Delaware River Basin Commission

FLOOD ADVISORY COMMITTEE
December 5, 2000
MEETING SUMMARY

The second meeting of the Delaware River Basin Commission Flood Advisory Committee (FAC) was held at the commission's offices beginning at 10:00 a.m. on Tuesday, December 5, 2000. A list of meeting attendees is attached (Attachment 1).

Committee chair Solomon Summer opened the meeting and asked for introductions by the attendees. The minutes of the September 7 meeting were approved with one correction concerning speaker identification noted by Gary Petrewski.

COMMITTEE PROCEDURES

There were no comments on the draft FAC procedures. Mr. Summer suggested that the mission of the FAC should be stated in writing, possibly along with the procedures His understanding was that the mission was generally to make recommendations to the commissioners to reduce flood losses in the Delaware River Basin, and initially the committee would take up the proposal for improved river flood warning. The FAC would then look at other areas for flood loss reduction. Dave Burd asked if this was the intent of Resolution 2000-8 authorizing the committee, and Rick Fromuth responded that it was. Mr. Fromuth stated that the DRBC staff would prepare a draft mission statement including the intent of the resolution, Mr. Summer's comments, and other member comments would be distributed to members for review. It was agreed that the mission statement could be listed along with the FAC committee procedures.

REQUIREMENTS FOR SUB-COMMITTEES

Mr. Summer asked for comments on sub-committee requirements. He stated that it may be a good idea to focus the talents of the group in selected areas. He noted that the group is diverse with expertise in different areas and it may be necessary to have a coordinator or subcommittee to gather specific information that may be needed in between the quarterly meetings. He said it was a way of spreading some of the responsibilities around. He suggested that, concerning the proposal for an improved flood warning system, data, forecasting, outreach, and mapping were all potential areas for sub-committees as the committee moves along. Jerry Kauffman suggested that this might be done spatially based on sub-watershed location. For example, a sub-committee could be formed for the Christina Basin or the Upper Delaware as another type of way to focus the sub-committee. Bob Schopp stated that a sub-committee focusing on telemetry might also be helpful in dealing with technical issues of the data transmission networks.

Mr. Summer asked if there was interest in establishing sub-committees at this point or in getting input for discussion at the next meeting. John DiNuzzo suggested letting the sub-committees develop on an as needed basis. He acknowledged the importance of the issues but felt it might box the committee in to set up subcommittees ahead of time. Bob Hainly agreed with this, but noted the importance of a continual effort in public outreach. He felt that a sub-group or individual should take responsibility for that.

Gary Petrewski asked if the DRBC staff had anything in mind concerning specific topics or directions other than flood warning that should be addressed by the committee in the short term He noted that this was the

second time the committee was together and he was not sure where the committee was heading and what was important or not important in terms of flood issues. Mr. Fromuth stated that the purpose of the committee initially is to improve flood warning, but that the overall purpose is to try to reduce flood damage in the basin. He stated that one of the reasons the committee was formed was to get people together to think about the direction that the basin should be going. This type of input would fit in with the comprehensive planning effort for the basin that is now beginning. He stated that the staff has ideas for directions, but rather than the staff driving the committee direction, staff can contribute ideas to the group. The purpose of the commission's assembly of the committee was to have a better basin-wide attempt at controlling flood damage. Mr. Petrewski responded that the comprehensive planning item on the agenda is a global kind of issue, and maybe there was an interest in having specific members forming a subcommittee to do something specific. He stated that the committee is looking for some help at this early stage. Eventually, the committee will be able to stand on its own and provide the staff with direction, but at this point it is looking for some direction from the staff.

Scott Steigerwald suggested using the public outreach experience of the Susquehanna River Basin Commission (SRBC) related to flood loss reduction and discussing this at the next committee meeting. Mr. Summer noted the National Weather Service's and SRBC's experience with outreach over the past couple of years and stated that this could be presented by the Weather Service at the next FAC meeting.

COMPREHENSIVE PLANNING EFFORT FOR THE DELAWARE RIVER BASIN

Esther Siskind, a water resources planner with the DRBC, provided an overview of the two year comprehensive planning process which the commission is starting. One of the responsibilities of the DRBC under its compact is to develop and periodically update a comprehensive plan. It is a plan for the water resources of the basin, but it is also a plan that sets priorities and DRBC's work program as well as its budget. The DRBC has not undertaken a comprehensive planning process since 1972, and there is general agreement on the need for a new planning process. In 1999, the Governors of the four basin states and the federal representative signed a resolution directing the commission to undertake a comprehensive planning effort. The commission now has the resources in place to do this. The new plan will cover all the areas covered by the Compact, including flood protection. The areas will be looked at individually as well as how they relate to one another.

The initial phase of the plannning process includes two efforts. One is to look at the existing plan and update and compile it. The existing plan has been modified over time through docket amendments and resolutions and is a series of loosely compiled documents which is in need of updating. This updating will be complete by early January. The second effort is the scope development process for the plan for the future. This process will take place during the next six months. Advisory committees are being provided with an overview of the process and one-on-one interviews are being conducted with basin alternate commissioners and organization representatives as necessary. The scope of work will include an issues paper and a work plan. The draft will be completed by early January. It will then be distributed to the advisory committees for comments. A series of public scoping meetings will also be held. The final draft is expected in April for review by the commissioners.

Another effort being undertaken during the initial phase is the establishment of a watershed advisory council that will guide the comprehensive planning process. The council will consist of approximately 30 members representing a broad range of interests. The first meeting of the council is planned for mid-January. They will be involved with the scope of work development process.

The staff will look to the advisory committees for input and advice on technical issues in their areas of concern. Ms. Siskind requested that the FAC consider the three questions posed in the introductory document on the scope of work process distributed at the meeting (Attachment 2). She requested input during the next few weeks or when the draft scope is distributed in early January.

Ms. Siskind introduced Mike Personett, who is serving as a consultant to DRBC during the scope of work development. Mr. Personett commented that the current comprehensive plan is really a documentation of projects, rules and regulations as they exist today. What is lacking is the forward looking element of the plan, which will be the focus of the current effort. Mr. Personett stated that as envisioned, the current set of docket approvals and regulations (which are required to be in the comprehensive plan by the Compact) would become appendices to the plan. The future plan, or framework, or framework document, would be updated every 5 years. The process is not being approached as a DRBC comprehensive plan, but as a process which addresses the broad issues in the Compact and should address the intergovernmental roles and relationships as they now exist and how they might or should exist in the future.

Mr. Personett noted that based on prior FAC meeting documentation, it is apparent that the initial focus is on improvements to the flood warning system. He requested focus on the broader issues of flood loss reduction and flood mitigation when providing inputs to the comprehensive planning process. He also noted the need for linking issues in an integrated manner and gave the example of the relationship between floodplain acquisition and increased recreation opportunities, non-point source pollution, and wildlife management. There is a need to pull together these issues to bring together multiple issues and funding sources in the future. He emphasized the usefulness of spatially defining problem areas using tools like GIS for the planning effort.

Mr. DiNuzzo asked about the overall timetable for the project. Ms. Siskind responded that there is a two year planning process with the first six months devoted to development of the scope of work. Mr. Personett noted that part of the process is to assess resources as well as address policy issues, and the advisory committees are encouraged to provide inputs in both areas. It is expected that a draft plan will be issued in 2003. Responding to a question by Mr. Summer, Ms. Siskind explained that the commission is seeking flood related inputs from the FAC. Mr. Personett stressed that while the focus is on flood loss reduction issues, the linkage of these issues to other water resources management activities is important in the assessment of the overall benefits to the basin. He noted that interaction between advisory committees might be helpful in some cases.

Clark Gilman stated that so far, the FAC discussion has centered on establishing or re-establishing a warning system, which is badly needed. The relative lack of major river flooding in the Delaware Basin during the past 20 years and the discontinuation of stream gages support this need. He noted that this summer's intense flooding of the Musconnetcong river, where two of three gages have been discontinued, emphasized the problem. He felt that the next step beyond establishing a better warning system was to become involved in flood damage mitigation. He felt that the commission's role would not be to undertake actual projects, but that this is an area where outreach is very badly needed.

Mr. Gilman noted the great strides that the City of Trenton, through FEMA's Project Impact, has made in its flood mitigation program for the property along the Assunpink Creek, which has had a history of flood damage. This has included property buy-outs of the major damage area with money from the New Jersey State Emergency Management Office and FEMA. In about two years, this project will be an excellent example of what can be done to mitigate flood damage. Despite its advantages, there has been a great deal of resistance to this concept in New Jersey. Local officials feel they can spend money for structural public works projects such as channel modifications, but can't spend money on private property. It is a narrow view that is in contrast to national policy. He stated that it is very difficult in New Jersey to get localities to accept the money that is available for flood plain acquisition or flood-proofing. He cited the example of Manville Borough in the Raritan Basin. After flooding in 1996, Mr.Gilman encouraged the Mayor and city council to obtain a grant from FEMA to flood-proof homes. They have also been offered money to buy 41 flood prone properties, but no action has been taken. The local officials are hesitant to make a public project out of something that involves private property. Although considered to be the future of floodplain management, land acquisition and flood-proofing are hard to sell. This provides an opportunity for outreach by the DRBC, who could provide guidance to the communities.

Kathy Lear pointed out that one New Jersey community, Branchburg Township, has been very willing to

implement acquisition and flood-proofing. Three structures will be acquired and 18 others will be elevated in a historic district. The project should be complete within a year.

Mr. Gilman emphasized that FEMA is willing to pay for 75 percent of these types of projects, but it is generally very hard to give the money away because of most elected officials' idea of what flood control should be.

Ms. Siskind noted that the FAC would be looked to for helping to prioritize what the strategy should be on flood protection and where resources would best be spent. In response to a question by Mr. DiNuzzo, Ms. Siskind responded that input could be obtained from individual committee members where necessary, but mostly through the committee.

Mr. Summer asked Ms. Siskind what she would like the committee to do initially. She responded that the committee should review the scope of work to be distributed in early January and provide comments, unless there is input the committee would like to provide earlier.

Mr. Fromuth stated that in light of some of the earlier comments on the directions for the committee, he could draft an introductory statement on what the DRBC staff sees the issues to be. Apparent issues so far are warning and mapping, mitigation, and possibly a third area of floodplain regulation. This can be sent out to the committee for their input. In addition, he would look at the three questions and put down some ideas. Both would be e-mailed to the committee members for comments. The comments could be returned to Mr. Fromuth or to Ms. Siskind. Mr. Personett added that the right way to approach would be to focus first on the substantive issues like flood warning, but then there are institutional issues and funding issues. The questions are 1) What are the problems and needs in the basin?; 2) What are the intergovernmental issues related to that?; and What are the funding needs? Mr. Summer agreed with Mr. Fromuth's providing a straw response for comments by the members.

REVISED FLOOD WARNING PROPOSAL

Mr. Fromuth presented a summary of inputs received since the September 7 meeting concerning improvement needs for the basin's flood warning system. Each of the members was provided with a copy of the summary. The inputs were requested to identify specific gage and telemetry problems and establish equipment needs for the river flood warning improvements proposal. The general concept for this proposal was developed by the DRBC staff in cooperation with the National Weather Service (NWS) in March of 2000. The intent is to develop a proposal which addresses identified problems related to flood warning and flood loss reduction. Inputs were received from the NWS, USGS, The Delaware Emergency Management Agency, The University of Delaware Water Resources Agency, and the New York State DEC.

As Mr. Fromuth summarized the inputs from the different organizations, a number of specific issues were raised by the members. The first item discussed was the list of priorities provided by the NWS for the upper Delaware basin.

<u>Discussion of Inputs from the National Weather Service - Binghamton</u>
The NWS has indicated that although the stream gage network in the Upper Delaware River is considered adequate, there is a need for more automated rain gages in Delaware and Sullivan Counties. Mr. Summer noted that IFLOWS rain gages use radio telemetry whereas LARC rain gages are linked to the NWS via telephone lines. John Talley questioned whether automated rain gages operated by New York City could be added to the network used by the NWS. Paul Rush responded that there are three automated gages, one at each of the three dams, which provide the NYCDEP with data on a real time basis. These stations are funded by the city and could be used to expand the gage network. It is the NYCDEP's intent to make this data available on a real time basis. Mr. Rush also noted the network of 22 additional rain gages operated by the city but which are not yet equipped with real time telemetry. The data are downloaded once per month. It is

not clear when these gages will be equipped with telemetry. In response to a question by Mr. Summer, Mr. Rush explained that the gages are tipping bucket rather than weighing rain gages and that about half are heated. (Correction: Mr. Rush noted on 1/5/2001 that none of these gages are heated. Three of the gages are capable of being heated). Each of the three gages at the dams is heated. Mr. Summer noted that one of the issues the NWS has with rain gages is winter-time collection of data. The IFLOWS gages are not heated and are of limited use during freezing conditions. Most of the LARC network is comprised of heated tipping bucket gages. Heated gages in the city's network would be useful.

Mr. Fromuth noted that the stream gage and rain gage location maps provided by the Binghamton office of the NWS for the upper Delaware basin were very useful and asked if similar maps could be provided for the lower Delaware basin. Mr. Summer and Walt Nickelsberg indicated that files of the precipitation stations in the lower basin could be provided to the DRBC staff to allow mapping with GIS. Mr. Summer thought that precipitation gage files would be available from the NWS Mid-Atlantic River Forecast Center. Bob Hainly stated that he provided the DRBC with the locations of USGS tipping bucket rain gages in Pennsylvania which are located at USGS stream gages. These are not shown on the map provided by the NWS. Mr. Fromuth noted that these gages were mapped separately and not included on the NWS map. Eventually, one map should be developed for all of the rain gages.

Mr. Fromuth noted that two additional priorities were cited by the NWS for the upper Delaware. These include:

- Establishing additional river flood forecast points upstream of the NYC reservoirs.
- Completion of E-19 impact statements which are charts that relate flood heights to flood inundation. These are not detailed maps, but provide a quick reference for determining potential flood problems.

Mr. Talley asked if there had been any detailed statistical studies of the distribution of the existing precipitation network in the upper basin and whether the network is adequate. Mr. Summer noted that there was a very limited number of studies completed in areas around the country. He noted that another issue is, now that there is radar coverage of precipitation quantity, how many gages are really needed to properly calibrate the radar estimates to get the best type of information. There is work that needs to be done in that area. Mr. Talley noted that determining the adequacy of existing gages applies to the stream gage network as well. He stated that he would contend that there is probably an adequate number of stream gages, if utilized properly, to do good flood forecasting at the basinwide level and at the local level. He does not believe people are using the data at the local level. He explained that Delaware officials are able to relate flood forecasts to the probable damage that will occur, and it is important to get local people involved.

Mr. Nickelsberg stated that he has been fighting a losing battle in the lower part of the basin with local emergency management people to establish flood stages for the newer gages. Some of the gages have been in place for four years and input relating gage height to flooding has not been provided. Mr. Talley stated that this problem in the lower basin excludes Delaware, because Delaware has established flood stages for all of its gages.

Mr. Rush noted that the Woodbourne gage on the Neversink River was downstream of Neversink Dam and no longer exists. Bridgeville is the new gage and is located nine miles downstream. However, the Bridgeville is occasionally still referred to as the Woodbourne gage on the web.

Mr. Fromuth noted that based on the discussion, problems with awareness of the meaning of flood stages and the statistical distribution of gages should be considered further.

A fourth priority identified for the upper Delaware by the NWS was the lack of NOAA weather radio coverage from Hancock to Port Jervis, NY and in most of Sullivan County in New York and in Pike and Wayne Counties in Pennsylvaina. Mr. Nickelsburg noted that this would be taken care of in a matter of

weeks. The NWS has purchased a transmitter and the State of New Jersey is placing a tower along the border of Warren and Sussex Counties. This should provide coverage for the area cited. The scheduled time for completion is early January.

In response to a question from Mike Reuber, Mr. Petrewski stated that there was some discussion during the FERC relicensing of a NOAA weather repeater station located on Lake Wallenpaupack, but no action has been taken at this time - no one has yet picked up the funding.

Mr. Rush pointed out that some areas of the upper basin receive weather radio transmissions from Binghamton and others from Albany. He has noticed that sometimes the forecast information from Binghamton which is intended for Sullivan County is not picked up right away and broadcast over weather radio by Albany - so Sullivan County is slow in getting the information. He emphasized the need for coordination of the office forecasts and radio transmissions. Mr. Summer noted that these forecasts should be picked up automatically, but that he would look into the situation in Sullivan County. Mr. Reuber asked Mr. Nickelsberg if the new radio transmitter in New Jersey would pick up the Binghamton forecasts. Mr.Nickelsberg noted that the forecasts would be out of the Mt. Holly office, but would include the Binghamton forecasts.

A fifth priority is the inclusion of notification of the NWS in the emergency action plans for the Mongaup hydro-power system reservoirs. The NWS has indicated the cooperation it has had with PPL in this regard. Mr. DiNuzzo asked if the New York City reservoirs had emergency notification plans. Mr. Rush explained that the plans are available and are currently being upgraded for all the dams. He said he will get back to the FAC on making the notification portion of the plans available.

The sixth NWS priority for the upper basin is the need for improvement of the volunteer rain and snow spotter network in Pike and Sullivan counties. One observation the NWS made was that better NOAA weather radio coverage could help communicate the need for volunteer observers.

Additional recommendations include an improved lake level gage at Lake Wallenpaupack. Mr. Petrewski noted that PPL for separate reasons is looking at replacing the existing gage and so may take care of this improvement on its own.

A recommendation to add a telemetered stream gage on the Delaware River closer to Port Jervis was questioned by Bob Schopp, since there is already a gage at Port Jervis. After discussion, the members agreed that there is a need to establish a gage on the Delaware downstream of the Lackawaxen River. Note: Correspondance received from NWS on 12/11/2000 indicates that this recommendation applies to a gage on the Neversink River and not the Delaware River. There is a need to have a gage closer to Port Jervis than the Bridgeville gage, which is 22 miles upstream.

Also recommended was the addition of data collection platforms at the stream gages at Stilesville, below Cannonsville Reservoir, and at the Barryville gage. The Barryville platform may be installed soon according to the NWS.

Discussion of Inputs from the National Weather Service - Mt. Holly

Mr. Fromuth listed the flood problem areas identified by the Mt. Holly office of the NWS. These problem areas include the middle Lehigh River, the Lower Neshaminy Creek, the Perkiomen Creek, Northern New Castle County including the Brandywine and Christina basins, and both the main stem and tidal Delaware River.

Mr. Talley listed some of the on-line tidal gages that Delaware uses. These include two on-line gages on the Christina at Newport and the Delaware at Wilmington. Tide gages are also located on the Murderkill at Bowers and at Lewes. There are three additional inland tide gages. Mr. Nickelsburg stated that the problems

in the listed areas are not caused by a lack of data, but by a lack of feedback, a lack of information on what is going on. Local people do not provide responses when asked when flooding actually occurs. Mr. Talley responded that in Delaware there is knowledge of which stages cause flooding. Mr. Steigerwald asked if there was data for the lower Perkiomen Creek. Mr. Nickelsburg stated that there is data, but cited the example of the Upper Neshaminy Creek where two gages exist but there is no knowledge of what the flood stage is. He said the same thing is true on the Perkiomen where there are four or five gages where flood stage is not defined.

Mr. Fromuth illustrated flood insurance claim information received from FEMA and placed on the commission's GIS system. The claims cover the period of record since the 1970's. Flood insurance claims in any of the watersheds can be mapped and sorted by county or by watershed. The data show the significant problem of headwater flooding where there is little time for flood warning, as well as significant river and tidal flooding. The headwater flooding may relate to some of the reports to the Mt. Holly office that flooding now occurs where it "didn't exist" before. Mr. Fromuth showed an example of headwater and river flooding claims for an urbanized section of southeastern Pennsylvania. Only a small fraction of eligible owners actually purchase flood insurance, so the claims data do not give the entire flood damage picture. The data are, however, a strong indicator of the distribution of past flood damage and potential future damage. A few of the flood problems have been addressed by land acquisition, but such programs are still quite limited.

Mr. Summer stated that the claims data illustrate the problems associated with urban flooding in small watersheds where there is little lead time that can be provided by flood warning. These areas are where local warning or other mitigation actions should be looked at. Mr. Steigerwald noted speed with which flooding occurs from intense thunderstorms in urban areas and causes damage in a short time.

Mr. Summer noted that one of the problems in the small urban watersheds is that even when there is a rainfall estimate and flooding is expected, only a generalized warning for portion of a county can be issued as opposed to a stream specific warning. Mr. Talley asked Mr. Summer if he envisioned ever having the capability to look at smaller basins. Mr. Summer responded that NWS will be working on this in the next few years. The NWS is working on a program to use GIS to delineate small watersheds and combine this with radar estimated precipitation and computer modeling to identify potential flooding. The program has begun in the Pittsburgh area. The program is to be expanded to include each radar zone throughout the country. At this point, the software to delineate the basins is in place. This has to be tied to the radar rainfall estimates to develop an automatic warning system. Lead times are so small in these watersheds there would have to be automatic recognition of a problem.

Mr. Talley asked if these local warnings would be tied in to media broadcasts or actually provided to emergency directors with a recommendation to take action. Mr. Summer responded that with short lead time warnings, mass media and NOAA weather radio were the most viable means of distributing the warnings. Another aspect of this program would be to provide graphical output of the precipitation estimates and watersheds to the local emergency level. Mr. Gilman stated that the warnings issued out of the Mt. Holly office generally do indicate the amount of precipitation expected with a storm. He said he thought the product would be useful. Mr. Kauffman noted that with what is available with the Internet and the Weather Channel, while there is a problem getting the word out to the public, it is more a matter of making sure gages are telemetered so the data can be obtained in the first place. At the local level in Delaware, the public knows to go right to the weather channel. The people who are flood prone have learned to do this. Even though they may only have 30 minutes of warning time, there is at least that much in some of the smaller watersheds. Mr. Gilman noted that NOAA weather radio is also useful in the smaller waterheds. Mr. Summer noted that the resolution of radar is as small as 2 by 2 kilometers so that fairly small watersheds could be covered by the new radar based program.

Mr. Summer noted that Pittsburgh was chosen for the initial application of the program because a complete set of small watersheds were already delineated and existing rain gages were used to calibrate the radar

estimates. The program is a prototype for what will be seen in the future. In the future, NWS is looking at having this done more automatically in conjunction with the AWIPS system where radar and hydrologic information are integrated. Hopefully, this will provide earlier warning on the small watersheds in the future. He noted that graphical outputs will have big advantages in smaller watersheds where there is not enough time or staff for telephone communicated warnings.

Discussion of Inputs from the USGS - Pennsylvania District

Mr. Fromuth stated that the Pennsylvania district of the USGS provided a file with the locations of the tipping bucket rain gages operated by the USGS at their stream gaging stations. The district also provided a list of stream gages that have been discontinued and could be brought back on line. Some of these are located in the more urbanized areas of the basin.

These precipitation gages are in addition to the IFLOWS and LARC gages used by the NWS and could potentially be added to the NWS data network. As stated earlier by Mr. Summer, it was noted that tipping bucket gages must be heated to be reliable in freezing conditions.

Discussion of Inputs from the USGS - New Jersey District

The New Jersey district of USGS provided a list of discontinued gages that could be reactivated with telemetry, and a list of gages which are active, but where telemetry should be added. At this point, Mr. Gilman provided a list of New Jersey communities that could benefit from a warning system. These include eight communities on the main stem Delaware, one community on Paulins Kill, and three communities along the Musconnetcong River. He noted again that there has not been a large amount of flooding experienced in recent years in these areas.

Mr. Talley noted that with respect to the re-activation of gages, it appeared that the USGS has some additional funds in this year's budget for putting more gages on line. He felt that with a group such as the FAC, there is the potential to have some clout in lobbying the four USGS districts to use some of that money to put some stations back on line. He believes the group could be successful if it made a valid argument as to why the gages are needed, and it costs very little. It would take convincing the directors to support a forecasting initiative.

Discussion of Input from the State of Delaware

Mr. Fromuth noted that information from the State of Delaware came from the Delaware Geological Survey working with the Delaware Emergency Management Agency, and the University of Delaware Water Resources Agency (formerly the Water Resources Agency for New Castle County). He displayed a map showing flood insurance claims, watersheds, telemetered stream gages used as flood forecast points, and potential gage improvements in New Castle County. Mr. Talley pointed out that several telemetered gages in Pennsylvania are also used in the warning network that Delaware uses. These include the West Branch of the Brandywine at Modena, and the Brandywine at Chadds Ford.

One of the identified problems is the need for telemetry at the stream gage on Shellpot Creek. Mr Talley stated that this gage is expected to be equipped with telemetry within one month. A second identified need is re-activation of the gage on Mill Creek near Hockessin, Delaware. Mr. Nickelsberg noted that all of the gages currently use phone telemetry and asked about the possibility of equipping the gages with satellite telemetry. Mr. Talley responded that this is a matter of funding. Presently, the gages are funded by entities such as the State of Delaware, City of Wilmington, City of Newark, and a water utility. Additional funding would be needed to add satellite telemetry. Delaware would be willing to add the telemetry if funding became available. He said there are problems when storms such as Hurricane Floyd knock out phone lines. Mr. Nickelsberg noted that an additional problem is the time required for the NWS to call the gages. Data are received automatically with satellite telemetry.

Mr. Fromuth explained that the Delaware Geological Survey is working with the Delaware Emergency

Agency (DEMA) and the State Climatologist on a proposal for a statewide weather station network. Mr. Talley noted the John Mulhern, director of DEMA, submitted the proposal in his budget for $150,000 to establish the network. The Delaware Department of Transportation is also adding stations to the network. He hopes that within a year or so the network of real time stations would be in place. In text of its inputs, the Delaware Geological Survey stressed the need for cooperation between Pennsylvania and Delaware in evaluating and improving the precipitation network in the Christina and Brandywine basins.

Two comments received from the University of Delaware Water Resources Agency were also presented. The first comment was to concentrate funding for open space in flood plains toward such activities as flood property buyouts. A second comment noted New Castle County's recently adopted flood plain regulations which require 2 ft. of freeboard above the 100 year flood elevation, a maximum allowable rise in water surface of 0.1 ft for newly constructed bridges, no new development in the 100 year floodway or the flood fringe, and no construction permitted in a 25 ft. buffer (minimum) on both sides of the stream. The ordinance was written for the county by the Water Resources Agency. It was approved with relatively little opposition. Mr. Kauffman noted that this might be a good example for other governments in the Delaware River Basin to follow because it is less expensive to prevent damage than to mitigate it. Stormwater regulations aimed at minimizing runoff were also written into the New Castle County Code. The Water Resources Agency's involvement on the FAC is really how, through ordinances, can the potential for flooding be reduced and let the floodplain do its job. He noted that the principle of allowing development in the flood fringe is an idea that is obsolete in the view of the Water Resources Agency.

Additional Discussion about Flood Warning Improvements

Mr. Fromuth re-capped the recommendations based on the input received. In response to a question from Mr. Talley, Mr. Petrewski stated that the existing lake level gage on Lake Wallenpaupack can be read remotely, but it is not equipped with satellite telemetry, which is what the NWS needs for real time access.

Mr. Fromuth then listed additional information that would be needed to develop a flood warning system improvement proposal. This includes location coordinates of the precipitation gages used in the existing lower basin warning network, location coordinates of volunteer rainfall observation points, verification of the existing flood forecast points in the lower basin, cost estimates for gages, cost estimates for telemetry, costs of operation and maintenance of gages, and costs of preparation of NWS E-19 flood impact statements. The original concept proposal had very general cost estimates for gages based on the earlier work by the Susquehanna River Basin Commission in their flood warning improvements program.

In addition to the gage related costs, there will be costs for the flood stage forecast mapping. The mapping in the original concept proposal was based on making use of the work already completed by the Corps of Engineers. This would reduce the cost of the mapping to about half of what it would otherwise cost.

Mr. Fromuth stated that he would use the information provided so far to revise the warning proposal to a form where it could be used to seek funding in early 2001. Additional refinements to the proposal will have to await the availability of more detailed information.

Mr. Talley stated that he would like to see a basin-wide map showing the locations of all stream gages, telemetered gages, and all precipitation gages used by each of the organizations in the basin. This would allow a comprehensive look at the information that is available and the types of stations that are out there. This would help the FAC coordinate efforts if they knew where everything was. Mr. Fromuth agreed that this map should be assembled. Mr. Talley noted that there may be a lot of information, from counties, schools, etc. that could be used by the NWS. Mr. Nickelsberg stated that it may be a little late, because a lot of people have put in monitoring networks that are not compatible. For example, data collected from a Natural Resources Conservation Service Network in Southern New Jersey is not available to the NWS unless it is purchased and the school data is not available in real time. The City of Philadelphia has 28 rain gages but the data is not accessible. Mr. Nickelsburg suggested that perhaps the FAC could put out some type of guideline on the type

of equipment that should be used, but he does not have the extra time it takes to get information from these existing networks. Mr. Talley noted that this is why we have the DRBC, so that they can require compatible data collection.

Mr. DiNuzzo added that it is an appropriate role for the FAC to work up strategies in these situations. The data are out there, but we have to find a way to get it. It is ridiculous that data is out there but cannot be used. Mr. Talley suggested that pressure be applied to share the data. He suggested working through congressional representatives to get the data released. Mr. Steigerwald asked if funding should be sought for computer hardware and software to access existing data where it is not compatible. Mr. Nickelsburg responded that the hardware is available, but the software would have to be written. Mr. Steigerwald added that funding for software development could be sought rather than requesting funding only for additional gages. Mr. Talley stated that the first objective is to locate all of the gages that can be accessed, then locate additional stations that are not accessible and work toward getting them accessible.

Mr. Fromuth stated that all information on the locations of gages could be provided directly to the DRBC. He stated that the DRBC has nearly all of the information on stream gages, but the precipitation data is incomplete. Mr. Summer said he would contact the NWS Mid-Atlantic River Forecast Center for their information on rain gages used in their forecast operations. This data could be expanded with information about any other networks.

Discussion of Flood Insurance Claims Data

Mr. Fromuth explained a handout of a DRBC staff analysis of Delaware River Basin flood insurance claims. The claims data were obtained from FEMA and include all claims from the late 1970's through July of 2000. Over 10,000 claims have been filed throughout the basin. The data has been included on the commission's GIS and can be sorted by county and watershed. Using the data, rankings of counties and watersheds, in terms of the number of claims and the total claim payment was prepared. Watersheds were also ranked in terms of the number of claims and total claim payment per square mile. The results were distributed to all committee members. Although flood insurance is not purchased by the majority of flood plain property owners, the data are a good indicator of the flood damage areas in the basin.

Mr. Nickelsburg noted that the claims data demonstrate the problems he is up against. For example, there is a USGS gage on the Pennypack Creek in Philadelphia. When Mr. Nickelsburg approached the emergency management personnel there, they stated that there was no flood problem, yet the claims data demonstrates a flood problem. The lack of acknowledgment that there is a flood problem stops any progress toward better warning. The claims data could be useful in helping to overcome this obstacle.

Additional Discussion Points

Mr. Hainly referred back to the time frame for revising the flood warning proposal, and Mr. Fromuth's comment that he would use recommendations to date in the revision. He noted that the list of discontinued gages was supplied to DRBC because it would be fairly easy to re-establish the stage-discharge relationships for those sites. He did not look at whether they would be valuable for flood forecasting. He suggested using the list in combination with the information generated from the insurance claims data to identify gages that are located in high damage watersheds and to determine where additional gages are needed. He agreed with Mr. Nickelsberg that the Schuylkill River at Norristown gage is a key in the forecasting for the lower Schuylkill. Mr. Hainley emphasized the need to highlight the benefit to cost ratio of 13 to 1 realized in the Susquehanna River Basin flood warning system.

Mr. Nickelsburg noted that in the case of Darby Creek, which shows up as a high claims area, all of the properties in the damage area have been bought out. Mr. Hainley stated that it would be worth checking with county officials, in addition to the weather service, to determine the best locations for additional gages. He also noted that costs for gages are generally about the same.

In Jeffrey Featherstone's view, February or March would be a reasonable time frame for getting a revised proposal together for consideration by the Delaware River Basin Task Force.

Mr. Summer added that one proposal item that needs some refinement is the actual flood forecast improvements. Three areas should be covered in the proposal. These are flood forecast points, the AHAPS initiative, and urban headwater flood problems. He said the NWS could provide some inputs on this.

Flood Stage Mapping - GIS Requirements

Mr. Fromuth stated that the flood stage forecast mapping originally proposed focused on rivers where warning time could be provided and not on headwater areas. The proposed work would take advantage of hydraulic modeling work already completed by the Corps of Engineers - Philadelphia District as part of their flood insurance work on the Delaware, Lehigh, and Schuylkill Rivers.

The purpose of the flood stage mapping is to provide local emergency managers with a quick assessment of the inundation to be expected from flood stages forecast by the NWS. One of the keys to the value of the maps is that they can be computerized for fast access. Mr. Hanley noted that the Corps of Engineers is doing a similar mapping project for the Wyoming Valley region of the Susquehanna River Basin. He stated that some of the rural counties do not even have computers much less a person who can use GIS. He noted that the mapping would have value for communities with the resources to use the product. Mr. Gilman added that flood stage mapping does not work well if the inundation differences between flood stages are small.

Mr. Summer noted that there is software which would allow transmission of GIS mapping products over the Internet. This could provide a means of getting the mapping to local communities. Mr. Steigerwald stated that it would be useful to have the standards used by the Corps in their mapping work so that individual communities might use these standards as a guide if they pursued flood stage forecast mapping on their own. Mr. Hainly noted that there is information available on the Internet which summarizes the progress of the Corps' Wyoming Valley mapping project.

Mr. Summer suggested that coordination and practicality of flood forecast mapping might be a good topic for a sub-committee.

Mr. Thomas asked where the flood stage mapping program would be starting from and what has been done in the basin? Mr. Thomas noted that FEMA has generally found more flood staging benefits for non-residential areas than for residential areas. Non-residential areas need more intervention and time to prepare. The one thing that seems to make this work is a sub-state system where the localities are part of the ALERT warning system and emergency personnel are called.

Mr. Fromuth noted that the Pennsylvania Emergency Management Agency has had a flood mapping software for about 10 years. Paper maps have been digitized into the system, many from the Susquehanna Basin. The system is not GIS based.

Mr. Fromuth stated that most of the base data available for GIS based flood stage forecast mapping is available for the main stem Delaware, Lehigh, and Schuylkill Rivers due to the flood insurance re-studies. This is why the cost of doing these maps would be less than for other areas. Mr. Thomas cautioned that it is important to know where the starting point would be in terms of existing mapping. He also noted that, given the expense to produce the mapping, it is important to know if there is a structure that can actually use it. For example, without someone who can understand and interpret the maps, then the flood stages are not helpful.

Mr. Summer stated that a first step would be to look at what mapping is available, and it seems there needs to be a plan for how the maps will be used. He noted that a subcommittee could be in order to deal with the mapping issues and asked if there was anyone with GIS expertise among the members that would like to handle the issue. Mr. Gilman stated that one of the problems in this type of work is that when the mapping

systems are developed and local personnel are trained to use the products, the use may be disrupted by the high turnover rate in local government. This happened with the Passaic River flood warning system after two years when key local personnel left. The products being used were paper maps, not GIS products. Mr. Thomas re-stated that such systems work when there is a regional sub-state system of emergency coordination. Mr. Gilman stated that although the Passaic River flood warning system user's group is still active and meets quarterly, the flood stage forecast maps have long been forgotten.

Mr. Fromuth was asked if there was any GIS expertise on the DRBC staff. He responded that there was and that the staff generates GIS layers from files that have been previously geo-referenced, but does not generally digitize data. He noted that the proposed maps can be used on any PC with ArcView software once created. Mr. Summer asked if it would be useful to have someone from the Corps of Engineers explain the mapping being completed for the Wyoming Valley in the Susquehanna River Basin.

Mr. Fromuth felt that the obstacle for the mapping is funding and not the lack of an ability to produce something useful. He stated that the Corps has already worked out the mapping procedures. He noted that perhaps the Corps could be asked for a summary of the Wyoming Valley project and what obstacles they have encountered. He stated that the obstacle was not in the design of the system but getting it used once it is there. Mr. Thomas noted that the Pennsylvania Emergency Management Agency has to pay a contractor to enter paper maps into their system and that is a cost on their end. He stated that the Pennsylvania system had more limitations than GIS and that compatibility is an issue.

Mr. Petrewski asked if the discussion focused on state or county level emergency managment. Mr. Fromuth noted that the objective of the state of Pennsylvania was to link up counties with the state system. Mr. Summer stated that the Wyoming Valley system is looking at getting down to the county level.

Mr. Summer stated that at this point, he felt that the FAC would like to learn more about what is being done with flood stage forecast mapping in the basin. Mr. Fromuth asked if the group wanted to continue to have the flood mapping be a part of the funding proposal. Mr. Gilman questioned whether the product would be useful based on New Jersey's experience with the paper flood stage forecast maps. The maps were not used to a great extent for evacuation, which was their main purpose. Mr. Summer noted that the resolution of these maps, which showed four feet contour intervals, may not have been adequate.

Mr. Gilman pointed out that unless a flood plain is very wide, the flood stage forecast maps are not very useful. He did not think the maps for New Jersey had been very useful. Mr. Summer suggested looking at specific locations where GIS systems are in place for application of the maps. Mr. Gilman stated that the City of Trenton, New Jersey has a GIS and may be able to use the maps. Mr. Summer and Mr. Gilman suggested including specific damage centers in the proposal rather than the entire length of the Delaware River. Mr. Nickelsburg suggested mapping for the Schuylkill River since it floods more frequently, as well as locations in Bucks and Montgomery Counties. There was agreement that the proposal should be refined to include population centers near flood forecasting points and inventory where the mapping would be beneficial along with examples of areas where mapping was implemented and successful now. Mr. Nickelsberg added that some local areas where there was good knowledge of flood stages could use the product if they were equipped with GIS.

Discussion of Outreach Activities

Mr. Summer stated that there appeared to be a lot of opportunities for outreach for both flood warning specifically and flood loss reduction in general. Kathy Lear noted that the New Jersey Office of Emergency Management usually puts on workshops every year throughout the state to educate local municipal officials about programs available for flood mitigation assistance.

Mr. Summer noted that the NWS has been involved with the StormReady Program. Mr. Nickelsberg stated that only Lehigh County was participating at this time. The state of Delaware wants all three of its counties

participating in the near future. Under this program, the weather service will recognize a county as a StormReady county if certain mitigation requirements are met. It leads to greater coordination between the counties and the weather service. The program just started within the past year and there are not many counties participating in the entire country. Mr. Summer noted that increased participation could be a goal for part of the forecast/warning improvements program.

Another outreach effort would involve getting information such as the flood insurance claims data out to the effected areas. Mr. Fromuth noted that the DRBC staff had done a lot of work in the past year on its web site to include both flood information and educational information, as well as information on who the agencies are that are responsible for flood loss reduction in the basin. Despite the fact that the web provides a good medium for making information available, the web site does not get used by that many people in comparison to the number of people in the basin. For the most part, it does not reach the educational system. Mr. Thomas suggested that this is why a public information person from the DRBC would be important because they know how to use the rest of the media. He felt that state public information personnel would be helpful in reaching the educational system, and should be brought into the process. Mr. Fromuth noted that the media representative position on the FAC was not filled and that perhaps a public information specialist from the DRBC or one of the states could fill the position. Mr. Summer agreed that this could be pursued. Mr. Thomas noted that timely campaigns during the year when people are thinking about flooding could be effective.

Mr. DiNuzzo noted that each state has an association of broadcasters that could be of help in avoiding the appearance of favoritism in selecting a media representative. This outside perspective might be helpful.

Mr. Burd stated that the Weather Channel is now offering a service where they will send out a forecast or flash notice to any PC upon request as well as to notify via pager or cell phone. This is a way to get messages to people who are interested and aware. This could be something to tie in and expand. He noted work with the Community Alert Network in New Jersey as another means of getting out warnings once the flood forecasts have been made. This telephone based system maintains a log of notified as well as unnotified individuals in the communications network during emergencies.

Mr. Summer asked Mr. Thomas if he had anything to add, as FEMA's representative, about the Community Rating System (CRS) and Project Impact discussed at the FAC's September 7 meeting. Mr. Thomas noted the orientation of the group toward warning, forecasting, and evacuation and that the group was trying to push out of a box that it had worked inside of for a long time. He did not feel that the group is quite ready to deal with these broad programs. He said that if reverse engineering is used - starting with the ideal and working backwards, these programs are quickly involved, but the FAC is not there yet. When talk is serious about mitigation, the CRS and Project Impact come into play. It takes a long time to discuss these things and how they fit in. It is a huge network of little programs that fit together in one organic whole, and they all must be understood at one time to figure out how it works. FEMA actually reorganized just to have people who specialize in getting this type of information out to the states. He suggested that the FAC deal with the data collection and warning issues first and then move in to these other areas. He offered to provide data that would help in locating data collection and forecast points.

Mr. Thomas noted that there was a lot of activity at the state and local levels with various components of flood mitigation programs. He noted that the infrastructure improvements sought by the FAC were important to these levels.

Mr. Fromuth asked FAC members to include all areas of flood loss reduction in their consideration of comments to the comprehensive planning process, and not restrict comments to flood forecasting and warning.

Again concerning outreach, Mr. Summer noted that the NWS has several videos about flooding and flash flooding with limited copies available. One of the videos is available in Spanish as well as English.

As at the September 7 meeting, Mr. Thomas emphasized the importance of partnering. He noted that the school districts might be willing to financially support some outreach efforts. For example, this could help defray the cost of making a large number of copies of the educational videos. He noted that partnering will attract the attention of government agencies.

Discussion of Longer-Term Goals

Mr. Fromuth noted that the FAC inputs to the comprehensive planning effort and setting directions for priorities for the basin could help focus the goals for the committee. Mr. Gilman agreed with Mr. Thomas that the FAC is not yet at the point of branching into broader flood mitigation areas. He said general flood loss reduction efforts would link well with an outreach program.

Mr. Petrewski noted Mr. Gilman's earlier comments about the Corps and the mismatch between their authorities and doing something to deal with problems on private land. He felt this is true with Corps authorities in a lot of areas. It seems that with four states and the DRBC here that there does appear to be a mismatch between local needs and federal authorities concerning the availability of funding. If there is ever going to be a change in this it will take a group like the FAC to try to institute some longer-term changes in federal legislation. He has heard of repeated cases where monies are authorized, particularly Corps funds, and never spent because of mismatches between small project programs and what the real problems are out in the basin. He feels that focus on this is a longer-term goal where work could begin without waiting for a data collection effort. Mr. DiNuzzo supported this idea and noted that it might help to have a representative of a member of Congress sit in on an FAC meeting, particularly one from the appropriate committee, to participate in a discussion about strategy.

Mr. DiNuzzo noted that FEMA, at this point, has a lot of influence within the federal government, yet when issues of the domains of agencies like the Corps' or the Natural Resources Conservation Service (NRCS) arise, there is not as much fluidity or coordination at the federal level to make sure that the work gets done by the responsible agency. This has been frustrating to the individual federal agencies. Sometimes activities by a given agency are blocked because they may be in the domain of another agency. Ultimately, he would like to see the FAC begin to try to address these kinds of problems. For example, if FEMA is the predominant federal agency in the sphere of hazard mitigation, they should be given the support to exercise their authority to insure that there is continuity and consistency among the federal agencies to solve the problems.

Mr. Petrewski asked what is going on with the comprehensive planning at the state level with respect to re-visiting their individual plans whether in flood loss reduction or other areas. Mr. Fromuth stated that he did not know the status of each of the state plans, but that the commissioners, and representatives from that states have been asked for inputs on a basin planning process. They have been asked to look at where they are with their planning and to incorporate that here. Mr. Gilman added that the flood component has largely been left out of New Jersey's comprehensive watershed planning effort.

Mr. Petrewski stressed that the objective of the FAC , if the comprehensive plan is going to be a forward looking document, is to provide the right guidance to the states. There needs to be consistency between the states. There needs to be, in essence, a community of people here that can reach outside that community and bring in the additional resources that are needed. The FAC member organizations need to be certain that in the long run, they work together as one group. Tying the basin comprehensive plan as much as possible to the plans of the states is to the benefit of the region.

There was discussion about the lack of recent Corps flood control projects in the basin. Mr. Gilman noted that the present federal administration is opposed to new major flood control or shore protection projects. Mr. Thomas noted that this trend had already begun under the Reagan and Bush Administrations.

Mr. Petrewski pointed out the need to tie flood related projects to the needs of other programs that are more politically current. For example, stressing the multiple uses of stream gages could enhance their chances for

funding under other programs such as Clean Water Action. Mr. Gilman noted the gages installed in Southern New Jersey under a drought reduction program. Both Mr. Gilman and Mr. Petrewski noted the frustration over Corps authorizations that never get implemented, or else take 25 years to get designed and funded. Mr. Thomas pointed out the inconsistency between FEMA and the Corps concerning the Corps' allowance for redevelopment of properties purchased by the Corps in association with projects.

Mr. Petrewski stressed the need, in order for the FAC to act effectively as a group, to know what all the programs are so that it can steer what might be a productive effort to get something accomplished. There needs to be a clear picture of what programs and funding are available in order to steer things in the right direction. Mr. Summer supported the need for this, and noted that knowing who does what is needed for an effective outreach program. Mr. Gilman pointed out the NRCS, is also a major player in flood loss reduction programs, and has fifteen watershed plans in New Jersey, mostly in the Delaware Basin. The projects undertaken by NRCS have included structural measures.

Mr. Petrewski noted the tendency to dismiss proposals such as flood stage forecast mapping because of a lack of training or ability of local personnel to keep up and use the products. It seems there is something missing in between. Maybe the priority should be to get those people on board and search for the funding to do the education, do the training, and put the tools in their hands so that they can be given a product that would be more useful over the long term.

Mr. Gilman cited cases where there has been recent severe flood damage yet communities have not acted despite the availability of programs to do so. Ms. Lear noted that five properties in Mannville are being purchased as a result of Hurricane Floyd. (Note: Ms. Lear noted on 1/5/2001 that the Borough of Manville has received a grant from FEMA to purchase up to 43 structures an has acquired 5 so far. She noted that acquisition depends on the homeowners' willingness to sell and that some municipalities are eager to have properties acquired when they are made aware of programs to do so. Mr. Gilman stated that 250 homes were originally slated for purchase in Manville. One of the frustrations is that acquisition can be held up by proposals from other agencies such as the Corps, for structural solutions which take many years for implementation.

Mr. Fromuth acknowledged the bottlenecks and problems associated with flood loss reduction programs. Yet he felt the flood warning and flood stage forecast mapping had definite benefits. He noted that if the chaos of flooding is to be eliminated, people have to be kept out of the flood plain. The mitigation program is a great way to do so, but it is not going to happen right away. Mr. Petrewski noted that this was all the more reason to start it sooner. Mr. Steigerwald felt that mitigation was never going to happen on a large scale because large scale acquisitions disrupt the fabric of an intact community and affect the tax base. Mr. Gilman stated that there are too many agency interests pulling everything in different directions and this affects buyouts and flood-proofing.

Mr. Fromuth stated that he did not have a document which summarizes all of the programs for flood loss reduction funding. Perhaps such a summary would be helpful. Mr. Gilman stated that there are not that many opportunities for structural solutions in the Delaware Basin and that non-structural solutions such as flood-proofing and buyouts fit a lot better in most of the basin.

Mr. Thomas felt that the committee should be careful not to deal with both the warning/forecasting and mitigation issue simultaneously, since this could bog the committee down. Once the committee starts to approach flood loss reduction from the mitigation objective, it will change the view of the flood loss reduction product. The FAC needs to make some choices about how to proceed, but is beginning to open a "pandora's box" that should be dealt with in another session. Mr. Thomas felt that the FAC could provide coordination for the mitigation programs that are already out there in the basin. This coordination is something that those programs do not have right now. This can be done right away. In addition, the FAC needs to find money. Without money, nothing will happen.

Summary of Required DRBC Staff Follow-up

Mr. Fromuth summarized a list of items that require follow-up by the DRBC staff. These included, in addition to the minutes:

- A mission statement needs to be prepared to accompany the FAC Procedures. The staff will draft a statement for review by the members.
- A straw response to the three questions posed in the comprehensive plan scope of work will be drafted for member review.
- A draft summary of FAC short term priorities will be prepared which fits in with the comprehensive planning effort.
- GIS layers will be assembled based on rain gage data submitted by the member organizations.
- Additional GIS compatible data on repetitive flood insurance claim loss and disaster relief information will be requested from FEMA.
- The staff will draft a revision to the flood warning improvements proposal which incorporates the recent input from the members. It will include new forecast points, it will tie in to the NWS's Advanced Hydrological Prediction Services program, and will have a section on the urban headwater flooding and include concepts for addressing that and river flooding. Costs will be estimated based on the available information. The proposal will also have a section on the value of stream gages for uses other than flood warning. The mapping component will include selected areas that can benefit from the mapping. Note: Mr. Petrewski asked if there was any advantage to scaling back the mapping in this way. Mr. Summer responded that it would be good to test the product first for selected areas to learn all that may be involved with successful adoption and use of the product by the communities. Mr. Petrewski indicated that the proposal should include training for the full implementation of the mapping at the local level. Mr. Summer added that the proposal should include an expanded outreach section.
- The staff will discuss filling the media representative vacancy on the FAC, either by requesting the help of a media board or by asking a public information officer to participate.

Mr. Fromuth requested that members provide inputs on the flood loss reduction programs and funding with which they are familiar. A compilation of programs will take additional time but would be based on this and other input.

NEXT MEETING

The next meeting of the FAC was set for 10:00 a.m. on **Thursday, March 15** at the Delaware River Basin Commission headquarters in West Trenton.

Attachment 1

FLOOD ADVISORY COMMITTEE
December 5, 2000

ATTENDANCE

NAME	AGENCY
Burd, David K.	Merrill Creek Reservoir
DiNuzzo, John	New York State Office of Emergency Management
Fromuth, Richard	DRBC Staff

Gilman, Clark D.	New Jersey Department of Environmental Protection, Flood Plain Management
Hainly, Bob	U.S. Geological Survey - Pennsylvania District
Kauffman, Jerry	University of Delaware Water Resources Agency
Lear, Kathy	New Jersey Office of Emergency Management
Nickelsberg, Walt	National Weather Service, Mount Holly, N.J.
Petrewski, Gary	PPL
Picca, Al	Delaware River Joint Toll Bridge Commission
Reuber, Michael	National Park Service
Rush, Paul	New York City Department of Environmental Protection
Schopp, Bob	U.S. Geological Survey - New Jersey District
Steigerwald, Scott	Pennsylvania Department of Environmental Protection
Summer, Solomon	National Weather Service, Eastern Region Headquarters
Talley, John	Delaware Emergency Management Agency
Thomas, David	Federal Emergency Management Agency, Region 3
Tortoriello, Richard	DRBC Staff
Featherstone, Jeffrey	DRBC Staff
Blum, Gail	DRBC Staff
Quinodoz, Hernan	DRBC Staff

Hydrologic Info | News Releases | Next DRBC Meeting | Other Meetings | Publications | Basin Facts | Contact Info | Your Comments Welcomed

Commission Member Links: Delaware | New Jersey | Pennsylvania | New York | United States |

DRBC Home Page

P.O. BOX 7360, West Trenton, NJ 08628-0360
Voice (609) 883 - 9500 FAX (609) 883 - 9522
croberts@drbc.state.nj.us