012 there were 14 stress days. Peter used existing monitoring data to illustrate the variability of water temperature over the summer and with distance downriver from the headwaters. He also discussed thermal stress mitigation efforts in the summer of 2012, when there were five thermal stress events. The most serious stress event of 2012 lasted 8 days. In response to one of these events, a pulse of cold water was released from Cannonsville reservoir.

Peter reviewed the data analyses done to quantify the magnitude of the thermal stress problem at Lordville. Based on available temperature records, it was determined that there were 12 stress days on an average summer (19 on the worst summer); stress events average 3 days in duration (the worst event had 9 days). Peter said the research challenge was to build a statistical model that can estimate the impact of a pulse release from Cannonsville or Pepacton on water temperatures at Lordville. The objective was to find an equation that explains the 5-year long temperature record at Lordville, factoring in the actual reservoir releases. The water at Lordville is a mixture of releases from Cannonsville and Pepacton, water from the Beaver Kill, and water from other tributaries; as it flows down river this water gains or loses heat to the environment depending on atmospheric conditions.

Peter used a regression approach to estimate the impact of reservoir releases on Lordville water temperature. A series of alternative linear regressions were tested against possible causal factors. The final regression equation includes only three factors: flow and water temperature at Stilesville (downstream from Cannonsville), flow and water temperature at Fishs Eddy (downstream from Pepacton) and maximum air temperature at Deposit. The main findings are the quantities of cold water release needed to affect a given change in Lordville water temperature: a 100-cfs Cannonsville release reduces Lordville maximum daily temperature the next day by about 0.47°C (0.85°F); a 221-cfs release lowers Lordville temperature 1°C; it takes a 118-cfs release to lower it by 1°F. Peter said this regression model was used to estimate conditions under FFMP operations and flow regimes for some 500 days of data from the summers of 2007-2012. Results show very good fit to recent records of maximum daily water temperature at Lordville.

Peter concluded that thermal relief is feasible at Lordville within the parameters of the current FFMP/OST program. He said the average summer required 3,418 cfs-days of releases and the worst summer required 6,499 cfs-days of releases; he compared these volumes to the 9,423 cfs-days of water in the IERQ that can be used to support "extraordinary water needs". Thus, thermal relief appears feasible at Lordville in most summers, even in an extreme summer. Peter said next steps include continuation of this research, development of a forecasting model for Lordville water temperatures, and development of a thermal relief algorithm. The goal is to develop a procedure similar to what is now successfully implemented on the Lackawaxen River by PPL under PA FBC jurisdiction. Peter urged the implementation of an experimental thermal relief program for Lordville in the upcoming FFMP/OST revision, based on the results presented and the ability of PA FBC and NYS DEC to forecast thermal stress events. In addition to providing stress mitigation next summer, this would allow conducting experiments to validate the estimates of the cooling effect of Cannonsville releases on Lordville temperatures.

Group discussion followed. In response to a question, Peter noted that in recent years, there has been IERQ water that has gone unused by the end of the summer. Jim Serio argued that additional water should be provided for thermal mitigation releases. Mark Hartle noted that if there are two consecutive days at or very near the 75°F limit, it is possible to lower temperatures over the two days with a single pulse, released on time to get to Lordville before dawn. Peter suggested some real-time experimentation would help confirm and fine-tune this idea. Glenn Erikson and Don Hamilton commented on possibly using data from other gages to test improvements to the prediction model.

Set next meeting date

The next RFAC meeting will take place on March 7, 2013 at 10:00 at DRBC offices in West Trenton, NJ. [*Note – This meeting was later rescheduled for March 18, 2013 due to inclement weather*.]

Opportunity for public comments

Dan Plummer spoke on behalf of the Delaware Watershed Conservation Coalition, which includes close to ten conservation organizations and river stakeholders. He read from a prepared statement, which is posted online on the RFAC page of the DRBC website. His statement includes a few recommendations. The first recommendation is the addition of special-need water release protocols to protect the river's ecosystem from severe thermal stress during inevitable summer heat waves. The Lordville program is being formulated based on a scientific study being conducted by Dr. Peter Kolesar. A second recommendation is to develop new protocols to cushion the impact of sudden reduced flows ("directed releases"), which can have a jarring impact on the river ecosystem. Directed releases should be ramped both up and down gradually, at rates determined by state fishery experts. A third recommendation is that any changes adopted for the current flow program be limited to one year in duration. Among the reasons cited is that the Croton system is scheduled to go back online in 2013, and the availability of this extra water will impact water needs from the Delaware and Catskills systems. As part of any long-term solution, the coalition asks that consideration be given to the Equitable Apportionment Plan (EAP), previously presented to RFAC by Garth Pettinger; this plan can provide the scientific basis for a rational and equitable long-term solution to water withdrawal from the Delaware. Another recommendation is for a more formalized protocol for public input on periodic evaluations and revisions to flow programs. In particular, the coalition requests that a public comment period be allowed prior to any new plan being implemented.

Joe Miri stated that he had recently discovered that a report title was incorrect in the presentation he gave to RFAC on April 2012. He provided the correct title (Supplemental Report on Releases from NYC Reservoirs in the Upper Delaware River Basin, 1976, NYS DEC) and requested that corrections be made to the meeting summary and presentation posted online.

REGULATED FLOW ADVISORY COMMITTEE (RFAC)

December 6, 2012

ATTENDANCE LIST

NAME	AFFILIATION
ANDERSON, Kelly	Philadelphia Water Dept.
BAXTER, Stefanie	DE Geological Survey
BOUSUM, Peter	Friends of the Upper Delaware River (FUDR)
DOMBER, Steven	NJ Dept. of Environmental Protection (NJDEP), NJ Geological Survey
ERIKSON, Glenn	Wild Trout Flyrodders
HAMILTON, Don (via phone)	National Park Service (NPS)
HARTLE, Mark	PA Fish and Boat Commission
HESSON, Molly	Philadelphia Water Dept.
KOLESAR, Peter	Columbia University
LIAGHAT, Hoss	PA Dept. of Environmental Protection (PADEP)
LOVELL, Stewart	DE Dept. of Natural Resources and Environmental Control (DE DNREC)
MIRI, Joe	NJDEP
MOLZAHN, Robert	Water Resources Association of the Delaware River Basin
MURALIDHAR, D.	NYC Dept. of Environmental Protection (NYCDEP)
MURPHY, Thomas	NYCDEP
NORRIS, Marian (via phone)	NPS
OLIVIO, Dana	NYCDEP
PAULACHOK, Gary (via phone)	US Geological Survey (USGS)
PEDRICK, Gail	Aquatic Conservation Unlimited
PETTINGER, Garth	NYS Trout Unlimited, Delaware Committee
PHILLIPS, Jan	Consultant
PLUMMER, Dan	FUDR
QUINODOZ, Hernán	DRBC
RESTI, Sherri	FUDR
SCANNAPIECO, Alycia	Resident – flood concerns
SERIO, Jim	Delaware River Foundation

NAME	AFFILIATION
SHALLCROSS, Amy	DRBC
SILLDORFF, Erik	DRBC
STEVENS, Glen	US Army Corps of Engineers
STEWART, Marie	USGS
TARRIER, Brenan (via phone)	NYSDEC
THARP, Diane	NorDel Conservancy
TUDOR, Bob	DRBC
VAN ROSSUM, Maya (via phone)	Delaware Riverkeeper
WO, Jeromy	NorDel Conservancy
ZIGON-RICHARDSON, Valerie	DRBC