DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
March 8, 2011

MEETING SUMMARY

The March 8, 2011 Regulated Flow Advisory Committee (RFAC) meeting began at approximately 10:00 a.m. at the Commission offices in West Trenton, NJ. Ms. Stefanie Baxter of the Delaware Geological Survey chaired the meeting. Introductions were made around the room and via telephone for those attending on a conference call.

Approval of the minutes from the January 25, 2011 RFAC meeting

Stefanie Baxter asked for comments on the draft minutes of the January 25 meeting. Joe Miri requested that a statement that he made during the discussion of the Root Cause presentation be included in the minutes. The statement "Joe Miri stated that from New Jersey's perspective, except for the discrepancies on water consumption figures regarding outside communities, the rest of Mr. Pettinger's points, including those on over-drafting and withholding, were correct" was added to the minutes. The meeting minutes were approved with this single amendment.

Hydrologic conditions report

Amy reported that year-to-date precipitation in the basin is above normal for stations above Trenton and approximately normal at Wilmington, DE. Snowpack is two inches or less in the New York and NE Pennsylvania portions of the basin. Current streamflows at USGS gages in the basin are much above normal; groundwater levels at USGS monitoring wells are in the normal or below-normal range. The NYC Delaware Basin reservoirs are currently at about 89% of capacity, and Beltzville and Blue Marsh reservoirs are both above the normal pool (flood control storage is available beyond the normal pool). The salt front is currently at river mile 75, upstream from the February normal (river mile 68). The national drought monitor currently lists Delaware and areas of SE Pennsylvania and SW New Jersey as abnormally dry. The drought outlook indicates that the southern portion of the basin is likely to develop drought conditions.

Brief update on Catskill system water-quality issue

Thom Murphy reported on water-quality conditions on NYC's Catskill reservoir system, which has recently been affected by high turbidity. He said there was significant improvement in early February, when the turbidity alert was dropped and the Ashokan diversion increased to 450 mgd. However, the February 25 storm brought the alert back into effect. On March 2, Alum treatment operations were started to reduce turbidity; the Ashokan diversion was decreased to 50 mgd. Mary Ellen Noble asked if very high turbidity is expected to occur every time it rains. Thom responded that high turbidity has been the result of unusual high-intensity precipitation events. He said the fine particles suspended in the water have not settled out yet – this should improve when the water starts to warm.

Brief report on Decree Party work group progress

Stefanie Baxter reported on the progress of the Decree Party work group in developing a one-year reservoir releases program to replace the current FFMP. The last work group meeting was on February 10; future meetings have been suspended while the Decree Party principals discuss some contentious issues. Decree Party work group members are working on individual

assignments (the 16 items of the current FFMP that were posted on the DRBC website), in anticipation of resuming their meetings. Stefanie informed RFAC members that she reported on the last two RFAC meetings to the DRBC Commissioners at their March 2 meeting. She relayed key aspects of the various presentations that were given, as well as the major concerns that were raised at the two RFAC meetings. Bob Tudor added that Stefanie communicated to the Commissioners the general sense among the RFAC meeting participants that having more frequent meetings was useful in providing a window into the Decree Party process. Stefanie said she plans to report back to the Commissioners at the next Commission meeting on May 11.

February 14th revision of the FFMP agreement, sections 6.a.i., 6.a.x. and 17

Stefanie Baxter reported on the most recent revisions to the FFMP agreement, which were agreed to by the Decree Parties and posted on the Delaware River Master website on February 14. The revisions allow NYC some flexibility in defining what percent of the available snowpack will be available for releases. While the original FFMP allowed 50-percent of the snowpack to be counted as in-reservoir storage for purposes of release calculations, some have argued that a higher percentage (up to 100-percent) could and should be used under some hydrologic conditions. The recent revisions to the FFMP attempt to expedite this process, allowing NYC to make this determination on a daily basis, without the need to seek approval from the other Decree Parties. Stefanie said this action was taken last month, when significant snowpack existed in the Upper Basin and in anticipation of the warm spring weather. Thom Murphy stated that NYC has already started using this new provision, counting 100-percent of the snowpack as in-reservoir storage and making larger reservoir releases. The higher releases started on March 4 at Cannonsville and will start on March 8 at Pepacton and Neversink; this will bring all releases to the L1-a zone. Thom added that the new provisions specify that the higher releases can be halted upon request of one of the Decree Parties.

Progress of OST table development

Brenan Tarrier reported that additional release tables are being developed by NYS DEC staff; each table is developed to be drought risk-neutral with respect to stated water availability and equal or greater likelihood of voids being present at any given time. One of the tables has release rates that match or approach the release rates proposed in the PA FBC/NYS DEC joint fisheries white paper (JFWP). The increased summer release rates included in previous temporary summer programs are incorporated in the new release tables. In addition to the release rates, the curves that define the release zones have been modified and new rule curves added (e.g., the L2 "normal" zone is now divided into two sub-zones with different rates). Brenan said the Montague flow target during drought emergency operations was also changed while developing the new tables, by reinstating the vernier that links the flow target to the position of the salt-front in the Delaware Estuary.

Brenan stated that the L1-a and L1-b zones have been shifted to conserve or improve the spill mitigation ability of the program and to reduce the number of days when the maximum capacity (L1-a) spill mitigation releases are made (1500-cfs and 700-cfs from Cannonsville and Pepacton, respectively). He presented some preliminary comparisons between the new tables and the release tables from the current FFMP. By design, all new release tables have the same release rates during the three stages of drought operations (the L3, L4 and L5 release rates are the same for all tables); the new L3, L4 and L5 release rates are generally lower than those in the current 35-mgd table and generally higher than those in the current 0-mgd table. Brenan also presented a comparison of release rates against those in the "Revision 1" program, indicating that the "Revision 1" program has a dedicated bank for thermal-relief releases that does not exist in the

FFMP. Mary Ellen Noble asked about what inputs from OST were used to develop the new tables. Brenan replied that no inputs from OST were used; instead, variable NYC demand rates were used as a proxy for water availability (later to be determined by OST).

OST overview

Grantley Pyke of Hazen and Sawyer, consultants to NYC DEP, presented an overview of the Operations Support Tool (OST), currently under development. He said he would provide some background on OST and its capabilities, and introduce more detail about how OST could be used to implement the release tables presented earlier by Brenan Tarrier. OST can be used for refill probability and drought risk analysis; outage planning and emergency management; operating rule development and water supply planning; climate change planning/demand management studies; and new infrastructure. OST is based on the OASIS model, which has been used in the Delaware Basin to develop long-term operating rules and reservoir operations programs.

Grantley said OST is a computer decision support system that processes real-time data and streamflow forecasts, and feeds them into linked water quality and water quantity models to predict reservoir and streamflow conditions. OST can quantify the performance of alternative operating decisions for given expected inflows and diversions, release requirements, spill rates, storage levels, and drought risk. OST could be used in the Delaware Basin to develop, evaluate, and implement alternative release plans; OST can predict the amount of water available for release at any given time, while maintaining NYC water supply reliability.

Grantley said OST could also be used to develop an enhanced reservoir flood mitigation program. Reservoir spills could be mitigated by developing and using conditional storage objectives, exercising flexibility in managing snowpack, and making proactive releases in anticipation of large precipitation events. An OST flood mitigation rule is currently under active development; eventually it will utilize reservoir inflow forecasts produced by the National Weather Service. The rule under development has to perform well over a long period of record and also in a position analysis (look-ahead) mode; when implemented, the rule will be used in the look-ahead mode.

Grantley discussed how OST will make decisions on reservoir releases, based on estimated volumes of excess water at specified risk levels. Currently the plan is to have several release tables like those presented by Brenan Tarrier, each one keyed to a given volume of available water. OST will be run periodically to update the volume of available water, which may dictate switching to a different release table. The OST team is currently testing a mass balance rule to define when to switch tables. Grantley provided an example of the mass balance rule and selection of a release table.

Josh Weiss, also with Hazen and Sawyer, presented preliminary OST results for reservoir storage, releases, and flows at tailwaters gage locations. He discussed a plot showing that reservoir releases under FFMP-OST would often be larger than releases under the current FFMP. He said these results will be updated to include enhanced reservoir flood mitigation when available. Elaine Reichart asked if the flood mitigation rule would have eliminated any of the spills that occurred two weeks before or two weeks after each of the recent major flood events. Josh replied that preliminary results show that the rule has some impact on peak releases and peak flows for many historical events, and added that he did not have specific figures for individual events. Bob Bachman said he agreed with using OST to move from one release table to another, but said the releases recommended in the joint fisheries white paper (schedule F) are the minimum releases that should occur from a fisheries perspective, not the maximum as shown in the examples here.

He said releases like those in the 35-mgd table in the current FFMP would ruin the main stem trout fishery. Bob said the basic difference between the release tables shown as schedule A and schedule F is the assumption of how much water NYC is allowed to divert, and not what NYC needs to divert. Thom Murphy said reservoir inflows are now a considerable part of the calculations – even if NYC is taking 800 mgd, there is a possibility (with large inflows) that releases could follow the 50 or 75 mgd table; however, this would become less frequent as NYC demands go up.

Conservation Coalition's preferred reservoir releases plan

Dan Plummer of Friends of the Upper Delaware (FUDR) stated that he was representing the Delaware Watershed Conservation Coalition (DWCC), composed of several conservation and fisheries groups, including FUDR, Trout Unlimited National, and its New York, New Jersey, and Pennsylvania Chapters, Theodore Gordon Flyfishers (TGF), the Federation of Flyfishers (FFF) and its Wild Trout Flyrodders (WTF). He read a statement from the coalition, supporting a revised water management plan for the NYC Delaware reservoirs to replace the current FFMP for the coming year and urging DRBC and the Decree Parties to propose, on an interim basis, the reservoir releases proposed in the joint fisheries white paper; scenario 6 would provide significant benefit to the river habitat without increased risk to the water supply.

Glenn Erikson, representing Wild Trout Flyrodders (WTF), read a letter of support for the implementation of the reservoir releases recommended by the joint fisheries white paper. He pointed out some deficiencies in the current FFMP, especially high water temperatures resulting from low release rates in late summer and early fall, and indicating the negative effects of temperature stress on trout. Glenn recognized that OST may produce enhancements to the FFMP, but with the scarce information available on OST, WTF cannot recommend it at this time. He also indicated that the potential implementation of "Revision 1" releases would have negative impacts on trout habitat.

An adaptive release plan for the Delaware

Peter Kolesar argued against implementation of the "Revision 1" releases program, because it would be disastrous for the ecology of the Upper Delaware River. He said "Revision 1" operations would be worse for New Jersey, Pennsylvania and the "flood groups" interests; the only benefits would accrue to NYC. He cited several statistics to illustrate how "Revision 1" would perform much worse than the joint fisheries white paper (JFWP) proposal: adult trout summer habitat and Trenton flows would decrease; reservoir spills would increase. Peter defined the JFWP releases recommendation as a "shovel ready" improvement over the current FFMP. He reported on a variant of the JFWP that he and Jim Serio developed, but indicated they would be happy with implementation of the original JFWP plan.

Peter reported on a modeling study, carried out with the DRB OASIS and DSS models, comparing alternative release proposals. Many model runs were conducted with seasonally varying NYC diversion rates, with annual averages ranging from 450 to 800 mgd. Long-run performance statistics (1928-2006) were computed on storage levels, releases, flows, spills, reservoir refill, drought days and aquatic habitat. The main focus was on critical or "interesting" time frames: 1960s drought, 2001 drought, the 1990s, summer 2005, recent years, etc. Although many metrics were used, two dominant metrics were found most useful in screening policies: total upper basin drought days and total summer adult trout habitat. He said his analyses indicate the JFWP plan is drought day-neutral at a NYC annual average diversion of about 660 mgd; this

value compares well to the historical NYC diversions over the last decade, which have averaged about 512 mgd.

Peter proposed a one-year interim program, based on three release tables and a very simple switching rule. Each month (quarter) NYC will statistically forecast their Delaware Basin average diversion rate for the year ahead, and use that forecast to guide the specification of the appropriate release table to employ for the coming month (quarter) as follows: if the forecasted diversion is 650 mgd or less, make the releases recommended in the JFWP; if the forecasted diversion is between 650 and 765 mgd use the current FFMP 35-mgd table; if the forecasted diversion is above 765 mgd use the current FFMP 0-mgd table. Having periodic evaluations, this plan is adaptive and can easily adjust to changing conditions.

Elaine Reichart said she had questions on every single presentation and comments on all of them. She asked if RFAC could convene a meeting devoted solely to discussion of today's presentations. That meeting would be an opportunity for the Decree Parties to hear concerns from the public, including issues that may not have been discussed up to now. She said such a dialogue should take place before a decision is made. Jeff Zimmerman concurred and asked for a day-long session to discuss these issues at length. After discussion, the committee agreed to have a meeting to address questions as requested. Stefanie Baxter asked that questions be submitted in advance, indicating who the question is addressed to. Questions should be sent to Hernán Quinodoz at DRBC by March 24 to allow time for presenters to consider and prepare responses. All presentations given at today's meeting will be posted on the DRBC website for everyone to review.

Next meeting date

The next RFAC meeting will be on Thursday, April 7, 2011, starting at 10 a.m. If needed, there will be a two-hour morning session, a lunch break, and a two-hour afternoon session.

REGULATED FLOW ADVISORY COMMITTEE (RFAC)
March 8, 2011

ATTENDANCE LIST

NAME	AFFILIATION
BACHMAN, Bob	PA Fish & Boat Comm.
BAXTER, Stefanie	DE Geological Survey
BOUSUM, Peter	Friends of the Upper Delaware River (FUDR)
BRAND, Tom	NJ Dept. of Environmental Protection (NJDEP)
CALKIN, John	Delaware River Basin Commission (DRBC)
CHASE, Phil	Upper Delaware Council (UDC)
DOUGLASS, Bill	UDC
ELLSWORTH, Alan (via phone)	National Park Service (NPS)
ERIKSON, Glenn	Wild Trout Flyrodders (WTF)
GARLITS, Skip	stakeholder
GRUBER, Hank	US Army Corps of Engineers (USACE)
HAMILTON, Don (via phone)	NPS – Upper Delaware Scenic and Recreational River
HARTLE, Mark	PA Fish & Boat Comm.
HESSON, Molly (via phone)	Philadelphia Water Department
KOLESAR, Peter	Columbia University
LIAGHAT, Hoss	PA Dept. of Environmental Protection (PADEP)
MIRI, Joe	NJDEP
MOLZHAN, Bob	Water Resources Association of the Delaware River Basin
MURALIDHAR, D.	Hazen and Sawyer
MURPHY, Thomas	NYC Dept. of Environmental Protection (NYCDEP)
MUZYNSKI, Bill	DRBC
NOBLE, Mary Ellen	Delaware Riverkeeper Network
PAULACHOK, Gary (via phone)	US Geological Survey – Office of the Delaware River Master
PLUMMER, Dan	FUDR
PYKE, Grantley	Hazen and Sawyer
QUINODOZ, Hernán	DRBC

NAME	AFFILIATION
REICHART, Elaine	Aquatic Conservation Unlimited
SCANNAPIECO, Alycia	Resident – flood concerns
SERIO, Jim	Delaware River Foundation
SHALLCROSS, Amy	DRBC
SILLDORFF, Erik	DRBC
STEVENS, Glen	USACE
TARRIER, Brenan	NYS Dept. of Environmental Conservation
TUDOR, Bob	DRBC
WANG, Luke	Hazen and Sawyer
WEISS, Josh	Hazen and Sawyer
WO, Jeromy	NorDel Conservancy
ZIGON-RICHARDSON, Valerie	DRBC
ZIMMERMAN, Jeff	FUDR et al.