

**DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
January 16, 2008**

MEETING SUMMARY

The DRBC Regulated Flow Advisory Committee meeting, chaired by Mark Klotz, began at 12:30 p.m. at the West Trenton Volunteer Fire Company in West Trenton, NJ.

Approval of Minutes from June 27, 2007 Meeting Summary

The minutes were approved without changes.

Hydrologic Conditions Report

Mr. Quinodoz reported on current hydrologic conditions in the basin. He showed the nationwide drought map to call attention to what is going on outside the basin. The most severe drought conditions are in the southeastern United States, in North Carolina, Georgia and Alabama. There has been virtually no change in conditions over the last month in Delaware and Maryland. The precipitation departure for the last six months for the northeastern part of the basin shows roughly five inches or more above normal, while for Delaware and southern New Jersey it shows about five inches below normal. A drought watch is in effect in Delaware and in portions of southeastern Pennsylvania, although conditions have started to bounce back since December. This is reflected on streamflows, which are mostly in the normal to above-normal range throughout the basin, except again for Delaware and southeastern New Jersey.

Combined storage in the three New York City (NYC) Delaware Basin reservoirs is now at about 98% of capacity, which is significantly above the median; this very high level is due in part to the rapid melting of most of the existing snowpack. On December 17, there were about two to six inches of water equivalent in the snowpack roughly north of Allentown, resulting in 32.4 bg of water equivalent on the drainage area of the three NYC reservoirs. The Flexible Flow Management Program (FFMP) currently in effect, counts 50% of the water equivalent in the snowpack as additional water in storage. Every day this volume is added to the observed reservoir storage; the resulting reservoir levels determine the release rates for each of the three NYC reservoirs. For quite a while, L1a releases have been made from Cannonsville and Pepacton; these are the maximum release rates under the FFMP, set at 1500 cfs at Cannonsville and 700 cfs at Pepacton. However, there was a major meltdown in the snowpack a week ago. This melted about 90% of what was there two weeks ago. As a result, Cannonsville has been spilling for the last few days.

Proposed Flexible Flow Management Program and DRB Water Code Changes

Mr. Muszynski gave a brief presentation about the Flexible Flow Management Program and the associated DRB Water Code changes. The presentation reviewed the DRBC rulemaking procedures, including the public comment process, and provided a summary of the proposed changes to the DRB Water Code to incorporate the reservoir operation rules contained in the FFMP.

Comments by Members of the Sub-Committee on Ecological Flows (SEF)

Steve Lorence represented Colin Apse, SEF Chair, at this meeting. He read a September 17, 2007 memorandum from Mr. Apse to RFAC, providing SEF's recommendations and comments on the reservoir operations contained in the FFMP.

Mr. Gast said he had a question about the comment on the FFMP being based on data from the 1983 IFIM study by Doug Sheppard, instead of the IFIM study recently completed by the USGS. He was caught by surprise by that comment and said the PA Fish and Boat Commission had some concern about it too. The way he understood the comment is that the New York State DEC (NYS DEC) relied on the Sheppard work in preference to the more recent work. He does not know whether that is true or not, but it surprised him. Mr. Lorence said there is a concern that some of the assumptions made in revising the THPDMP (the reservoir releases component of the FFMP) to date may not fully reflect SEF's judgment. Dr. Murali suggested that this may be because of the deficiency in the temperature component of the DSS model. The comment in SEF's memo reads "may not fully reflect SEF's judgment (e.g., use of the 1983 IFIM study results rather than the current USGS habitat modeling study)." Mr. Gast asked if they actually did that or is that just an incorrect assumption. Someone from the audience said he used some of the numbers from Sheppard's report. He used some low threshold numbers for habitat, and then those were run in the DSS. The Sheppard numbers were a little more straightforward and easier to comprehend. Mr. Gast said he explained to Doug Austin and Leroy Young of the PA Fish and Boat Commission that the basis numbers that they started out with are those of the old revisions of the D-77-20 Docket and obviously come out of Sheppard's work. There was a lot of work done to revise those numbers as they tweaked the program and tried to improve not only the habitat, but decrease the negative impacts to other areas of the system. The comment implies that you are still sticking with the 1983 Sheppard study in preference to the DSS, and he was hoping that was not true.

Discussion with Interested Parties

Dr. Peter Kolesar of Columbia University presented a proposal for a modified FFMP, labeled "Augmented FFMP." He said his team has been studying these problems for a number of years and they like to use the most scientific basis possible and doing a lot of analyses. They have been modeling the FFMP and have done a number of simulations under a variety of conditions and a variety of alternatives that they have been considering for possible improvement. He wanted the RFAC to have an opportunity to hear what these ideas are in a less formal context in which questions could be asked and offered to provide additional information as desired in the future.

Dr. Kolesar's group has examined the FFMP from a number of viewpoints. Their basic position is very similar to that of Colin Apse and SEF, and that is that the FFMP, as implemented now in the interim plan, represents a modest improvement over the plans that have been in effect to date. They are supporters, but are critical supporters because the FFMP is clearly sub-optimal and one can do a lot better. Although there are a variety of criticisms that can be made and suggestions for improvement, today they want to focus on one issue. The dominant issue is that the FFMP is based on an unrealistic projection of New York City annual average diversions of 765 mgd. This number drives the only analysis that has been looked at, and drives the plan itself. The range of actual diversions over the last decade goes from 463 to 631. What does that do to the river? First of all, by assuming a 765 mgd diversion you overestimate the risk of drought days by 200%. You underestimate the reservoir refill probability by 50%, so there is an overstatement of risk. As a consequence of that, the model drives releases in a way that underestimates September reservoir levels by 17%, which means that actual reservoir levels in September, considering the possibility of hurricanes, will increase flood risk. From a conservationist viewpoint, they have a heavy concern about the upper main stem and the rainbow trout habitat, and the proposed FFMP reduces the trout habitat unnecessarily by 92%.

This is all correctable in a very simple and straightforward way. Currently, the FFMP consists of four release matrices or release schedules, keyed to anticipated New York City annual average diversions at four fixed levels: 765, 780, 790, and 800 mgd. Dr. Kolesar suggests adding two other release matrices, called Table A and Table B. Table A would be followed if the anticipated New York City annual average diversions were 600 mgd or less. Under these conditions, the proposal would increase only the normal level of late spring and early summer releases from Cannonsville and Pepacton in a modest way, but a way that is very much key to those release levels. These releases were calculated very carefully so this can be done with no increase of risk. Table B would be followed if the anticipated NYC diversions are between 600 and 700 mgd; reservoir releases in this table are identical to those contained in the CP2 proposal that was made last spring. Finally, In the event that anticipated New York City diversions are 700 mgd or higher, the current interim FFMP matrices would be employed as appropriate. So the structure is very simple, the changes are modest, but the impact can be very significant.

Dr. Kolesar indicated that this proposal does not use a drop of additional water; exactly the same amount of water would go down the river with this proposal as in the current interim FFMP. The proposal changes the schedule of those releases. There will be a reduction of spill and flood risk. There will be no impact on the availability of water supply for any situation in which New York City diversions are in fact at a high level. This system would divert water exactly the same way, but releases would have a slightly different pattern at the lower diversion levels. Dr. Kolesar noted that he has very carefully calculated that there is no additional risk at all.

By changing the timing of the releases, the benefits are an increase in the trout habitat in the upper river by some 92%, as indicated by the DSS model. Because of the timing of the releases and reduction of spill, reservoir levels at some critical junctions, and particularly September reservoir levels, would be modestly reduced – this would reduce both the risk of spilling and the risk of flooding. Dr. Kolesar and his group have examined this in excruciating detail and can assure that this proposal will handle the drought of the century very well. They believe that this is a logical and simple extension of the current plan, and they are advocating that this modification be implemented when the current interim FFMP expires.

Mr. Gast asked what Dr. Kolesar meant by rationalizing the Montague target. Mr. Kolesar said there are several elements of that concept. A major one is that the Montague target is not itself keyed to any objective requirements, either habitat requirements or water availability requirements. They believe that the Montague target makes some sense, but needs to be keyed to real needs. Such a target clearly should not be constant for 12 months of the year. They have in mind keying it to real needs and having it vary by month of the year. Another element is the interpretation/implementation of the Montague target. Dr. Kolesar believes that during summer months, because of the ripsawing effect of power generation releases from the Lackawaxen River, the counterbalancing ripsaw releases from the New York City reservoirs are a detriment to the upper river, without benefiting anyone in the lower river.

Mr. Gast asked if Dr. Kolesar's group has ideas or suggestions regarding what they might do with the ERQ. Dr. Kolesar said the ERQ is another interesting idea similar to the Montague target. The idea was to force releases to be spread out in a somewhat more rational fashion. Again, the ERQ is not itself keyed to actual needs. The group has performed simulations with the ERQ, without the ERQ, and with ERQ modifications. They know from the simulations that if the ERQ were utilized in a way that is keyed to either environmental needs or to water availability needs, then a more sensible, productive use of that water could be made.

Mr. Klotz said he is not sure about Dr. Kolesar's proposal in terms of diversions. It is something that would have to be discussed at length by the Decree Parties. It is not a direction that has been pursued in the past, but certainly the other components are things that many people have had on the table for consideration. As the Decree Parties have developed it, the FFMP has a periodic evaluation and revision process. They are planning to do that at the end of the comment period for the proposed Water Code changes and annually thereafter. Mr. Klotz asked if there are certain pieces of Dr. Kolesar's proposal that are going to be done in the short-term and that might be brought to the Decree Parties for evaluation now. Dr. Kolesar said the group does not have a timeline now. They have worked collaboratively with the NYS DEC staff before. It would be helpful for his group to get feedback about those issues that the Decree Parties think are of interest, so his group can set up a work plan and try to collaboratively address these issues. They have previously analyzed many of them, but for earlier versions of the FFMP. He believes that the analyses would have to be updated for the current interim FFMP.

Dr. Murali asked why the last ten years of NYC diversion data was used in the analyses, and whether the reason they chose the last ten years is because it was a wet cycle – this would make a difference compared to other cycles. Mr. Kolesar said that 636 mgd was used as the diversion rate for all of their analyses, which is the average over the last 25 years. They have gone back and looked at all the records they have available, and the database starts in 1982. There is an issue of stability; however, the system is not so stable. He thinks there are some interesting judgments to make as to which time period is most relevant. The maximum year in the last decade has diversions just a bit above 600 mgd. Dr. Murali said the time period since 1980 has been a little above normal in precipitation. Also, there were drought years in the 1980s, and that may reflect a different rate of diversion and consumption. Dr. Murali said he heard that the group was experimenting with some of the recent data and asked if Dr. Kolesar used some of the recent data in his analysis. Dr. Kolesar said most of their analysis is based on OASIS and so they suffer from the same limitation that everyone suffers from in that OASIS inflow data stops in the year 2000. All of the simulations do that. The group could provide a forecast on the basis of their OASIS simulations of what drought days would be, what trout habitat would do, etc., given a reasonable forecast of what NYC diversions would be over the coming year or two years. Dr. Kolesar noted that if the demand is 765 mgd, then plan to operate the river the way you expect the river to be. But if the demand is less than that do not punish the environment of the river, do not punish the river communities based only on the possibility that someday NYC will need 765 or 800 mgd. When that day comes, act accordingly. In the meantime, do not go through the next year or two or the next decade acting as if they are going to use the water they do not even need. That water that they are not using is going to go down the river. Rather, even out the releases so that the environment benefits and the river communities are less subject to flood, as opposed to pretending to divert water that you know you will not be diverting. The FFMP pretends to divert water that is not actually being diverted; therefore, it is forcing reservoir levels to be higher than they used to be, and is forcing more frequent low flows to the detriment of trout habitat.

Mr. Klotz hypothetically asked, if that was done, is there any potential negative impact to the habitat to have for a short-term, say a five-year period, summer releases at 450 cfs and establish the habitat based on that release level. But later, when the City diversion reaches 800 mgd, releases would be lowered to 260 cfs. What would happen to habitat? Dr. Kolesar said let's take that risk. It might require a little work. Mr. Klotz said his concern is more than just the regular trout habitat, but also the dwarf wedgemussel. Dr. Kolesar said the Augmented FFMP plan smoothes out summertime flows, including the flows at Callicoon, which is one of the areas that the National Park Service is concerned about. Thus, there is a modest dwarf wedgemussel benefit in his proposal. Mr. Gast said that benefit will only improve when diversions are down in that 600-700 mgd range, but it would go away when diversions increase above those levels. His answer to Mr. Klotz's question would be similar. First of all, there will be flood mitigation

benefits from going to Dr. Kolesar's proposal and those flood mitigation benefits will not go away as the City increases their demands, because they are going to be maintaining whatever those marginal storage voids are by their diversions rather than by releases down the river. The environment is what will feel the pinch as the City's demands grow in the future. They will create an environment for the fishery that is going to fade off as releases are reduced when the City begins to approach the current FFMP diversion levels. If in fact, you are going to end up creating dwarf wedgemussel habitat by these higher releases, they may face problems down the road even with the FFMP program in place now, because of the staged changes in releases keyed to NYC diversions. This might create problems with the Fish and Wildlife Service with regard to the eventual decreases in that habitat.

Jim Serio noted that the FFMP, as implemented so far, had improved the stability of releases during the winter period. Mr. Klotz thanked Mr. Serio for his observations and noted that this was good to hear. He stated that it was hoped during the design of the program that it would work out this way, but they will have to rely on their staffs and also the public to evaluate the outcomes. The Decree Parties developed the program thinking it is going to work a certain way, but it needs to be groundtruthed a little bit and that is part of the purpose for this periodic evaluation – to see if what we thought would happen will actually happen out in the field.

Someone from the audience asked a question about what happens if you implement a higher release and then when you need more diversion, you decrease it. Mr. Klotz said he does not know if any of them has the answer to that question right now. He thinks if they were ever to pursue something along those lines, it would need to be studied before any decisions were made.

Lee Hartman talked about the East Branch and the Neversink under Revision 7 of the D-77-20 Docket. He noted that the trout fishery has been in place for 35 years and that the FFMP will be detrimental to the fishery without a provision for thermal releases. Mr. Klotz said they know about this issue and will have to monitor and look at possible temperature effects. He said his recollection from initial OASIS runs comparing alternatives is that flow duration curves had median flows somewhat higher under this program, in each of the tributaries and in the main stem. Mr. Lorence said that under normal (L2) conditions probably in the East Branch would be about 10 cfs lower than it would have been in Revision 7. But if you look at L2 conditions in the West Branch, it would probably run significantly higher. Mr. Hartman said you have to take into consideration that there is not going to be any thermal releases or flow targets for habitat protection under the FFMP. Mr. Lorence said he agrees with his comments about the main stem, and there could be some difficulties during a hot dry summer. When you look at the incremental flow compared to what the releases are, except for the East Branch, the other two branches are a little bit higher and the West Branch is actually quite a bit higher.

Someone from the audience said Dr. Kolesar pointed out that the actual NYC demands are considerably less than 765 mgd. Mr. Murphy responded that two questions were being asked. One issue is stating that you do not feel that that rate can be delivered. It can be delivered, even if the actual NYC demand right now – depending on what is going on with the other systems – may or may not be there. NYC designs its systems for the future. They expect to be using 800 mgd in the future, and in this program, NYC is providing the 35 mgd temporarily to make this program sustainable. They do intend to use the 800 mgd at some point, and additional storage needs to be built to provide the 35 mgd so that they are not in a position of creating a habitat, giving something, and then turning around and saying they are taking it back. The sustainability part of this program is based on additional storage to provide the water for this program. The same audience member asked about NYC historically using less water. Mr. Murphy said the City has used less and that, to a significant extent, is due to a very aggressive conservation program in the City, which everybody has benefited quite a bit from. But at some point, you will still have

growth. That catches up and they will get to use the 800 mgd from the Delaware. They benefited greatly from conservation. They have knocked down daily consumption by 200 to 300 mgd, and they plan to continue with an aggressive conservation program. But there is only so much you can do on the conservation side and at some point there is going to be additional demand. The audience member asked if there was going to be a population increase or what event is going to cause water use to go up. Mr. Murphy said he is not up to date on the projections, but he believes they are talking about significant demand increases by the year 2040, due to population growth as well as a number of other factors.

Mary Ellen Noble asked if the City anticipates that you could divert 800 mgd through the drought of record. Mr. Murphy said they could not, since there are cutbacks in diversions during drought. Ms. Noble asked, regardless of the Good Faith constraints, will those watersheds yield 800 mgd? Mr. Murphy said they have a program to cut back both NYC diversions and Montague targets during droughts. They would not operate at 800 mgd in a drought situation. Ms. Noble said suppose you have demand dependent on that 800 mgd and asked what they would do. Mr. Murphy said there is a drought plan that would be enacted and people would be restricted in their water use. He noted that the City has other systems that may be affected to a greater extent such as the Croton or the Catskill systems because of either water quantity or water quality. The Delaware system has the best water quality and would be expected to make up the difference in that case.

Mr. Muszynski noted that the OASIS model inflow data is going to be updated through the year 2006. In response to a question on current snowpack survey data in the NYC watershed, Mr. Murphy said it will be placed on the web, but he was not sure how soon that would be done.

In response to a question about how the average diversions by the City are calculated, Mr. Paulachok noted that the diversion year starts on June 1 and a running average diversion is computed going forward from that date; however, if later in the year storage levels drop into drought watch, that computation is restarted. Mr. Paulachok indicated that the River Master diversion year runs June 1 to May 31. Ms. VanRossum asked where someone could get the annual diversion figures. Mr. Paulachok said you can get them from the River Master's office or from their weekly reports, which are posted on the River Master's website. Their weekly records go back to the mid 1990s, so there should be ten years in the online archives. Mr. Gast asked if the annual River Master reports provide that same data and Mr. Paulachok said they do. There is a complete set of annual reports all the way back to 1951. Ms. Noble said she is sure these reports would be in the DRBC library too. In response to a question from Ms. Noble, Mr. Paulachok responded that the data should be at the DRBC in some format and certainly NYC would have that information as well. Dr. Kolesar stated that interested people should not have to struggle to gather such data and related his ongoing request that DRBC be responsible for the availability of a comprehensive database related to reservoir operations.

Next Meeting

The next DRBC Regulated Flow Advisory Committee meeting will be scheduled at a later time.

REGULATED FLOW ADVISORY COMMITTEE
January 16, 2008

ATTENDANCE

NAME	AGENCY
BAXTER, Stefanie	Delaware Geological Survey
BRAND, Tom	New Jersey Department of Environmental Protection (NJDEP)
CARLUCCIO, Tracy	Delaware Riverkeeper Network (DRN)
COLLIER, Carol	Delaware River Basin Commission (DRBC)
DALEY, Jim	New York State Department of Environmental Conservation (NYSDEC)
DOMBER, Steven	NJDEP
FROMUTH, Rick	DRBC
GAST, William	Pennsylvania Department of Environmental Protection (PADEP)
HOFFMAN, Jeff	NJDEP
HUNT, Jason	Philadelphia Water Dept.
KLOTZ, Mark	NYSDEC
KOLESAR, Peter	Columbia University
LORENCE, Steve	NYSDEC
MAYER, Bob	New York City Department of Environmental Protection (NYCDEP)
MERSHON, Jim	Merrill Creek Reservoir
MIRI, Joseph	NJDEP
MURALIDHAR, D.	NYSDEC
MURPHY, Tom	NYCDEP
MUSZYNSKI, Bill	DRBC
NOBLE, Mary Ellen	DRN
OTTO, Harry	Delaware Department of Natural Resources and Environmental Control (DNREC)
PAULACHOK, Gary	United States Geological Survey – Office of the Delaware Rivermaster
QUINODOZ, Hernan	DRBC
SERIO, Jim	Delaware River Foundation
SILLDORFF, Erik	DRBC
STEVENS, Glen	Army Corps of Engineers
VANROSSUM, Maya	DRN