DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
March 6, 2007

MEETING SUMMARY

The DRBC Regulated Flow Advisory Committee meeting, chaired by Mark Klotz, began at 10:00 a.m. at the DRBC offices in West Trenton, New Jersey.

Approval of Minutes from September 19, 2006 Meeting Summary
The minutes were approved with no additions or corrections.

Hydrologic Reports
Upper Basin
Gary Paulachok presented the hydrologic conditions in the upper basin. December precipitation was deficient above Montague, a little less than two inches. In January, precipitation totaled about 3.40 inches; slightly more than 100% of the long-term mean. In mid-February, the upper basin area received the first significant snowstorm of the season, and the precipitation of 2.96 was mostly in frozen form. The event first began as snow and sleet, changed to freezing rain, some rain, and then snow. Through March 6th, there was less than an inch of precipitation. The long-term mean for the month is about 3 and a third inches.

During the last 30, 60, 90 days there were no significant anomalies in precipitation throughout the entire basin. For the 365 days prior to March 1, 2007, there was a surplus of 9.54 inches in the upper basin. New York City DEP, as part of their regular monitoring program, conducts snowpack field surveys. On January 15th there was no snow in the New York City Delaware Basin reservoir watershed, so there was no snow survey. The long-term mean snow water equivalent for that date is about 19.67 bg. On January 29, there was no snow, and the long-term mean for that date is about 23 bg. The snowpack in early February was 11 bg, and the long-term mean for that date is about 24 bg. As of February 15 the snow survey showed 48 bg vs. the long-term mean about 24 bg (203%). Additional precipitation in the form of rain subsequently increased the water equivalent to 57 bg. Currently, the snow water equivalent in the Catskills ranges from about four to eight inches, and below Narrowsburg is less than two inches.

There was normal streamflow in December, excessive streamflow in January, and in February the streamflow was deficient, mainly because the precipitation was in frozen form and has not yet melted. Much of the rain that came in March was absorbed by the snowpack and was not released as runoff.

Combined total storage for Pepacton, Cannonsville, and Neversink Reservoirs for January 1st, was 94% of usable. Storage for February 1st and March 1st were 97 percent, and 87 percent, respectively, not including snowpack. The storage-based flood mitigation program went into effect in January and it has a bearing on these storage levels. The status on March 5th at Pepacton was at 123 bg (88% of usable), Cannonsville at 80 bg (84% of usable), and Neversink at 31 bg (88% of usable), and the total storage in the City's Delaware system reservoirs was 86%. Lake Wallenpaupack for March 4th stood at 17 bg, which is 47% of usable.

Ground water levels for December, January and February were generally above average with some exceptions. In the Pocono region of Pennsylvania, the ground water levels in those observation wells are entering into the drought watch range. Once the water comes out of the snowpack and recharges the groundwater, that situation will reverse. There is a decline in ground water levels at this point in the Pocono wells, which is very unusual for this time of year.

Soil moisture for the week ending February 24 is well above normal in the upper basin, above normal in central and southeastern Pennsylvania, and normal in all of New Jersey and northern Delaware. The Weather Service reports that soils in the upper basin are frozen as of March 2, and are expected to remain frozen for the next two weeks. While the soil is frozen, any release of water from the snowpack probably will result in runoff and not recharge.

Lower Basin

Rick Fromuth presented the hydrologic conditions in the lower basin. He showed a slide containing the forecast for the storm of March 1-2. The southern part of the basin got as much as over two inches of rain and there was some minor flooding, but in the upper basin the snowpack did not melt and there was not much of a stage rise in the Delaware River. The heaviest concentration of precipitation was over the eastern part of the basin which received over two inches. There were a number of streams that went just over flood stage. Before the storm, flows in the upper part of the basin were much below normal due to the frozen conditions. The rain combined with somewhat warmer temperatures over the previous 24-48 hours increased the streamflow in the stations monitored in the upper basin.

The National Weather Service's Operational Remote Sensing Center in Minnesota flies routine low-level gamma radiation detection flights over the United States to assess snowpack. A comparison of the current snowpack with the snowpack that existed before the March 2005 flood shows that the snowpack is similar, but there was a heavier snowpack concentration two years ago built up in the Poconos and in the Neversink Reservoir watershed. As of March 5th, most of the upper basin still had in the range of two to four inches of water equivalent. There is a forecast for significantly warmer temperatures in the 6 to 10 and 10 to 14 day forecasts and melting should begin in that period.

Flows were quite low until recently due to the freezing conditions, and the location of the 7-day 250-part chlorides that are tracked in the Estuary were about eight miles above normal in early March, but that is changing due to the early March rainfall. The recent rainfall caused a peak flow of around 40,000 cfs at Trenton. That increase in discharge will push chlorides downstream over the next week or so.

A graph was displayed that showed storage levels during the course of the spill mitigation program for the New York City Delaware Basin reservoirs. There has been a total of about 40 bg of spills during the program as of March 6th. It was really the decline in runoff due to frozen conditions and the increase in the diversions to New York City that occurred during the month of February which were responsible for that decline. The storage has come up slightly because of the early March precipitation. Over the 163 days of the program, there have been 151 bg of releases and a total diversion of about 65 bg. The change in storage since the program started is 14.8 bg as of March 5, and the present void is about 37 bg. Snowpack water equivalent based on the Weather Service data is 64 bg. The number for total storage, assuming 100% of the water equivalent snowpack plus the storage, is just under 300 bg as of March 5th.

Proposed Flexible Flow Management Plan

William Gast gave an overview of the proposed program. The proposal was presented by the Decree Parties to the DRBC at the February 28th Commission meeting for their consideration and the DRBC is going to be considering the proposal for possible approval at the May 10 Commission meeting. The program was posted on the DRBC website on February 20th. The history of the reservoir diversions and releases goes back past 1954, but since 1954 has operated under the 1954 Supreme Court Decree. In 1977, the Parties agreed to enter into Good Faith Negotiations to develop a drought operation plan as a result of the experience in the record

drought of the 1960s, and that culminated in Docket D-77-20 (Revised) in 1983, that, along with Resolutions 83-13 and 84-7, embodied the Good Faith Agreement and created the drought operations plan that the Parties and the Commission have been following since that time. The Good Faith Agreement also provided for some fisheries releases. Since 1983, there have been eight additional revisions to Docket D-77-20. Most of them involving the fisheries release program, and through the years, additional water has been added to the fisheries program. In the last fisheries revision in May of 2004, the Decree Parties and DRBC adopted Revision 7, which has been called the Interim Fisheries Program, and is probably the most complex of the programs to date. There are three different sets of banks that are involved in this program and a lot of daily monitoring and daily decision making goes into the program. That program is set to expire at the end of May this year. Revision 9, which was approved last fall and which also expires the end of May this year, was a temporary spill mitigation program. There have been some spill mitigation components previously, but this was the first one that was applied at all three of the NYC reservoirs and actually incorporated snowpack and storage-based increased releases to provide some voids that would capture heavy runoff and provide some spill mitigation.

The objective of the flexible flow management program is to allow for modifications, at least slight modifications, to the program as time goes by, based on evaluation of monitoring results. Reservoir diversions and releases, in particular the diversions to New York City, and the releases down the Delaware River, would be managed according to the Decree to maintain the flow objective at Montague. One of the problems with the past programs is that the supporting sources of water have not been sustainable. An objective is to develop a program that could be long-term and based on sustainable sources of water. There is also the goal to ensure safe supplies of water to New York City and New Jersey customers, particularly those who depend on the Delaware and Raritan Canal diversion which is also a component of the 1954 Decree. Flood mitigation has come to the forefront, and was not something that was built into earlier programs. Over the last several years there have been some spill mitigation programs based on snowpack. An objective of this flexible program is to incorporate flood mitigation to the extent possible. Another objective is to provide adequate flows and temperatures for the tailwater fisheries that exist downstream of the three reservoirs, and hopefully provide a more natural flow regime. This program is based on storage in the reservoirs, and there will be higher releases when storage is high and lower releases when storage is low to mimic natural flow regimes in the system and to protect withdrawal and non-withdrawal uses in the main stem, the estuary and bay including aquatic resource needs and salinity repulsion in the lower reaches of the river, the estuary and the bay.

There are a series of elements that are in the FFMP that restate the Decree itself. The language regarding the diversions for both New York City and New Jersey pretty much paraphrases the language in the 1954 Decree. The Montague flow objectives remain pretty much as in the Decree and as modified by the Good Faith Agreement during periods of drought. The Trenton flow objective, likewise, is in the Good Faith Agreement and remains in tact in this agreement. Conservation releases are being modified under this new flexible flow management program. There is some discussion of the excess release quantity. The agreement includes a section on re-evaluating the excess release quantity – how it is computed and how it is used – as discussions move forward and negotiations take place over modifications to the program in the future. An excess release quantity extraordinary needs bank is also described in the proposed plan. There have been some changes made to drought management compared to the Good Faith Agreement. The first change is one that was made in an earlier revision of D-77-20. That change revised the previous Good Faith drought curves, which simply had two levels of drought warning between normal and drought emergency, and created drought watch, drought warning, and emergency zones to be more in concert with the way the states handle drought operations. The states in the basin operate using a watch, warning and emergency basis. A number of years ago, in one of the

revisions to D-77-20 the curves were revised to show watch, warning and emergency zones, and that change is incorporated into this agreement. In drought emergency, the proposed program replaces the Good Faith operations, which set the Montague flow objective based on the salt front location in the Delaware Estuary, with fixed seasonal flow objectives. This change is proposed at the request of New York City. A disclaimer was included in the Good Faith Agreement indicating that the City would not be responsible for managing or maintaining the salt front, and this implements that disclaimer. The other proposed change in drought management rules is that New Jersey's drought warning and emergency diversion allowance in the D&R Canal would increase to 85 mgd, vs. the 70 mgd in drought warning and the 65 mgd in drought watch that are specified in the current plan.

Mr. Gast made a few brief comments about the Tailwaters Habitat Protection and Discharge Management Program (THPDMP). The program that is proposed would replace the current and previous bank-based programs with a program that is based on storage levels and provide seasonally adjusted fixed releases rather than releases that have to be determined each day depending upon flows and temperatures in the tailwaters. As they were reviewing a long series of alternatives, the impacts, benefits and drawbacks of these proposals were assessed using DRBC's OASIS basinwide flow model and more recently the Decision Support System (DSS) that was recently developed by the U.S. Geological Survey in coordination with the Subcommittee on Ecological Flows. The adjustments to the releases in this program provide a more natural flow regime; higher releases when the NYC Delaware Basin reservoir storage is full and lower releases when storage is lower to mimic natural conditions. Ramping is also built into this program as it was in the temporary spill mitigation program last fall to dampen large changes in release rates. The spill mitigation component of the proposed THPDMP retains the storage and the snowpack-based programs in Revision 9, which was approved last fall, but there are some slight changes in the release quantities.

The proposed program retains the Good Faith objective for salinity repulsion, so there really has been no change made in that language. When the Decree Parties were in the process of approving the current interim program a few years ago, dwarf wedgemussels came to the fore as a protected and endangered species, so there is a provision in this program similar to the provision that was in the interim program. The Decree Parties would continue to review potential impacts to the dwarf wedgemussel in order to make modifications or adjustments as necessary to protect that habitat.

There is a component in the proposed program for Lake Wallenpaupack. PPL approached the Commission last fall and indicated that they were interested in implementing a snowpack and spill mitigation program similar to the one for the City reservoirs. An element has been incorporated in the proposed program that would ensure the consideration of such a spill mitigation program when and if it were presented. (DRBC Staff Note: PPL actually requested DRBC to grant temporary waivers (lowering) of first of month elevations for March and April of 2007 in order to provide additional room for snowpack, and the waivers were issued, with the condition that PPL submit a formal spill mitigation plan for review). There is an element in the proposed program for estuary and bay ecological health. It is there as a placeholder right now. New Jersey and Delaware are currently working to study the oysters and other ecological concerns in the bay. They really do not have the information needed to include provisions in the program at this time. There is also a placeholder for warm water and migratory fish. Before the program is approved, language will be added referring to the shad and other species. New Jersey has drafted language to put in this section. The basis for, in particular, the fishery management part of this program is a proposed increase in storage in the Cannonsville and Pepacton Reservoirs. Ultimately, the Decree Parties will determine how that storage would be used. It will have impacts on the diversion and releases under the Decree. The proposed program also includes monitoring, reporting and periodic evaluation provisions. At least on an annual basis,

the Decree Parties would look at the monitoring and reporting information that comes from the various elements of the overall program and consider revisions and modifications that should be made to the program as time goes on to operate it under the premise of adaptive management, in as flexible a manner as they can. There is a provision that the Parties can temporarily suspend or revise the program for unforeseen circumstances.

The proposed program represents a new concept in terms of managing the fishery releases, combining that with the spill mitigation program, and eventually bringing in other elements like the estuary element when that information becomes available. There are a lot of new concepts in this program and the Decree Parties wanted to allow a little bit of escape valve in case things do not work exactly the way the model shows, so there is a provision that would allow the temporary suspension or revision of the program for extraordinary circumstances. The intent is that the program will be initially effective for a three-year period. So, assuming it is approved at the May 10 Commission meeting, it would run for three years through the end of May 2010. At that time, the Parties would have to take action to extend the program with the premise that renewals after that time would be automatic on a five-year basis unless one of the Parties notifies the others at least 180 days prior to the renewal date that they want to discontinue the program. That would give the opportunity to at least engage in some discussions to determine how to move forward if the program were to be cancelled. The last feature of the overall program is to rescind revisions that occurred to D-77-20 since the Good Faith Agreement. There are a lot of provisions and particularly the last few revisions to D-77-20 that would be either replaced or changed by this program so it would rescind those other revisions.

Proposed Tailwater Habitat Protection and Discharge Management Program (THPDMP)
Dr. Murali noted that the current interim habitat program is based upon DRBC Docket 77-20 Revision 7 that ends on May 31, 2007. The reason for the proposed change is because the current program is based upon a limited habitat protection bank, which is not sustainable and is very labor intensive; it requires almost 24/7 operation by staff of DEC and DEP. The two agencies had problems with this program during the second year when the available bank of 20,000 cfs days was inadequate.

In addition, the three recent floods have caused a lot of public concern about the releases from the reservoirs. There is a need for maintaining some kind of supplemental releases in addition to the conservation releases, and that prompted the development of D-77-20 CP (Revision 9) which was adopted temporarily in September of 2006 through the end of May 31, 2007. The temporary program calls for supplemental releases from October through May. The temporary program is based upon actual storage in the reservoirs plus 50% of the water equivalent snowpack in the Delaware system. It is also triggered by an 80% rule curve, so if the accumulated storage, that is the actual water storage plus 50% of the snowpack, is above the 80% rule curve then this program kicks in.

Many concerned citizens have commented that the pulses in release rates are not good for the habitat and a more natural flow regime is preferable. The NYSDEC had several meetings with representatives from a fishery coalition (The Nature Conservancy, Trout Unlimited, and Delaware River Foundation). Based upon the comments, the NYSDEC concluded that they should try to make more constant releases based on storage level and season.

A constraints document prepared by the Decree Parties was posted on the DRBC website for reference by individuals or groups who wanted to look at other release programs. The goals and constraints specify that there shall be no significant increase in drought frequency, no significant reduction on basin diversions and no impact on aquifers, the oyster population, or the water intake that the City of Philadelphia uses.

The proposed program is based upon the potential addition of a total of 14 bg of increased storage at Cannonsville and Pepacton Reservoirs. New York City and the State of New York are looking to evaluate the economic feasibility of this expansion. In the interim, the State of New York has negotiated to provide 35 mgd of water from their authorized diversion rate of 800 mgd. The releases are based upon input from coalition groups and are directly related to storage levels. The releases are designed by the NYSDEC to simulate the target flows that were developed by IFIM studies by the NYSDEC in the early 80s to provide habitat at the downstream locations (Harvard, Hale Eddy, and Bridgeville). The spill mitigation component of the program, is based on observed storage plus 50% of the water equivalent snowpack, and uses a 75% rule curve to trigger supplemental releases, as compared to the 80% rule curve used for the temporary program which expires on May 31. *(Staff Note: The rule curves referred to are triggering mechanisms for supplemental releases. They change seasonally throughout the year and rise to the 100 percent level in the spring and early summer. These triggering curves do not represent the size of any required void in the reservoirs and the proposed program does not require minimum voids).* This program is applicable year round in the sense that even during the winter months, if storage plus 50% of snowpack exceeds 100%, supplemental releases would continue. The maximum supplemental releases from Cannonsville are about 1,000 cfs, from Pepacton about 700 cfs, from Neversink 195 cfs – significantly above the conservation releases. One significant improvement of the program is that it includes the summer months when there is less potential for refill. If the storage in the Delaware system is above the triggering rule curve (referred to as the75% rule curve, but variable with the season) the program kicks in and the individual reservoir rule curves are used to determine the release rate.

The proposed releases program provides more natural flows and less variation. It provides a program that is more adaptable, so that if there are other reasons to change the program based upon public concerns, other studies, oysters, or downbasin needs down the road, this program is more flexible and much less labor intensive because it is based upon constant releases.

A significant change in this program is the increased releases during drought watch, drought warning and drought emergency compared to previous programs. Prior to now, and based upon the 1983 Good Faith Agreement, drought emergency releases during summertime in Cannonsville were as low as 23 cfs. Now there will be constant releases of 75 cfs during July from Cannonsville.

Report from Sub-Committee on Ecological Flows (SEF) on Proposed THPDMP
Colin Apse summarized SEF's initial recommendations and said he would follow that with a memo and then they will do some additional work to review the proposal to give the final set of recommendations before the hearing on the 27th. He thanked RFAC for all the work to get this flexible flow management program out to public comment.

The SEF believes, based on the DSS results and their own experience, that the THPDMP is definitely an improvement upon previously viewed proposals associated with meeting their resource needs. More specifically, they are looking at THPDMP results in the DSS relative to Revision 1 and Revision 7.

Compared to Revision 1, there were a number of gains for species life stages under different seasons. There were a couple of exceptions; one was the shallow fast guild where they saw some declines in habitat in a number of their modeling decades. There were some cases of no gains or losses. There is a dead heat when compared to Revision 1 for the upper main stem and for the East Branch for a range of species including trout. Against Revision 7, SEF saw some significant gains associated with the proposal for trout, but only when conditioned by temperature in the

West Branch trout habitat generally and some other key habitats. SEF is interested in examining the sensitivity of temperature related gains for trout in the main stem since they do not see those gains without temperature conditioning. SEF used a twenty degree estimated temperature with a model that USGS put together that predicts temperature based on releases. If you use twenty degrees as something that defines whether you get habitat or not, the new proposal actually does quite well. If you do purely habitat based on flows, the new proposal is pretty much a wash relative to Revision 7 so they want to look into that a bit more. Against Revision 7, the proposal leads to some losses in the Neversink across seasons for most species habitat combinations. One thing SEF wants to look into further is whether it makes sense to move some of the summer L2 increases in the proposal to the Spring in the Neversink. SEF also sees some losses associated with persistent spawning habitat for trout. Those are probably associated with Revision 7's target flows. This habitat persistence, the way that the habitat model computes persistent habitat, means looking at what the range of flows are at certain locations over periods of time; over the seasons basically.

SEF has at least one member who wanted to point out that they feel that 250 cfs L2 release from Cannonsville will not sufficiently sustain the main stem trout fishery and wants to make that of more concern to SEF. They believe that the adaptive management approach that is crystallized in the FFMP proposal is a really excellent step. It reflects their recommendations from the past, and it is a good way to get new information in about resource needs. SEF would like to participate in the structured adaptive management program as an advisor so they can get new ecological information whether it is oyster modeling results, dwarf wedgemussel results, or monitoring information that they get from the field being incorporated into the annual reviews. They also suggest that if there is language that can be more specific on how this adaptive management process will proceed in the future, it would be valuable in order to make sure that they can effectively incorporate new information as much as possible.

SEF did not find any clear commitments in the proposed program about ramping rate adjustments from the reservoirs during normal conditions in the FFMP. This is a recommendation SEF has made multiple times. NYCDEP has made a lot of efforts to date on working with SEF on ramping rate and trying to deal with the operational difficulties associated with that including limiting the size and the pace of decreases of flows especially when you are moving towards a low base flow. They think those are advances for protection so they are interested in seeing if there is a way to get that crystallized in this proposal, and they are going to work with the Decree Parties to get that language in there. There is a lot of ecological value in the proposal or the FFMP structure that is not detected by the DSS. Mr. Apse noted that Dr. Murali and Mr. Gast did a great job summarizing these including smoothing out releases directly downstream of the reservoirs, eliminating some of the pulse problems they saw associated with Revision 7, getting some natural variability back in the system across years associated with linking flows to storage levels, and reducing the possibility for human error in release scheduling. Those are all things SEF feels are important.

Mr. Apse will send SEF's recommendations to RFAC as soon as he can. Mr. Nuffer asked if the recommendations would get posted on the DRBC website so that all of the audience has the same information available to them. Mr. Apse said yes as long as the recommendations are labeled as initial because SEF is expecting to do more.

Mr. Apse asked if there is anything in particular RFAC would like SEF to look at before the public hearing coming up on the 27th and said they could let him know verbally or in written form. Other than looking at the DSS results, SEF will probably do some hydrologic analysis using the IHA program to help look at some of the impacts of the current proposal.

Dr. Murali asked if SEF was going to estimate a modification to the DSS model based on the temperatures. Mr. Apse said they are not actually talking about a modification. Joe Miri asked about the funding for the SEF work. Mr. Apse said it is the same funding they have been getting, which is zero. Dr. Miri asked if the Nature Conservancy was going to do this. Mr. Apse said no this is SEF so they are hoping that the Park Service helps to do some work associated with looking at the new numbers. They are also hoping that Jim Serio is going to pitch in to help do some runs. As a group they will be volunteering their time to talk through this to refine the recommendations and get RFAC what they need within reason.

Dr. Murali said the NYSDEC has not seen any official recommendations by the Park Service. Mr. Apse said they have not either. Mr. Nuffer asked Dave Forney if those numbers by the Park Service are going to be shared with the state conservation departments that are involved, both Pennsylvania and New York, so that they would have a chance to vet those numbers to make certain that they understand. Mr. Forney said a lot of it has to do with Dr. Ellis and his evaluation of the report and then his recommendation that comes to the National Park Service, and from that they will distribute as appropriate. Mr. Nuffer asked if he knows whether there have been any initial conversations at all with the Fish and Wildlife folks in the state of New York and Pennsylvania. Mr. Forney said he is not privileged to that information. He is more concerned about information on the federal side and sharing it with the Fish and Wildlife service to ensure that it meets the Endangered Species Act requirements and the things that they are upholding. Mr. Nuffer said he would encourage them to reach out and give those agencies some heads up that something is coming down the line. Mr. Forney said he thinks it is part of the plan to do that. Mr. Apse said it is a tough situation because it is literally just being finalized. Mr. Nuffer suggested that before being finalized they are shared with their colleagues at the state level so that those numbers can be vetted to make certain that they are accepting them. Dr. Murali asked if there is any kind of field review process for the work done by Dr. Ellis. Mr. Forney said yes, that is part of the work that Dr. Ellis is doing from USGS and that is part of the finalization of the draft.

A member of the audience had some questions. He wanted to clarify that it is SEF's position that the proposed flow plan is not adequate to maintain the main stem. Mr. Apse responded that relative to Revision 7, they see significant gains when conditioned by temperature, but they see no gain associated with it compared to Revision 7 for the main stem. The audience member asked if that was significant gains with flows of 250 with temperature. Mr. Apse said yes, with temperature. The audience member's second question asked what data they base their pulse studies on. Mr. Apse said that is from discussions from biologists at SEF and they are using literature from around the country, so they do not have specifics. The audience member then asked what about the specifics for the river. Mr. Apse said there is no river pulsing study that has been done; it is only based on expertise and scientific literature about it. The member said with the present plan, the pulsing may not really have any effect. Mr. Apse said it has not been documented. The member said the real pulsing occurs with the differences between Montague. When Montague is being met, the majority of the pulses occur from PPL and Cannonsville. If he understands correctly from the last meeting, that has not been approached. So the reality is that there is not really anything that is going to be done about the pulse. Mr. Apse said that the affect of the proposal on that type of pulsing will be limited. What is addressed is the pulsing that was associated with habitat and temperature releases associated with Revision 7.

Mr. Apse asked again if there were any instructions from RFAC as far as where they want to go over the next couple of months. Mr. Klotz said at this point he was not aware that the committee had any other suggestions for SEF to follow up on as far as directives. There will be some discussions about the whole process and the comments received here. The RFAC members can certainly look at that and if they have any suggestions, provide them very quickly recognizing

that they have a very short timeframe to try to move this process forward. Along with that, Mr. Klotz wanted to acknowledge SEF's work and said they appreciate SEF's efforts through the whole process especially because this was a very short timeframe.

Lee Hartman said he is confused about the 250 cfs release as related to temperature on the main stem, because from what Mr. Apse reported there is a significant gain. Mr. Apse said relative to Revision 1 and Revision 7, particularly to Revision 7, you see those gains in the temperature conditioned habitat, and that is probably because during Revision 7 at times you end up running out of banks or you have other problems in which you can completely erase all habitat for significant periods in certain years. Relative to Revision 7, the proposal does quite well in temperature conditions. Mr. Hartman asked at what point were they measuring it on the main stem. Mr. Apse said in the study there are multiple sections. There is one section that represents from Callicoon all the way up to Hancock that was sub sampled. Mr. Hartman said he thinks the comparison is unfair with Revision 7 because that was a disaster when they lost the thermal banks. Mr. Apse said that is a constraint to what they are doing which is comparing to base cases. You can detect changes relative to those base cases that may not be ideal conditions, but they still are relative compared to that. They do not have the capability against some kind of idealized goal; they can only do relative comparisons with what they have.

Phil Chase said the main question the public has is how this plan will protect the main stem rainbow trout population from Callicoon up to Hancock. The main stem population of rainbows is the finest there is in the northeast. The biggest question is if the temperature will be suitable for the main stem rainbow. Mr. Nuffer asked Mr. Apse if the DSS tool will help them answer that question. Mr. Apse said it could help, but he does not think it is the only way to go about it. That could be one of the things that RFAC asks of SEF; to use whatever tools to come up with some recommendations about what could be done to protect the upper main stem.

Mr. Paulachok suggested that SEF stay abreast of the developments with respect to the dwarf wedgemussel flow needs. As soon as that information becomes available, SEF should start looking at it, because it could really have a significant impact on the shape of this program.

Discussion with Interested Parties

Lee Hartman said Resolution 1, back in 1981, had a 325 cfs release from June 15 to August 15 for the most critical time of the year. It also had to release water for the flow target as well, so it gave a significant amount of water for the fishery. It created a fishery that was established down to Callicoon. It is what made that fishery what it is today and it provided a lot of economic benefits to communities such as Hancock and Deposit). Revision 7, everybody admits, was a disaster. It actually created drought conditions in the main stem because there was no water being released when the reservoirs were full. This proposal, at a 250 cfs release, which is going to occur 80% of the time is not enough water to sustain that main stem fishery. The temperatures are still going to go up. On top of that, he thinks PPL is going to increase their operations this year. Those releases are going to be credited to the Montague flow target so there will be even less water in the upper main stem. It is the major concern of a lot of people if this happens. It is going to be Revision 7 all over again, and he thinks that should be addressed. It is important to the communities up there, to the anglers, and it benefits the economy. Mr. Klotz said he understands, and they will take that into consideration and look at it. They were hoping to have their fishery biologist here today, but he was unable to attend. They will communicate Mr. Hartman's concerns with him.

Dean Frazier wanted to clarify that in Table 3, Dr. Murali indicated that from the dates March 1 through May 31 in zone L1-A that the 1,000 cfs release would be continued at Cannonsville. Dr. Murali said this release would not be continued through May, but during the months of March

and April. Mr. Frazier asked if there were any planned releases in the L1 zone in May. Dr. Murali said not to his knowledge because in the proposal for the month of May the release would be 180 cfs for storage in the L1-A, B and C zones. Mr. Frazier said this is a substantial change from what was in the temporary spill program. March through April is going to stay the same, but you are saying that in May, for instance in Cannonsville, that the 1,000 cfs that was in the temporary spill mitigation program is now eliminated. Mr. Rush stated that the goal of the water supply system is to have the reservoirs filled when they start drawdown on June 1, so there is really not an opportunity to start lowering the reservoirs during May in order to meet that goal and also to provide the water that you need in the summer to sustain the fisheries releases. Mr. Klotz said it sounded like Mr. Frazier thought the temporary program had those releases in May. Mr. Rush said the temporary program has the provisions going up to May. For the operation of water supply and also providing enough water to sustain the fisheries releases in the summer, it is essential that the reservoirs are operating in the manner where they get filled prior to the start of drawdown or when demands on the system begin to exceed the inflow to the reservoir.

Mr. Frazier said in Table 1 of Resolution No. 2006-18, on L1 there was 1,000 from May 1 to May 31 and September 15 to September 30 in that category. Mr. Rush said in order to make those releases; it requires adding snowpack to get above the 100% mark. Mr. Frazier said if there is discussion about increasing the level of the impoundments, you are going to have to come up with another 14 bg of water; they may have to raise the reservoir. He asked if that was correct. Mr. Rush said yes. Mr. Frazier asked if there were any inundation maps to show what adding 14 bg would look like and can he get them. Mr. Nuffer said detailed inundation maps are not available at this point other than rough calculations that were done for prior analysis. He noted that New York City has agreed to funding work that would provide details on what the inundation would look like if they were to raise the spillway at Cannonsville by two feet or by four feet or by six feet. The inundation maps would show whether roads, homes, bridges, etc. would be impacted upstream of the impoundment. Mr. Rush said any activity that increases the height of the dam is going to have impacts. Impacts on highways, bridges, and property have to be evaluated. A preliminary look showed that the impacts on property would be confined almost entirely to existing property that the city owns, but there are a lot more impacts than that both upstream and downstream. Enlarging or raising the height of a dam requires a lot of work and discussion. Mr. Nuffer said that discussions are needed with political officials, individuals, and property owners above stream and downstream. The ideas have to be thoroughly explored, and there will be a public process for this. Mr. Frazier said he is already getting questions about it, so the more information, the better. He asked if the 75% curve was going to be longer than two months. Dr. Murali said the 75% line is only for two months on the bottom whereas the 80% line was added for five months. This is a curve they thought better serves the needs for spill mitigation.

Phil Chase said that back in the 90s, there was talk about improving the flows and releases for the three rivers by the improvement of the gates in Cannonsville – the Cannonsville valve. New York State and the city put a lot of money into it and New York City said at the time this was for the good of the fisheries. A flow of 325 cfs was coming through the valve before it was changed. Then the valve was changed so the flow could be less. Now the public is hearing the possibility of increasing storage. Do not count your chickens that you are going to improve this river system by more storage. It did not work for the Cannonsville valve.

Elaine O'Neal asked if a void would be provided in the proposed additional storage. Mr. Rush said one of the elements of this plan is that when the additional storage is constructed, there would have to be a plan on how it would be operated, filled and used. There is no determination yet on how that storage would be used, and that will raise the concern of whether it would go to the fisheries, or whether it would go into a void. He noted that the first step is to get a handle on

whether it is feasible to construct additional storage with these reservoirs. Since this has been public and up on the website, there has been a lot of attention focused on New York City dams – not all of it good – and people have concerns. Ms. O'Neal wanted to discuss the point that the proposed L1 rule curve goes up to 100%. It goes up to 100% on June 1, which is the high hurricane season. In the presentation, it shows that this plan is going to help everybody do everything – save fish, save the dwarf wedgemussel and help flood mitigation, but she wants to understand how you are going to do that if you have 100% full reservoirs. She asked how the City will know when a storm is coming and how they are going to make sure that they drawdown that reservoir so that it is safe and keeps the people below the dams safe. She said they have not been too successful in the past three years. She asked what the difference is with the proposed plan that will allow the people who live along the river to feel that this will help keep them safe from the flooding. Mr. Rush responded that there are competing needs on the reservoir system. There are competing needs for water supply, which provides a very essential component to the people of the state of New York who drink water from those reservoirs (roughly 9 million people), there are needs for the fisheries downstream, and there are concerns regarding flooding downstream. The reservoirs as they are right now, even if they are full, provide attenuation. Ms. O'Neal said the City is not stopping preventable flooding; that is what the people are asking them to do. Mr. Rush referred to her first question about what do they do on June 1 for a water supply reservoir; that is the start of the drawdown period. In operating the reservoirs for water supply, it is essential that those reservoirs are full at that time. Ms. O'Neal said she does not believe that because if you look at the daily diversions for the past six or eight years, the City diversions are down to 448 mgd. She asked where the studies are that show that the demand is going to go up or that show the drinking water needs of New York City are going to expand. Mr. Rush said in any reservoir system or water supply system, in order to provide maximum protection against a long-term drought (the drought of record that you never know is coming just like you never know when that big flood is coming) it is really an essential element to have the reservoirs filled at the beginning of a drawdown period. That is how the system is designed. Ms. O'Neal said using drought days for the past 70 years is relying on old data. She suggested re-looking at the constraints and noted that the last four or five years have been in a rainy cycle. If this is going to continue, then the old data is obsolete. Mr. Rush said he thinks she makes a valid point on climate change and what those impacts may be in the future. Some results of climate change may be more variable climate; more variation where there may be periods of extreme storms and longer periods of drought which are not fully understood. The best information they have right now is the 70 years of record that is used to operate the OASIS model. The city is spending a lot of time and resources in trying to understand climate change and also doing demand forecast in trying to understand how the city is going to grow in the future, and what those water supply needs will be 40 to 50 years in the future. Ms. O'Neal asked if Mr. Rush realized that the business owners of Frenchtown, New Jersey, in Yardley, Pennsylvania, all up and down the river do not have the luxury of 40 years. One more flood is going to make these towns into ghost towns. She has heard that repeatedly from their many members (Delaware Riverside Conservancy (DRC)) on both sides of the river and also their members in New York. They cannot afford for the City to figure out 40 years from now; they need them to figure out how they are going to help protect them over the next couple of years.

Pete Bousum said he attended the RFAC meeting for the fisheries issue, but he lost his home too. He received about three feet of water in the first home and six feet in the second. He does not understand the proposed plan. The storm was in June, and the plan calls for full reservoirs in June. He understands their rationale a little bit, but it does not fit and he does not understand why they call this flood mitigation. They should change the name; it is insulting. He asked when the OASIS model was last updated. Mr. Fromuth said the data is updated through the year 2000. In order to evaluate and compare plans, the model uses a naturalized inflow record where the effects of regulation are taken out for a period from about 1926 to 2000. On top of that, added to OASIS

are all the reservoir operating rules for whatever scenario you want to compare. Changes are made to the OCL, the operating control language in OASIS, to incorporate rules for different model runs. As experiments are done with different operating rules, those coding changes are made and then the code can be transferred back and forth among those running the model and the DRBC. It is really not a futuristic or predictive simulation model. It looks at data that has been recorded based on streamflow record and seeing how these different plans compare for that same period.

Mr. Bousum asked if the proposal for the main stem was 250 cfs. Dr. Murali said the 250 cfs number is not a random number. It is based upon several comments they received from conservation groups and their own biologist. Mr. Bousum also asked if they start with an agenda when working on the plan, or if there is data available that says exactly how much under this present situation is available. Dr. Murali said the number was based upon many OASIS runs made within the goals and constraints described by the Decree Party workgroup and was developed based upon a lot of time and a lot of input by conservation groups and the NYSDEC biologists. Mr. Nuffer said NYSDEC did not pick a number out of the air and say lets give them that. They did the model runs and looked at what the water supply needs were and tried to balance a number of issues. A range of numbers was generated, and they had to arrive at some balance that tried to meet a broad range of needs. That particular number was the balance. Mr. Hartman asked how much water is available for the fishery. He can tell you that there is none, because the concept that a drought of record is going to start tomorrow tells you that there is no water available for the fishery. He does not know where they are getting these figures of 250 from. He feels this plan should not even be called a fisheries management plan. What you are doing is trying to safely release water so storage does not go down towards the drought curve and the premise is being used that the record of drought will start tomorrow. That means that no water will be released other than to a flow target and there is no water available for a fishery. Mr. Nuffer said there are still releases. Mr. Hartman said of course there are releases, but you should not call it a fisheries plan. A fisheries plan is that you take a look at the fishery – the overall established fishery – what it has done, what economic value has gained and then try to maintain it. That is not what is being proposed. The proposal only releases a minimum amount of water to maintain maybe the East Branch or the West Branch, but does not look at the overall picture. A flow of 250 cfs is not enough at all to cover the fishery. Mr. Gast said that, first of all, the Decree Parties are not calling this a fisheries management program; it is a flexible flow management program and it encompasses a lot of needs including tailwaters habitat protection. Secondly, Mr. Hartman is right. There is not one gallon of water in this program to go to the fishery, and that was by intent and by design. The Parties intentionally did away with a bank-based program that provided water to the fisheries. All the comments that they were getting said let's go to a program that releases more water when there is more water available, less water when there is less water available, and that is exactly what this program does. They have tweaked this program in order to maximize releases for the fisheries as much as possible and yet maintain some semblance of reduction in spills which is totally contrary to the concept of storing water for the fisheries. It is also totally contrary to the concept of storing water for water supply, which is what these reservoirs were built for in the first place. They have tweaked this program to maximize the benefits of all these various elements the best they can, and there is not a gallon of water in this program that says that this belongs to the rainbow trout.

Mr. Hartman said, thanks to New York City, the water diversion to the City has been cut to 448 mgd and that is where the water is available. Also, the releases that are being credited down to the Montague flow target, there is saved water. He asked where it is going. He thinks they should start looking at the fishery and say let's give something back to the fishery. Mr. Gast said part of the answer to that is that they have modeled this based on an interim assumption that the City is using 765 mgd as opposed to 800 mgd. All these model results are based on the premise

that the city is taking 765 every day except when in drought operations. Now, in reality you are right, the city is not taking that 765 every day and therefore, in the real world, storage is going to be in better shape going into periods of low precipitation and periods of lower storage. It has got to be in better shape in the real world than the model says it is, because in the real world the city is not taking as much water. Therefore, the fishery is going to end up getting higher releases more of the time in the real world than the model says it would. But, the modeling is done based on providing what the Decree requires that they provide to the city. That is the way they have to design the program. Tom Murphy added that since the city is not using all the water, they are able to front water until the additional storage is built so that there is 14 bg of water now available for the fish. Part of their objective was that this program should be sustainable. They cannot sustain offering that water out into the future. It should also be noted that New York City does not store water just for the nine million people in the city. They store drinking water for numerous communities all the way down to Delaware. It is misleading to look at the 400-500 mgd that the city is taking. There is water there, but it is not all the city's; other municipalities have claims on that water as well.

Mr. Chase said they have seen a lot of presentations and they are very good. It would be nice if they did not have to put their energy into taking notes so that they can do some thinking during the presentations. He would like to have better notes if that is possible. Mr. Gast suggested having the presentations in printed form to hand out for the media. Mr. Nuffer said Mr. Chase is suggesting for them to be available in advance so that he could actually look at them and think of questions in advance rather than react. They can be included as an e-mail in advance as well or individuals could go to the website and review them. Ms. Collier said the ones that were given at the Commission meeting are on the website. Mr. Nuffer said Mr. Chase's point is that before a meeting, they can pull all together that stuff that they are going to be discussing at the meeting so that people have a chance to review in advance and put questions together in their minds.

Ms. O'Neal asked if they could spare five minutes to view a photo show that Mr. Hartman has. She said it pictorially shows what is going to happen to the river at various 200, 400, 600 cfs releases. The people in the DRC support the fisheries and their needs because their needs are our needs, so we have common goals in this area.

Jan Phillips asked whether the city and the state have given any thought to the prospective economic feasibility of additional storage and how to evaluate the benefits in an economic feasibility study where you would be able to put dollars to the benefits. A hidden comment is that the Good Faith Agreement of 1983 included a similar provision that the city and state were going to look at expansion of Cannonsville. Dr. Murali said there is an extensive report that was done on the eight-foot enlargement in response to the Good Faith Agreement. It was discovered to not be economically feasible, and the report is available. Mr. Phillips asked if they have some concept of how they are going to evaluate. Dr. Murali said they should follow essentially the ground rule that was prescribed earlier both emulating an economic feasibility that would decipher if the project would go forward. Dr. Miri said, for the record, that there was some question about the complete validity of the conclusion of that study.

Lee Hartman's photo show was played.

Mr. Klotz said part of the design of this program is to try to eliminate some of those very low releases, recognizing that there are variations in flow due to other things that happen on the river. That was one of the main premises behind this, and it should not get to that same type of level under this proposal. Mr. Hartman said what he thinks they are doing is using the lowest concept in the DSS modeling during that study. He thinks they need to increase the release numbers, particularly in the summer months.

Jim Serio said he was encouraged today in terms of adaptiveness and flexibility. Since the meeting Wednesday, he has seen two or three adaptations or changes to what was put out Wednesday and he is encouraged by that, but they still have a long way to go. The upper main stem is a concern. He is encouraged because he thinks that there is an avenue that can be considered and adopted by May and that this is now an open public forum. It looks like there is hope for actually making adaptive changes before May.

Mr. Klotz encouraged anyone to give comments through April 6. He encouraged anyone that did speak here, or anyone that did not, to submit their comments to DRBC. They assure everyone that they are going to look at each one of these and that they are still making changes to the plan. Someone asked how the communication should be written – should it be over the web or in written form. It was responded that people could send e-mails or it could be in written form. Mr. Klotz said that there will also be a formal response to written comments provided at the hearing.

Next Meeting
The next DRBC Regulated Flow Advisory Committee meeting will be held on Wednesday, April 25, 2007 beginning at 10:00 a.m. at the DRBC offices in West Trenton, New Jersey.

REGULATED FLOW ADVISORY COMMITTEE
February 6, 2007

ATTENDANCE

NAME	AGENCY
APSE, Colin	The Nature Conservancy (TNC)
BAXTER, Stefanie	Delaware Geological Survey
BOUSUM, Peter	Friends of the Upper Delaware River (FUDR)
BROBAKER, Tom	FUDR
BUNTING-HOWARTH, Kathy	Delaware Department of Natural Resources and Environmental Control (DNREC)
CHASE, Phil	Upper Delaware Council (UDC)
COLLIER, Carol	Delaware River Basin Commission (DRBC)
CREVELING, Ellen	The Nature Conservancy
DOUGLASS, Bill	UDC
FORNEY, Dave	National Park Service – Upper Delaware Scenic and Recreational River (NPS UPDE)
FRAZIER, Dean	Delaware County
FROMUTH, Rick	DRBC
GAST, William	Pennsylvania Department of Environmental Protection (PADEP)
HARTMAN, Lee	Trout Unlimited
HUHNER, Kurt	Columbia Coalition
KLOTZ, Mark	New York State Department of Environmental Conservation (NYSDEC)
KOLESAR, Peter	Columbia University
LIEB, Steve	TGF
MAYER, Robert	New York City Department of Environmental Protection – Bureau of Water Supply (NYCDEP/BWS)
McCRODDEN, Brian	Hydrologics
MERSHON, Jim	Merrill Creek Reservoir
MIRI, Joseph	New Jersey Department of Environmental Protection (NJDEP)
MIRI, Larry	Conservation Coalition
MOLZAHN, Robert	Water Resources Association
MURALIDHAR, D.	NYSDEC
MURPHY, Thom	NYCDEP
NIESWAND, Steve	United States Geological Survey (USGS)
NUFFER, Fred	NYSDEC
O'NIEL, Elaine	Delaware Riverside Conservancy

OTTO, Harry	DNREC
PAULACHOK, Gary	USGS Office of the Delaware Rivermaster
PHILLIPS, Jan	Consultant
QUINODOZ, Hernan	DRBC
RUSH, Paul	NYCDEP
SCHULER, George	TNC
SERIO, Jim	Delaware River Foundation
SHEER, Dan	Hydrologics
SILLDORFF, Erik	DRBC