DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
February 23, 2006

MEETING SUMMARY

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

Approval of Minutes from May 19, 2005 Meeting Summary
The minutes were approved with no additions or corrections.

Fred Nuffer suggested that it would be useful to have a section, perhaps at the end of the meeting, to allow for public input, comment, and issues of concern on a regular basis.

RFAC Committee Organization
The biggest change to the resolution that created the RFAC is that the membership has been expanded to include the City of Philadelphia, an additional representative from New Jersey, and an additional representative from Delaware. New Jersey has not determined who their second representative is going to be yet. They would like to defer the appointment of the second member, and they sent a fax to Carol Collier stating such on February 22nd. In addition, the Rivermaster is officially a member.

Last spring, bylaws for the old Flow Management Technical Advisory Committee were adopted and most of the contents of those bylaws is now embedded in the resolution that created the RFAC committee. One item that was in the bylaws but not put into the resolution was the term limits of the chair and vice chair. The old bylaws said the chair and vice chair will be selected by the voting members and the term of the chair and vice chair will be one year. It was recommended that the chair and vice chair instead serve for a two-year period and that there be a transition so that when the two-year period ended for the chair, the vice chair would step into that role and a new vice chair would be elected.

Mr. Gast suggested taking out the executive sessions paragraph because RFAC is no longer a Decree-related entity like it was before. Mr. Nuffer agreed. Mr. Gast said the opening phrase of the subcommittee section "with the approval of the Commission" is not needed because the resolution already gives them the authority to form subcommittees. It can just say RFAC may form subcommittees. He asked for a motion to approve these bylaws. A motion was made to approve the bylaws as amended, it was seconded, and then approved. It was agreed to wait until the next meeting to elect the chair and vice chair.

Mr. Nuffer indicated that New York State would be willing and would appreciate the opportunity to serve as a chair for the two-year period. He thinks that the issues at least for the next two-year period are still going to be focused on upper basin issues regarding releases. Mr. Nuffer's sense is that the focus is going to begin to shift by the end of that two-year period away from the upper basin issues and move toward the estuary and the lower portion. He suggested that it would seem appropriate to have a member from the lower portion of the basin serve in the vice chair position to take over after that two-year period. Harry Otto said he would like to underline the fact that things are already in transition in the lower basin. There are several groups already beginning to start work. It is beginning to turn and a great deal more interest will be focused on the lower basin in the coming year.

Guidance from SEF on Enhancements to Fishery Releases Program

Mr. Nuffer had asked for the various fisheries interests and public groups to come together and reach consensus on ideas or approaches that they would like to see as they move toward a long-term flexible program. On February 22nd, some of the conservation groups presented a framework to DEC based on development between Trout Unlimited, Delaware River Foundation, The Nature Conservancy, and Columbia University. The presentation was just a discussion of concepts and whether or not those concepts were worthy for them to pursue further. They also discussed putting the concepts together into specific proposals that could be run through OASIS to see what the impacts were and compare against existing and prior programs. Mr. Gast said he would be interested in hearing about those ideas and concepts discussed.

Jim Serio said the conservation organizations were asked as a group to put together some ideas and that they have prepared concept paper that they call the framework. It is still in draft form, but it brings up some ideas in trying to move away from banks and flow targets. In some ways, it simplifies operation and also helps in flood mitigation overall. April 2007 is coming up very quickly and they need to keep moving forward with a process to protect the fisheries in the rivers all the way down to the estuaries. Peter Kolesar, Columbia University, has developed a simplified model of the upper basin to make some runs to show a constant release policy based on probability of refill. In preliminary runs it has been shown that the proposal does not use more water and results in about the same number of drought days. They have taken into account a number of the Decree Party modeling constraints. The concept is based on setting release quantities based on the total storage that is available in the reservoirs at any given time period during the year. The more water that is in the reservoirs relative to the time of year, the higher the releases can be. This allows you to take advantage of water when it is in the reservoirs, and it also allows for conserving water when reservoirs start to get lower. What was found is that for wet years like 2003 and 2004, when basin storage stayed high and then spilled during the hurricane season, the proposed concept would drop storage down somewhat and then at the end it is still be well above any of the drought curves. In a dry year, again you will see a bit of a gap between existing flows and releases but it does not really change too much.

Mr. Apse said that release levels would vary based on season. You could hypothetically have different releases for each day of the year. It is probably more reasonable to think across seasons with relatively consistent releases within a season for each trigger level. So you would have four or five sets of release levels that met wet, normal, cautionary, warning, and drought triggers. In that way, it really takes advantage of the fact that when there is more water in the reservoirs, there is more to release. During dry periods, the conservation groups acknowledge there will be less water available, but that it would be worth it in exchange for having adequate water in wet years. The other advantage is it automatically creates modest voids during wet years that would be useful in ameliorating some of the concerns related to downstream flooding without creating extremely large voids that would increase water supply risk. It is designed around finding the acceptable level of risk to the system from a water supply perspective so that release waters can then be allocated across the three reservoirs and across the trigger level associated with that level of risk.

Mr. Nuffer said one of the things that was mentioned yesterday was that this particular approach much more closely mimicked what natural systems would follow. That is one of the goals that SEF had looked at in terms of trying to more closely mimic or follow what natural flows might represent. Mr. Tudor asked Mr. Nuffer if it actually does that. As he looks at the proposed Framework, it has attention to dampen variability across seasons. Mr. Nuffer said he thinks the concept is when there is more water available, more water goes into the river. That is the natural process. If it rains more, more water is going to be in the river. Mr. Apse said the current system is focused around meeting certain targets regardless of what status the reservoirs are in, which is

kind of a central tendancy management approach. The Framework proposal is more of a let's match what the overall status of the watershed and the reservoirs are and accept the fact that there are going to be lean times. The fishery can handle those times because it will be created gradually rather than extremely rapidly as in the current system where you could go from feast to famine. Mr. Serio said this also makes a huge step in preventing the rapid up and down day-to-day flows in the system, which is really important to the fisheries. Mr. Fromuth asked if this extends to the Montague target as well. Mr. Szeptycki responded yes. This framework says to convert the Montague target from a 24-hour average to a 7-day average. If you do not do that, this reduces the degree of short-term change in the system and makes it more like a natural river, but if you combine the elements of this approach with converting the Montague target into a 7-day average then it really does that. Then you see the rates of short-term change in the system really flatten. It is the same amount of water; it is just allocated differently over a short-term period of time.

Mike Principe asked if these would be fixed releases out of the reservoirs as opposed to targets measured downstream. Mr. Serio said that is correct. He thinks that the document is important and there are a lot of details in the document that are important, but he thinks the things that people should focus on are how to evaluate this proposal in the long-term, its core principles which are switching from banks and flow targets to specific constant release numbers. Another core principle is that those release numbers should vary according to season and according to the existing reservoir storage levels. Another core principal is that it can be done consistently with the way that it is phrased in the constraints document, which is not to substantially increase the number of drought days. That is factored into the way that Peter Kolesar is looking at this in his model, but he thinks that they would like to see a little better evaluation built into how this is looked at in terms of the overall risks to water users independent of the number of drought days. They recognize drought days are important and that they are not going to go away, but look at the real world water issues that affect parties from risks like probability of refill of New York City's reservoirs and use those factors in a way that this proposal might change that risk slightly compared to other proposals and really focus on the risks and risks related to those key water use parameters between this and other proposals and evaluate them. What they would like to do when they start plugging specific numbers into the framework is to evaluate, using the USGS information, the affect of those numbers on fish habitat and at the same time evaluate the affect of those numbers on the risks to water users and start comparing the risks vs. the benefits. Mr. Apse wanted to reiterate that he has not circulated it to the SEF members yet because they wanted to run it through DEC first, so he can do that and then provide that input to the committee. Mr. Nuffer said if you are willing to circulate this to the SEF members, they can review this, comment, and provide those comments to DEC as well. He still thinks it is incumbent upon New York State to come back within the specific challenge that they have been given by Parties of the Decree to make a presentation to them to show them how they can move forward to develop this long-term flexible program. He wanted to make certain that they provided an opportunity for both the fisheries interests and SEF to give input so that when they put the proposal together; hopefully, they can come to agreement on what some of the better ideas would be on how to achieve this long-term flexible program. Any feedback on the framework document can go to Colin Apse, Mr. Szeptycki, or Mr. Serio.

Senobar Safafar suggested a discussion agenda item for SEF's next meeting. It is always taken as a given that the constant release is what the fish like or need. She would like to know before choosing a program that is based on constant releases if all the members of SEF are in agreement with that statement. Mr. Apse said one of their biggest concerns is rate of change and that has been a topic of discussion that they have had a number of times. The idea or the characterization of yo-yo flows as probably being the worst impact of the current management that really goes on and that, not tied to natural hydrologic cycles, it really creates havoc on species movements and

species habitat. Ms. Safafar said it would be beneficial to see a statement from SEF recommending one way or the other.

Dr. Miri said when they approached the idea of using a group like SEF, the idea was that there would be some notion of a relationship between the quantity of flows and the quantity or quality of habitat. In what he is seeing thus far, that relationship has not been made explicit, but he thinks they would like to see a little more clarity on whether their scientific efforts led them to conclude that x amount of water during this particular season is good for recruitment, or it is good for longevity, or it is good for this fish, or it is good for that fish – something that would provide a basis for anything that they end up choosing because this is based on some understanding of habitat flow. Mr. Apse said this is exactly what the USGS model does and it does it in much the same way that OASIS deals with drought days. It creates indicators that you can look at on a yearly basis, but you could also look across the whole period of record, which is what you really see in the output of the DSS. It gives you exactly just what you ask for, which is that under this flow regime as a result of these rules, the habitat for this species or this species' life stage in this particular river stretch or across the whole basin has increased or decreased or roughly stayed the same. There are obviously many indices that can come out of that USGS study and the DSS is a way to try to summarize those in as useful a way as possible. Dr. Miri said he is looking at how much habitat you get from a given quantity of water. Mr. Nuffer said there are two things that they can do. You are going to take certain flow regimes, and you are going to run all of those through OASIS and find out what the implications are with regard to what it does to drought, what it does to a whole series of conditions. You are going to take those same regimes, plug them into the USGS DSS and it will show, for this particular flow regime, what the impact is on habitat. Mr. Apse said they cannot provide a one number answer for the right cfs because the ecosystems are too complex for that. You can only look across flow regimes, across years and multi-year flow patterns and examine it in the light of how it affects different species. In some cases those are conflicting. There are only the results of looking across different flow regimes that are results of rules and seeing how different species are likely to respond or how the habitat is likely to respond and weigh those as best you can within the ecological knowledge you have. That is the best they can do and that is the best they will ever be able to do, and it does require stepping forward with a set of rules on the best available information to begin that iterative process of evaluating habitat indices and drought indices to see how to close in on a plan. This framework is really a way or a potential approach in starting that iterative process of developing rules and evaluating from habitat and human use perspectives.

Mr. Principe said the thing that he finds somewhat frustrating from a process standpoint is that the framework is sort of putting the cart before the horse. He always assumed that SEF was going to develop favorable habitat descriptors and that then this is just one framework of many that could be evaluated. He gets the sense that this presupposes that you would get favorable habitat from implementing this framework, otherwise why do it. He has no problem with this as one example of one framework, but he just thinks that they need to rule that out and get a sense of what that habitat is. This is never going to be a natural system, and there are many constraints. Mr. Nuffer said from his perspective, this is not something that they are standing behind and supporting at this point. What they are saying is yes, there are concepts here that seem to be very interesting; a different approach, perhaps a simpler approach and one that potentially, more closely mirrors a natural system. He agrees they are never going to have a completely natural system. They still have no idea what impact that particular regime really has on the habitat until the DSS modeling is done. Mr. Principe said that this is pre-supposing what the DSS is going to produce. He would like to get the feeling from SEF that from an ecological standpoint, one of the goals is to provide a constant release and minimize variability that would create favorable habitat in the upper Delaware. Mr. Apse said the reason it is not putting the cart before the horse is that when the habitat model and this associated DSS is done all it does is now wait, just like OASIS

waits, for a different alternative to put into it so that they can assess relative habitat benefits. He agrees that they want to be examining alternatives that are endorsed in principal from just a framework perspective by SEF and that has not happened even though he has a feeling they will be supportive.

Ms. Safafar suggested that SEF should produce an ecological constraints document. Mr. Apse said it might be more of an ecological goals document. Mr. Gast commented that an approach like this would lend itself to a more flexible Montague number as well. If they were able to soften the Montague control, an approach like this could then take into account downbasin and bay requirements, and they could be built into the seasonal release numbers as well. He said if we build a flexible release structure that could be modified as time goes on, it could bring into the needs as they identify those needs until such time as they have identification of what those needs are.

Mr. Serio added that one of the big frustrations that Peter Kolesar mentioned is that the data available to try and make or develop a new model is difficult to find and they strongly urge the DRBC to take the initiative to create a centralized, validated and publicly accessible electronic database for analysis of the Delaware River policies and practices. It is very difficult trying to pick and choose and find data from several different sources.

Distribution and Discussion of Guidance Documents Prepared by the Decree Parties

Mr. Gast said there are three documents that they have been working on for about a year or more, and they finally got to the point where they have agreement on three of them: Goals, Objectives and Constraints, Protocols from Models, and the Delaware River Basin Daily Flow Model.

Goals, Objectives and Constraints Document – This is a consensus of a larger document that is internal to the Decree workgroup. The constraints, goals, and objectives were a consensus of a larger document, but this is the information important for the public to have in order to develop or propose alternative operation schemes. It really comes about as a result of their recognition of some limitations that they have had in the programs that exist to date. Flow Management measures should be designed to address aquatic resource needs based upon scientific knowledge. Huge steps have been taken forward in the past couple of years through the SEF committee and through monitoring and the current program that is in place to develop better scientific basis for the program that we are trying to design. New York City implemented a very effective water conservation program a number of years ago, and that coupled with some loss of industrial base in the area led to reductions in the city's demands, and the excess release quantity. The drought of the 1960s changed everybody's view of how sustainable the yield of those reservoirs really is and a lot of the programs, including the Good Faith Agreement, were designed to address the shortages that do exist with the storage up there. The down basin states particularly recognize that they have some limited flexibility in how they use the water because of the nature of the Montague control number which is a fixed number. Over the last few years, DRBC completed the Basin Wide Water Resources Plan which really helped identify issues and needs throughout the basin and particularly with regard to city reservoirs along the mainstem and down into the bay. They would like to be able to have a little more flexibility in their operations of the releases from the reservoirs to help address some of those issues that were identified in the Basin Plan. Then they identified a goal and three objectives that were seeking to meet the goal. These were generally stated to secure the benefits of increased flexibility, to improve performance, and to simplify the programs from any of the reservoir releases. Achieving that goal is outlined in three objectives. One is to reduce the number of drought days as defined by adopted drought rule curves, which may be revised if necessary. Provide a sustainable source of water to support instream uses in the tailwaters in the river and down through the bay. The third objective is to

consider flood mitigation below the NYC Delaware reservoirs. Then, for guidance, they identified some constraints that are recognized in the system and in the Decree.

Mr. Szeptycki said he would be interested to hear a little bit of the discussion that went into the parenthetical of the fourth bullet point in the Constraints section that states "this constraint recognizes that the stated objective is to actually reduce drought days." It seems to him that the only way you could have resolved that conflict is by changing the drought curve. Mr. Gast said if you change the operations, even keeping the same drought curve, you are going to have potentially different numbers of days and different frequencies of occurrence of drought. That does not necessarily entail a change in the drought curves to result in different numbers of days or frequencies. Mr. Szeptycki said he is just curious how they resolved the tension between having a constraint at no significant increase, which seems to be a reasonable constraint, but at the same time have the goal of decreasing the number of drought days. Dr. Miri said he did not understand whether in recognizing that the stated objective is actually to reduce drought days – he did not know whether it was just recognizing it with the idea that they could disregard it if they wanted or recognizing it with the idea that they acknowledge that is still an objective to reduce drought days. It was explained to him that they had no intention to reduce or minimize or put into lower status the objective of reducing drought days, but they really have to be careful about increasing them significantly. Mr. Szeptycki said he has not seen any proposals that benefit the fish that provide for any decrease in the number of drought days, but he has seen some that provides a significant increase. Dr. Miri said his experience has been similar and this is one of the things they have to try to work through.

Protocols from Models Document – This is with regard to protocols from models that people other than the committee would need to follow in order to present a proposal to the Decree Parties. The Decree Parties and their advisors understood that there was interest by various groups in perhaps developing some models to look at different alternatives to water management, particularly in the Upper Basin. It was also anticipated that those models would be put forward to the Decree Parties for consideration. They wanted to set up a set of ground rules so that everybody was working off the same page and would follow a prescribed format to make it easier for them to look at any products that were presented to the Decree Parties and also that those products would contain certain elements of information. This document will be posted on the River Master website, and the final copy should be up by next week. The objectives in putting this together were to make sure that any models and modeling studies that are done by parties other than the Decree Parties are adequately documented, to make sure the studies are easily understood and amenable to technical review; and also by having these procedures in place, to increase confidence in the models and the modeling studies that are presented to the Decree Parties for consideration. The River Master's office will be the point of contact for the Decree Parties for anyone who is interested in submitting models.

Delaware River Basin Daily Flow Model Document – This document traces the development of daily flow modeling that the DRBC has done over the years for the Decree Parties. The version of it now is OASIS, so it is not the only type of model that could be applied to a river system like the Delaware, but it is the one that has been the most developed to replicate the rules of the system. The developments lasted about thirty years, and there have been about seven different developers that have worked on it, plus some work that the DRBC staff has done in modifying the rules for particular runs. The underlying concept of the daily flow model is to develop an unregulated inflow set using gaging station data for as long a period of record as possible. The primary use is to be able to compare planning alternatives as opposed to prediction of a certain flow or certain storage on a given day. Dr. Murali asked if the new inflow file is available. Mr. Fromuth said that it was. The arrangement with OASIS is that anyone can purchase a license as per the original contract with Hydrologics and get a copy of the model and run it. This new

inflow file would run with the existing version of OASIS that has been distributed. The fee for the license is about $600.

Public Input
Mr. Gast opened up the meeting for public input. Bill Douglass asked Gary Paulachok if there was a reason on page 3, item number 5 in the Protocols for Models document where it talks about Lake Wallenpaupack being included in the model, that the Mongaup system should not also be listed. Mr. Paulachok said the Mongaup system would be pretty tough to simulate because it is not operated in the same fashion as Lake Wallenpaupack.

Next Meeting
To be announced.

REGULATED FLOW ADVISORY COMMITTEE
February 23, 2006

ATTENDANCE

NAME	AGENCY
APSE, Colin (via conf. call)	The Nature Conservancy
BAXTER, Stefanie	Delaware Geological Survey
DOUGLASS, Bill	Upper Delaware Council
ELLIOTT, Wayne	New York City Department of Environmental Protection (NYCDEP)
FORNEY, Dave	National Park Service (NPS)
FROMUTH, Rick	Delaware River Basin Commission (DRBC)
GAST, William	Pennsylvania Department of Environmental Protection (PADEP)
LORENCE, Steve	New York State Department of Environmental Conservation (NYSDEC)
MAYER, Robert	NYCDEP – Bureau of Water Supply (NYCDEP/BWS)
MERSHON, Jim	Merrill Creek
MIRI, Joseph	New Jersey Department of Environmental Protection (NJDEP)
MOLZAHN, Robert	Water Resources Association
MURALIDHAR, D.	NYSDEC
NOBLE, Mary Ellen	Delaware Riverkeeper Network
NUFFER, Fred	NYSDEC
OTTO, Harry	Delaware Department of Natural Resources and Environmental Control (DNREC)
PAULACHOK, Gary	United States Geological Survey Office of the Delaware Rivermaster
PRINCIPE, Michael	NYCDEP/BWS
QUINODOZ, Hernan	DRBC
SAFAFAR, Senobar	NYCDEP
SERIO, Jim	Delaware River Foundation
SZEPTYCKI, Leon	Trout Unlimited
TINGLE, Christine	Army Corps of Engineers
TUDOR, Robert	DRBC