
Public Hearing

before

ASSEMBLY STATEWIDE FLOODING LEGISLATIVE PANEL

*"Testimony concerning flood mitigation and response from the New Jersey
Department of Environmental Protection, the New Jersey
Office of Emergency Management, the National Weather Service,
other invited guests, and the public"*

LOCATION: Evesham Township Municipal Building
Marlton, New Jersey

DATE: September 24, 2007
6:00 p.m.

MEMBERS OF PANEL PRESENT:

Assemblyman Francis L. Bodine, Chair
Assemblyman Robert M. Gordon, Vice Chair
Assemblyman Larry Chatzidakis



ALSO PRESENT:

Philip R. Gennace
*Office of Legislative Services
Panel Aide*

Kate McDonnell
*Assembly Majority
Panel Aide*

Thea M. Sheridan
Christopher Hughes
*Assembly Republican
Panel Aides*

***Hearing Recorded and Transcribed by
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ASSEMBLYMAN FRANCIS L. BODINE (Chair): Ladies and gentlemen, if you could take a seat, it is 6:00, and we would like to begin.

Unfortunately, Assemblyman Gordon is on his way. He's in traffic. And we have talked to him, and he understands that we will begin without him.

I wanted to welcome everyone, and thank you for joining us today for the opening hearing of the Assembly Statewide Flooding Legislative Panel. This body was created under legislation given unanimous approval this past June. It has two simple missions: first, to assess the shared lessons of major river and stream flooding across New Jersey; and second, to identify any potential long-term remedies that could mitigate future flooding problems in the state.

I know some of my colleagues in the Legislature have second thoughts about taking on an assignment like this in an election year. General approach of this type of thing says not to do anything until after the election. But there are those who we talk to in the public that ask us why we're not back in Trenton working. So we feel this is a major issue. And I feel that it's worth undertaking now.

The problem of periodic flooding around the state is such a serious safety -- that it should not wait. We had to get action going now, because you just never know when the next storm or flood will occur.

At this point, the Panel is in a fact-finding -- fact-gathering mode. And I hope that the information that we do accumulate will eventually shed new understanding on the flooding in this state. I would like the Panel to take on a more global participation with flooding issues,

and follow this meeting up with, perhaps, another meeting in Central Jersey and North Jersey.

Historically, when floods occur in a state they are very localized. In 1984, the Passaic River Basin experienced enormous flooding, while much of the rest of the state didn't encounter any problems. In 1999, we know that Hurricane Floyd devastated Bound Brook. Right here, in Burlington County, in the Pines, the torrential rain caused a network of dams to collapse and created terrible flooding right here at home. In 2006, serious flooding occurred in the Delaware River, in Mercer and Hunterdon County. But the most recent, the nor'easter that swept across the state this past April, triggered flooding in all of these places, and at the same time.

I think that there are lessons to be learned from that storm, because it showed that flooding is not just an occasional problem in one section of the state or another. The storm showed that there are serious problems across the state.

I'm hoping that this committee can look at all these places and cultivate the common ground that links them as a flood-prone area. Are there land issues? Are there topography issues, geographical issues, infrastructure issues? These are just a few of the things that we'll be looking at.

However, before we go to the distinguished groups of experts we have scheduled, I want to first thank Speaker Roberts for appointing me Chair of this Panel. And I also want to say that I am grateful to serve on a Panel with distinguished legislators who are deeply concerned about this problem, as I am.

Assemblyman Peter Biondi is a member of the committee and could not make it tonight. Peter Biondi has been an advocate for strong flooding protection efforts along the Raritan River, in central New Jersey. Assemblyman David Russo-- Dave is from the opposite point of the state. And truly, I couldn't expect him to be here. But he has a tremendous knowledge of the flood issues in the Passaic and Ramapo river basins. Assemblyman Gordon, who is on his way, not only knows about flooding issues in Bergen County, but he also serves on the Assembly Environment Committee, as does Larry--

ASSEMBLYMAN CHATZIDAKIS: Yes, I serve.

ASSEMBLYMAN BODINE: --as Assemblyman Chatzidakis, who has joined us tonight.

I thank everyone for being here.

And before we open the floor for presentations and questions, I'd like to give Larry an opportunity to make any comments that he would like to at this time.

ASSEMBLYMAN CHATZIDAKIS: Well, to echo some of your sentiments-- Obviously, we know what happened in Burlington County over the last few Summer seasons, the unexpected storms we had. And you're actually going back quite a few years. You gave some of the history. You did mention about what some of us refer to as the *silly season*, or more commonly known as the *campaign season* -- why we're tackling something like this. And it's important to know that we shouldn't diminish what we're here to talk about this evening.

And I do hope that as you progress further, and meet in the rest of the parts of the state, that something comes of this Panel. As we know,

we have many, many panels and commissions over the years, and we study a lot of -- do a lot of studying. And we seem to get an incomplete grade on those things. But I think this is something and -- I'm sure we'll hear some of the testimony -- where a lot has been going on in Burlington County, on the county level, with the freeholders, as well as many municipalities. And hopefully we can take those lessons that we hear of spoken tonight, and move to the rest of the state, and come up with an overall plan that will help everyone throughout the state, regardless of when a storm or unexpected occurrence happens. As we know, nature doesn't pay attention to the calendar, doesn't pay attention to political seasons or campaigns, so we have to be prepared at all times.

And I commend you for having this legislation, and moving forward and addressing the concerns that we'll hear tonight, and help the residents who are living in these flood-prone areas maintain a quality of life.

Thank you.

ASSEMBLYMAN BODINE: Thank you, Assemblyman.

For those who are here: Anyone who would like to speak or give testimony, there are forms in the back that we would ask you to fill out and submit them to us so that we can call you at the appropriate time.

At this time, I'd like to begin and call Mike Arabatzis, who is representing the United States Corps of Engineers, the Philadelphia District.

M I N A S M. A R A B A T Z I S: Good afternoon.

ASSEMBLYMAN BODINE: Could you state your name into microphone for the record, please?

MR. ARABATZIS: Yes, my name is Mike Arabatzis, U.S. Army Corps of Engineers, Philadelphia District.

ASSEMBLYMAN BODINE: Go right ahead, sir.

MR. ARABATZIS: Okay.

We have a few slides I'd like to go through.

Thank you for the opportunity to talk about this very important issue, the issue of flooding and flooding risk in New Jersey, and to give you an overview of the Corps of Engineers' involvement, the types of work we can do or the things that we have underway.

(Begin PowerPoint presentation) These are examples of the severity of coastal storms. These are pictures from the 1962 event, which is the storm of record for the coastal-type storms in New Jersey, also known as the *high-five event*, because it lasted over five consecutive high tide cycles.

I have a few pictures that I will go through just to give you an idea of some of the problems that we're dealing with. And then I will go into more detail.

The Philadelphia District, of which I am the Chief of the Planning Division, oversees the Delaware Watershed and the coast of New Jersey from Manasquan Inlet, south. I will focus the discussion today on our area, and then New York District, which manages the rest of the state, will be making a presentation at the follow-up hearings that you will have on the northern part of New Jersey.

These are some additional photographs of the '62 event. And following that, there's a picture of the '92 event at Whale Beach, where we have that breach. And after that, the '91 coastal storms at Ocean City and Cape May Point; and a couple more photographs along the Delaware Bay

and along LBI of 1984. And, of course, development of most of these areas has, in fact, intensified over the years. So these photographs -- especially from the '60s -- can only give us a small picture of the impact it could have on a much more developed coastline -- any kind of a storm of that magnitude. And then, of course, we have the riverine type flooding that we had in '04, '05, and '06. And these photographs are from Trenton during the '06 floods.

The Corps of Engineers is responsible for providing planning, engineering, and design and construction services for water resources to address the basic missions -- that we have flooding/ecosystem restoration and navigation needs.

The slide on the coast typically -- while it emphasizes the significance of the New Jersey coast as an environmental as well as an economic resource to the nation -- 35 million people live within a hundred miles, 25 million within 50 miles. And while our projects are formulated to provide storm protection for the communities, and the infrastructure, and the public investment along the coastline, we cannot overlook the bigger economic impact that the coastal economy provides to the state and to the nation as a whole.

Well, how do we approach reducing the risk? Reducing the risk involves developing solutions and balancing each of these elements: the economics, the environment, and the public acceptance. On the economics: well, basically what that means is that our projects must have benefits that exceed costs. We go through a thorough analysis, not only developing the cost of what it would take to protect what we are trying to protect, but also the types of benefits we would get out of it. And then we have to compare

it and make sure that the benefit-to-cost ratio is over one, meaning the benefits exceed your costs. At the same time, we must ensure that not only are we not harming the environment, but if there is any way to enhance the ecological systems that exist, that has to be accounted for as well. And, finally, public acceptance: The project has to be acceptable by the public which we are trying to protect.

And here, what I'd like to note is that, when it comes to flooding, we can never eliminate flooding. And I think we all need to understand that flooding is a risk that we live with. There is no way we can ever provide a project that will completely flood-proof a community. But we can reduce the flooding risk. And that is what we strive for within some reasonable economic means.

The following -- this is a little difficult to read. But it actually has shown-- It shows on it the different studies and projects that we have. We can provide a hard copy if you would like. It shows all the projects along the coast, and then along the Delaware, including studies that we have underway. But I can talk to you a little bit about each one of them.

The Delaware River is-- Well, as I mentioned, the Philadelphia District manages the Delaware Watershed, of which New Jersey comprises about 3,000 square miles. As a result of the devastating floods of '04, '05, and '06 again, the Corps and the New Jersey DEP entered into a feasibility study agreement in July of '06. Shortly thereafter, we initiated the study using funds that were added by Congress.

At this time, we have jointly developed a list of the major damage areas, which are about a dozen, to be investigated in detail. And we are in the inventory phase, which basically means it's the data collection

and defining the base conditions again, which we'll then develop alternative solutions and evaluate their effectiveness, efficiency in economic and both ecological terms.

To the extent that we can, we'll be examining ways to reduce damages and enhance the ecosystems, as well, such as stream bank-type restoration and opening; and returning the floodplain basically as much as we can to a more natural state. Traditional structural measures, such as levies, floodwalls, etc., will also be investigated. But it will be more on the -- from the point of view that if nothing else works, or if they are much more efficient-- We will try as much as we can, again, to work with the waterways, rather than against them. But there will be instances where a hard structure -- what we would call a *hard structure*, like a floodwall or a levy -- will be inevitable.

Subject to funding, we estimate the study to be completed in about four years. However, it is not in the President's '08 budget. So we will continue only if it is added by Congress. I need to mention to you-- I'm not sure how familiar you are with the way the Corps works. But all our studies and all our projects are specific line items in the Energy and Water Bill. And they have to be specifically listed in there with a specific amount for us to be able to work on that in any given year. So if in a given year a study or a project is listed with specific funding, then we can work on it. If it's not, then we cannot work on it. It is a critical item to know. And, right now, it's not in the '08 budget which, for us, starts in a couple of weeks -- on the 1st of October. But the budget is always negotiated in Washington between Congress and the President. And I know both your

Senators and the affected Congressmen are working pretty hard to get funding for the Corps to continue these efforts.

Now, indirectly to this Delaware comprehensive effort, we also have initiated a smaller-scope study with the DRBC, the Delaware River Basin Commission, with whom we work very closely to look at the New York City reservoirs in upstate New York, to see whether modifying their operation, by seasonal adjustments, will have an effect of reducing flooding for the downstream.

As far as risk goes, this is a slide that can give you an idea. This is a section of Trenton. So it's an urban environment. And it shows the 100- and the 500-year floodplain. It's not very clear because of all the lights on. But basically the blue -- the shaded blue area is the 100-year floodplain. And then the tan that extends beyond that a bit is the 500-year floodplain. This is one section of Trenton. And based on that, there are about 400 structures in the 100-year floodplain.

Now, to put it in perspective, of the three recent storms that we had -- the '04, '05, and '06 -- the '05 was the most severe. And it was almost a 50-year event. Damages from that storm were estimated for New Jersey at about \$38 million. The '06 flood was a 25-year event. And the '04 flood was less than a 25-year event for Trenton, again. This is just to give you an idea of what it means with respect to the 100-year floodplain. Estimate of the three flood events together for New Jersey was that damages exceeded about \$100 million.

When it comes to the coast-- This is a quick rundown of our projects and studies. Again, we have about a hundred miles of the coast, from Manasquan down to Cape May. It's about a hundred out of a total of

125 miles. Typically these projects involve a berm and dune system. And in some cases, such as the Townsends Inlet and Herford Inlet, they involve a hard structure, such as a seawall. Now, depending on site conditions and how the economics, again, benefit the cost, (indiscernible) berms range from 100 to 200 feet, and dune heights from about 16 to 20 feet.

Currently, we have one ongoing study and two completed studies that are awaiting construction authorization. Again, our process is, once we complete a study, we submit it to Congress, and Congress considers it for authorization for construction. And the way they provide that authorization is, they include it in the Water Resources Development Act. Right now there is an act-- That bill is in Congress. The House and Senate have, more or less, agreed on it. And we expect to have one this year -- this calendar year. And the two projects that I mentioned for New Jersey are included in that bill. But basically, once we do a study, we cannot move to construction until we have that authorization.

On the Delaware Bay side, we have three projects that have, in fact, been authorized already. And these are Oakwood, Reeds, and Villas; and are awaiting construction funding. But all the study parts, the design parts, everything else -- including authorization by Congress -- we already have that.

A little more detail on each one of these coastal projects, going from North to South -- and the color scheme-- The three red ones that you see there -- these are the ones that are awaiting authorization by Congress. The others have gotten authorization and are basically in either the construction phase or in some kind of renourishment phase.

Going from North to South: Manasquan Inlet to Barnegat, that's one that's awaiting authorization. All the study effort, design has been done. LBI was initially -- we started construction in '05 by truck hauling some sand; continued in '06 and '07, constructing Surf City. Approximately 10 to 15 percent of the entire project is complete. Brigantine Inlet to Great Egg -- that's split into two parts. Brigantine Island construction was completed in '06; Absecon Island construction was completed in '03 and '04; Great Egg Inlet to Peck Beach -- which is Ocean City -- construction was completed in '92, and has been renourished four times since that -- since the construction. Great Egg to Townsends Inlet is awaiting authorization, like the first one. Townsends Inlet to Cape May -- Avalon and Stone Harbor construction was completed in '03; the Avalon seawall was completed in '07; and the North Wildwood seawall is to be completed in '08. Hereford Inlet to Cape May -- it's the only study that we have that is still ongoing and will be completed in '08. Cape May to Lower Township, construction completed in '91. And Lower Cape May Meadows to Cape May Point -- that's a unique project. It combines environmental and ecosystem restoration with storm damage protection. The storm damage protection was completed in '06, and the ecosystem restoration was completed in '07.

Now, all of these projects -- all of these coastal projects include the initial construction -- placing the berm, and then the dune on top of it. But the berm needs periodic renourishment. So if it was completed several years ago, it's probably in need of some kind of renourishment -- typically every three or four years -- depending also what the conditions are. We do survey them periodically every year to ensure the conditions are correct.

And the problem is, with the funding, periodic renourishment is not something that OMB looks favorably at. So it's another thing that we depend on -- essentially, congressional adds -- to continue the renourishment of these projects, to provide the protection for which they were originally designed.

To give you an idea of project funding-- First, I have to indicate and say -- state very clearly -- that the State of New Jersey is, has been, and continues to be an excellent partner, with more foresight than with any of our other partners that we have. They have been working with us for many years. All these projects and studies need a nonfederal sponsor. And the State of New Jersey has always leveraged State funds with Federal funds to accomplish all these projects.

Typical cost-sharing on the study phase is 50-50 between the Federal government and the State. And then, when it goes to construction, it's 65 percent Federal and 35 percent nonfederal. Again, generally speaking, we've had issues with, especially, the coastal projects. It looks like OMB and the administration typically support the initial construction, but future nourishment continues to be a problem. So much of it depends on how the budget gets negotiated between Congress and the President. To give you an idea, right now the needs for the renourishment probably exceed \$10 million on the Federal side.

Now, looking back at the completed projects, I think we can clearly say that they are a good investment of public funds. These projects reduce damages to property and protect lives. Our economists estimate that we get an impressive 87 percent return on investment. And net benefits are estimated to be about \$52 million a year. Now, these figures, again, do not

include the economic engine generated by Summer vacationers along the shore; and the hard-to-quantify, but equally important social benefit to millions of citizens from the heavily populated urban areas of the Northeast.

At the same time, we recognize that the remaining needs and risks are great and will never be eliminated. However, we look forward to continuing our partnership with New Jersey and the congressional delegation to strive and reduce those risks.

So with that, I conclude my statement.

ASSEMBLYMAN BODINE: Thank you very much for your testimony.

I have some questions. Is there any tool that you have been working with over the years that could be determined to be the most effective flood mitigation tool, that would help eliminate the flooding or reduce flooding?

MR. ARABATZIS: Well, it varies from location to location. Typically, trying to return, as much as we can, the floodplain to some preexisting condition is always the first thing to look at. And this would be the place-- This would depend on the place, again, that you're examining. In a heavily urban area, that is difficult, because there is so much already -- infrastructure, and public and private investment -- that has gone there. But I think preventing, wise planning ahead of time, future development-- I think that's the way to reduce, as much as possible, future type of damages; and, to the extent that we can, try to address problems using ecologically type friendly solutions.

One of the things that we have found out, for example, is stream restoration-type measures -- where, again, you remove fill that has been placed over the years and restricts the flow of the stream, and forces the stream to jump the banks. So there are means by which you can do both -- address the ecosystems that an area has and, at the same time, reduce the flooding. And these typically are also the least costly alternatives. So to the extent that these types of approaches work, these are the types of solutions that we should be looking at.

Back in the early '80s, when the Corps had looked at some of these issues, we concentrated on what I would call typical hard-type structures of levies and floodwalls. And they tend to be expensive. They are difficult to reverse if they don't work. And, again, because of the high cost of it, it makes a lot of projects not feasible. But in looking at softer-type measures, and measures that look at more preserving or returning, as much as we can again, the environment to some preexisting condition -- might be able to help us out.

ASSEMBLYMAN BODINE: You stated that the '05 storm was the equivalent of about a 50-year storm. Is there any way of comparing that storm to the storm of '62? Was '62 a 100-year storm or a 25-year storm? I'm just trying to get a feel of the devastation that occurred and how this is looked upon by the Army Corps.

MR. ARABATZIS: The '62 storm was along the coast, versus these floods which were more along the mainstream of the Delaware. And they're really -- they're difficult to compare, because the-- A nor'easter is not like a hurricane -- that you have a tropical-type hurricane. It typically comes and stays in an area over a long period of time, and it keeps

pounding and pounding that area. So it's the duration of it -- lasts a lot longer. These recent storms we had on the Delaware -- '04, '05, '06 -- had a tremendous amount of rainfall that fell. There were some areas in upstate New York where we had 15 inches of rain in a very short period of time. So they're two different events. They're very difficult to compare. One is a lot of wind-type and wave action along the shore, and the other one is simply too much water coming down too fast.

ASSEMBLYMAN BODINE: Just so I understand what you said earlier, at the completion of your studies -- as they are completed for each different task -- you do not get Federal funding until your study is completed, and you cannot move forward on that project until the money is allocated?

MR. ARABATZIS: No, we get funded each year for what we need that year. So if a study costs \$1 million, we don't get a million dollars. We get whatever we say we need that fiscal year. And then the following year -- whatever we, again, get appropriated to. We can only work as long as we get that funding. If for one reason or another we do not receive the funding, we stop working on it. And that--

ASSEMBLYMAN BODINE: So it has to be included in this Water Resources Act?

MR. ARABATZIS: It has to be included in the Energy and Water appropriations. And it's specifically, again, line item. It's not the budget for the Corps. The budget for the Corps is a list of projects by state.

Now, once you complete your phase of, let's say, the study phase; to go to the next phase -- which would be construction -- you need specific authorization by Congress. So we cannot complete-- If we were to

complete the study today, next year we cannot go into construction. We have to submit that report to Congress. Congress has to approve it, include it in the Water Resources bill, and then fund it. And then we can move. So it's a big, complicated process. You have authorizations, you have appropriations, and they do have to be synchronized and, sort of, continually funded from year to year.

ASSEMBLYMAN BODINE: Okay. Thank you.

Assemblyman Chatzidakis.

ASSEMBLYMAN CHATZIDAKIS: Yes. Thank you.

In your presentation, you mentioned that New Jersey was a good partner. I assume that was in the financial aspect of it, as compared to maybe communicating with our DEP. And that's a concern I have. As we see many of these natural disasters, we find that the enemy, many times, is our own government -- on how we deal with different levels of our own government and cross-government. And I'm just curious to know, as far as the Army Corps of Engineers' communication with the DEP -- is there any? How do you communicate? How do you get together to have planning? I'm just--

MR. ARABATZIS: We have an excellent relationship and communications with the DEP. We meet periodically, we go over the joint efforts that we have, and update. We have had no issues. In fact, again, they've been better than most.

ASSEMBLYMAN CHATZIDAKIS: We've mentioned about cleaning out the streams and the silt buildup, and we know that's been a problem in Burlington County. As a former municipal official -- county freeholder -- we're sensitive to the issues, and we know the DEP, sort of, has

been an obstacle in that. I'm just curious if you would see something obvious like that, would you make a recommendation to any government entity -- not the DEP, anyone -- to say, perhaps, maybe you ought to look at another standard or another policy on it? How would that work in regards to that?

MR. ARABATZIS: You mean as a policy type?

ASSEMBLYMAN CHATZIDAKIS: Well, let's say there's a policy that, perhaps, is contributing to maybe what's some of our flooding problems. And, as you said, you're always communicating with DEP. And if you -- for whatever reason, that policy is being enforced, and from your expertise as the Army Corps of Engineers you would feel that that policy, perhaps, should be abandoned or, maybe, modified somewhat -- would you ever -- not you specifically -- but would the Army Corps make a recommendation to say, "Perhaps you ought to look at something differently?"

JANET HARRINGTON: Could I take that one?

MR. ARABATZIS: Sure.

MS. HARRINGTON: With regard to problems, needs, opportunities identified during a study process, like the New Jersey Del-Comp, Delaware Comprehensive Study-- What we do is, we work with our partners -- New Jersey Department of Environmental Protection -- to identify areas that they're aware of that are having problems, and they have needs. And we go forward, and we look at a comprehensive look -- whether it's shoaling in the river, whatever the issues are. We try and gather enough information, and we look at a comprehensive watershed-type solution -- integrating environmental benefits, obviously flood damage reduction

benefits -- to try and come up with the best solution. The easiest, quickest solution may not always be the longest-lasting, most appropriate one. So that's the purpose of these comprehensive studies -- is to look at it in the big picture, not just little Band-Aids. Because what we've found over the long haul is that if you do a bunch of Band-Aids, it's not always the best for the river, and the floodplain, and the watershed in the long--

MR. ARABATZIS: This is, by the way, Janet Harrington. She's our Chief of the Project Development Branch.

ASSEMBLYMAN BODINE: Could you speak into the microphone and identify her, please?

MS. HARRINGTON: I'm sorry. My name is Janet Harrington. I work for Mike Arabatzis in the Planning Division, U.S. Army Corps of Engineers, Philadelphia District.

ASSEMBLYMAN BODINE: Thank you.

MR. ARABATZIS: Typically, when a community has an issue and they call us, and they ask for us to go and see whether we can assist them or not, we'll go out. And based on a quick assessment, we can give them some advice along the lines that you mentioned, and also take it further and say, "Well, this looks like it's something that we can help you long-term. It's within our authorities, and we have the ability to address it," or, "It's small enough. It's something you can do on your own. And here's some advice on how to go about it." So I think that kind of answers--

ASSEMBLYMAN CHATZIDAKIS: Well, thank you very much for your answers.

Thank you.

ASSEMBLYMAN BODINE: Thank you very much, Mr. Arabatzis. We appreciate your testimony.

At this point, I'm going to call Melissa Castro, who is here to make a statement on behalf of Senator Menendez.

M E L I S S A C A S T R O - M A R M E R O: Good evening, Chairman.

ASSEMBLYMAN BODINE: Thank you.

Could you state your name and speak into the microphone, please?

MS. CASTRO-MARMERO: Absolutely.

My name is Melissa Castro-Marmero, and I'm here on behalf of Senator Robert Menendez. Unfortunately, the Senator could not be with us today, as he is in Washington, D.C. But I would like to read a statement that he has prepared for this evening.

"Dear Chairman Bodine, I am pleased to be able to submit this statement in today's inaugural Flooding Legislative Panel hearing. Flooding is an issue that affects all residents in New Jersey, and it is one that is not going away unless we use all of our ingenuity and collaborative efforts to navigate away from looming disasters. I commend you, Chairman and the Panel, for taking steps to address this issue by holding this hearing.

"This past April, we experienced a terrible storm. The nor'easter affected huge swaths of the state and, cumulatively, 15 counties were declared disaster areas. Traveling from the northern parts of the state to the southern parts of the state, I saw firsthand how families had been uprooted from their homes, seeking shelter in schools; and how business

owners lost their entire inventories, with their livelihoods cast off as rubbish in the streets.

“Although storms cannot be prevented, we have to plan, and strategize, and think about the future. We have to work together: Federal, State, and local governments, to develop a regionalized plan to better position our state to prepare for and react to floods. I strongly believe that comprehensive regional flood planning will ensure that all Federal, State, and local efforts and actions will result in bringing forth a holistic resolution to the state’s flooding dilemmas. That is why, a few months ago, I held a statewide flooding conference to try to address our state’s flooding issue and create the synergy to begin solving the problems that increased flooding has wrought, and that global warming threatens to exacerbate, in the future. The conference was the first step to opening the avenue for a dialogue.

“I am happy to announce that today the Senate approved a conference report for the Water Resources Development Act, WRDA, which authorizes more than \$480 million in Federal funds for the Army Corps of Engineers’ projects in New Jersey. From this bill, New Jersey will benefit from a number of projects to rebuild storm-damaged lands, restore critical ecosystems, improve infrastructure, and help prevent future flooding. I am proud to have helped secure these funds for the Garden State and New Jersey families, and to continue working in the United States Senate to address and act on the state’s flooding problems.

“I believe that with today’s hearing, the members of the Panel are taking a very important step in maximizing and integrating all efforts to find a tangible and far-reaching resolution to the state’s flooding problem.

“I commend you all for your efforts, and look forward to working with you to continue protecting the health and safety of New Jersey’s children and families.

“Thank you.

“Senator Robert Menendez.”

ASSEMBLYMAN BODINE: Thank you very much, Melissa. And please convey our appreciation to the Senator for his interest in this Panel and our efforts.

MS. CASTRO-MARMERO: Absolutely.

Thank you.

ASSEMBLYMAN BODINE: Mr. Gary Szatkowski, National Weather Service.

G A R Y S Z A T K O W S K I: I have some hard copies here of the PowerPoint.

ASSEMBLYMAN BODINE: Okay. Thank you.

Again, could you state your name and speak into the microphone, please?

MR. SZATKOWSKI: Certainly.

My name is Gary Szatkowski.

ASSEMBLYMAN BODINE: I was close.

MR. SZATKOWSKI: You were very good. (laughter)

Again, the topic I’m going to be covering is about flooding in New Jersey and, from a weather perspective, talking about what some of the causes are, and where we go from here, basically.

(Begin PowerPoint presentation) Again, I'm the chief meteorologist for the National Weather Service office that's located in Mount Holly, New Jersey.

Next slide.

Our mission statement-- I've kind of highlighted the important things here, since we're talking about flooding. Hydrologic forecast and warnings for the protection of life and property are the main things that are relevant for the Panel today. I will talk some about climate and weather, obviously, since they all tie in.

Next slide, please.

Again, this is just some of the recent floods. Some of the previous speakers have talked about some of the other flood events. But we've obviously had quite a few in, really, just the past three years. And so those are just some of the major ones we've had that we can think about. And that will be part-- Real quickly, we'll talk about some of that, and then go into sort of where the future -- what does the future hold, and also what can we do about it.

Next slide, please.

These are just some pictures of the flooding. This is kind of a wake-up call for folks living along the Delaware River, who had not experienced major river flooding for quite a few years. This is associated with the remnants of Tropical Storm Ivan back in September of 2004. And then the next slide is, again, flooding along the Delaware River from the April 2005 floods. Folks who hadn't seen flooding for a long period of time, and then made it through the September 2004 event, seven months later were, again, experiencing significant flooding.

Going on to the next slide: Again, this-- From talking with folks, from attending different meetings, and making presentations, there are a number of things that folks are talking about regarding why the flooding is occurring. One of the things that has been talked about, that people have asked questions about, is urbanization. Particularly, this relates to the Delaware River. People are saying that we paved over too much land upstream. And is that then causing more runoff as you come downstream?

The reality is that there is still a lot of undeveloped land, much of which is protected State or Federal property, on the upstream portions of the Delaware River. And we're not really seeing-- We use computer models to help us with our forecasting for river flooding. And we don't see that development having an impact, in terms of the runoff affecting the Delaware. So, right now, we would not say that because of urbanization, that's a driver for why we're seeing this flooding on the Delaware River.

I would also point out here that we do have a -- I think -- some success story here to talk about, that we see on the weather end of things. You certainly see areas that were developed back in the 1940s, and '50s, and '60s, where they were urbanized, and there was paving over of the land. If a storm moves over that area with a certain amount of rain, you certainly see more flooding, more runoff producing more flooding than you do if it moves over some other areas there -- rural area. But also, something we've seen is that areas that have been developed from the 1970s and later, we see much less effect in our hydrologic models in terms of them needing to be adjusted because of that development, in terms of there being more runoff. So I would just say, kind of subjectively, as we see it, all those retention basins that are sitting at the edges of the shopping malls or in the

subdivisions -- and anything else that's been going on to try to more smartly develop our areas, and do it in a way that mitigates flooding -- we see it having an impact, in terms of how our hydrologic models respond, which, again, we calibrate and correct based on real-world observations.

Going on to the next slide: This is a picture of one of the major New York City reservoirs that -- on the upstream portion of the Delaware River. And then going on to the next slide: again, a couple of-- Another common belief that we find along -- from residents living along the Delaware River is that the reservoirs cause the flooding, that the reservoirs are actually the basis for the flooding; and if the reservoirs were operated differently, there would be no flooding. And there's a couple examples there -- both occasions where there was spilling water, and there was flooding that did occur, and conversely, when they didn't spill water and flooding did not occur. However, there are a lot of good weather reasons, hydrologic reasons to show that the reservoirs can potentially play a role in the Delaware River. You cannot stop the flooding with the current infrastructure on the Delaware River -- at least as far as we can tell with our hydrologic models, when we do scenarios where we keep the reservoirs from releasing water with real-life events. We've done this with both the April 2005 and the June 2006 flooding. And you can see some improvement, but there's no way to stop the flooding, basically, if the New York City reservoirs were operated differently. That's not going to stop it.

Going ahead to the next slide: So, yes, basically the main driver for all three major floods on the Delaware River was excessive rainfall, which then led to excessive runoff. Precipitation -- you heard a little bit earlier from the speaker before about one in 25 or one in 50. I'm looking at

it from the precipitation side of things -- how frequently-- What are the odds of you seeing this amount of rainfall in how many years? And when you go to some of -- where some of the heaviest rain fell in those three major floods, you're looking at rainfall return rates historically on the order of either one in 50 years to as much as -- with April 2006 -- one in 250 years, which is obviously a very extreme event.

So moving on to the next slide: Again, there are some folks who are hoping that if we do some things differently we can stop the flooding. And, unfortunately, the answer is, no, we cannot. We can maybe do some things to help mitigate it. But weather is holding all the trump cards, basically, in this situation. It is flooding because we have had more extreme rainfall events. And we're going to go through some slides to just kind of talk about the weather background, kind of backing this up.

So going on to the next one: This first slide is looking at northern New Jersey. So it would be -- some of that would be runoff into the Delaware River, but it also affects some of the other river basins that were talked about -- the Passaic and the Ramapo. And basically what it's saying is that it's getting wetter. The mean average rainfall in the six-year period from 2001 to 2006 is a little over 51 inches. If you go back earlier in the 20th century, it was only 44.5 inches. So it's getting wetter.

Next slide: Here's another way to look at this. This is looking at a little bit broader perspective. That red line is the one to focus on, which I know is a little hard to see in the black-and-white handout. But it's the smoother curve. But it's basically higher now above the average than the curve was below the average back in the drop period of the early- to

mid-'60s. So we're wetter now than that period was dry. So it's a very wet period.

Moving on to the next slide: This shows both temperature and precipitation. So, again, just real quickly-- The top half of that slide is showing that it's getting warmer in a lot of parts in the country.

And let's go on to the next slide, because it zooms in on that bottom one. I just want to talk about that a little bit more. This whole northeast part of the country is getting wetter, northern New Jersey being one of the areas that's showing the greatest trend increase. That blue shaded area up there on the slide is basically saying -- looking at the trends over an extended period of time -- and this is on a decade-by-decade basis. Basically, each decade-- As each decade has gone by, it rains about an inch-and-a-half more annually in those spots. And so we're considerably wetter now -- another way of just looking at that same problem -- that we're considerably wetter now than we were 30, 40, 50 years ago.

Okay. And then one last slide. This is a bar graph. And this is just basically-- This is looking at the upper Delaware Basin. So some of that obviously covers New Jersey, some of that is covering adjacent portions of Pennsylvania and New York. And just basically, wherever that line goes really high, that's heavy rain. The acronym -- that MAP is an acronym standing for *mean aerial precipitation*. And it's just basically, the taller that bar is, the wetter it is. Way over to the left-hand side, you can see Connie and Diane's impact on the area. And that's-- Again, folks who have been around here a while can remember that as being an extreme event. And fortunately, the events we've had here recently have -- over the last 10 years -- have not been as extreme. But you can see Floyd; you can see April 2005;

you can see Tammy listed in October 2005; June of 2006. Basically three out of the four biggest flood events -- rainfall events for the upper Delaware Basin have all occurred within the past 10 years. And so again, this is just another way to kind of look at that increasing trend of precipitation over time: that those -- more of those bars, where they go really high, are occurring in our time now than they did in the past.

Moving on to the next slide, I'm going to switch gears here now and talk about -- we've been talking so far about riverine flooding, flooding -- heavy rainfall that will cause flooding along rivers, and streams, and creeks. Now we're going to talk about the coast.

Sea levels rising: The east coast is fortunate in a lot of respects. One way it's fortunate, from a weather perspective, is we have weather observations going back for a long period of time. We have gauge observations that go back almost to the beginning of the 20th century. And you can see here, with almost a hundred years of data, that there's a trend for sea level to be rising at the gauge in Atlantic City, New Jersey. And the trend is a little -- is just around 1.3 feet per century. Part of that -- about a half-a-foot or so -- is due to the land itself sinking. If the water is rising it's for two reasons: either the ocean's going up or the land is going down. And frequently it's some of each.

The New Jersey coast is going down about a half-a-foot a century. And that's just a geologic process. But the remainder of that is ocean level rise. And we'll talk a little bit about that -- a little bit more about where it's going in the future. But let's continue to talk about what this means for us just today.

So going to the next slide: This just shows some of the major flood events along the coast. And this is for Atlantic City. It's referenced at the tide gauge. The '92 nor'easter is the benchmark, in terms of the highest amount. And then the hurricane of '44, and Hurricane Gloria, and then the Ash Wednesday storm -- the '62 event -- is there in the top four. So, basically, those give you some ideas of some of the numbers.

But we've got to take into account what the previous slide just showed you: that the ocean is rising. So going on to the next slide, what does that mean? Well, it means that even if the weather -- without even taking -- worrying about whether or not there's climate change or anything like that-- If the Ash Wednesday storm -- the 1962 storm -- happened today, the water levels would be a half-a-foot higher, just because of the trends at the ocean level. So you don't need any worse weather for worse flooding. You just need the same weather you had 30, 40, 50 years ago, and it will be worse now, because the ocean is higher. Similarly, with the 1944 hurricane-- If it happened now, it would be eight-tenths of a foot higher. Again, the weather is not any worse, it's just that the ocean is starting from a higher level. And you'd have a new record. So, again, you don't need any worse weather. But, again, we'll talk a little bit about maybe some ways in which the weather will get worse. But just the fact that the ocean is higher is making the threat of flooding along the coast worse.

Going on to the next slide: So where are we going from here? Again, that top graph is just -- that's the State of New Jersey graph and just long-term trend line. And that's temperature. And you can see it's gradually going up. So the discussion on whether or not we're warming up is pretty much over. That part of the climate change discussion is pretty

much wrapped up. And it's really kind of the-- It's the modified graphic there on the bottom. How much of our fingerprint is on that change? The changes that are occurring -- how much can we attribute to us, people's activities, versus how much would have happened based on Mother Nature?

Going on to the next slide: Some of you have seen this in the *New York Times* and in *TIME* Magazine. So if you've glanced through either one of those, or any other source, you may have heard that we're losing our polar ice cap. And there's-- It's a little hard to tell in the handout. The graphic there on the display -- there's a purple line on there. And that basically shows where the ice should normally be up on the arctic ice cap. You're looking at the top of the world there. And this is from just September 16, so this is just a little while ago. And basically, the arctic ice cap is about a third -- shrunk down by about a third or so from what it normally would be over the historical record, which only goes back for about 40 or 50 years. So we're seeing a significant change in terms of how much ice is melting up in the North Pole. And that's one of the things that was predicted by the climate change models, and where I think we're starting to see some real-world evidence to support that.

Okay. This slide has a little animation with it here. Just real simply, that's a historical record going back for about a thousand years. And sort of like the shopping center, it says, "Today you are here," to kind of locate you. And then it's talking about where we're going. First of all, again, there are some-- This is still-- There are some folks who haven't completely bought into this, but I'd say 80 to 90 percent of the science community and the weather world is pretty much convinced we're in uncharted terrain right today. That curve, right now, is higher than we've

been over the past thousand years, as far as we can go back and reconstruct it.

And then, more importantly, it's where we go from here that-- You're in a whole new-- You're moving on to someplace we've never been before, as far as humanity is concerned, over the next hundred years, based on these climate model forecasts.

Now, there's quite a bit of spread there. Some of that is due to climate model uncertainty -- that our models are not good enough yet to just kind of pick a point and say-- Scientists trying to be honest will say there's a range there. But some of it's also the choices that we are making today and that we'll make in the coming weeks, and months, and years. If you-- If we do things to help slow down the current increase in greenhouse gases that we believe is contributing to the warming of the atmosphere, you come in on the lower end of that curve. That's basically why there's some of that spread there. If we behave differently, the answer in a hundred years, in terms of what the world is going to look like from a weather standpoint, changes also.

Going on to the next slide. Again, this got quite a bit of press earlier this year: the Intergovernmental Panel on Climate Change, which is chartered by the World Meteorological Organization -- so it's an international group -- came out with their latest report on climate change. And I've highlighted, again, the things that are relevant for this group. And the increased threat from heavy precipitation events is rated *very likely*. And for them to rate something very likely is on the order of 80 to 90 percent or greater. So it's a pretty high-confidence forecast.

We're in a period-- The graphic there shows that we're -- we had kind of a lull period with hurricane activity in the Atlantic Basin from the 1960s to about 1995. And then it's picked up since then. Really, the only the discussion going on right now in the science community, on the weather side, is whether this increase is only going to last for another 15 years or so. There are some folks who believe that there's about a 30-year pattern or so on the Atlantic, where you alternate between above normal -- above average hurricane activity, and then it kind of lulls back down to a lower average. There are others who feel this increase is now permanent, that this is tied in with some of the climate change arguments, and that we're not going to go back to a lower level of hurricane activity.

And then as far as going back to talking about the Jersey Shore and what's going to happen in the future, I'll defer to -- you know, using a comment from Dr. Anthony Broccoli at Rutgers University. Again, you saw that we went up 1.3 feet in Atlantic City over the past hundred years. He believes that we're going to rise about 2 feet over the next hundred years. And, again, that difference being the additional driver of climate change. The geologic process isn't involving any changes at the Jersey Shore, in terms of it rising or sinking. And it's sinking slowly -- aren't going to change. That difference is because of climate.

So going on to the next slide: Again, what's the difference between moderate and severe coastal flooding at the Jersey Shore? It's a one-foot difference. When we put out a warning, the difference between moderate and severe -- that's all it takes. So a storm that produces moderate coastal flooding today will cause severe coastal flooding for your grandchildren when they reach your age. It's not that far-- It doesn't-- It's

not very distant. It's going to be something that people see, who are here with us today.

So going on to the next slide: How to prepare for the next big flood. Again, there's a lot of-- What we do is, we issue-- One of the things we do is, we issue forecasts and warnings. And so those warnings you get from a variety of ways -- but one of the ways you can get them is from our Web site, and also one particular portion of it is the Automated Hydrologic Prediction System.

Going on to the next slide: First, I will talk about what I consider a success story. This is the June 2006 flood event. But this is not the observed rainfall. This is not something telling you, after the fact, how much rain fell. This was the forecast five days in advance telling you how much rain was going to fall over the next five days. So, again, we are getting better at forecasting major events and getting better at being definitive, in terms of just how much rain will fall. So you can't do a lot of things in five days, but the things you can do in five days, based on a forecast like this -- you can take action, because you're getting it ahead of time and not finding out about it basically when the rain starts.

Going on to the next slide: This is the page that covers much of New Jersey -- that Automated Hydrologic Prediction System. If you clicked on the point for Trenton-Delaware on the map -- going on to the next slide -- back on the June 2006 flooding, this is what you would have seen. The curve on the left-hand side that's solid is the observed values. That basically shows how the river is starting to rise because of the heavy rain that's occurred. On the right-hand side are dots. And that's probably of greater interest to folks. That's basically our forecast. At this point, you

don't know what's going to happen. The river is rising. How high is it going to get? When is it going to crest? And that's what that forecast is. Those dots basically tell you how high it's going to get and when that's going to occur. And this is all -- pretty much been rolled out over the past two years. It was there in a more basic sense for the 2004 flooding; and was really kind of put to the test with the 2006 flooding, and came through with basically flying colors, in terms of data availability and getting the information out there. We saw tremendous rises in the number of visits to the Web site, the number of hits. So we know it had a lot of popularity.

Going on to the next slide: What can we do about the future? Really, real-time data access is critical, both leading up to and then during an event. And we see, over and over again, is that after every major flood event there's a call to strengthen and expand gauge networks. We saw that here locally in Burlington County with the floods. And we see it along the Delaware River. And that's a very natural and appropriate response.

Opportunities with the State of New Jersey: Again, I will echo what was said previously, that this is -- I view this as opportunities to strengthen an already strong relationship between the National Weather Service and the State of New Jersey. Our primary partners are the emergency management community, both at the State, county, and local level.

Those gauges need care. They need care and feeding. Operations and maintenance of the gauges is an opportunity for making them more -- putting them in a more firm footing, financially, to keep them operating.

The second bullet is a real -- I think a real exciting opportunity: high resolution data that allows flood mapping. Rather than just giving you a curve that tells you how high the river is going to get, we'll give you a map that goes with it, because we've got high-resolution data showing just which areas will be inundated. That's the next area we're working on. We're looking for partners to make this happen in New Jersey.

And then, again, we need to still do some more work in terms of establishing some of the basic things like flood stages at some of the newer gauges that have not yet been fully tested.

Moving on to the next slide: There really are no easy answers, in the sense that you can't make flooding go away. And you saw in some sense it's going to get worse. If you had the same weather system today that you did 50 years ago along the coast, you're going to get worse flooding. So the opportunities are there to strengthen our already strong partnerships, both in terms of the data network and also working on improving our ability to get better information into decision-makers' hands faster. The more you know it, and the sooner you know it, the better off you're going to be.

When we issue warnings, obviously we encourage-- We do a lot of education outreach. We want to make sure people know what to do when they get a warning -- a flash flood warning or a river flood warning.

And sort of the final -- the final thing is, unfortunately, no silver bullets. If you live in a floodplain, flooding will probably occur in your future.

And that is the end.

Thank you.

ASSEMBLYMAN BODINE: Thank you, Gary.

Assemblyman, welcome to South Jersey. We share some of your problems of North Jersey.

Would you like to make a few comments?

ASSEMBLYMAN GORDON: Well, I think in light of the fact that I got here a little late because I did encounter -- forgive me -- a flood of traffic (laughter) in North Jersey--

I simply want to commend you, Mr. Chairman, for your leadership on this issue. I think it is important to recognize that we really can't deal with this problem by dealing with it on a local basis, by channelizing a stream here, or building a dam there. This is a regional problem, if not a global problem. And we need to take a statewide approach to this. And I think these hearings are a great start. And I commend you for sort of authoring the legislation that brought us here today.

So I look forward to working with you and my colleagues on the committee.

ASSEMBLYMAN BODINE: Thank you for joining us. We're happy to have you.

Just a couple quick questions.

That's a fascinating report. I've lived here all my life and gone through a lot of these storms.

Two quick questions: It seems as if the waters are getting warmer and warmer each year, and lasting longer and longer into the season. And we've escaped any kind of major hurricane in I don't know how many years. But just -- not a prediction -- but if this water continues

to warm up -- I don't know -- a degree or a half-a-degree, could we be subject to hurricanes more often in the future than we have up until now?

MR. SZATKOWSKI: Well, I think that to look to the future in this case, you could also look to the past. We had some really major events back in the '30s, '40s, and '50s. We had some major inland flooding from hurricanes in the '50s. I kind of personally consider really the last time a hurricane really hit the Jersey Shore hard is the 1944 hurricane. Even though it technically didn't make landfall, the eye passed so close to the shore that there were portions of the barrier islands -- which, of course, were less developed at that time than they are now -- that were literally swept clean. And so if that happened now, it would certainly be even more catastrophic than it was back then.

We are in a pattern, right now, that is at least as bad, if not a little worse, in terms of hurricane frequency and intensity as we saw back in the '40s and '50s. The risk is just as great as it was back then. We can go back and look at pictures and look at data from those events. So, yes, we're certainly as risky as we were back then. If the trends continue, if waters do get warmer -- and you're correct, one of the things hurricanes thrive on is warmer water -- there's no reason to think they're going to back off. The threat would increase.

ASSEMBLYMAN BODINE: About in July, the *Philadelphia Inquirer* -- there was a theory about sands in the upper stratosphere coming across and impacting the hurricane weather pattern. Are you familiar with that? Is this just a hoax? Do you know the article I'm referring to?

MR. SZATKOWSKI: I know the article you're referring to. And actually, on a personal note, my first duty station in the National

Weather Service was San Juan, Puerto Rico. It was a very tough duty. (laughter) And you could actually see the dust come in, particularly during the Summer season. You would get -- they would call them *tropical waves*. And in the wake of a tropical wave, the wind would pick up a little bit, and Saharan dust would actually have come in with that wave all across the Atlantic. Obviously, the bigger particles fell out long ago, but you get kind of a haze effect. And so it's a real thing. And it's not understood.

You know, the 2005 hurricane season was the monster hurricane season that we'll remember for a long period of time. We had hurricanes Katrina, Rita, and Wilma that all had major impacts, Katrina in particular. And the water is not really any cooler this year by any significant margin than it was in 2005. But we're certainly not on any type of pace where we're going to continue-- We're not on a pace this year where it's going to be like 2005. And so there are other factors in play. And that article about the Saharan dust is actually something that's under discussion, as scientists continue to try to understand why one year is not as active as another year when all the other -- when all the parameters you're looking at look pretty similar. So, yes, we're looking at the dust.

ASSEMBLYMAN BODINE: Interesting. (laughter)

MR. SZATKOWSKI: We're going to keep at it until we explain it. We're just going to keep at it.

ASSEMBLYMAN BODINE: Assemblyman Gordon, any questions?

ASSEMBLYMAN GORDON: Not for this witness.

ASSEMBLYMAN BODINE: Okay.

Assemblyman Chatzidakis.

ASSEMBLYMAN CHATZIDAKIS: Well, I have a question. Perhaps you may not have the answer.

I'm impressed with the statistics and information.

I'm taking my grandson to Sesame Place on Saturday. Do you know what the weather is going to be like then? (laughter)

MR. SZATKOWSKI: Let's see. We've got a front coming through. It should be a little cooler. And I think it's going to be dry by Saturday. I think we've got thunderstorms -- showers and possibly thunderstorms in the forecast for Thursday night and Friday. I think Saturday will be okay.

ASSEMBLYMAN CHATZIDAKIS: Well, thank you for the answer.

But anyway, on a serious note, we hear about -- you know, the hurricane patterns start off the coast of Africa. And then we hear about El Niño.

Over the years, as we've come -- with the 24-hour-a-day Weather Channel -- everybody is more attuned to the weather. Obviously, that's the first thing we talk about -- strike a conversation. But is it a chicken or egg thing? Where does our weather really -- is affected? I mean, is there any single place our weather is affected, or a pattern starts somewhere and it sets off a chain reaction throughout the world -- you know, Antarctica shrinking? Does any of that have anything to do with sort of the extremes? We don't seem to get a little drizzle anymore, we seem to get downpours all the time.

MR. SZATKOWSKI: You know, in terms of like just trying to just key on one thing, it's very hard to do that with weather, because it's

such a complex system. That's why it is so hard to forecast -- because the interplay is very complex.

But, I mean, the climate change -- going back to the climate change issue-- I mean, one of the things that the research has suggested is what -- the last comment you made -- is that the extremes will become more extreme, but not just-- Even though I've talked about us getting wetter, the threat of drought isn't necessarily going to go away. We had, actually-- We got into a moderate drought in Autumn 2005. That was broken by the remnants of Tammy coming through and giving us rain, which then became flooding rain.

But the climate change research is suggesting that actually the weather will become-- There will be some trends. It will trend toward warmer, it will trend toward wetter. But you'll also see some greater extremes than you've seen in the past. So that's about as specific, unfortunately, as I can be at this point.

ASSEMBLYMAN CHATZIDAKIS: Thank you for your answers.

ASSEMBLYMAN BODINE: Thank you.

Thank you very much, Gary.

MR. SZATKOWSKI: Okay. Thank you, everyone, for the opportunity to present.

ASSEMBLYMAN BODINE: David Rosenblatt, John Moyle, and Joseph -- I don't have your last--

J O S E P H R. R U G G E R I: Ruggeri.

ASSEMBLYMAN BODINE: The gentlemen are from the DEP.

And, again, if we could have your names for the record, and speaking into the microphone.

DAVID B. ROSENBLATT: Mr. Chairman and committee members, thank you for having us here to speak this evening.

I am Dave Rosenblatt, Administrator of DEP's Office of Engineering and Construction. With me to my left is John Moyle, Chief of the Bureau of Dam Safety and Flood Control; and to my right is Joseph Ruggeri, Supervising Engineer of our Flood Control Section. These two groups, and my Bureau of Coastal Engineering, work very closely with the U.S. Army Corps of Engineers -- both districts in Philly and New York. We review their study results, we review their engineering and design plans, we watch their construction in New Jersey. So we're very closely attached to them. And we provide them funding, too.

We will speak briefly to two points regarding flooding in the state: floodplain development, and dam ownership and ownership responsibilities.

Mr. Chairman, you have already listed the floods of interest which have driven the recent discussions. So I can jump right to: What do the floods tell us?

Too many of our homes and businesses have been built in floodplains and coastal flood hazard areas. We already knew, but the State's Flood Task Force reminded and confirmed, that we should expect floodplains to flood. The Task Force found that damage during the three floods of 2004, 2005, 2006 was disproportionately attributable to patterns of development that are insensitive to flooding, and that we were not adequately prepared with hazard mitigation planning. I would point out

that the Task Force further found that recovery in the aftermath of floods was hampered by inconsistent approaches by government agencies -- local, state, Federal; uncertainty and gaps in relevant rules and regulations; and regulatory and bureaucratic barriers to appropriate reconstruction. Decision delays, differing requirements between agencies all impeded people's attempts to get their lives together.

We cannot stop the flooding, but we also don't have to make people's lives more difficult in the flood aftermath. In view of continued development pressures and expected continued increases in hurricane activity over the next several decades, significant changes in policy, management, planning, and development will be needed to limit New Jersey's risk of loss from future flood events.

New Jersey has the fourth largest number of repetitive loss properties, and the fourth largest in the total amount of National Flood Insurance Program payouts. Since 1978, over 75,000 insurance claims have been paid, valued at over \$685 million. Repetitive loss: that's the same people with the same ruined homes and belongings.

Many of us involved in flood loss reduction have expressed the desire to end the damage-and-rebuild cycle that has been allowed to continue in the floodplains. Strong regulations and adequate funding -- lots of funding -- are needed to end this cycle and, ultimately, reduce long-term flood damage costs. Think buyouts and home elevations in floodplains.

I asked Joe to summarize some of the initiatives currently undertaken by DEP to promote and administer floodplain management efforts throughout the state.

Joe.

MR. RUGGERI: Thank you, Chairman and committee.

Thanks, Dave.

I'm just going to touch on some of the general initiatives that we've taken on at the DEP, like Dave said, for floodplain management throughout the state.

One of the things that's going on right now is an update to the Flood Hazard Area Control Act rules, which -- the final version of the new rules is scheduled to be published in the *New Jersey Register* this November. Among some of the measures included in the new rules are statewide, zero percent net fill standard; extension of buffers to preserve stream corridors; creation of 46 permits by rule and 16 general permits to both facilitate and encourage projects that have no adverse impact on flooding and the environment.

Something else that's been talked about -- the Army Corps talked about it also. The DEP serves as a local sponsor on a lot of the projects that are undertaken by both the Philadelphia District and the New York District Army Corps of Engineers. We cost-share our State funding to be leveraged with the Army Corps' funding. And that's for study, design, and construction of large flood mitigation projects. We also had a one-time funding source in the Bond Act of 2003 for \$25 million. This money has been allocated to projects throughout the state to implement State and local flood control projects.

Another measure is our partnership with FEMA. We partner with FEMA on their MAP modernization program initiatives. And what that is, is a digital upgrade of existing FEMA flood insurance rate maps and

flood insurance studies, on a countywide basis. As part of that, eventually we'll also need to upgrade and readopt our State floodplain mapping.

Another measure that we take-- We also provide floodplain management assistance to local communities throughout the state through our National Flood Insurance Program's Community Assistance Program. And this includes ensuring that the communities readopt their local flood damage prevention ordinances to include the upgraded digital flood insurance rate maps. Communities need to do that in order to remain in good standing with the NFIP, and also to ensure that their building construction within the floodplains is undertaken in accordance with local floodplain development standards.

One more item that I want to touch on is that we work closely, also, with the New Jersey Office of Emergency Management on planning and technical issues, through the State Hazard Mitigation team. And what that includes is work to update the enhanced State Hazard Mitigation Plan. And also, we provide technical assistance to communities that are preparing their all-hazard mitigation plans.

And those are all the measures that I wanted to go over.

MR. ROSENBLATT: Okay. Thanks, Joe.

I want to introduce our segment on dams by talking about something that we shouldn't have to talk about, and that's dam ownership and dam-owner's responsibilities.

Too often we can't even get to remedial actions, because we don't know who owns the dam. We don't know whether the municipality or the county owns a dam that their road runs over, in too many cases.

And if we know -- if we think we know -- too often we find nobody wanting to take ownership because of the repairs that are necessary to the dam.

One party -- one owner has done some work on the dam in the past, and the other party will point to this as justification for not being considered an owner. We have those cases. In the case of multiple owners, and assuming that all parties agree they're owners, what is the proper sharing percentage of the cost? Who determines what repairs will be made, and by whom? In New Jersey, we have over 1,700 dams. At least 200 of them have been documented to consist of multiple owners, although this number is probably higher in reality. And we're trying to get to the bottom of that.

I'd like John Moyle to go into our dam program that kicks in once we know who the owner is. I'd also like to point out that Mr. Moyle is a nationally recognized expert in dam safety. He often guides Federal policies as to the approach the dam owner should be taking.

JOHN H. MOYLE: Thank you, Dave.

And thank you, Chairman.

The primary goal of the program in New Jersey for dam safety is to protect lives and properties from consequences of dam failure.

As Dave indicated, we have 1,700 dams in the State of New Jersey. Of those dams, 205 are listed as Class 1, high-hazard dams; 361 are listed as significant-hazard dams; and the remaining thousand are listed as low-hazard dams. A high-hazard dam is a dam that is defined as: should that dam fail, there's a potential for loss of life. The significant-hazard dam: there's the potential for property damage, but loss of life is not envisioned. And low-hazard dams result in a loss of the dam only. All our Class 1 and

Class 2 dams are required to be inspected every two years by a licensed professional engineer, and it's the owner's responsibility to hire that engineer to perform that inspection and submit the report to the State.

The Safe Dam Act was amended in 2005 to strengthen the Department's enforcement powers, which would provide administrative penalties of up to \$25,000 for noncompliance, and also allow the Department to remove dams that Dave talked about, where the dam owner refuses to accept responsibility or implement the required repairs.

The Department has taken some action since the flood of 2003 down here, where we have had a large number of dam failures. All our Class 1 and Class 2 dam owners who have not complied with inspection requirements are under order today to make those inspections before the end of the year. All of our Class 1 dam owners that do not have a compliance schedule for upgrading their facilities are being referred to the Attorney General for enforcement action, with a possible draining of those lakes. We run across these disputed ownerships. Those cases are referred to the Division of Law.

The protection of lives and property from the uncontrolled release of water from New Jersey dams remains a Department priority, and the Department anticipates that these new administrative penalties with the new law should be in the register this Fall, which would give us greater enforcement power and greater compliance.

Thank you.

MR. ROSENBLATT: Mr. Chair, any questions?

ASSEMBLYMAN BODINE: Okay.

Assemblyman Gordon.

ASSEMBLYMAN GORDON: Thank you, Mr. Chairman.

In the rains of last Spring, a number of communities in my district were devastated by flooding. And the municipal officials and the county officials in the area tell me that one of the major factors exacerbating the floods was debris buildup in the streams. And they have said that to clean that debris out, they need approvals from DEP, and give me the impression that it requires an act of God to get a permit from DEP to clean out these streams. And I think if my colleague John Rooney were here, I think he'd tell something about his own experience in Bergen County about that.

I don't know whether this is within your purview at DEP. Can you comment on the issue of cleaning out streams? Because it seems to me this is a major problem -- a process problem -- at DEP.

MR. MOYLE: This has been an issue that Commissioner Jackson has discussed with our Land Use Regulation Program. And I think in the past, when we did not have these flooding problems, there was a permit required to clean a stream. She has made it a requirement, now, that no permit is required to clean that stream. If you need to go through wetlands to clean the stream, you may need to get a permit. But there's a lot of misconception out there, as far as what the Department's role is right now. And Commissioner Jackson had made it clear. In fact, she came down here this past Summer to meet with some of the Burlington County officials to make it clear that permits were not going to be required for certain areas to be cleaned up.

ASSEMBLYMAN GORDON: I think this is a statewide problem. And I would appreciate it if you would convey my concerns to

Commissioner Jackson. I think it's really important that the Department find a way of streamlining or expediting the process. Because this is-- We're experiencing unnecessary damage just because of these bureaucratic logjams. If we could get the bureaucratic logjams cleared, we can clear the ones in the streams.

Thank you, Mr. Chairman.

ASSEMBLYMAN BODINE: Thank you.

Assemblyman Chatzidakis, any questions?

ASSEMBLYMAN CHATZIDAKIS: Well, basically, Assemblyman Gordon echoed what I had mentioned earlier about having obstacles within our own government to clean up some of these conditions.

I think perhaps if we hear some of the local officials, perhaps they'll echo those sentiments about really-- I think it's still in doubt about some of these permit processes. From what, anyway, the local officials have presented to myself and Assemblyman Bodine, we were at those tours of -- this past Summer we went out there in Lumberton.

MR. MOYLE: I think the clarification is, there's certain people who would think that stream cleaning would take the bulldozer down the stream and just completely clean it out. And those are things that would require a permit.

ASSEMBLYMAN CHATZIDAKIS: Yes, I--

MR. MOYLE: But the actual removal of debris in shoals that are obstacles to providing true flow passage can be done without a permit.

ASSEMBLYMAN CHATZIDAKIS: Yes. I think people know that bulldozing -- I don't think you're talking-- You're talking about backhoes and debris, broken brush and tree limbs -- things like that -- tires

and anything else that ends up in these streams, especially with these high storms we have. It's like a flush -- everything gets flushed downstream. So, hopefully, that issue could be addressed.

ASSEMBLYMAN GORDON: If I could just add a point. In my district, several communities have worked together to try to improve the channels and the piping, and so you have more water flowing more freely into a blocked stream. And what do you get -- a flood.

ASSEMBLYMAN BODINE: Any other questions? (no response)

Thank you, gentlemen.

I'd like to call on Paul Weiss, who is a councilman from Medford Lakes.

P A U L G. W E I S S, ESQ.: Thank you, Mr. Chairman and fellow members of the Panel for this opportunity.

ASSEMBLYMAN BODINE: Could you identify yourself for the--

MR. WEISS: Certainly. I'm Paul Weiss. I'm a Councilman in the Borough of Medford Lakes, and Chair of the Flood Recovery Committee from the '04 storm.

I just want to thank the Committee for this opportunity to address you and testify on what is obviously a very important issue for folks in Medford Lakes, New Jersey.

Just as background, Medford Lakes is approximately 1,500 homes. A third of the homeowners in our town are senior citizens. The '04 flood caused roughly \$9 million in public infrastructure damage and about \$3 million in private property damage. We are grateful, for the record, for

the support of the State OEM and FEMA in the immediate aftermath of the disaster; and also to the DEP for their support, not only in expediting our permitting process for the restoration of dams and lakes, but also for their support under the DEP's loan program, which was authorized through the 2003 Bond Act.

However, what we are still grappling with in Medford Lakes is -- and it's now three years since the disaster -- and we still struggle with FEMA in obtaining public assistance for capital projects that were necessary to rebuild the town. And without this FEMA assistance or some other form of debt relief, the citizens in Medford Lakes face some fairly stark choices, and particularly since, as other citizens in New Jersey face increasing property taxes, the burden of managing a disaster recovery project on our own is significant. And I'd like to talk to you about that financial impact in dollar terms, and take a step back briefly.

The precursor to the legislation that created the 2003 Bond Act was S-2636. And that would have provided, had it been passed, for grants for dam and lake reconstruction, and restoration programs, as well as steam desnagging programs. That legislation didn't move forward. And in its place, S-2182, which was the precursor or the introductory legislation for the '03 Bond Act went forward, and that of course, as we all know, provided the basis for lending for these types of capital projects instead of grants. What that means for the average homeowner in Medford Lakes -- this change from loans to grants -- is a 23 percent increase, or \$7,500 over 20 years, which is the term of these loans, or \$11.25 million to rebuild our town -- for a small town where 98 percent of the municipal budget is funded by homeowners. And generally speaking and historically speaking,

State aid has been relatively low. This debt service obligation will have a significant negative impact on our seniors, and certainly our middle-income class residents, who find it very hard to pay their regular tax bill, let alone the additional tax burden this causes.

The cost of restoration in Medford Lakes and the investment we've made -- and by the way, as of July of this year, we've nearly completed all of our capital recovery projects, and we certainly invite you to come to our beautiful town and see our restored lakes and our restored dams. But that investment really doesn't just benefit Medford Lakes. It benefits the State of New Jersey. Because we invested this capital, we have cleaner water going through the Rancocas Watershed, of which we are a part. That watershed is 360 square miles. It's the largest watershed in south-central New Jersey. There are healthier ecosystems as a result of this investment, and we've created and restored another livable community in New Jersey, that will attract people to New Jersey who want to live here because of the kinds of communities that New Jersey offers.

In short, it's appropriate -- and I think necessary -- that the State reassess and reexamine how the State funds these sorts of large infrastructure projects whose benefits don't stop at the border of the town that's engaged in the project, including Medford Lakes. The benefits of our investment far surpass our own 1.2 square miles.

Lastly, I'd like to speak just about what we've encountered with FEMA. And again, the initial response from the FEMA staff in the immediate aftermath of the storm of '04 was tremendous. They were there very quickly and promptly, advising us and helping us to manage our disaster, as they were with other communities in Burlington County and

Camden County. But the rigidity of FEMA regulations stall, and in many instances prevent, timely and cost-effective reconstruction of public infrastructure and natural resources. Medford Lakes' approach to restoration of our natural resources saved time and money. Yet FEMA's regulations don't recognize these efforts. Small towns like Medford Lakes should not be forced to fight our own government to receive disaster assistance, and that's what we have been put in position to do.

What we ask the State representatives that are sitting here today, as well as your colleagues, is to support legislation such as S-475 and A-1695 that would provide debt relief for up to 50 percent of the dam restoration projects that were put forward post-2004. And quite honestly, we respectfully request that the State consider reexamining for complete debt relief, given the clear benefits that these types of municipal investments have for the State of New Jersey.

We also would request our State representatives to lobby Congress to have them amend the Stafford Act, to require FEMA to acknowledge and accept State regulatory requirements and cost efficiencies in reconstruction projects that Medford Lakes has endeavored to complete -- that have improved our dams, improved our lakes and natural resources, and also improved the overall flood control structures that exist in south New Jersey on the Rancocas Watershed.

And I, again, thank you for this opportunity to testify, and would appreciate any questions you may offer.

ASSEMBLYMAN BODINE: Thank you.

Assemblyman Gordon.

ASSEMBLYMAN GORDON: Thank you, Mr. Chairman.

Before I was elected to the Legislature four years ago, I had a firm that assisted municipalities in recovering the cost of disasters from FEMA under the Stafford Act, through the Public Assistance Program. And I can appreciate some of the comments you've made about the rigidity of FEMA. It was my experience that you really needed to know someone who knows those regulations backwards and forwards, and knows what FEMA decided in some other part of the country, to make a case before the FEMA people for reimbursement. If you have someone like that, you can get a high percentage of cost recovery. Unfortunately, most small jurisdictions in New Jersey don't have those kinds of resources or expertise available.

Your points about some kind of alternative funding mechanism, I think, are a good one. I know one of the bills that we are considering in the Assembly now is an approach modeled after Florida, I believe, which actually imposes a surcharge on insurance policies, which provide funds for a budget account that's used to provide disaster assistance to help make municipalities whole. We have a bill, I think -- the prime sponsor is Assemblyman Panter -- to establish a catastrophic coverage fund. I don't think that's the exact name, but it's modeled after Florida, I believe. But I think we need to consider some permanent funding mechanism so that we don't have to rely on FEMA and so that we can accelerate the recovery process in our communities.

MR. WEISS: Well, and I think what we've heard today from prior testimonies is that this problem is not going to go away, that it's a statewide problem. And to have the burden of that problem shouldered by small towns like Medford Lakes, who is essentially in debt themselves over a long period of time, so we're losing investment -- it really benefits the

State. This is the type of project that is really ripe for State aid and State assistance.

ASSEMBLYMAN BODINE: Assemblyman Chatzidakis.

ASSEMBLYMAN CHATZIDAKIS: Yes, thank you.

First of all, I commend Medford Lakes and everyone in the town -- the governing body, emergency -- because we were there when that happened. We remember the infamous canoe that's wrapped around a tree, which I think has probably has been around the world a few times.

MR. WEISS: It's still wrapped there, yes. (laughter)

ASSEMBLYMAN CHATZIDAKIS: You didn't touch that, did you?

MR. WEISS: Haven't removed it yet.

ASSEMBLYMAN CHATZIDAKIS: But all that aside, obviously, I mean, there are problems here when -- the reaction to this disaster; and move forward and be positive, and as you said. The enemy -- we've seen the enemy, and it's us. That has to be corrected. (indiscernible) in all levels -- at local county, State, and Federal Government, hopefully. There's been patchwork legislation over the years being -- reacting to disasters, obviously, when we want to be proactive. And hopefully, that's something that we move forward. I can't say anything will happen this year, but hopefully the next legislative session that things can be addressed.

ASSEMBLYMAN BODINE: Thank you.

Thank you, Paul.

MR. WEISS: Thank you, again.

ASSEMBLYMAN BODINE: Dr. Stewart Farrell, Stockton Coastal Center.

Could you state your name for the record, please, into the microphone?

STEWART FARRELL, Ph.D.: Yes, good evening, gentlemen.

Dr. Stewart Farrell, from the Richard Stockton Coastal Research Center, over in Atlantic County, New Jersey.

Good evening.

This evening I wanted to talk a bit about the two phases of tidal flooding. I was asked to particularly express the issues regarding the coast of New Jersey. Our 121 miles of coastline is a major financial source of revenue for jobs, tourism, tax revenue, and a destination for many of those 50 million people who live within 100 miles of the Jersey coast. Just this past Sunday, even after Labor Day, there was a significant number of people on the beach enjoying the conditions that were around.

This slide here on the wall (indicating) is a picture of the beach nourishment project that was completed in Atlantic City, Ventnor, in 2002, or early Spring of 2003, showing the reconstructed dune.

Tidal flooding is driven by two major processes: One is the storm surge, which accompanies the storm regardless of whether it's a hurricane or a nor'easter. That, of course, contains the wave energy. And the wave energy is superimposed on top of this still-water elevation, that was mentioned before, of 8.8, 8.9 or high as 9 feet. So place on top of that breaking waves with elevations of 10 feet, 12 feet, and sometimes as much as 16 feet, and you can see where the storm surge damage is not just the incidence of the water level rise. Tidal flooding in the back bay areas is a different subject. It is basically still-water rise above the normal situation. But let's look at the beach first.

Next slide, please.

The practice of putting together large-scale beach restoration projects has been a major endeavor of both the NJDEP and the Federal Government, through the Philadelphia and New York districts Corps of Engineers. Here we see -- the red bars indicate the amount of sand that has been placed on the beaches starting in 1995, '96, '97, '98, and '99 along the Monmouth County shoreline -- \$250 million, 21 million cubic yards of sand. There were many naysayers who said this was all going to go away in a few weeks. Well, here is the results, cumulatively, year by year for the last eight years, and there are still almost 18 million cubic yards of sand within the project area in Monmouth County.

Next, please.

The projects have been spread the entire length of the Jersey coast, with the biggest and the grandest being the Monmouth County project. However, none of this would have happened had not the State Legislature, in 1994, passed Public Law 94, which authorized the creation of the New Jersey Shore Protection Fund. Initially, \$15 million -- today, \$25 million -- which the Bureau of Engineering and Construction dutifully used primarily to match the Federal side of authorized congressional beach nourishment projects. Those pay 65 percent of the cost, and the State agreed to pay 75 percent of the 35 percent, leaving the local folks to pick up the remaining 25 percent of 35, which is 8.75 percent. So that for the local people on the Jersey coast to get a beach nourishment project, it cost them \$8.75 for every hundred dollars spent. Or I like to just put it in bigger numbers: for every million dollars spent, their cost is \$87,500. So there aren't many deals that come along like that often.

Here the project is underway in 2006 in Brigantine. The sand is pumped from sources onto the shoreline, and modified with the machinery into a dune system that has been designed by the district engineers to resist the storm-surge elevation and wave run-up produced by a 100-year storm event. That is the goal of each of these projects. And as I say in here, these projects demonstrate the power of New Jersey's legislative mandate for providing funding to match the Federal dollars back in 1994. None of these projects would have happened without this money. New Jersey, with far less than 1 percent of the nation's shoreline, has garnered 50 percent of the Federal projects so far to date. So we've beaten Florida, California -- they've got pretty big coastlines down in those states. But because we have the money to make the matches, and we don't have to go to the locals to come up with 35 percent of the project, these projects have gone forward in spades.

Next.

Here is the results in Brigantine. This is the post-1992 northeast storm, which has been mentioned before. The beach and this whole area of infrastructure and private dwellings suffered millions of dollars of losses in 1992.

Here is the post-project beach fill in the Fall of 2006. The county government came in with the town and they rebuilt the promenade, because it was basically demolished.

Next.

Here, Atlantic City undertook its own beach fill -- 100 percent city paid for -- prior to the Federal project starting in 2003. But this is a shot from Ocean One Pier of the operation. Here's the pipeline from the

inlet discharging the slurry onto the beaches. The dozers push it around, and manufacture dunes and grade the beaches as the project moves forward.

Next.

Here's a look south following the Ventnor/Atlantic City project sponsored by the district Corps, and State and local matches. You can see that this project ended at the southern end of Ventnor City, because in their infinite wisdom the locals in Margate and Longport elected not to participate in the project. There was a number of issues -- dunes blocking their views, rats and muggers in the dunes, things like that. You never know -- all this stuff came out at the public meetings. But anyway, they declined. And you can see the beach with -- narrow down here. And if a Category 3 hurricane comes ashore in Cape May County, they are going to suffer far more than these folks.

Next.

Just to give you an example: In Ocean City, which is one of the earliest projects undertaken, here is 20th Street Boardwalk in 1991, standing at the bulkhead, houses 10 feet behind the bulkhead. The high tide -- came to the bulkhead every high tide. Not a good thing.

Next, shows in 2003 -- here's the boardwalk. The bulkhead is right behind it there. Here is the width of dune that has developed as the project has been renourished four times at the north end. This area has had no sand at all placed on it since the project was completed in 1992.

Next.

Okay, we've heard about hurricanes. Here is the prediction for 2006. The Colorado State folks said that there was going to be 17 named storms, 9 hurricanes, and 5 major hurricanes. Well, it shows your

prediction is -- got some flaws in it. There actually were 10, five, and two. This year, so far, we're up to 10 named storms, but only four hurricanes and two major hurricanes, both Category 5. So while we haven't set any serious damage records in the United States, the Category 5 occurrence has never been two in one year making landfall in the history of the collection of this kind of data.

Next.

What are the causes of the tidal flooding? Well, storm intensity and storm frequency. Duration of the storm -- in other words, more than one tidal cycle. This is what raises the 1962 northeast storm to celebrity status. It occurred over five high tide cycles. So if the first high tide didn't get you, the next one started to, and the third one cleaned the living room out of all furniture.

Beach dune width and elevation -- so the amount of beach you have between you and the breaking waves is all so important, along with the dune elevation. The elevation of the land surrounding the tidal waters -- if people are building, characteristically, on lands near the salt marshes that are at elevation 5, 6, 7, and 8, they can expect tidal flooding from inlet-driven waters during storm events. And so these sorts of tidal floodings are a result of building on low-lying area. The elevation of the infrastructure and buildings -- you can build on low areas. However, if you raise the building up to -- say the first floor elevation is 10, 11, or 12 feet above the zero datum, which is approximately mean sea level -- those structures usually pass muster in terms of surviving damage from flooding inside them. And then the ease of the tidal surge inland, either over the barrier islands or

through inlets, or making new inlets during the storm -- that also has occurred in New Jersey.

Next.

Let's see, I think you hit the down arrow again. Okay. Just do a couple so I don't have to-- Yes, just get them all up there.

Thank you.

Now, why is the climate warming? One of the issues is sea level rise. I was going to spend more time on it, but it was beautifully covered, and I'm not going to spend a great deal of time on it. The continuation, however, of a 15,000-year melting of ice sheets is an on-going process. Fifteen thousand years ago, sea level was 360 or 370 feet lower than it is today. And at Asbury Park or Atlantic City, you had a 65 miles drive to the shoreline. So you were about as far away from the beach at Atlantic City 15,000 years ago as you are sitting basically in, maybe, West Philadelphia today. So that's one of the things. The human use of fossil fuels, of course, we know that.

Next.

Let's go through this pretty quickly. We saw this -- this is a variation of the New England sea level rise curve.

Next.

I like this. This is a job done by the folks at the University of New Hampshire, and it shows the shoreline -- this is a sea level in New England -- first dropped after about 15,000 years, as the land which had a mile of ice sitting on it literally bounced back up as it rebounded. And sea level went out about 90 to 100 feet, and then gradually came back in. So

this thing repeats over and over again, and shows the gradual approach of today's shoreline.

Next.

This shows Lewis, Delaware; Battery, New York; Atlantic City; and Sandy Hook sea level rise curves over the last three-quarters of a century. And you can see they all have approximately the same slope. The one for Atlantic City had a longer time scale onto it, a (indiscernible), but basically they all show the same thing -- sea levels rising.

Next.

Here's Portland, Maine.

Next, please.

This shows the effects of sea level rise. Another little gif showing the shoreline response to sea level rise is sand accumulation and then overwash. Then of course, we come along and we change things, creating the demand that things stay put, and they don't always stay put. And then we go, "Well, let's just build it bigger and better." And that was highlighted on CNN last night, where they showed them all clucking about the gulf coast of Florida, how they had done just that -- built bigger and better.

Next.

Okay, so what can we do about tidal flooding? Clearly, on the ocean side, is implement these New Jersey/ACOE beach nourishment projects. The Corps of Engineers -- both Philadelphia and New York district -- have, both districts have had-- All the coast of New Jersey is currently under what is called a *feasibility study completion*. In other words,

they know what the problem is. They've identified what has to be done. It awaits congressional authorization for construction to proceed.

Right now, the passage of the WRDA for 2007/2008 Fiscal Year is the key thing -- is sitting on the table -- that will go to move this process forward.

Another thing: discourage development, redevelopment in entirely flooded areas. We have this possibility. It is something most municipal governments are loath to pursue. And I don't see the State of New Jersey rushing to do anything like this either. However, discouragement can be subtle, and needs to be studied.

Require new construction to meet or exceed FEMA flood elevation codes. Now, FEMA itself doesn't come in and enforce this stuff as far as meeting the codes. It's up to the municipalities to make sure that they do this strenuously, vigorously, no matter how many hundreds of thousands of dollars the individual is spending on building his McMansion next to the water.

Encouraging the raising elevation of existing structures: Repetitive damage claims, as was said earlier by the folks from DEP, are the single biggest cause of problems in New Jersey. Many of these repetitive damage claims can be mitigated against by simply raising the house up. It is not that expensive. It's not something most people write a check for, but essentially you're talking about, instead of rebuilding a whole new house, lifting what's there up two courses of concrete block or putting pilings under the building and raising it a little higher.

And finally, acquire undeveloped low areas for open space -- a process that has gotten going really well in the last few dozen years.

Next.

I think that's it.

But looking at tidal flooding, we see that it has two sides. And unfortunately, the key that had all my nice tidal flooding pictures from Long Beach Island from 2005 decided it wasn't going to work tonight, because it had some sort of defect in it. So unfortunately-- I put together what I had still on the laptop and assembled this out of the pieces, parts, for the original talk. I will send a PDF file with the slides printed out for your distribution and use.

ASSEMBLYMAN BODINE: That last point that you made about acquiring the lowlands acres, is that similar to the Blue Acre program concept?

DR. FARRELL: Yes, sir. Blue Acres, and also New Jersey Green Acres program. In my own community of Port Republic, they just purchased 100 acres, including a 30-acre pond, using county, State, and local funds; and took a very large and really desirable development area off-line -- in a low-lying area associated with chronic river flooding, in this case.

ASSEMBLYMAN BODINE: Assemblyman.

ASSEMBLYMAN GORDON: Just a question regarding the repetitive damage claims. I thought that as long ago as the 1970s, the Federal Government had tried to address that by requiring -- by saying that you don't -- you're not able to get flood insurance unless you elevate your property above a certain level of high-risk level.

DR. FARRELL: Well, a lot of this comes in the form of carrots, not sticks.

ASSEMBLYMAN GORDON: Yes.

DR. FARRELL: And if a property owner is damaged, and simply repairs everything with their claim money and pays the premium, they're covered under flood insurance again. That's why they end up with repetitive claims. Now, eventually when the repetitive claims number three and four, they get more and more pressure. And I think insurance companies these days, after Katrina, Rita, and the rest of them, are doing it themselves. And that's one issue that is going to be quite a big one if they suddenly reduce or leave off providing homeowners insurance, say, east of the Garden State Parkway. So that's another stick that they're getting ready to use.

ASSEMBLYMAN GORDON: Okay, thank you.

ASSEMBLYMAN BODINE: Thank you very much, doctor.

DR. FARRELL: You're welcome.

ASSEMBLYMAN BODINE: I'd like to call on Major Rick Arroyo and Sergeant Miller, State Police.

MAJOR RICHARD ARROYO: I'm Rick Arroyo. And Mr. Chairman, Committee members, thank you for giving us this opportunity to testify.

While Paul Miller sets up our presentation, I'd just like to start off by saying that I actually head the Emergency Management Section for the New Jersey State Police. And under that Section, we take care of, of course, mitigation, preparedness, response, and recovery. As you've heard from testimony and questions, we have discussed partnerships. I believe the partnerships are very strong in the State of New Jersey. And again, we actually operate out of the Regional Operation Intelligence Center, up in West Jersey at Division Headquarters. The building is not a State Police

facility; it's a State facility. If you haven't been there, I certainly invite you to come. That's where all those processes, the four processes, take place -- mitigation, preparedness, response, and recovery.

Paul Miller is a Sergeant First Class. He actually takes care of the Flood Mitigation Assistance Program. He also handles the program grants. So at this time, I'll turn it over to Paul.

SERGEANT PAUL MILLER: Thank you, Major.

Good evening, folks. Thanks for giving us this opportunity.

To touch a little bit -- give you a snapshot as to what our office does, what grants we manage -- we manage all the Federal, FEMA mitigation grants. One of the reasons why I took the job as a State Trooper 21 years ago was to help people out. And I never would have thought that I would hold the position of the State Mitigation Officer, or SMO (laughter) -- that's the acronym for it -- but we are still helping people out. We're assisting victims of natural disasters, most particularly. Again, as you heard from testimony prior to me, New Jersey is the fourth most repetitive flood claim state in the nation. We're doing many, many projects to address and mitigate against flooding, and the Major passed out a couple of our dittos with the projects that we're involved with.

What I'd like to do is just go over, a little bit, the Flood Mitigation Assistance Program.

First slide, please sir.

What that is, that is mitigation activities that reduce or eliminate the long-term risk of flood damage for insured properties. And we were just speaking about the National Flood Insurance Program. Any home that we elevate, any home that we acquire -- which we just saw -- elevation

and acquisition, those are our number one and number two projects. Acquisition: Getting rid of that structure forever, it's gone. No more police, no more fire, no more emergency services personnel. That home is acquired, it's gone, destroyed. Nothing else can be built there, and we've eliminated it. We've totally mitigated against that structure having effects of flood damage or people needing to be taken out of there.

Next slide, sir.

The flood mitigation grants that we manage, they're awarded on a competitive basis to the communities with the greatest need. Again, the projects that we're typically speaking about are elevation and acquisition of these structures. And you'll see in the handout there, we're currently doing a flood mitigation assistance program in Wayne -- the acquisition of 40 repetitive-loss structures in Wayne Township. We're working with our partners, DEP, on this. The State is providing funding through Green Acres funding, through DEP--

What is it, Joe?

MR. RUGGERI: Flood control.

SERGEANT MILLER: Flood-control funding.

Okay, maximizing the Federal dollars that are coming into the state with State moneys, just as we were speaking with, before. Utilizing State moneys to mitigate against flooding.

Next one, sir.

The key thing that we have to understand, that our office is charged with, is letting people know that you have to have a plan before you can be eligible for a project. And up to about two years ago, there were

no all hazard mitigation plans in the state -- actually, there was one -- and there are approximately 25 flood mitigation plans in the state.

Next slide, please.

Here you can see an example of flood-mitigation communities that possess a flood mitigation plan, and some of the projects that have been implemented in those communities. And you can see, there is acquisition of homes, quite a bit; elevation and pump stations. Brigantine was just awarded, in 2007, a million dollar grant for a pump station. Wayne, I spoke about that before. Ewing, we had acquisitions. Long Beach, Ocean City, flood control panels -- and the list goes on.

Next slide, please.

An outstanding flood mitigation planning initiative that, again as the Major spoke about, with partners -- partnership. We're not able to do this all by ourselves with NJOEM. We partner with the state folks that are out there that are accomplishing one mission. We're all partnering together and getting this job done. Delaware River Basin Commission, NJDEP, county and local governments, county GIS -- geographical information folks -- putting all our heads together to get the best product we can. DEP is kicking in money for the match for this Federal grant to--

Next slide.

--to develop flood mitigation plans for four counties -- the first in the state. Regional flood mitigation plan -- Sussex, Warren, Hunterdon, and Mercer County. The Delaware River Basin Commission is spearheading this effort. They're developing the plan, again, with the partnerships, NJOEM and New Jersey DEP.

Next slide, please.

All hazards planning: There's a difference between flood planning and all hazards planning. All hazards planning involves all other natural hazards that we're going to go over on the next slide. But first, you'll see here, and again it's also in your handout, 17 counties are involved with all hazards mitigation planning. Burlington and Essex Counties are close to completion. We're in Burlington County, right, right now? Okay. I'm from up North Jersey, in Morris County.

All the planning has been funded through NJOEM, through FEMA, with the exception of Ocean and Bergen Counties. We are providing as much assistance to Bergen and Ocean Counties as we can, with FEMA reservists, to help them along their way.

Next slide.

These are the examples of other hazards that go into an all hazards plan. And you can see them up there. In New Jersey, we are susceptible to most of those up there on the slide.

Next slide, please.

As I spoke with, before, we've got 17 counties involved in all hazards planning. Each and every county is involved. All the counties -- except the blue -- should be green. They're ongoing plan development. I'm happy to say that with the assistance, again, of our partners and our FEMA liaison, we were able to secure these grants from '05, '06, and '07. There were no all hazards plans in progress until 2005. We've got the whole state covered.

Next slide, please.

What will an all hazards plan do for a municipality or a county? Well, that will enable them to be eligible for the whole *enchilada*, I

like to call it. Pre-disaster mitigation grant from FEMA; flood mitigation grant from FEMA; annual basis, money comes to the State of approximately \$1 million, give or so. Pre-disaster mitigation, annual basis, competitive-wide throughout the country, anywhere from \$50 to \$250 million on an annual basis.

RFC -- repetitive flood claims -- program: That's a nationwide competitive program that addresses repetitive loss properties from flooding. And I'm proud to say, again, with all our partners involved in our efforts and our office, New Jersey received \$2 million out of \$20 million nationwide. We received about 10 percent of the whole nation in this program. That is an outstanding feat. I'm proud to say that. Again, through our partners, right down from the locals developing these applications, all the way up into FEMA, we were able to secure those grants.

Next slide.

The State has their mitigation goals and the State has their mitigation plan, which our partners from DEP mentioned are: protect life/protect property, promote a sustainable economy, protect the environment, and increase public preparedness. All these are the goals of the Hazards Mitigation Unit and our partners. We are attempting to utilize each and every dollar that the Federal Government has out there, eligibility wise.

The Wayne project, through the Flood Mitigation Assistance Program -- in New Jersey we received \$1.1 million in 2006. We submitted an application to FEMA for \$3.3 million. FEMA was able to come up with that extra money from other states, from leftover funds. They found that

extra money that we asked for, again due to the efforts of our office, as well as our partners, and more.

The funds that we get are, again-- The bottom line, which the Chairman had addressed at the beginning of this meeting: What can we do for our people, what can we do for our flood victims? And our office is doing as much as we can. We're excited about these programs. We're excited about getting these Federal dollars and putting them out on the street, and we're really excited about getting more than we're allocated for. The sewerage repetitive loss program is due out very soon. We've got a strategy in place. We've made adjustments to our State Hazard Mitigation Plan to allow for 90 percent from the Federal Government, as opposed to 75 percent. It's a 75/25 percent program -- 75 percent from the Federal Government, 25 from the locals or the State or the counties. We were able to do some research, complete some tasks where now we're eligible for 90 percent -- 90/10. Through the efforts of DEP and our partners, again, we're able to come up with this match and give the homeowner, our flood victim, the person who has been through this several times--

Up in Fairfield, we're working with a woman up there who suffered three losses -- three losses. We're elevating her home. During the elevation, the floods came through and it got flooded again. But this project is almost completed. Super folks up there. We're out there as much as we can, again, through the assistance of DEP. We had some problems with the municipality knowing exactly what needed to be done with the permits and whatnot for the elevation. Those guys -- we called up Joe, "Hey." They came down; on the phone -- we got everything together.

That's what partnerships will do. And who is it for? It's for our flood victims. That's what we're in it for.

One more point I'd like to make with the Wayne projects, with the acquisition of the 41 homes. We're up to about \$6.1 million. And you can also see on your handouts there, our office is currently managing \$27.5 million worth of projects -- pump stations, acquisitions, elevations. Okay? We're doing as much as we can.

We need support from the State Government, from the Assembly. There is a State Hazard Mitigation Team which a representative of the Governor's Office sits on. DEP folks, our partners, mentioned the State -- Delaware River Task Force report that came out. All this information is vital in bringing everybody together on the same page -- again for what? -- for our flood victims. That's what it's all about. So I appreciate--

ASSEMBLYMAN BODINE: That's our objective, too.

SERGEANT MILLER: Yes, exactly. We're all on the same page.

ASSEMBLYMAN BODINE: Yes.

SERGEANT MILLER: And I'm glad that we're able to come out and get the word out. Folks are listening. The homeowners and any flood victims in here, we're here. That's what, again -- why we're here.

ASSEMBLYMAN BODINE: Thank you.

Colonel (*sic*), do you have anything to add?

SERGEANT MILLER: Major. (laughter)

MAJOR ARROYO: Major.

You just made me a Colonel, sir, and I'll take the promotion.
(laughter)

I'd just like to say -- you can understand now why I let Paul Miller speak. Really, he's done an outstanding job. You can tell he's proud of what he's done, and I am also.

ASSEMBLYMAN BODINE: Thank you very much.

Do you have any questions?

ASSEMBLYMAN GORDON: I do have a couple of questions.

I appreciate your presentation, and I think it's been very helpful to see what you're doing. Clearly though, our communities are still being devastated across the state by flooding, and our residents are asking us to take action to consider options we may not have considered before. And I'd like to just sort of step back and take a look at the bigger picture. And as a former emergency manager, I like the approach of looking at things in terms of mitigation, preparedness, response, and recovery.

And if we could take each one of those: In terms of mitigation, there are some observers of the flooding situation in New Jersey who are saying we have built too much in vulnerable areas, we've increased the impervious surface -- that's contributing to the severity of our floods. As a way of mitigating risks, lessening the impact of these floods, do you think it would be useful for us, as a State, to take another look at our municipal land-use law, for example, and maybe require in municipal master plans some provision for flood risk? Perhaps some areas shouldn't have the impervious surface applied because of the flood risk. Is this something that we ought to take a look at?

SERGEANT MILLER: Yes, I believe so. And that would be more an issue that I would feel would be with DEP land use. They have the permitting process. And I don't think I'm in a position to address that with permits, and land use, and things of the such.

What our office does is, when we get a disaster, we have a problem. We see what homes have been repetitive loss, and we throw out to the homeowners, "Hey, if you're interested in a buy-out or elevation, you have to work through your local office of emergency management." Now, we have to determine eligibility. So we're out there. We have mitigation -- the big picture of mitigation, without a doubt, but we're dealing with the here and now with the folks, like you said. "Hey, we need help, you've got to do something for us."

ASSEMBLYMAN GORDON: In terms of preparedness, do you think there are things we can do to improve training exercises, preparedness of the local emergency responders, communications? And one subject that's of particular interest to me is public alerting systems. The technologies are now available to alert whole counties very rapidly with high-speed telephone alerting systems. It could be run out of West Trenton barracks, for example, at the communications center. I've mentioned this to Colonel Fuentes.

In Bergen County, we just had an event, not related to a flood, but the alerting system really didn't function as it should have. Is there anything in the works at NJSP or--

MAJOR ARROYO: We're actually in the process right now-- You're referring to reverse 9-1-1?

ASSEMBLYMAN GORDON: Right. Or CAN (phonetic spelling), or similar systems.

MAJOR ARROYO: And that system is-- We tested that. The last test we just had was two weeks ago. It functioned properly. Unfortunately, you'll have glitches when you're having a new system. Right now, that system is up and running. We just utilized it on another exercise that we had two weeks ago. It functioned properly.

As far as the education, we do regional training. We do regional tabletops. We're also now working with NJN and other radio stations to actually try to educate the public. So I think education, training, and exercise -- those are the things that we actually go -- in the preparedness stages.

And as far as DEP, I've got to tell you that they're a very, very strong partner. Paul just mentioned that -- I believe they testified to the fact that the areas you were looking into really should be looked into by the State, as far as building.

ASSEMBLYMAN GORDON: I just think we need to do something radically new to deal with this problem, because we're still experiencing these severe floods. And I don't think we can continue with business as usual.

But I thank you for your testimony.

ASSEMBLYMAN BODINE: Thank you, gentlemen.

SERGEANT MILLER: Thank you.

MAJOR ARROYO: Thank you.

ASSEMBLYMAN BODINE: We are starting to run a little late. I want to give everybody an opportunity to speak, so I'd like to move right on and call on Pat Delany, Mayor of Lumberton Township.

MAYOR PATRICK DELANY: Good evening, and thank you for giving me the opportunity. I'll speak to you about the flood damage that my community has experienced.

ASSEMBLYMAN BODINE: Your name into the microphone, please, for the record.

MAYOR DELANY: Patrick Delany.

ASSEMBLYMAN BODINE: Thank you.

MAYOR DELANY: Okay.

Over the last three years, Lumberton has experienced two floods that have put 130 families out of their homes, in addition to damage to public infrastructure. We've had 75 families that have been damaged twice within three years. And we're at a point here -- and I know you're looking at long-term solutions -- but we have people that aren't living in McMansions, as was referred to earlier, that are everyday working people living in middle-class and working-class homes that, every time it rains, they don't know when it's going to stop or what they need to do. So although you're looking for long-term solutions, we need to start looking at short-term solutions as well.

Along the Rancocas Watershed, after the April event, the Burlington County Bridge Commission, the Burlington County Freeholders, the Townships of Medford, Lumberton, and South Hampton have been working to come up with solutions to remove the debris from the South Branch of the Rancocas Creek. I take offense to the comments from DEP

earlier that “You don’t need permits to remove stuff from the creek, you just need permits to go through wetlands.” Well, if you’re familiar with this area, most of that area is wetlands to get to the creek, unless you’re going over an existing bridge. We have an excessive amount of buildup of debris in the creek that prevents water from leaving the area. We have areas where -- I will talk to residents who have lived there their whole life, their family; the property has been in the home for generations, and they have-- They’ll tell you, “It was 14 feet back here. It used to be 14 feet.” Now, if you go down there at low tide, it’s lucky it’s 14 inches, because we have patterns of where the trees go down, they catch the tires, they catch the other debris, you get the silting around there, and then it happens to be in the middle of the woods on a floodplain. So there’s no way to get down there to remove a large tree and a large obstruction without heavy equipment. So we do need permitting.

On the plus side of DEP, the Bridge Commission tells me that they’re being very cooperative this time around in trying to help secure these permits. But we will have -- hopefully, we will have, in the near term, the snags removed from the creek. But we also may need to look at the next couple steps. The first one is, we need infrastructure or organizational structure to monitor flooding events, and have an empowered OEM so that they can take action to mitigate flooding.

And I’ll give you an example. In advance of the last flood, we lowered the Kirby’s Mill Dam -- or Medford Township lowered the Kirby’s Mill Dam at the request of Lumberton Township OEM, because we have a good relationship there. We lowered it as much as we could lower it -- about two feet. That reduced some of the flooding damage for a number of

people who missed having their properties flood by about that much (indicating). But a lot more can be done. There's a lot of large lakes upstream that we could put motorized spillways on that could be monitored; and taking the data from the National Weather Service, and the modeling, and the gauges, and then days in advance being able to release water within that watershed so that when the big storm comes, there's more capacity for it to go up before it goes into living rooms.

So I think that -- one of the things that I'd encourage you to do is go back and look at enabling legislation to empower county OEMs to do that. Once they do that, then we can start looking at the funding to get the motorized spillways, the advanced computer networks to tie into weather data, the tide gauges, and the flood gauges and everything, so that we can make good decisions.

And finally, the thing that needs to be looked at in the Rancocas Watershed -- and I know it's a dreaded word in the environmental community -- but we need to look at dredging. Like I said, we have sections of our Creek that were 14 feet deep that are now 14 inches deep. And the water has no where to go but out, and out into people's homes. And we need to do better than that. Like I said, these aren't McMansions. These are people's homes, people who were financially devastated three years ago, financially devastated five months ago. And many of them don't know if they're going to be financially devastated again in five days or five years, or hopefully never. But I think we have an obligation to get those items that, quite often, frankly, haven't been environmentally correct, in place. And I think that they're doable, listening to the testimony from the gentlemen

from the Army Corps of Engineers. I think the Rancocas Watershed would make an excellent project to be looked at. And that's all I have.

ASSEMBLYMAN BODINE: Any questions or comments? (no response)

Thanks very much, Mayor.

MAYOR DELANY: All right.

Thank you.

ASSEMBLYMAN BODINE: Richard Kropp, the United States Geological Survey.

R I C H A R D H. K R O P P: Chairman Bodine, Vice Chairman Gordon, and members of the Legislative Panel on Statewide Flooding in New Jersey, I want to thank you for the opportunity to discuss the role of the United States Geological Survey in collecting streamflow and tide data, and providing information on flooding to New Jersey.

First, it's clear from recent events that you've heard about tonight and you've seen on the news, that flooding problems we see in New Jersey are not limited to this state or this region. Across the nation, flooding threatens security, safety, economic well-being, and natural resources. Governments at all levels are faced with difficult decisions, as we've heard about tonight, balancing growth and development while ensuring the safety of their communities.

The USGS is the earth science agency in the Department of the Interior, and is an international leader in monitoring, assessing, and communicating timely information about flood hazards. The work that we are currently doing across the nation, in New Orleans and the Gulf Coast, throughout the Mississippi River Basin, and the many other areas affected

by flooding, adds to our collective knowledge of the hydrologic systems, and how these systems are affected by climate change, land-use change, and the policy decisions of Federal, State, and local agencies. The knowledge gained from our work across the country helps us better understand flooding here in New Jersey.

This evening, I would like to explain the role of the USGS in monitoring and assessing floods in New Jersey. In conjunction with other agencies, many who are represented here tonight, the USGS operates and maintains 108 stream gauges in New Jersey. For over 100 years, the stream gauging network in New Jersey has been a key component of the state and county emergency management infrastructure.

These gauging stations allow us to accurately measure both the stage and discharge of streams and rivers at specific locations across the state. The stage, which you've heard a number of times tonight, is the measurement of the height of the water; and the discharge is the measurement of the streamflow.

The basic data that is collected continuously and transmitted in real time via satellite to our base station, is then posted on the Internet where it is used by a variety of agencies, consultants, and the general public. The real-time streamflow information collected from these gauges is essential to the National Weather Service for developing its forecasts and issuing flood watches and warnings.

The stream gauges are used by the USGS in conjunction with the Army Corps of Engineers, and a number of counties and local agencies, to operate five flood warning systems in New Jersey. Three flood warning systems are basin-wide, and they are in the Pascack, Rahway, and the

Passaic River Basins; and two are county-wide, in Burlington County here, and in Somerset County.

These flood warning systems are used by emergency management officials to make decisions on when to close roads and when to evacuate those living or working in flood-prone areas. They can also provide critical information to document flood hazards and post-storm assessments.

The USGS also operates a tidal flood warning system that covers coastal areas of the state from the Hackensack River, around Cape May, to the lower Delaware River. The tide gauges in this system are also used by State, county, and municipal emergency managers for evacuations, road closures, and post-storm documentation.

In addition to the collection and assessment of basic hydrologic data, the USGS also conducts focused research to improve hazard predictions; and works with other Federal, State, and local agencies in assessing the vulnerability of towns, cities, and ecosystems to flooding. One such research project we are currently working on is an update of the flood frequency equations for New Jersey. These are the equations that are used to determine the 100-year flood. These equations have not been updated since 1974, and as I think we're all aware, there's been a few land-use changes to the landscape of New Jersey since that time.

These equations will allow us to develop a new information system called *Stream Stats* that will allow anyone with access to the Internet to use a geographically based system to choose a point along any stream and delineate the drainage basin to that point, the characteristics of that basin, and obtain peak flow frequencies for that location, such as the 100-year

flood. And this project is being cofunded by the Army Corps of Engineers and the DEP, as our partners.

In closing, when it comes to flooding in New Jersey and across the nation, the goal of the USGS is to use accurate observations, focused research, and timely communication to help safeguard people and properties, and assist state and local decision makers in their efforts to keep natural hazards from becoming natural disasters.

I am available tonight and at any time in the future to answer any of your questions regarding the role of the USGS in helping to forecast and better understand the causes and effects of flooding in New Jersey.

Thank you.

ASSEMBLYMAN BODINE: Thank you very much.

Assemblyman.

ASSEMBLYMAN GORDON: I do have a question.

Director Kropp, am I correct in understanding that your funding for this flood gauge system has been exhausted, or will end this month?

MR. KROPP: We are currently working with the Office of Homeland Security, at the State, and the Office of Emergency Management in securing funds to keep this system running for at least another 90 days. The Federal funds are available. There's been some issue with the State funds, but they look like they're starting to get wrapped up.

ASSEMBLYMAN GORDON: Okay. I mean, if I'm understanding your testimony, this flood gauge system is pretty critical in being able to predict the severity of floods in a given region. Isn't that right?

MR. KROPP: Yes.

ASSEMBLYMAN GORDON: I would think-- I mean, when I heard that there was some question about the continuation of its funding, I was just aghast. I mean, here we are trying to deal with the flooding problem, and our major predictive tool seems to be losing its funding. I think if we do anything as a Committee, it would be, I think, a good idea to convey to our colleagues on the Budget Committee that this should be a higher priority so that funding for this, at least from the State, is made available. So I thank you for your testimony. I think it's important for us to know this.

ASSEMBLYMAN BODINE: Yes, it's a very good point.

Thank you.

MR. KROPP: Okay.

ASSEMBLYMAN BODINE: Chris Mueller, from Dunellen.

CHRIS MUELLER: Good evening.

My name is Chris Mueller. I live in Dunellen, New Jersey. I am vice chairman on our Planning Board in town, so this issue really is a major interest of mine, as we deal with our applications in town; also with working with our -- updating our master plan.

We do have a couple of brooks, that are tributaries to the Bound Brook, that run through our town. But tonight, I'm here on a more personal note. April 15 -- we were affected by the flooding situation that we had from the storm. Early in the day, we had sewage backflowing into our houses. Many of our neighbors do during every major rainstorm. There's breeches in our sewer mains, which are about 100 years old, which causes, with these rainstorms-- All the stormwater goes into the sewer

mains. With our two new pump stations, we see a major spike in the pumpings that are going out. Unfortunately, when we were evacuated from our house that night -- Public Service was told not to cut power. They did. We had three foot of sewage backflow in the house. Prior to getting evacuated, I'm in the basement trying to hold together one of our drain traps as we're evacuating. I was covered head to toe in sewage.

Over the course of a month, before we got back into the house, symptoms progressively got worse. We got back into our house. Two days later I'm in the hospital for four days with a blocked intestine. They seem to think it was all sewage related.

Working with various groups, FEMA has given us some support of roughly \$1,000 -- just trying to upkeep, with the repairs of the house. We've got most of those done. But it's what we can do in the future to try to prevent it -- is some of the issues we're dealing with. My son is starting to get sick.

But it's mainly -- talking with the township, how do we get funding for this? Because they don't have money to fix the sewer mains, is the main issue that we're looking at. And anything that we can do-- I think we're on -- somewhere located in the third stage of the Army Corps of Engineers' planning to do anything with fixing the brook system; or we're trying to clear it so we don't get the flooding. It's something that hopefully we can look at a lot sooner.

Thank you.

ASSEMBLYMAN BODINE: Thank you very much.

Richard Miller, Vincentown. (no response)

Frank Staff, Lumberton.

F R A N K S T A F F: My name is Frank Staff. I live on Main Street in Lumberton, and I just find this kind of ironic that a panel of Assemblymen don't know what all these resources are. During the time -- we were flooded in '04, and it just seems like our Mayor, as he told you, he keeps trying to get some headway made with cleaning out this creek. Nothing seems to happen as far as the creek. We don't hardly ever see the politicians come down to our township meeting -- and I attend quite a few of them -- and it seems kind of weird that the Legislature and the county seems to kind of ignore it, and then all of a sudden during an election year, now we have a committee that's going to address this.

Assemblyman Bodine, you approved some funding, or sponsored a bill for funding to fix the dams that ruined our house, but yet no attention was ever paid to the damage that it did to the creek in Lumberton. We've got beautiful lakes, now, in Medford. And those houses -- the value has been restored. But as a homeowner in Lumberton, I can't sell my house because there's been no money, no funding -- and it should have been tacked onto this dam repair. Those dams were out of compliance to begin with, as DEP says. Nobody seems to know who owns them. Well, they're private lakes. We should have been able to figure out who owned them. And to turn around and have dam funding, but yet neglect the rest of the waterway that those dams connect to seems to be ludicrous. When those dams spill, they come down to our town and slow down from a couple miles an hour -- and I don't know the facts on speed -- to no mile an hour, and spread. And at that point, we're flooded.

Now, we went through it in '04. We went through it again in '07. As Mayor Delaney said, if it wasn't for lowering the dam in Kirby's

Mill -- and thank God that our town was cooperative with theirs -- we would have been flooded. At what point does our legislators, who signed the paychecks for these organizations, know what to do and know that we actually are paying for something? It seems to me there was a lot of folks up here who had a lot of good things to say, and I find it hard to believe that four to five years -- actually, three years after the flood nothing has been done in the town of Lumberton, and no support.

FEMA was-- When Katrina happened, my friend said, "Well, what do you think about FEMA?" Our flood happened on Tuesday; we didn't see FEMA till Friday. So it's three days delay, and that's what happened in Katrina. It was the same thing. So it just makes me wonder. Is this election-year politics? Because at this point, I haven't seen, in the last three years -- and you've been our Assemblyman in the last three years -- I haven't seen you at a township meeting in Lumberton, and I've attended most of them.

And at the same point, we've got our township talking about redevelopment downtown, which is a flood zone. We've overdeveloped Lumberton. There's nowhere for the traffic to go, there's nowhere for the water to go, and nobody seems to know whether or not we need a permit to dredge our creek. And nobody wants to address it.

ASSEMBLYMAN BODINE: I can't address-- You've just made a statement about overdeveloping your town, that has--

MR. STAFF: I understand that, but that's a--

ASSEMBLYMAN BODINE: That has nothing to do with the legislation.

MR. STAFF: Sure it does, because that water goes into the Rancocas Creek. The storm runoff goes into the Rancocas Creek. The Creek hasn't been dredged--

ASSEMBLYMAN BODINE: My point is, we don't have any jurisdiction over your home-elected officials. They're the ones who determine, not the New Jersey Legislature.

MR. STAFF: I understand the development. I'm not talking about the development. Let's talk specifically about the bill that you sponsored to fix the same waterway, but didn't fix the waterway in Lumberton. So the housing values have been restored in Medford Lakes, but they haven't been restored in Lumberton, because the creek hasn't been fixed, which is the same waterway, and nobody seems to want to come down and help us with that.

ASSEMBLYMAN BODINE: Well, we're not here to discuss my bill. We're here to discuss the safety of the residents of the State of New Jersey. That's what we're trying to accomplish.

MR. STAFF: I am here to discuss my safety, because this waterway hasn't been repaired in Lumberton, and we're still at the same point. Every rainstorm, it's vulnerable. We've heard time and time again, "Thank God there's no lifelong loss in Lumberton." But we don't know what life (indiscernible) lost in Lumberton, because the sewer came through just like it did -- from the gentleman from Dunellen. Long-term effects, families breaking up, stress, due to the fact that-- I mean, every night that it rains, my wife's in tears because she doesn't know whether we're going to be evacuated in the middle of the night. And we don't know, as legislators

who sign the paycheck for these programs, that these programs exist? We have to have a meeting like this to find out they exist? Seems ludicrous.

ASSEMBLYMAN BODINE: I think that your comments are well taken, and at this point, I thank you for your testimony.

MR. STAFF: It definitely seems like election-year politicking.

ASSEMBLYMAN BODINE: Do we have-- That concludes it?

All right. Well, we're really-- These people have gone -- we've gone far beyond where I expected, but could you just briefly summarize your presentation? This is Richard Young, from Lumberton. And if you could summarize, we would appreciate it.

R I C H A R D F. Y O U N G: My name is Richard Young. I am a resident of Lumberton for 35 years.

Well, I have put together -- I am an engineer by profession -- electrical engineer -- but what I have put together here is as a layman, because it concerns stormwater and dam-control issues, and mitigation projects. I had five things -- some of them Mayor Delaney had spoken about.

At the beginning of this presentation, I went over that the flood of record for Lumberton was September of 1940. And then, after that flood, there was no other -- that which was caused by record rain, but also collapse of dams upstream. In the 64 years between 1940 and 2004, there were no floods, no flood damage in Lumberton, despite the fact that there have been six to eight inches of rainfall which occurred. And I mention that as an amount, because we had 5.4 inches of rain in this past April which caused flooding, which it never caused -- that amount of rain never caused flooding in the past.

In 2004, this is the Medford stream gauge -- the USGS gauge -- said there was 7.2 inches of rain, which Lumberton had experienced numerous times over the 64 years and never was flooded. But the difference in 2004 was, there was 21 dams collapsed. And the amount of sediment it brought downstream from the collapse of those 21 earthen dams brought tens of thousands of cubic yards of sediment. And once it becomes waterborn and reaches Lumberton, we are at tidal. It hits incoming tides, and the sediment drops into the channel, and that's why the channel has been clogged.

There's a picture in there of what the downtown area of Lumberton looks like. I had said that the channel of the Rancocas Creek used to be very deep. It was deep enough for boats all through the 19th century. The channel was also considerably narrower. Stormwater in the upper watershed from agricultural and residential development increased dramatically over the last three decades. And the storm of 2004 and the collapse of those dams carried thousand of yards of sediment. The water table has been permanently raised, which kills riparian trees, as some of the things that you had mentioned. Trees collapse into the creek and quickly form sandbars that impede flow. The trunks and the sandbars force the channel against the opposite bank, where the water is constricted, creating turbulence and erosion of the bank, which drops more sediment into the creek.

There has been immeasurable environmental damage -- was caused by the collapse of the dams, and it is ongoing in the clogged channel. In the three years since that devastating flood, no one from any agency came to assess the environmental damage of the creek -- no one from the

DEP or any of the other environmental groups in the state. None of the agencies ever came to say-- You know, they want to fix the residential properties and the commercial properties, but no one looked at the environmental damage that was done.

Consequently, it continues. The South Branch of the Rancocas is defined as an unstable streambed. A stream is stable, by definition, when it can carry the sediment load supplied by the watershed without changing its dimensions -- either its width or its depth or shape -- the flow pattern remains stable, and it also does not build up of bottom materials, and it does not incise -- flow out of its channel and degrade the sides of the streambed. The Rancocas is unstable because the banks are eroding with leaning or falling old trees, the channel widens relative to depth, and the sediment bars are continuously forming.

I showed a number of pictures that I took in the past couple of weeks. This is at low tide going upstream from where my property is. This -- back for the 35 years up before 2004, this creek never had trees accumulate. The channel at low tide was six to seven feet deep. Whenever there was a tree -- would fall down, and the next time you got three or four inches of rain and the tide picked up, the force of the water coming down was enough to take two-and-a-half foot trees totally out. And now, because of all the sediment -- and the creek is so shallow, when a tree falls it gets stuck in the mud. The sandbars form around it, and it is permanently lodged there. Then the creek starts spreading out.

I would invite you -- or to invite any environmental group -- come look at this streambed. It is an environmental disaster and it's only going to get worse.

Some of the testimony you heard about FEMA -- FEMA funds are used for two things: elevate houses and buy them out. FEMA does not spend money to clean channels of creeks out that prevent future flooding. Consequently, even if people are -- have their houses raised, and no one comes back to fix the channel of the creek, the creek is going to get worse and worse, and where we'll eventually have to face the problem.

All projects done by FEMA and Army Corps of Engineers, all have to have benefit-cost analyses done. Someone needs to look at the benefit-cost analysis of fixing the creek to handle the load of water that it used to be able to handle, because it cannot do it anymore. So the buying of houses and elevating of houses is a Band-Aid, but it's not fixing the cause of the problem.

I had listed five projects. One of them was to clear the trees.

ASSEMBLYMAN BODINE: Could you just list the five projects or mention the five projects?

MR. YOUNG: Yes, I was going to do that.

We were told volunteers could do this job, but volunteers and several of us were in this creek this past weekend. It needs heavy equipment. We don't have a way of disposing of materials, and then there is the potential for accidents. The Mayor brought up the fact that the county highway department was going to do it, but as soon as they put the people in the creek, they wound up with safety, legal, and administrative issues -- meaning union issues -- and-- So the county highway departments don't want this job.

ASSEMBLYMAN BODINE: Okay.

MR. YOUNG: Actually, the county should hire an independent contractor and distance themselves from these other issues.

The other project was, remove the sediment from the channel to restore the channel to its pre-flood depth. It would restore the riparian habitat which was damaged by the flood. A majority of the extracted sediment can be placed on the adjacent land -- that is all wetlands. We're talking several hundred acres through the center of Lumberton that is all forested and -- it's lowlands. We need academic studies to be done.

The third project was, we need to have a USGS tide gauge installed. There are two tide gauges upstream from Lumberton; one is in South Hampton at the Vincentown Dam and the other one is in Medford, right at Route 541. They are both five miles upstream on two separate branches. We need, in Lumberton, a tide gauge. And it would serve several purposes, because our local EOM people use the tide-- And what we have is a stick gauge, and they have to look at tide tables and decide that the tide is going out, so upstream you can lower the level of one of the lakes. But this is an antiquated system. I showed some pictures of what stick gauges and the USGS gauge show in Medford.

The fourth project was to implement a flood control system on the south and the southwest branches of the Rancocas. Upstream from Lumberton are 83 dams; 18 of them are publicly owned, 7 of them failed, collapsed, in 2004. Ten of them are private, nonprofits -- Girl Scouts, YMCA, JCC camps. Five of the 10 dams failed, others were damaged. Fifty-five of the dams are private homeowners associations and some are cranberry farmers; and of those, nine failed in the storm. So we have collapsed dams by different levels of ownership, so it's hard to say that the

fault lies with what types of organizations can do maintenance or choose not to do maintenance on the dams.

What I am suggesting is that there should be -- that the 83 dams should be managed like a public utility. They should be monitored and controlled by Burlington County OEM. We are fortunate in Burlington County that the county contains almost all of the Rancocas Watershed. This is a problem that -- other watersheds that transverse two or three different counties would have a problem being controlled by an OEM organization. I would suggest that we would be able to convert this recreational lake system into a flood-control system, if eight to 10 of the dams had motorized spillways. The only one of these dams that has a motorized spillway is Kirby's Mill. If they were able to install some additional lake-level and streamflow gauges, the county OEM, along with the National Weather Service and the tide gauge, could say -- as the guy from the National Weather Service testified -- we have two and three and four days notice that a major storm is coming. And the county OEM then would have eight -- six or eight tide changes to maneuver with them, to say that the dams could be sequenced -- lowered over the course of several days. And then just as the storm comes upon us, those lake levels could be raised back up again. And we would wind up having this tremendous amount of storage upstream, instead of being confronted with the possibility of all this water coming down.

I had made a note in here that the surface area of those 83 lakes represents two square miles of impervious surface. Stormwater regulations address asphalt parking lots and say that they are impervious surfaces, so that you have six inches of rain land on them, the rain has to go

to a culvert to get to a creek. But when you have a lake surface -- and there's pictures I show in here -- the way the dams have been rebuilt with wide spillways, you drop six inches of rain on that lake surface, it's like an asphalt parking lot -- that six inches of rain is coming right off of it and it's heading downstream. So the rain that used to fall -- 81 of the dams are in the Pinelands, and the Pinelands is pervious soil, very sandy. Rain that used to fall upstream from us stayed upstream. It went back into the ground. Now you have two square miles of lake surfaces that the water flows off of and heads downstream into Lumberton, along with the ground runoff. It is a tremendous problem.

I showed in here -- there's a--

ASSEMBLYMAN BODINE: Mr. Young, I'm really going to have to ask you to summarize because it is running much--

MR. YOUNG: Okay.

ASSEMBLYMAN BODINE: --longer than we ever expected. I would like you to conclude, if you would please.

MR. YOUNG: I have concluded. I hope you take a chance to read through the testimony that I have given. I have spent a lot of time putting that information together.

ASSEMBLYMAN BODINE: Can we share this with some of the agencies?

MR. YOUNG: Pardon?

ASSEMBLYMAN BODINE: Can we share this document with agencies?

MR. YOUNG: Absolutely. I can provide more copies if you need them.

ASSEMBLYMAN BODINE: Thank you very much.

MR. YOUNG: Thank you for your opportunity.

ASSEMBLYMAN BODINE: That concludes--

Assemblyman, any closing comments?

ASSEMBLYMAN GORDON: No. No, I don't, given the hour.

ASSEMBLYMAN BODINE: Thank you all for joining us tonight. And at this point, it concludes our meeting.

(HEARING CONCLUDED)