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PUBLIC HEARING

before

SENATE LAND USE MANAGEMENT AND REGIONAL AFFAIRS COMMITTEE

SENATE BILL NO. 2339

(Proposed "Watershed Protection Act" and Related Issues)

May 23, 1990  
Paramus Borough Hall  
Paramus, New Jersey

MEMBER OF COMMITTEE PRESENT:

Senator Paul J. Contillo, Chairman

ALSO PRESENT:

Algis P. Matioska  
Office of Legislative Services  
Aide, Senate Land Use Management  
and Regional Affairs Committee

\* \* \* \* \*

Hearing Recorded and Transcribed by  
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**New Jersey State Legislature**  
**SENATE LAND USE MANAGEMENT**  
**AND REGIONAL AFFAIRS COMMITTEE**  
STATE HOUSE ANNEX, CN-068  
TRENTON, NEW JERSEY 08625-0068  
(609) 292-1596

## NOTICE OF A PUBLIC HEARING

The Senate Land Use Management and Regional Affairs Committee will hold a public hearing on:

*Senate Bill No. 2339, the proposed "Watershed Protection Act" and related issues*

The hearing will be held on Wednesday, May 23, 1990 at 2:00 p.m. in the Paramus Borough Hall, Jockish Square, Paramus, New Jersey.

*The public may address comments and questions to Algis P. Matioska, Committee Aide, at (609) 292-7676 or Hannah Shostack, Committee Aide, at (609) 292-1596, and persons wishing to testify should contact Rita Nutt, secretary, at (609) 292-1596, or Senator Contillo's Legislative Office, at (201) 487-0044.*

The proposed "Watershed Protection Act" requires the Department of Environmental Protection to adopt rules and regulations establishing buffer zones for all watershed lands associated with public water supply reservoirs, including water supply intakes and tributaries, for the purpose of protecting drinking water quality.

The Committee is interested in receiving testimony from informed members of the public and private sectors on this very important issue.





STATE OF NEW JERSEY

INTRODUCED FEBRUARY 15, 1990

By Senator CONTILLO

1 AN ACT concerning watershed protection, and supplementing  
2 Title 58 of the Revised Statutes.

3  
4 BE IT ENACTED by the Senate and General Assembly of the  
5 State of New Jersey:

6 1. This act shall be known and may be cited as the "Watershed  
7 Protection Act."

8 2. The Legislature finds and declares that the protection of  
9 the State's water supply system is a matter of grave concern and  
10 is essential to the health, safety and well-being of all the citizens  
11 of New Jersey; that new water supply projects, conservation  
12 programs, and allocation practices alone are not sufficient to  
13 adequately protect the quality and long-term availability of the  
14 State's drinking water supplies; that the use of surface water  
15 resources for drinking water becomes increasingly more difficult  
16 as those waters become more contaminated with point source and  
17 nonpoint source pollution; that while pollutants emanating from  
18 point source discharges of wastewater are covered under the New  
19 Jersey Pollutant Discharge Elimination Systems (NJPDES)  
20 regulatory program, there are at present no specific regulatory  
21 programs for the regulation of nonpoint source pollution,  
22 considered to be a major cause of water quality degradation in  
23 the State.

24 The Legislature further finds and declares that the  
25 effectiveness of buffer zones in providing water quality  
26 protection against nonpoint sources of pollutants has been amply  
27 documented, and that the establishment of buffer zones around  
28 water supply reservoirs is an effective method of providing a  
29 measure of water quality protection; that placing buffer zones  
30 only around water supply reservoirs, however, will not be  
31 sufficient to protect the water quality from nonpoint source  
32 pollution and long-term degradation; that in order to provide  
33 adequate water quality protection to water supply reservoirs it is  
34 necessary to implement a watershed management program that  
35 incorporates a multi-zone buffer approach; and that the public  
36 interest dictates that the State establish appropriate and  
37 effective multi-zone buffers for all watersheds associated with  
38 water supply reservoirs, tributaries, and intakes.

39 The Legislature further finds and declares that a statewide  
40 watershed management program must necessarily embody the  
41 diverse geological and climatic conditions and population  
42 characteristics that define this State; and that while watershed

1 management should be undertaken in a comprehensive manner,  
2 careful attention must be paid to regional differences, relative  
3 population density, levels of growth and development, and similar  
4 land use considerations in order to reflect this diversity; and that  
5 the distinctive nature of New Jersey's various regions and  
6 development patterns must be taken into consideration in  
7 implementing a multi-zone buffer approach to statewide  
8 watershed management.

9 The Legislature therefore determines that it is in the public  
10 interest to establish a comprehensive watershed protection  
11 program in the Department of Environmental Protection  
12 incorporating a multi-zone buffer approach to water quality  
13 protection which includes all tributaries, water supply intakes,  
14 and water supply reservoirs, and which reflects the State's  
15 diverse regional, geological and population characteristics.

16 3. As used in this act:

17 "Buffer zone" means a strip of land designed and planted with  
18 specific vegetation to achieve sediment and soil erosion control;  
19 or a band of naturally vegetated land which is left undisturbed  
20 around a stream, pond, wetland or reservoir for the purpose of  
21 mitigating the effects on the water resources from pollution and  
22 disturbances from adjacent land uses;

23 "Department" means the Department of Environmental  
24 Protection;

25 "Watershed land" means those lands located above or upstream  
26 from a terminal water supply reservoir or surface water intake,  
27 including the land surrounding tributaries or feeder streams  
28 entering the water supply reservoir.

29 4. a. Within one year of the effective date of this act, the  
30 department shall adopt, pursuant to the "Administrative  
31 Procedure Act," P.L.1968, c.410 (C.52:14B-1 et seq.), rules and  
32 regulations establishing buffer zones for all watershed lands  
33 associated with public water supply reservoirs, including water  
34 supply intakes and tributaries, for the purpose of protecting  
35 drinking water quality. The rules and regulations shall incorporate  
36 best management practices for nonpoint source pollution control,  
37 and include the following considerations:

38 (1) The effects of climatic conditions, including mean annual  
39 temperature and precipitation levels, upon the watershed land;

40 (2) The effects of regional and geographical differences which  
41 characterize the various watershed lands identified by the  
42 department; and

43 (3) Land use patterns, including population density, degree of  
44 urbanization and present and projected levels of growth and  
45 development.

46 b. The provisions of this section shall not apply to land utilized  
47 for the purpose of the protection of a public water supply if the  
48 land is otherwise subject to regulation pursuant to P.L.1979,  
49 c.111 (C.13:18A-1 et seq.) or P.L.1973, c. 185, (C.13:19-1 et seq.).

50 5. This act shall take effect immediately.



## STATEMENT

This bill would require the Department of Environmental Protection to adopt rules and regulations establishing buffer zones for all watershed lands associated with public water supply reservoirs, including water supply intakes and tributaries, for the purpose of protecting drinking water quality.

The rules and regulations must incorporate best management practices for nonpoint source pollution control, and include consideration of the effects of climatic conditions, regional and geographical differences and land use patterns, including population density, degree of urbanization and present and projected levels of growth and development, that characterize the watershed lands identified by the department.

## LAND USE

The "Watershed Protection Act."





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SENATOR PAUL J. CONTILLO (Chairman): We are going to begin this hearing on Senate Bill No. 2339. This is an Act concerning watershed protection in the State of New Jersey. The Act is going to direct the DEP to set up a system of buffers and direct the creation of a water set management plan in the State of New Jersey.

I was shocked a couple of years back when the Hackensack Water Company transferred property. There were no rules or regulations dealing with the environmental impact of such transfers. I think this bill will go a long way toward doing what should have been done years ago; that is, it will set up some buffers and a management program dealing with watershed protection; it will set some environmental factors; and it will not allow pure economic factors as the only reason for transferring or not transferring property.

As you know, the Governor -- Governor Florio -- has just signed into law a bill that will put a moratorium on all watershed transfers until the results of this bill are put into place. So, we are going to direct DEP to develop a rational system of buffers around the watersheds in the State and their tributaries.

The first person I want to testify today is Eric Evenson, from the New Jersey Department of Environmental Protection, Division of Water Resources.

ERIC J. EVENSON: Good afternoon, Mr. Chairman.

SENATOR CONTILLO: Eric, please go ahead.

MR. EVENSON: On behalf of the Department of Environmental Protection, I am very happy to be here today to testify on this important piece of legislation. I am the Acting Director of the Department of Environmental Protection's Division of Water Resources. The Department has been actively involved in many programs related to watershed protection, including aquifer and recharge area protection, non-point source pollution control, and the study of watershed buffers.

The Department has also been actively involved in the protection of the State's public water supply reservoirs. Recently, the Department submitted a report to the Governor and the Legislature entitled, "Evaluation and Recommendations Concerning Buffer Zones Around Public Water Supply Reservoirs." In evaluating the effectiveness of buffer zones in protecting drinking water quality, the Department determined that vegetated buffer strips around water supply reservoirs by themselves would not be sufficient to provide adequate protection of drinking water quality. Based on this conclusion, the Department proposed a concept that incorporated a multi-zone buffer approach to watershed protection. Such an approach would provide more complete protection of the watershed by incorporating the traditional buffer strip approach with a broader application of best management practices for non-point source pollution control throughout the water supply watersheds.

In its report, the Department also recommended that the Legislature pass a law authorizing the Department to adopt regulations establishing multi-zone buffers for all watersheds associated with water supply reservoirs, tributaries, and intakes.

The Department strongly supports the concept of watershed protection as presented in Senate Bill No. 2339. This bill authorizes the Department to adopt rules establishing watershed buffer zones. It requires that these rules incorporate best management practices for non-point source pollution, and it incorporates the multi-zone buffer approach to watershed protection.

The Department does, however, recommend several revisions to the bill as it is presently proposed. In order to allow ample time for everyone to speak, I will provide a summarized version of the Department's recommended revisions. A more detailed version of these comments will be submitted in writing for the record.

First, while the findings and declarations section of the bill incorporates the multi-zone buffer approach recommended by the Department, the definition of a buffer zone provided in S-2339 encompasses only one of the zones recommended by the Department in the multi-zone buffer concept. The bill's definition applies to the "protective zone," and omits any definitions that would address the "special management" or "standard BMP" zones recommended for the remainder of the watersheds. If the bill is to incorporate the multi-zone buffer concept recommended by the Department, then definitions applying to each of these zones should also be provided as part of the bill.

Secondly, S-2339 does not expressly establish the requirement for protective zones of 50 to 300 feet recommended by the Department as part of the multi-zone buffer concept. It is conceivable that if the Department were to promulgate rules establishing such "nondevelopment areas" without explicit authorization from the Legislature, the Department could be faced with claims of a regulatory taking of land. In order to avoid the potential of any dispute, we recommend that S-2339 explicitly state that, "The Legislature hereby establishes protective zones around water supply reservoirs and water supply intakes." The bill should also expressly authorize the Department to establish criteria for determining the actual width of the protective zones, as well as the areas where the protective zones should be applied.

Third, while the Department recommends that the protection of multi-zone buffers be extended throughout water supply watersheds and also to watersheds for surface water intakes and feeder streams, the Department did not find that the 50- to 300-foot protective zone is always necessary for the entire length of every tributary feeding into the public water supply reservoir. Therefore, the bill should further authorize the Department to develop regulations for identifying tributary buffers.



The Legislature is also asked to establish clear definitions for the water supply features addressed in S-2339, such as "public water supply reservoirs," "water supply intakes," and "tributaries." Public Law 1988, Chapter 163 -- the Watershed Moratorium Bill -- never clearly defined "public water supply reservoirs," and this omission has caused some controversy in determining the appropriate application of the watershed moratorium.

Additionally, S-2339 should expressly authorize the Department to promulgate rules for administering the watershed buffer zone requirements and allow this activity to be incorporated into fees established for the Department's other permitting programs. By so doing, many of these programs-- We are not envisioning creating a new program to deal with this, but implementing it through a variety of our other programs. We would like the ability to incorporate any additional work associated with that into our existing fee structures.

And finally, in order to comply with the rule-making provisions, the Department would have to first develop a methodology for determining the actual width and requirements of the special management zones. Since developing such a methodology is a complex and time-consuming process, the Department would ask that it be allowed to have two years to develop these regulations.

Those are my comments. I reiterate that the Department strongly supports this type of legislation. We believe it is necessary for the protection of our surface waters, especially those used for public water supply reservoirs and intakes. We recommend that the bill even go further -- be further strengthened through some of the definitions that have been recommended.

SENATOR CONTILLO: There are no other Senators to ask questions, so I will ask you the questions I have on my mind: You said there seems to be an inadequate description of water

supply reservoirs. What is your problem with that particular phrase? It is not encompassing enough, or it is too encompassing?

MR. EVENSON: Well, the issue that comes up is that there is a variety of different types of reservoirs; some owned by public utilities regulated by the Board of Public Utilities; some owned by municipalities; and other reservoirs reserved for a variety of purposes, balancing reservoirs and the like. What we would like to do is provide you with what we might envision as a description that would limit it to those water supply reservoirs that are utilized for potable purposes.

SENATOR CONTILLO: Which would include underground water reservoirs, or not?

MR. EVENSON: No. Well, we had not envisioned it including the groundwaters as part of that.

SENATOR CONTILLO: You discussed the fact that the buffers around the tributaries may not need the 350 feet. On the other hand, this 350 feet should not be looked at as a maximum either. There must be areas where even that is not sufficient.

MR. EVENSON: Correct. There are what-- We feel there should be buffer areas as more or less a "no build," or what we refer to as a "protective zone," and then outside of those areas but within the watershed, there should still be the utilization of special best management practices and standard best management practices to protect from other potential polluting sources to the reservoir.

SENATOR CONTILLO: Now, we give you, I think, a year in the bill to deal with the question of setting up the buffers, and you do not feel that that is adequate?

MR. EVENSON: Correct, given the time that we envision it will take to develop the methodology and also to finally promulgate the rules. We anticipate there will be a lot of significant comments on any rule of this nature. We feel that

two years is a more realistic schedule to have these rules enacted.

SENATOR CONTILLO: Okay. The previous administration of the Department -- Chris Daggett, Dr. Dewling, and, I guess, Don Deieso, who was one of the division directors -- felt and, in effect, told me that they saw the "black box" concept -- that watershed areas were passe, and that the Department was prepared to allow for purification and not to be concerned, because in a sense they were giving up the ghost on protecting our watershed areas. Would you please comment on that for me?

MR. EVENSON: Well, certainly for all of our surface waters that are utilized for potable purposes there is required treatment put on them, but even from a water supply perspective -- a drinking water perspective -- certainly the cleaner water that one starts out with as a raw water supply, water from a reservoir, is an advantageous thing to have.

Secondly, you know, I see one of the great utilizations of this bill would be to strengthen our protection of surface waters in general in these areas that have -- in these watersheds above potable water supplies. So, the Department certainly feels it is a necessary step to take.

SENATOR CONTILLO: Now, as I sit here and listen to you this afternoon, I get the feeling that the Department directed the Legislature to suggest that there be buffers and, in effect, the Legislature, in a previous session directed the Department to set up the buffers. But, in the original direction, we also directed the Department to set up an open-space program throughout the State of New Jersey. While it is not in this particular version of the bill, obviously we are having this public hearing today before we refine the bill.

I think it would be helpful if the Department went back to the original charge, which was to develop not only a buffer formula for watershed areas and tributaries, but while they were there, so to speak, to also develop an open-space

program, if not for the entire State of New Jersey, for those areas which are currently serving as watersheds; that is, look at every watershed area in the State and say, "This is the area that must be preserved for a buffer. This is the area that the State may need for open space," and the balance could be sold off.

MR. EVENSON: Well, I think it would be entirely appropriate, as part of the measure of establishing rules, to take open space as a consideration. The Department would certainly in no way be opposed to having the Legislature include open space as a consideration as part of this bill.

SENATOR CONTILLO: Okay, that's fine. Thank you.

MR. EVENSON: Okay, thank you.

SENATOR CONTILLO: Did you wish to testify also, or are you just his driver? (addressed to unidentified person in the audience)

MR. EVENSON: Barry is here supporting me. (laughter)

SENATOR CONTILLO: Okay. The other department I see represented here is the BPU -- Ms. Kiernan.

G R E T A K I E R N A N: Thank you very much, Senator Contillo, for having this hearing here and for inviting us to testify. We were asked to review very briefly the report we did for you pursuant to Chapter 163 last year; the Board of Public Utilities' impact study of what would happen if we should hold or not hold certain properties. I would like to tell you that this was prepared by the Division of Water and Sewer. I have brought with me today Mr. Paul Giancaterino, who is probably the principal architect of the plan, and he will be happy to discuss any technical aspects of it.

In that report, the BPU identified 1172 acres held by five water companies which constituted watershed land as was used in your legislation. It identified 1071 acres of the land as salable, and calculated that one-time benefits to customers could range from \$4.2 million to \$7.6 million should the land be sold, depending on the size of the buffers required.

The present costs for inclusion of the full 1172 acres in customer rates totaling \$227,921 range from six cents in annual costs per customer of the Hackensack Water Company to \$61.56 per customer of the Highland Lakes Improvement Company.

SENATOR CONTILLO: Are you going to present that in some form to the Committee? Do you have a--

MS. KIERNAN: Yes, if you would like. I will give you my copy.

SENATOR CONTILLO: Okay.

MS. KIERNAN: The low cost of Hackensack Water Company property is due, in part, to the golf course leases. The high cost of Highland Lakes is due to the small customer base and the amount of local property taxes it is paying on the land.

The Board believes that total watershed land in this State is about 52,000 acres, so the part owned by private companies, and the subject of this study, is only about 3% of the total. This report states that private watershed land unneeded for water company purposes could be preserved in open space through negotiations by the Board staff and the Public Advocate to obtain company agreements on deed restrictions on the future use of the land, should the Board approve a sale or transfer.

The bill you are discussing today will establish the parameters under which the DEP will define and protect watershed. Even when this is accomplished, further legislation may be necessary. For example, the report also states that a mechanism to allow ratepayers to vote on the diversion of benefit money which otherwise they would receive on the sale of that property-- Some legislation may be necessary to make it feasible for them to defer that money into another -- another way: For example -- and I know it has been discussed in Bergen County -- the idea of an open space fund.

In addition, the report suggests that the Legislature consider an amendment to the State utility laws to allow water



companies to continue to cover their costs for the preservation of open watershed land through customer rates, even though the land may not be needed for water company purposes.

President Scott Weiner has urged the Legislature to consider this last measure in particular, as providing a greater inducement to water companies to hold any excess watershed land for open space and recreation, rather than selling it for development. Under present law, the BPU is barred from requiring water companies to hold land along their reservoirs, unless they find that those lands are needed for water company purposes.

As an aside, this last statement is another indication of some of the actions the BPU has taken under the leadership of President Weiner. The Board is presently -- as you probably know -- studying mechanisms for utility companies to be encouraged to conserve by giving them a break on the rates on the kilowatts that are not used, as opposed to the ones that are used. It is somewhat analogous to the problem we discovered in the State of New Jersey with our garbage, our recycling, and what is profitable for one is not the best thing in the world for the citizens at large. The idea of conserving watershed property can be made more attractive to the people who hold that land through some actions on the part of the Board of Public Utilities vis-a-vis how those rates are charged.

If the Committee has any questions about the report, Paul Giancaterino will be pleased to discuss the methodology, and we will be here to answer any questions you may have in the future.

SENATOR CONTILLO: Okay. What you are talking about would be the retention of property-- Well, actually, the watershed property in Bergen was carried on the books at such an infinitesimal amount of money, that I am sure there is not a single member of the public who would not have been very glad to pay those few pennies a year to keep that open space. You

are not the only one who has suggested that we preserve that; that maybe we should do that through legislation. Even if it is a few pennies a year more for your water, I think most of us would be willing to pay that.

There is something else I would like to ask, I guess -- I don't know which one of you -- that has disturbed me about the Board of Public Utilities; not the Board so much, but the results of some of the hearings prior to this year, when you were not involved, and neither was -- President Weiner, is it? (Ms. Kiernan nods affirmatively) Okay.

I have noticed that when they had hearings dealing with certain utilities and those properties were sold off, the money goes back to the ratepayers. But for some strange reason, when the Hackensack Water Company property was sold off, the Water Company became a partner in the deal. Other utilities -- electric utilities, for instance, gas utilities -- when they sell off a piece of equipment or a property, that money seems to go entirely back to the ratepayers. Is there a separate criteria or a separate rule for water companies?

P A U L G I A N C A T E R I N O: Well, Mr. Chairman, I can say this: There is no separate rule. Recently, President Weiner has asked that we look into this difference and why it is being handled that way. He has asked his staff members to look into that. I can tell you that as far as this country goes, New Jersey is probably in the forefront, I guess, of being pro ratepayer and getting some of the money back to the ratepayers. In our report here, you can see that in other states, none of the money flows back. In most of the other states, in most instances, none of the money will flow back to the ratepayers. So, New Jersey is in the forefront, and the laws are not very clear. The laws can go either way on these things.

I think in the cases of the electric companies -- if that is what you are speaking about -- what we found is that

the electric companies voluntarily do this, because they don't want bad publicity and because the money is so insignificant. In this case--

SENATOR CONTILLO: If I extrapolate that out, that means the others do not care about the bad publicity.

MR. GIANCATERINO: Excuse me?

SENATOR CONTILLO: I said, if I extrapolate that out, that means that the Hackensack Water Company doesn't care about the bad publicity then.

MR. GIANCATERINO: Well, I don't know about that, but I have to say that because of the amount of money involved here, apparently they were not willing to negotiate a little bit away. But the law is not clear.

SENATOR CONTILLO: And to his credit, Scott Weiner has identified the problem and is looking at it.

MR. GIANCATERINO: He has identified it, that is correct.

SENATOR CONTILLO: Yes, okay, but I just wanted it out in the public so we understand that all utilities in the past have not been dealt with equally, and we think they should be.

There is no one else to back me up on questions here, so thank you very much.

I am going to go back to my witness list, and I will try to call you in order. I notice that a number of people have come in. Chet Mattson-- I assume you want to testify, Chet? (affirmative response from audience) Okay, I will put you on the list. And John Sheridan, I recognize him, and Ella. Anyone here who wishes to testify, please come up and put your name on this yellow pad.

Okay, now, the first one I have on my list is Tim Searchinger, from the Environmental Defense Fund. Tim? Now, if you have prepared testimony that you want to leave with us-- The last two speakers did not produce prepared testimony they wish to leave?

MR. GIANCATERINO: We left it with the hearing reporter.

SENATOR CONTILLO: Good enough. If anyone has an extra copy, I wouldn't mind going over it as you give your testimony, just to make sure you're saying what you wrote down. (laughter)  
TIMOTHY SEARCHINGER: My apologies on that. We actually have not yet completed our written testimony. We will be submitting that, probably within the next couple of weeks.

Thank you very much for the opportunity to testify. I would just like to make it clear that I want to thank the Committee for the extremely strong leadership it has shown on this issue, particularly the Chairman. It is an important issue, and one on which the Legislature has certainly taken the lead. I have a number of things to say, so I am going to talk a little bit fast, but please feel free to tell me to slow down if you need to.

Let me first go right to some of the science of the issue of drinking water. Unfortunately, the expert who is most associated with us who wanted to be here, couldn't be here because of illness, but I will try to present the fundamental principle of water quality protection. That principle is one of multiple barriers. It emphasizes, a little bit like a nuclear power plant, that things go wrong, so you have to have different layers of protection, and there are numerous instances in the history of water quality where people get very sick, despite the fact that you think that a filtration system or otherwise should be available to keep them from becoming sick.

Filtration certainly is a good thing. It is something that is coming; it is something that most have. But filtration alone cannot do the trick. Filtration occasionally goes down; filters get replaced; they miss things. If you have a lot of organic pollution in the water, a lot of sedimentation, then

you will find that bacteria, pathogens, or toxic materials can get through. Well, toxic materials I'll get to. They get through anyway. But even the normal bacteria, the diseases that are the primary concern of water quality, can get masked by the organic material, and then when you try to kill it through chlorination or some other method, it can still get through.

This gets into the question, Mr. Chairman, that you asked just a moment ago about why we need buffer zones, even though we have filtration. The first reason is, when you get even certain kinds of very conventional pollution, particularly the kinds that come from non-point sources that are protected by buffer areas-- When you have a lot of that, filtration doesn't always work.

Secondly, there is a variety of toxic chemicals that are not normally filtered out. These toxic chemicals are increasing. The reports of DEP about non-point protection point out that we don't know a lot about toxic chemicals. There isn't a whole lot of monitoring of them. But we do know that they are probably there causing significant problems, because in some streams we know that we cannot account for the problems to marine life any other way, and these can come from a wide variety of sources; from pesticides-- They can come from car exhaust, oils and greases. They can be, in fact, manufactured in the water or even in the filtration system in the combination of oils and greases with chlorine or other chemicals.

So, we have a real problem here. We have a problem that can potentially be of a large magnitude. One of the principles I think we are urging is that, as we have now seen, as the development along the coast has caused problems that people throughout New Jersey are well aware of, the problems of non-point source pollution and the degradation of coastal waters, we have an opportunity, particularly in the northern



areas, right now, while we still have watershed land, to keep that kind of degradation from happening and influencing our drinking water early on. Don't wait until there is a disaster to take prudent measures.

I would like to express general support for the DEP study. I think the recommendation-- We feel that the recommendation of the multiple barrier approach is an extremely intelligent and prudent one; is one that is in accord, as far as we know, with general drinking water quality experts. They emphasize not just that you need a specific buffer area protecting reservoirs and feeder streams, but also that non-point pollution throughout the watershed is a serious threat. This is a national trend to emphasize non-point source pollution controls throughout a watershed area, and DEP appropriately responded to that.

I should also emphasize that when DEP stated a minimum of a 50- to a 300-foot buffer zone, that was just a minimum. We understand that there was a lot of dispute about that, some people wanting a larger buffer zone. It is an inexact science, for sure, but that 300 foot is a minimum, and that was only to prevent degradation from affecting drinking water. The DEP report itself said: "If you want to prevent any degradation of the water stream, you are going to need a larger buffer zone." We think that a larger buffer zone, a nondegradation standard, should be in place wherever possible.

Finally, let me just make a couple more quick comments before we get into the proposal we have. Non-point source pollution is a serious problem in New Jersey. It is a problem that has been recognized throughout the United States. It is probably the principal threat to water quality. New Jersey's most recent report on non-point source pollution stated: "Sixty-six percent of the streams and lakes in New Jersey do not meet the water quality goal set by the Clean Water Act of being fishable or swimmable, and the vast majority of these were highly impacted by non-point source pollution."

Despite this fact, and despite the fact that the Clean Water Act, since its inception back in 1972, has been urging states in a wide variety of ways to come up with general--

SENATOR CONTILLO: Are you talking about the Federal--

MR. SEARCHINGER: Federal, yes -- urging states to come up with controls on non-point source pollution. DEP's report quite honestly admits that very little has been done. Reports get prepared. They are lovely documents. They get put on a shelf and ignored. They are difficult things to implement, and that should be taken into account here where DEP has recognized that the control of non-point source pollution through a multiple-barrier area is fundamental to protecting drinking water quality. It is a difficult problem. It is one that you cannot accomplish just by preparing a report or by delegating general standards, because it is not going to be implemented. The history of non-point source pollution throughout the entire United States is that non-point source pollution controls have not worked.

Finally -- my last basic principle -- the open space issue is a very important one. The fact is, as areas like New Jersey, and particularly New Jersey, have developed, watershed areas more and more are becoming the only remaining areas for open space. This is a social reality to recognize. The reason that happened is because there has been a source of funding for paying for these areas. Ratepayers, essentially the public, have been guaranteeing whoever holds the watershed areas, whether they be public entities or private entities, that they will pay for them. So the public, now having paid for these areas throughout their history -- 100 years, usually when the land was acquired-- I think now the public has a claim on this land, and if the public wants -- and that is for you to interpret -- the preservation of open space -- which I think is something that has widespread public support -- they have a certain claim to try to preserve these lands for open space purposes.

We have a win/win situation here where the protection of drinking water quality is fully consistent with the protection of open space, and that should be a guiding principle in the legislation.

Now, our bottom-line recommendation is in five parts. It is something that I want to apologize for in advance. I know that what we are really asking you to do is take a much harder look and take a more -- and pass a more complex piece of legislation than I think you have anticipated. But our recommendations flow 100% from the DEP's report's recommendations themselves.

The first prong is simply the prong of buffer requirements, and here we are making three kinds of recommendations: First, we think it is perfectly appropriate to say that because of the threats to drinking water quality and nondegradation, a 1000- or 1500-foot buffer area where the lands already exist should be preserved. We think it is perfectly appropriate for that to be said right away in legislation. It is certainly a conservative approach, but again is one that also protects open space requirements. It is a win/win. It is something we think you could provide for in the legislation.

Now, in addition to that, the DEP report notes -- and this is certainly true -- that a general minimum buffer zone alone does not always do the job. There are a lot of other factors that go into it. We think it would be appropriate to, in the legislation, tell DEP that you want them to take a conservative approach to analyzing these other factors.

Finally, in terms of the water quality that these buffer areas should be designed to protect, we think that at least from the standpoint of preserving existing watershed areas -- not buying others, but preserving existing watershed areas -- a nondegradation standard should be there. In other words, if getting rid of some of these watershed areas would

allow the stream or the reservoir water quality to degrade, then it shouldn't happen. There shouldn't be a notion of an acceptable level of degradation where we are talking about existing watershed areas that have already existed for that purpose.

Secondly, we think we need legislation directed at non-point source controls. The DEP report on non-point source controls specifically recognized that it was going to need legislation for a variety of purposes. It was going to need legislation to deal with the problem of crankcase oil disposal. It is a serious problem. People change the oil in their car. What do they do with the oil? A lot of the time it can wind up in a water area.

Household hazardous waste is another major problem. There are some very toxic chemicals. A lot of times they are poured down the drain or dumped on the lawn. Let DEP recognize the need for legislation to help to deal with that.

Perhaps most significant is the problem of new construction. Our feeling is that non-point source control should be included in the zoning criteria by local planning boards. That should be provided for in legislation. We think that is of fundamental importance. Construction work itself causes a lot of non-point source pollution; then, which way do the storm water pipes go? Right now we have storm water pipes going right from parking lot areas into streams that feed right into reservoirs. This is an almost unimaginable situation.

We would recommend that we have legislation that requires zoning codes to be amended to take into account non-point source pollution in accordance with the standards to be set by DEP.

The DEP report also talks about storm water management requirements and the need for legislation. I won't go into all of that. There should be a provision specifically dealing with the additional legislative authority DEP needs for non-point

source controls, and in addition to that, some instructions about what it is supposed to do. Authority alone-- It already has a fair amount of authority, but it hasn't really implemented it -- as it quite candidly admits -- in the past. We think they are probably committed to doing so, but a legislative push could help a great deal.

One last thing on that: The DEP report recommended very strictly, "No transfers of watershed land until the multi-layer protection of non-point sources exists." We take that "exists" to heart. That does not mean exist on paper; that means it is working in practice. Although it would be difficult to do, the criteria before you allow watershed transfers should be when the program does not just exist on paper, but is working, and there should be tests for determining whether or not non-point source controls are really being implemented.

You should provide for, even more explicitly than ORFA, the preservation of open space. This prong only goes to the private land. Frankly, we think the BPU is totally incorrect in its present legal analysis of its obligation; not just in ability, but we feel that previous legislation passed by this Committee obligates BPU to consider open space criteria before approving a transfer area. I could go into why their legal analysis is wrong. It is terribly flawed. It relies largely on the 1935 decision from a southwestern state at the time when New Deal legislation was being vetoed by the Supreme Court. It is kind of a legal flaw that has been repeated from document to document without additional analysis.

So, we think it already exists, but, frankly, it should be just straight out. There are only 1000 acres of privately held watershed land, or private utility watershed land remaining. Simply provide that that land should be protected for open space. Why not? There may be a few

portions of that that could be sold out in areas that are really unnecessary, but generally that land should simply be preserved for open space.

SENATOR CONTILLO: What is the difference between private watershed and public?

MR. SEARCHINGER: A lot of watershed land -- most of the watershed land -- is held by municipal water supply companies. They are not under the jurisdiction of the Board of Public Utilities. They present somewhat different considerations. I am going to get to that. That is over 50,000 acres of watershed land, whereas right now we only have a little over 1000 acres in privately held land, at least depending on the results of the lawsuit we are engaged in. That could increase it by another 700 acres.

The issue of funding-- This goes right to the municipality problem. A lot of this land is held by the municipalities. It is very expensive for them to hold onto this land. They are taxed by local communities. This has led to a great deal of discord. I don't want to wade too much into this discord, but our feeling would be that municipalities that hold large areas of watershed lands whose value is not just protecting their drinking water, but providing open space for the entire State, should be afforded some measure of tax relief. This is an issue we think the Committee should study.

The DEP report made very clear that there is a lot of watershed land -- buffer land, basic buffer land -- for even a 250-foot buffer that is needed, that is not now held, and that is a fundamental point. We need to acquire new land to have proper buffers. We make two recommendations about the acquisition of this buffer land not held:

One recommendation is: If a water utility is going to sell off some watershed land because it claims it is not needed for drinking water protection, it should be required to take that money and use it to acquire other land that is within even the 250-foot minimum buffer. In other words--



SENATOR CONTILLO: Trade?

MR. SEARCHINGER: Trade, swapping. We should not be getting rid of some watershed land on a kind of hoped for, long-term promise that, "Oh, we'll get around to acquiring that other watershed land we need." Let's make it right up trade.

We think it may be appropriate to establish a fund to help to acquire this minimum 250-foot buffer area around the feeder streams, and a small water bill surcharge, we think, should be considered by the Committee, which could be used to establish that fund. Sure, it would cost ratepayers a small amount now, but-- I have not done the economic studies. Some environmental groups have done it. They say it is a very small amount, and it is really "penny wise, pound foolish." A little investment now is going to save us a lot of investment later.

Lastly, a process issue. We would recommend that the legislation provide for an independent panel of experts to advise DEP on the regulations it will be required to develop. We think that could include members from the academic community, members from organizations such as ANJEC, and members of the environmental community and the water utilities.

So, those are-- We will be forwarding this to you. We hate to try to burden you excessively with a complex piece of legislation, but we think it is appropriate. This land once it is gone, is gone. We encourage you to take your time in drafting a careful bill that would do the job.

Thank you.

SENATOR CONTILLO: Thanks, Tim. My aide just said to me, "He set out a program that will take you the rest of your life." (laughter) But that aside, you touched on one area, and then you went off again. I don't know if anyone here is going to testify to it. But, there has been the recent problem of the pollution, or the nonpollution of the Hackensack River as it flows down from New York State. That was the exact point; that while the company may be testing for certain things

at certain times in certain parts of the river, there are certainly more sensitive tests that can be taken that deal with wildlife in a more accurate testing, and apparently that is not being done. I don't know how we can get that done, but that seems to be-- You touched on it, and then you walked away from it. I don't know if you want to comment on it some more.

MR. SEARCHINGER: Well, I think the company has said it is going to be conducting some more tests. I may be incorrect on that. Generally speaking, we don't test. Nobody tests for a large number of toxic chemicals that might be present. It is really a reason for concern. I, frankly, am not that educated about the problems of the pollution coming in from New York. I have been told about that, but I am not an expert.

SENATOR CONTILLO: As far as the 1000- to 1500-foot buffer-- I was considering buying property up in the New York State area, in the ski area, and it was around a reservoir. I saw-- It was 2500 feet. It was a half a mile. They had a huge cyclone fence that separated the reservoir from the rest of the world, so to speak, and it was a half a mile set back. Okay, thanks.

MR. SEARCHINGER: The Cook County study notes that-- It even gives statistics for where their mean buffer-- They are much, much larger.

SENATOR CONTILLO: Are there any less than have been proposed here in New Jersey? Are there any states that deal with them on a lesser basis than we do?

MR. SEARCHINGER: The legislation is not always that strict in terms of actual preprescribed standards, but they are usually narrative standards.

SENATOR CONTILLO: Also, you suggested that you thought you would have a different composition or some public input into the DEP. That is the purpose of this hearing. We are having a public hearing now. With the limited charge we

have given DEP, they are requesting a two-year turnaround. If we ever gave him that list you gave us, he would be talking about the next century for his report, I am afraid.

But I think that somewhere between the two, we have to decide what can be done in a reasonable time. We can accelerate the process and focus the process by doing that in the legislation; by giving DEP specific directions.

MR. SEARCHINGER: That's right.

SENATOR CONTILLO: But even within their process, they have long and lengthy public hearings also.

MR. SEARCHINGER: That's right.

SENATOR CONTILLO: I think that probably would be adequate, between this public hearing and the public hearing they have and their input and everything else. And, we always have legislative oversight to fall back on.

All right, Tom, thank you very much.

MR. SEARCHINGER: Tim.

SENATOR CONTILLO: Tim, thank you very much.

I want to put the fellow on who has gone over the report. Which one is he? (addressed to Committee Aide) Is Howard Horowitz here -- Dr. Howard Horowitz, excuse me -- from Ramapo College?

D R. H O W A R D H O R O W I T Z: Thank you, Senator Contillo, staff members, and other people for providing the opportunity for this hearing. Can you hear me?

SENATOR CONTILLO: I can hear you.

DR. HOROWITZ: I am a professor of natural resources and geography at Ramapo College, and I have been involved in the organization of several conferences dealing with watershed issues in the northern New Jersey/New York State area. I will just give you some feedback on this issue. Certainly, I am speaking strictly for myself here, and am not in any way representing the institution of Ramapo.

First of all, I think the DEP report is a good beginning. We recognize that the mandate it has had is a narrow mandate. It does not address the broader question of open space which the legislation would appropriately address. It is specifically looking at what we would need to protect water quality.

When we look at it that way, we see that it is a cautious report. It agrees that buffer strips are necessary, but not sufficient, and argues for the multi-zone protection. I think all that is very, very good, but probably not sufficient for several reasons. One is, we do not really get a clear definition -- and maybe cannot at this time -- of what is specifically involved in the term "best management practices," the BMP term that is used. We know we want to use them specifically in the second zone behind the protective zone, but what they are is not fully designed. Certainly, any practice that restricts just laissez-faire activity is an improvement, but, depending on how we define "best management practices," it may or may not be adequate to protect the watershed.

In particular I think, for example, of golf courses. I mention golf courses because a commonly proposed use for watershed land-- In many people's minds, a golf course is the same as natural open space, and in some ways a golf course is a kind of open space. It is certainly a useful and valid recreational space, but ecologically it is not equivalent to open space, but stresses on the runoffs which are vastly more severe than you get in natural open space; for example, the maintenance of lawns and greens typically with fertilizers and pesticides which will inevitably-- Some of them outdoors run off into the water, even if there is a buffer strip of modest dimensions.

Similarly, any kind of even limited home development and road development will have some impact that is degrading. The question of whether it is severe or not is something that

would be very site specific and would be really hard to quantify. But we should proceed cautiously in those things, and recognize that the only real open space in terms of watershed protection is undeveloped land, land that is left in the natural condition, possibly suitable for hiking and very light recreational use, but not really anything else.

Regarding buffer zone width, which has been mentioned before, the report seizes on the numbers 50 to 300 feet, although the report does specifically say that that really isn't sufficient for the actual reservoir protection. I am going to take the liberty to read briefly half of a paragraph from this report. This is from page 18 of the summary regarding the three-zone buffer. It says:

"Previous studies have shown that the vegetated buffer strip should be a minimum of 50 to 300 feet in width. As discussed earlier, the actual width needed for a vegetated buffer to be effective is determined by the buffer's intended function and purpose, and must be based on site-specific parameters. A minimal buffer of 50 to 300 feet would be required if the buffer strip is intended only to protect the resource from pollution that would threaten the existing use of the resource for water supply. If the buffer strip is intended to protect or maintain the existing water quality of the resource over the longer term, then a larger buffer strip may be required."

No matter how one reads that-- My reading of that is certainly that 50 to 300 feet should not be regarded as a sufficient buffer strip, but as a minimum which indeed may not be sufficient in all situations. And indeed, as was mentioned earlier, many other municipalities have much, much larger buffer strips. I have just come from the Pacific Northwest, and I can give you two examples of large cities there -- the city of Tacoma, Washington, which has as its watershed the Green River-- The Green River is essentially an intact

watershed in which no development of any kind is permitted. Public access, in this case, isn't even permitted within the watershed. I am not suggesting that every watershed needs to be that strict, but that is one way of doing it.

Similarly, Portland's Bull Run Watershed, which is in the Mount Hood National Forest land, has restrictions that make it different from other areas managed by the National Forest. The National Forest generally permits logging in most areas, but not within the Bull Run Watershed. So, these are examples of very, very strict interpretations of what is necessary to protect high water quality.

I would suggest in general that the literature on it is somewhat vague. We are talking about buffer strips around streams -- tributary streams -- but they may be different than buffer strips around the reservoirs themselves. In general, we probably would need a bigger buffer strip in many situations around the reservoirs themselves than around the tributary streams. If the distance of the tributary stream is substantial, there is a lot of opportunity for self cleaning as the stream flows and other things that may not require quite as large a strip around the tributary stream as around the reservoir itself.

In general, I do agree with the spirit of the report, but I would suggest it is a cautious report. The report does not address the second but very, very important function of this legislation. It is not maybe specified in intent, but it is really there and should be clear; that is the preservation of the rather limited remaining open space we have. I think that is a very valid dual function and something that we really need to address as a society. Watershed lands have become open space; in many areas, they are the only open space. I invite you to take a look at the USGS -- the United States Geological Survey -- map of the lands around the Oradell Reservoir, and you will see for yourself how much that really has become the remaining patch of ecologically integral open space in a large region. There is really little else.

Historically, as regions develop, the amount of open space diminishes. The value of that which remains becomes greater and greater. It becomes greater and greater economically, but it also becomes greater and greater ecologically, and I think the word "ecology" has a very important place in this discussion. In my own mind, I think there is a very, very real analogy between preserving limited amounts of watershed lands, because they are limited now, and preserving such things as Brazilian rain forests or old growth forests in the Pacific Northwest. These are things that have economic value in those places. Certainly, the Brazilian rain forests-- In this country, we hear a lot about how they need to be saved, and they do, and yet there is a lot of interest in exploiting them for their potential cash value. We say there is an overriding benefit in saving them. Similarly with the old growth forests in the Northwest. They are worth a lot as lumber, but there is only 8% or 10% of them left, so there becomes an overriding value in saving what is left, because there is not really that much left.

It is kind of that way with these watershed lands. As the rest of the State develops, they become more and more valuable just the way they are. Even though they are becoming more and more economically valuable as potential sites, they are also ecologically valuable because they become islands, or patches, where there is a functioning, integral, intact ecosystem, and you do not get that kind of ecosystem on a golf course or in people's backyards. Squirrels may live in backyards, but deer will not. You need to have the entire ecosystem to preserve its diversity, and the way things have worked out historically, it is largely accidental. These watershed lands have become very, very important for their ecosystem value, even besides their value as water quality protectors.



Generally, in the country where we have municipal watersheds, where the watershed is managed by the city or the county or the State, this never comes to a head because it is understood that the open space value is great enough that nobody wants to do anything with it. The conflict can come, as it has here, when the private utility realizes there is tremendous potential for profit that becomes irresistible. My feeling becomes, if the utility cannot preserve the open space around the watershed reservoirs, then the argument to me is that they are not serving their function in the broader sense, and maybe the utility should be a public utility, rather than a private utility. There wouldn't be the temptation to cash in on the windfalls triggered by rising lakefront real estate values.

I do not object to fair compensation to the private water companies for lost development opportunities. How fair compensation is calculated is beyond my ability to suggest; possibly through tax relief in some form or other, possible for some payments for the transfer of development rights. On the other hand, it is true that as open space it has been benefiting the company and the public for decades, and that would go into account.

In this instance, to say that we should set aside several hundred feet and then develop the rest is not enough, because I don't think we should settle for half a loaf today because we don't have a loaf anymore. All we have is a tenth of a loaf left. Right? When you have that little, it really becomes appropriate to look at the overall best interest being to save all of it. If we are talking about a few thousand acres, I think we should figure out a way to save all of it. In general, if there were not the conflict with open space, then we could look at buffer strips as being sufficient. But because there is this dual issue, number one, how to protect water quality, and number two, how to retain ecosystem

integrity, I think the need becomes to really preserve what is left, virtually in its entirety. There isn't that much of it.

Thank you.

SENATOR CONTILLO: Thank you very much. You touched on some good points.

I have those who have signed up, and I have some who have called in. I'll see if I can't move on to that list. Is Jim Appleton here, from the Hackensack Water Company? (no response) He called in, but he is not here, okay. I was hoping that someone from the Water Company would be here to testify.

Next I have Peter Russo, a Commissioner from Lyndhurst. Peter?

COMMISSIONER PETER B. RUSSO: Senator, I want to thank you very much for having me testify before your Committee. I appreciate everything you are trying to accomplish here. I have given you an illustration which shows you the four rivers -- the Delaware River, the Passaic River, the Hackensack River, and the Hudson River, these four rivers. I know about the four rivers because the Delaware River-- I was up at a farm, way up at Port Jervis, and I noticed them dumping garbage in that area -- in that river there. Everything that is dumped in that river up there, I think you know ends up in the Atlantic Ocean.

Now, the four rivers -- the Delaware, the Passaic, the Hackensack, and the Hudson-- The periodic rise and fall of the surface of the oceans and the rivers connected with them caused by the attraction of the moon and the sun and the lunar day of 24 hours and 51 minutes-- There are two high tides. The flow of the tide causes debris -- broken trees and garbage that flow from the Passaic River to our beaches in Point Pleasant, Belmar, Beach Haven, and the Atlantic Ocean.

As Chairman of the Passaic River Coalition Cleanup Committee, I volunteered some prisoners from the Bergen County

jail to clean up these towns bordering the rivers. We cut down dead branches from trees with chain saws. We cleaned the area 20 feet from the low water line. We took away hundreds of refrigerators, ovens, television sets, and car motors, plus 200 car tires and 50-gallon drums with oil and chemicals in them. We have used our resources to pull all kinds of trash out of the river. We have covered the towns of Harrison, Kearny, North Arlington, Lyndhurst, Rutherford, East Rutherford, Wallington, Garfield, Elmwood Park, Fair Lawn, Paterson, Passaic, Clifton, Nutley, Belleville, and Newark.

Who was dumping in the rivers? The very people who lived on the borders of the rivers. Who should prevent this dumping? The health departments and the police departments. Who should keep the river areas, from the rivers to 20 feet or more? The parks and the public works departments. Who should rid these rivers of the muck usually found in the rivers? The Army Corps of Engineers. The Army Corps of Engineers has not attempted to clean our rivers during the past 20 years. Which are the agencies that should enforce these laws? The Coast Guard, the Marine Police, the DEP, and the Army Corps of Engineers.

What we need, Senator, is a strong law ordering these towns and ordering these people to once and for all, at the four rivers that you see here, stop dumping garbage. I appreciate what you are doing here today. I think it is a wonderful thing. But first we have to rid these rivers of the garbage that is already in them. That is the only way we can take care of them and have clean rivers and clean water. These rivers go into all of the tributaries all over the State of New Jersey, and cause nothing but filth. They are the dirtiest rivers in the country.

Thank you very much.

SENATOR CONTILLO: Thank you, Peter.

COMMISSIONER RUSSO: If you have any questions, I will be glad to answer them.

SENATOR CONTILLO: No, but thank you very much for your testimony.

Assemblyman Pat Schuber?

A S S E M B L Y M A N W I L L I A M "P A T" S C H U B E R:  
Good afternoon, Senator Contillo.

SENATOR CONTILLO: How are you, Pat?

ASSEMBLYMAN SCHUBER: I am here today to testify with regard to your bill and the issue of watershed protection. I would first thank you for holding this hearing and for giving me the opportunity to testify here today, and indicate to you, as was done with regard to the original 18-month moratorium-- I offer the hand of bipartisanship with regard to this issue, because I think the issue of open space, as has been testified to by prior speakers, as well as the issue of clean water, are ones that are not the bailiwick of any one individual or one party, but rather are ones that command the respect of the entire county and the entire State.

The original concept, I think, of the 18-month moratorium was to provide breathing space for the purpose of allowing the Department of Environmental Protection to draft the appropriate rules and regulations to govern the use of these types of watershed properties when it was found that, in fact, there were no such rules and regulations before.

Quite frankly -- and we had a discussion on this, Senator -- I thought that original legislation provided enough authority to DEP to provide those rules and regulations. I was quite surprised to read in the report, although I believe much of what is in there, that they need further legislation to provide for a greater mandate in this particular area. I had thought that was quite clear from the original legislation.

But, be that as it may, the report of DEP in this area I think provides a sort of a beginning anyway. I think, as some of the previous speakers have indicated, it is a cautious approach. There is no doubt about that. But I think the

concern that we had originally has been met by the most recent legislation you sponsored -- which I was able to co-sponsor in the Assembly -- which was to continue the moratorium until such time as this whole matter can be concluded properly by the Department of Environmental Protection.

The bill before us today which addresses that I think will give the Department of Environmental Protection the marching orders -- for lack of a better term -- to finish the work which I think was originally mandated. I appreciate that, and I support that concept.

I think the issues that are before us at the present time which we have to look at are three: One I think is the issue of the emphasis not only of the protection of the watershed and the protection and providing of clean drinking water, but the issue of open space preservation which I think has to be emphasized, and has to be emphasized in the rules and regulations that may be adopted. I think that is extremely important, especially at a time when open space is of grave concern to us, especially in Bergen County, where the amount of open space has shrunk to a very small percentage.

I think the second thing that has to be done with regard to that is that maybe some kind of guidance with regard to buffers may have to be provided. I heard testimony, and I know the report provides for certain site-specific requirements and best management practices. I agree with one of the prior speakers. I am not exactly sure what "best management procedures" may mean to DEP, as far as that goes. I know the report provides for the recommendation of 50 to 300 feet. I think that is probably inadequate. I have recommended in the past, and I know many of us have talked about this and have had testimony with regard to this in Assembly committees in the past, that a 500-foot buffer may be one that should be utilized, or looked at, with considerable amount of the space that is watershed property today. We do have legislation in

the Assembly that would do that. That is probably not the be-all and end-all of this, but it is something, I think, that would provide for a greater buffer than has been provided for originally by the recommendations of DEP.

Finally, I think the thing we have to provide for is the input of the citizens, who really, to a great extent, sparked the revolution in this particular area originally. I think a proposal -- as has been testified to before, and which I support also -- to provide for, in the legislation, an independent advisory committee to review the recommendations of the DEP in this particular area-- I think this is probably apropos and germane, given the nature of the concerns we have and maybe the cautious nature of DEP in this particular area.

As as been testified to before not only by myself but by many of the previous speakers here and at other forums, the fact of the matter is that once this land is developed, it is never going to be brought back. We have a unique opportunity, as one of the prior speakers has indicated, for a win/win situation, not only to preserve our clean water, but to preserve our open space.

I think your bill to provide more power to DEP to provide those rules and regulations is important, and I think it calls for support. I think there are some aspects -- which have been testified to by myself and some of the other speakers -- which might be added to it, to give it more strength so that DEP is really given as many marching orders as we can give them to provide for the preservation of our shrinking amount of open space and watershed property.

I thank you for the opportunity to be here.

SENATOR CONTILLO: You suggested -- and you are now the second speaker who has done this -- that we have a citizens' advisory committee. Do you have specific recommendations you would like to add to this bill?

ASSEMBLYMAN SCHUBER: Yes. I would like to make those to you, if I might, in legislation language, through OLS.

SENATOR CONTILLO: Okay, because that is the purpose of this hearing, and the public is going to be heard. I think if we go on and on with it-- We can go on with public hearings and public hearings.

ASSEMBLYMAN SCHUBER: Oh, I appreciate that. My purpose is not to prolong it.

SENATOR CONTILLO: No, but I'm saying, if you have specific recommendations, I would be happy to hear them, either right now, or you can forward them to me.

ASSEMBLYMAN SCHUBER: We will forward them to you. I think as has been testified to, OLS and the Assembly are preparing some of those for us now. The situation with regard to an advisory committee, I think with appropriate scientific and environmental persons on it, is one that can easily be done. I don't really want to add much more than that. I would also ask you to look at the potential for the amount of the buffer zone you might want with regard to the thing. I think the 50 to 300 which has been recommended is inadequate, quite frankly. I have recommended in the past 500 feet, which I think is something that has been testified to on numerous other occasions as being a safe buffer zone. There may be occasions when more than 500 feet are needed. Those recommendations we can make, and we can provide the appropriate language to you.

SENATOR CONTILLO: Five hundred, except where less can be proven.

ASSEMBLYMAN SCHUBER: If it can; if it can.

SENATOR CONTILLO: Okay, thank you.

ASSEMBLYMAN SCHUBER: Thank you, Senator.

SENATOR CONTILLO: Jeremiah O'Connor, would you like to testify? (affirmative response from audience)

J E R E M I A H F. O ' C O N N O R: Good afternoon, Senator, members of the State Legislature, public officials, and concerned citizens of New Jersey.

SENATOR CONTILLO: I didn't know whether to call you Senator or Mayor or Freeholder or what, so I just called you--

MR. O'CONNOR: Just don't call me late for lunch. That is the only thing that is really important, Senator.

My purpose in joining you today is to add my own deep concerns to those residents of our State who are very deeply concerned about our drinking water. I am here to offer my complete support for your bill, which finally, after far too much delay, provides that needed level of protection to the watershed properties in our State.

When and if enacted, this vital legislation will direct the Department of Environmental Protection to establish criteria for the purpose of creating formal buffer zones to protect watershed properties in the State of New Jersey. This bill also calls for a coherent and comprehensive watershed management plan, another vitally necessary weapon in this sacred battle to protect our drinking water.

It is my belief that the legislation we are discussing this afternoon should be swiftly enacted for two very important reasons: one being environmental, and the other economic.

From an environmental standpoint, this legislation would provide -- for the first time, I might add -- protection of our water supplies from non-point source pollution. It is this very same non-point source pollution -- runoff of rainwater carrying pesticides from our lawns, chemicals from industry, petroleum products from vehicles, and toxic spills -- that currently produces and presents the greatest threat to our water supply.

I firmly believe that this generation has a sacred duty to protect our land, our air, and our water for future generations. There is no greater good, no more important task, and no more serious mission that can be undertaken, than to preserve our environment. That duty rests with every one of us, and frankly, it starts right here with this vital legislation.



But concern for our environment is but one reason to support this important bill. Another equally compelling motivation is the economics of this matter. It would seem to make much greater sense to protect our water supply from pollutants today, than -- as we presently do -- have to pay more money tomorrow to remove those same pollutants from a contaminated water supply.

So, for both of these crucial factors -- protecting our environment and protecting our taxpayers' money -- this legislation, hopefully, will be enacted as quickly as possible.

Before I conclude my remarks, Senator, I would like to take a moment to address the local impact of protecting the watershed property in Bergen County, and that is the preservation of approximately 1000 acres of open space in northern New Jersey and in northern Bergen County in particular.

Even as I speak, attorneys for the Environmental Defense Fund are arguing in the Federal courts to overturn an ill-advised and controversial transfer of some 700 acres of watershed property to the Hackensack Water Company -- to its development company. The Environmental Defense Fund argues -- and rightfully so -- that this transfer should never have been approved by the Board of Public Utilities in the early '80s, and that the transfer was accomplished in violation of the spirit and letter of the law, and without proper consideration of the environmental impact of developing these properties. I sincerely hope they are successful in their lawsuit.

I want to make it extremely clear that I support this lawsuit and its determination to return these properties to the utility and the ratepayers. I also completely support a subsequent transfer of the 300 acres which was accomplished at a midnight hour of the Kean administration. There is no doubt in my mind that it is clearly the best use of Bergen County for all of these acres to be preserved as open space for future generations.

One fact is indisputable, Senator: The good Lord has only given us so much land to work with, and He has placed upon our shoulders -- and upon the shoulders of the members of the Legislature -- the duty to protect that land when the only motivation is profit. The welfare of all of the people must always take priority over the financial gains of a fraction of the people. That is a commitment we must all continue to make each and every day of our lives.

I hope this bill is successful, and I wish you great success in the legislative process of adopting this legislation. Thank you very much.

SENATOR CONTILLO: Thank you very much. Is Gerry Donohue here? (affirmative response from audience) Gerry, please go ahead.

GERARD DONOHUE: Thank you, Senator. I have given your aide 10 copies of the testimony, and I have additional copies should anyone require them.

I would like to apologize for Freeholder Mary Donohue for not being here today, but she is attending a Freeholder work session which started at two o'clock, so I am presenting her testimony:

"It is certainly clear to everyone that New Jersey stands at the crossroads in its fight for environmental survival. Every legislative measure introduced and acted upon -- the Coastal Commission, the Clean Water Enforcement Act, the Pollutant Discharge Regulatory Program, the Watershed Moratorium, and now Senator Contillo's Watershed Protection Act -- direct our attention and hope toward enabling legislation which will contribute substantially to the quality of life in our State.

"In Bergen County, we are especially and specifically concerned because we are witnessing, regrettably, the questionable tactics of a public utility, the Hackensack Water Company, to divert much of their traditional careful attention to concerns for water supply to concerns for real estate profit.

"Oh, we hear much of their interest in continuing to be a good neighbor of all to whom they supply water. We hear of how much is being spent by them -- by us, the ratepayers, actually -- to enhance the quality of the water they supply. It all sounds very altruistic, but what are they telling their stockholders? Quite frankly, we in Bergen County desperately need the bulward of the Watershed Protection Act, a management plan designed to establish buffer zones for all watershed lands associated with public water supply reservoirs. Too little, but not too late, we are all paying attention to one of our most needed, and to be cherished, resources -- our watershed.

"Bergen SWAN, starting from nowhere, has done extraordinary work in focusing the attention of the public on our watershed needs. Their cause is so right and so manifestly just, that the prestigious Environmental Defense Fund has now joined hands with them, and is legally pursuing the sale of our watershed by Hackensack Water Company to its realty arm, Rivervale Realty.

"A suspect waiving of the watershed moratorium provisions by the Board of Public Utilities in the waning hours of the Kean administration is but the latest assault on the Bergen watershed.

"However, lest I be labeled as resorting to rhetoric in hinting at the ultimate designs of the Water Company for the use of the watershed lands, let me ask you to consider quotations from the 1989 Annual Report of United Water Resources which was distributed to stockholders at the annual meeting held May 14, 1990 in Teaneck. United Water Resources is the holding company for both Hackensack Water Company and the real estate arm, Rivervale Realty.

"On page 11 of the above report, we find the following, and I quote: 'Rivervale Realty now owns about 1300 acres of prime lands, mostly undeveloped, in northern New Jersey and southern New York. Most of it lies within a 20-mile radius of midtown Manhattan.'

"Then the report continues: 'The real estate business spearheaded by Rivervale represents a long-term commitment by United Water and is an integral part of the company's strategic thrust. Over the long term, the proceeds from Rivervale's real estate transactions will be used as a funding source for additional real estate purchases, other general operations, and, of course, dividend growth.'

"Did you hear anything about water supply, water quality, environmental concerns? I daresay, 'No.'

"Indeed, the company should be well positioned to implement a strategic profit thrust with its real estate holdings. Consider this: In 1984, they transferred 700 acres of watershed land in various north Bergen towns to Rivervale Realty and rebated to its customers \$3 million, or \$18 per household.

"We can no longer sit quietly on the sidelines and rely upon dedicated groups like Bergen SWAN, the Sierra Club, etc. to alone save us. We must all be in this together to ensure an environmentally sound legacy for our children and theirs. We must be alert to every effort by those whose economic concerns present growing potential toward despoiling our crucial water supply.

"I urge your support -- vocal, thoughtful, and forceful -- for Senator Contillo's Watershed Protection Act. We must insist upon its prompt enactment. This is a war, and nothing less. Thank you."

SENATOR CONTILLO: Thank you, Gerry.

Dr. Lester Levy -- are you still here, from West Milford? (no response) Did he leave?

UNIDENTIFIED SPEAKER FROM AUDIENCE: I believe that's Dr. Lynn.

SENATOR CONTILLO: Dr. Lynn? Is he here? (negative response) We have 20 other people who wish to speak. I am going to try to ask you -- or I will ask you to focus on the

bill. Try not to be repetitious, and if you go over six minutes, I am going to cut you off. Dave Gordon? Identify yourself, please.

D A V I D K. G O R D O N, E S Q.: Senator, my name is Dave Gordon, and I work with the Hudson River Fishermen's Association. I am a student at Pace University Law School. I am an attorney, and I am going for a graduate degree in environmental law at Pace. My affiliation with the Hudson River Fishermen's Association is through the clinic -- the Environmental Litigation Clinic -- at Pace, which represents the Hudson River Fishermen's Association in litigation.

The clinical professor -- Professor Robert Kennedy, Jr. -- is the attorney for the Hudson River Fishermen's Association, and he has become public over the last couple of years with respect to watershed protection. He has submitted for the Committee today a letter, portions of which I would like to read to you:

"Much of our effort in the past few years has been directed at the pollution of New York City's supply reservoirs and their watershed areas. The driving factor behind this degradation has been the siege of development in the watershed areas. Well over 100 point sources -- sewage treatment plants and industries -- currently discharge wastes directly into streams which are tributary to our reservoirs. Many of these dischargers regularly violate their permits. But even those that comply, degrade the waters, since their permits are not set at levels to protect drinking water quality. Further problems are caused by increases in runoff contaminated by the fertilizers, pesticides, sediments, and other chemicals which result from development.

"Uncontrolled development in the watershed areas has been a disaster for the Croton Reservoir system in Westchester and Putnam Counties. The Croton is the smallest of New York's three reservoir watersheds, contributing about 10% of the

supply. Once among the finest drinking water in the world, the Croton has declined to borderline quality due to the chemicals and nutrients that regularly enter the system by point and non-point discharges. Parts of the system suffer from severe eutrophication problems. Because the watershed is no longer high quality, the City must construct a filtration plant, at a cost of \$300 million to \$400 million, which it hopes will remove many of the impurities in the water.

"The City now recognizes that special steps are needed to protect its watershed resources, especially if its upstate Catskill supplies are to avoid a fate similar to the Croton. Failure to adequately protect the Catskill supplies would result in added filtration costs of \$5 billion or more, as well as the degradation of an invaluable resource. Albert Appleton, the City's new Department of Environmental Protection Commissioner, has announced plans to implement a multifaceted protection program, which will include greater involvement in permit reviews for development and discharge permits, prosecution of violators, and cooperation with local authorities in watershed areas.

"What is happening in New York is also happening throughout the East Coast, as improper development and industry advances in water supply areas. Many states and cities are taking steps to address this serious problem, often adopting detailed land use controls in water supply watersheds. We commend the Committee's interest and efforts to address this issue, and urge the State of New Jersey to adopt a watershed management program sufficient to protect its reservoirs from degradation."

I would also like to add some of my own comments, if I have a few minutes left.

SENATOR CONTILLO: Go ahead.

MR. GORDON: With respect to Tim Searchinger, the Environmental Defense Fund, and the testimony he gave earlier,

the agenda he has outlined for you sounds like an excellent one. It is the first I have heard of it today, but many of the provisions which he is suggesting sound like precisely the sort of things which you should be considering, in terms of developing a watershed protection program, and also are very similar to the types of programs which are now being proposed in New York State, and in particular for New York City.

I would like to make a couple of comments on his proposal: He spoke a little bit about the kinds of multiple barriers and the need to go beyond simple filtration treatment in order to make sure that pollutants do not come into the water supply. In particular, he spoke about the probability that all the toxics that come into the water supply will not be removed, and that is one of the classic problems with relying on filtration.

There is one other which I would like to point out, and that is one which I referred to, which is eutrophication. Eutrophication is the natural process of aging in lakes. Typically we know it as algae forming. It happens to all lakes over time, but it happens much more quickly with respect when lakes are impacted by uncontrolled development. One of the problems with eutrophication is that the water -- although it is borderline drinkable -- is of very poor quality, and the long-term effect of eutrophication of reservoirs is the fact that the reservoirs lose their supply capacity and become useless.

This problem has caused many communities in many states on the East Coast -- this problem among others, but primarily this problem -- to take very aggressive watershed protection measures, including land use procedures. Going further south to the State of North Carolina, last year they enacted a comprehensive watershed protection bill which includes detailed land use regulation with respect to water supply watersheds. Eutrophication has impacted several of New

York City's reservoirs, including at least two in the Croton system and the very large Cannonsville (phonetic spelling) Reservoir, which empties into the Delaware River. As I am sure many of your constituents in New Jersey have become aware, the Delaware River quality is somewhat impacted by the releases from Cannonsville.

So, I would point out that when you design -- if you design land use measures to protect the reservoirs, that you take the eutrophication problem into particular consideration.

Also, Tim spoke about non-point source problems. Non-point source problems have been the bane of clean water since basically the Clean Water Act dealt with point source problems. In order to address non-point source problems, you have to get toward land use controls, and that has created some political difficulty in various areas of the country. I would suggest that if you-- It is a very good idea; in fact, states are moving toward non-point source controls, but it is going to take a very comprehensive, responsible approach. It is not something you can do, or you should be looking toward doing, you know, kind of halfway.

I would also like to point out that New Jersey already has some of the mechanisms in place to address these problems. New Jersey has a comprehensive Storm Water Management Program, but the situation with that -- as well as with many of the other programs, such as the Clean Water Act -- is that in watershed areas they have to be managed with the regulations in place toward drinking water watershed criteria. The levels of protection are much higher. Until these regulatory programs, such as the Clean Water Act, the NJPDES Program, or the Storm Water Management Program--

SENATOR CONTILLO: What Clean Water Act are you talking about?

MR. GORDON: Oh, I'm sorry. The Federal Clean Water Act.



SENATOR CONTILLO: Federal, okay.

MR. GORDON: The Federal Clean Water Act, which was passed in 1972, comprehensively regulates point source discharges. In most states -- I am not certain about New Jersey, but in New York and most other states -- the states have taken over the regulatory program. Under EPA direction, or EPA control to some extent, the states basically regular it. That has solved a lot of the point source problems we have, but states still have a tremendous amount of responsibility in this area. Also, again, the situation is, in watersheds-- In New York State, for example, one of the problems is that the regulation of point sources in the watersheds is the same as the regulation of point sources everywhere else, and in many cases, the protection of a stream which empties into a reservoir -- a New York City reservoir -- is the same as the protection of the Hudson River, which is a very low level of protection. So, the amount of pollution, which is allowed by the permits is no different for the reservoir areas. The point is, even where the regulations are in place for point source protections, for storm water runoff, for non-point sources, you need special consideration and special criteria for watershed areas.

I am somewhat conscious about going over the six-minutes time limit. I would be happy to answer any questions you may have.

SENATOR CONTILLO: Well, I have no questions. You did make a strong point for questioning the permits that exist today for the pollutants that go into the reservoirs, whether they be non-point or those that are permitted from a specific source even. Those are serious questions.

MR. GORDON: I will say one thing about that: Commissioner Appleton of New York City, in announcing his Watershed Protection Program -- which is more than just one program; it is a lot of different things he is going to be

doing-- Only the state can put together a comprehensive program. Point number one on his list was to go out and sue illegal permit violators in the watersheds. The Clean Water Act--

SENATOR CONTILLO: The illegal ones?

MR. GORDON: Yeah. Well, just because you have a permit-- The permit gives specific limits.

SENATOR CONTILLO: Right.

MR. GORDON: Many of the dischargers in the New York City watersheds are violating their limits, and the Commissioner intends to sue them and has already, as a matter of fact, put together 60-day notices to inform these violators of the suits.

SENATOR CONTILLO: But even those which comply with the limits are frightening.

MR. GORDON: That's right. The other thing he is doing now, is getting very involved in the renewal for those permits. One of the things we are hoping the state can do is to set up stricter regulations for watershed areas.

SENATOR CONTILLO: Thank you.

Is Peggy Blumenthal here? (affirmative response from audience) Please identify yourself.

C O U N C I L W O M A N P E G G Y B L U M E N T H A L: Hi, Senator Contillo. I am Peggy Blumenthal, Councilwoman from Haworth.

Now, I believe there is a need for regulations from the State, because towns cannot be responsible for sound drinking water policy. When the people in my town come up to me and ask me to stop development on the watershed lands, on a town level I feel we are basically helpless. I think we need guidelines from the State.

Haworth just recently had a land subdivision on the watershed property, and ramifications of this will be unclear for many years. We need the State, the DEP, to protect our

watershed and help city officials with guidelines to ensure that land use transfers are done in a proper and environmentally sound way.

I think we are going to see a massive assault on the environment surrounding the Oradell Reservoir. I envision someday that Lakeshore Drive will go through. Now this is a roadway that runs along the Oradell Reservoir. Right now, it is gravel and dirt. I believe that once that happens, we are going to see a road just like Kinderkamack Road in Emerson. It will be jammed with traffic, and there will be development all over the place.

I think time is of the essence, for Rivervale Realty is still taking on one town at a time. This is what they have done, and this is what they are going to continue doing. They are going to reduce watershed lands, and they are doing so even as we sit here speaking. I think -- as I said before -- time is of the essence. We have waited a long time. We thought the moratorium would help, but then the BPU made the lands that we are discussing here in Haworth exempt from the moratorium, so we were back in the business of trying to do what we could to preserve the property back there. On a town level, we are not equipped to do that, because we have to treat them as if they were a regular development company, which they are when it is transferred to Rivervale Realty.

I believe the only help we can get is from people like you on a statewide level. Thank you very much.

SENATOR CONTILLO: Thank you. Mayor, would you like to speak -- Mayor John DeRienzo? (affirmative response from audience)

M A Y O R   J O H N   D E A N   D e R I E N Z O: Thank you, Senator. I will confine my remarks to the Borough of Haworth and what I consider to be the fiasco we have gone through for the last seven years.

First of all, I am very fortunate because our Environmental Commission, our Planning Board, our Council, and the vast majority of our population have mandated "no development; protect the land." That is the objective of the Borough, and that is what we are trying to accomplish.

I applaud you on your efforts with the bill you are trying to get through, because if we had had that bill going back seven years, we would not be in the situation we are in today.

I see two basic problems: The blame, as far as I am concerned, is at the State level. The reason it is at the State level is very simple: It is illogical that the State of New Jersey does not have a comprehensive plan to deal with this type of a situation. With the amount of attorneys we have on staff, with the amount of environmental experts, and with the information we can obtain from other states, it should be an easy matter to have done. At this particular time, we do not have anything like that, and that is a burden. I hope you are successful with this bill because we certainly need it.

The second problem I perceive is the individual departments operating within the State not coordinating their activities. If I were to try to get a stream encroachment permit from DEP today, I would have a stack of regulations, rules, and so forth that thick (demonstrates) on how to do it. When it comes to this topic, there are none.

The cross-acceptance plan -- which everybody has spent an awful lot of time working on -- clearly defines the individual areas. Within the Borough of Haworth, our land that we are concerned about has already been denoted as a Tier 7. Unfortunately, that is not recognized by either the Council on Affordable Housing or the DEP, because there are no teeth in that legislation.

It is very important that all of the departments get together so we can have one comprehensive plan. If this had

been done seven years ago, then the individual efforts of people, and their money to hire lawyers, etc., would have been totally unnecessary. It is the State's responsibility. The boroughs and the towns cannot afford it, and we need help.

Thank you, Senator.

SENATOR CONTILLO: Thank you, Mayor. I would just like to remind you that seven years ago, I was a private citizen. (laughter)

MAYOR DERIENZO: I forgot that.

SENATOR CONTILLO: I do agree with you that the last-minute approval by the BPU -- it was literally the last few minutes when they did it -- and the poison pill provision they put in there, are simply unconscionable and, hopefully, may prove to be illegal.

I have one more person from Haworth who also signed up -- Henry J. Gripenburg. Henry, you gave me a statement, didn't you?

MR. MATIOSKA (Committee Aide): It's on the table there.

H E N R Y J. G R I P E N B U R G: Excuse my voice, but I do suffer from allergies from all the heavy vegetation.

SENATOR CONTILLO: Not from the water you drink?

MR. GRIPENBURG: No. I would rather let the vegetation grow around the reservoir and suffer with the allergies. I need clean water. Also, as a businessman locally, I depend on commercial growth. Again, I depend much more for my life on clean water.

Over the past several months, I have seen various full-page newspaper ads telling us what wonderful tap water we have. I really wonder, who paid for these ads? It states on the bottom both names -- the Hackensack Water Company and United Water Resources. I wonder if the ratepayers paid for it, many of us who depend on bottled water as our only dependable source, or is it the stockholders who paid for it,

the ones who are going to benefit directly from releasing the filtration barrier. Ratepayers bought the land, but at times were paid much less than the cost of the land. We were never paid the market price. Why is land which was never bought by stockholders allowed to yield them such obscene profits? Woodcliff Lake property during the '80s is an example of this.

Development being allowed while there are no existing standards for watersheds is beyond belief; also, allowed by a company which keeps telling us they can filter any water, but never mentioned to us the cost of newer or better technologies. They never mentioned the efficiency or real dangers. They never discussed future requirements if they overload the system. They never discussed the testing for viruses, bacteria, heavy metals, and other contaminants.

The ads also described the great effort they went through to get we in Bergen County sewers. They didn't mention the profit the sewers will help them to obtain by selling land that was otherwise unbuildable. They didn't mention that sewers leak; sewers overflow; and other sources of discharges occur, as stated earlier, and also in the Havens & Emerson Report, section 3, pages 5 through 10. They never discussed the real costs of sewers to present homeowners. What happens when the Federal Sewer Discharge Standard becomes stricter? We are now facing an average surcharge per homeowner, I've heard, of \$100 to work on a plan to get rid of the sewerage sludge. Present methods will be obsolete very shortly. Just the surcharge is greater than what my old septic tank cost me 10 years ago before the sewers.

They have sewers through most of Bergen County. Old Tappan doesn't. There are large spills in Lake Tappan. County sewer trunk lines are near most reservoirs. A major pumping station is within 50 feet of the Oradell Reservoir. To me, it sounds like a sincere danger. Sewers are subject to breaks. There were several in the Oradell area. I believe that our

northern reservoir is transferred to the lower reservoir areas here, partially by a local river that has sewerage discharge plants going into it.

Since they are so high on sewers, I would like to know why they are building along Lake Tappan. Old Tappan, again, has no sewers. They use septic tanks. Over the past few years, they have built many houses near the reservoir on released Water Company land. Now I heard that a well supplying a resident along O'Connor Lane -- which is right in that area -- is now closed because it became dangerous. What do we need to show the danger of pollution, an epidemic? I want to know how many wells have been closed in North Jersey in recent years due to the danger of the groundwater. They never state that in the newspaper ads.

I understand now that there is a developer requesting a variance to build 110 townhouses in Old Tappan, behind the Bistate Plaza. Again, they don't have sewers; they only have septic tanks. I really wonder, with a company which has so much to gain by land sales, if the land sales were public and revenue only went to the ratepayers, how much land would actually be developed?

How can a watershed buffer be explained in simple terms as distance? We need soils, vegetation, area drainage to figure the formula. I really question development without future study. I must add, I hope it is not companies affiliated with New Jersey United Water Resources.

As a lifetime resident, I have seen the water get worse throughout my lifetime. An old saying I would like to bring up comes out of Lancaster, Pennsylvania: "Land is not inherited from our parents, but borrowed from our children."

Pass the bill to save the watershed. Thank you.

SENATOR CONTILLO: Thank you very much, Henry.

Again I am going to ask, is Jim Appleton here?  
(negative response from audience) Yes?

M A R T H A C. G R E E N: (speaking from audience)  
Senator, may I speak for Jim Appleton? I am from the  
Hackensack Water Company.

SENATOR CONTILLO: Okay. He called to be put on the  
list today. That is why I asked for him. I thought there  
should be someone from the other side to comment on what we are  
doing.

MS. GREEN: That would be myself, sir.

SENATOR CONTILLO: Okay. Would you like to come  
forward to comment?

MS. GREEN: Thank you, Senator. You threw me off  
before when you asked for Jim Appleton. That was why I didn't  
jump up at that time.

SENATOR CONTILLO: Would you please identify yourself?

MS. GREEN: Yes, sir. My name is Martha Green. My  
title is Vice President of Public Affairs with the Hackensack  
Water Company.

SENATOR CONTILLO: The Hackensack Water Company?

MS. GREEN: Yes, sir.

SENATOR CONTILLO: Okay.

MS. GREEN: I want to thank you for giving me the  
opportunity to speak today before you concerning this proposed  
bill and other issues that I know are on your minds and have  
been reflected in some of the earlier comments. In addition, I  
will ensure -- as we have done in the past -- that responses  
are provided after the hearing to questions raised here today  
by either yourself, your fellow Committee members, or other  
speakers.

The subject of the hearing today and the name of the  
bill is Watershed Protection. We're delighted to see attention  
focused on the value of a comprehensive watershed protection  
program, which until recently was an unheralded and  
unappreciated science. But, not for us.



Hackensack Water Company supplies water to 750,000 people in Bergen and Hudson Counties. Since its founding in 1869, the company's principal source of water supply has been the upper Hackensack River. The water system today consists of four reservoirs in the Hackensack watershed which hold more than 13 billion gallons of water. I should note also that a major supplementary source is from the Wanaque South Project, which uses part of the Passaic Basin.

The freshwater portion of the Hackensack River watershed drains a bistate watershed encompassing 72,000 acres. At least half of that land is in Rockland County, New York. The watershed is home to more than a quarter of a million people. It includes schools, gas stations, office buildings, shopping malls and, unfortunately, a few landfills, which I will discuss specifically in a moment.

Senator, I am trying to be brief. I will have a more comprehensive statement.

SENATOR CONTILLO: I will give you each six minutes. That's okay.

MS. GREEN: Each six minutes? Oh, good, I'll take his, okay. Thank you, I appreciate that.

Our water supply is unique among major surface water supplies in the United States in the respect that the watershed is not far away in the hills like the supplies serving New York City, that of Tacoma, Washington, Boston, or Los Angeles. It is right here, overlapping the area we serve.

The developed nature of our watershed requires a special vigilance on our part. It always has, and it always will. Our approach has evolved over the years to adapt to changing conditions and technological capabilities. Our approach is a comprehensive, multifaceted watershed management strategy -- not a reliance on one or another technique, and I will have a little more to say about that in a moment.

We have a clean watershed and a good quality raw water supply. In the last 30 to 40 years, our raw water supply has gotten cleaner.

The single most important pro-environment event in our watershed was the completion of sewers throughout the watershed during the late 1970s. That did not occur without our help. We invested \$1 million -- our company did -- in the Rockland County sewer system. I found out today that we even did some of the preliminary engineering work. In the 1950s, we built and operated our own sewer in Westwood for quite a few years before the BCUA was formed, as a protective tactic for the Oradell Reservoir, and we have donated hundreds of acres of land in easements to facilitate sewer construction. As a result, there is no sewage discharge in the Hackensack watershed. The three remaining towns in the watershed served by septic systems include Old Tappan, as one of the earlier speakers noted, but he did not comment -- perhaps he was not aware -- that Old Tappan has a sewerage program in the works, which the company is working on with them.

Our watershed program also includes testing. We are not required to do any watershed monitoring, yet we do so aggressively. The company patrols the remote corners of the 72,000-acre watershed, testing water quality in feeder streams, miles from our reservoirs. We test water samples from 38 locations throughout the watershed on a monthly basis, more often and with other locations as needed. Water at our intakes and reservoirs is tested continuously.

An example of the monitoring component of our program, which you may be familiar with recently, is the accelerated monitoring we have gone into in the upper Hackensack River near West Nyack, where concerns have arisen about the discovery of traces of dioxin near an old landfill. Dioxin was not found in the water, nor was there any dramatic evidence of other contamination from this landfill, or any of the others nearby.

These results did not particularly surprise us, because we have been monitoring this location for decades.

It was our watershed monitoring program that first detected a volatile organic discharge from an industrial site in Tenafly, for example, another example that has been publicized, into a tributary to the Hackensack River. Local authorities and DEP were called in through our efforts.

Our people are always there to assist State or county authorities with cleanup efforts in the case of spills of gasoline, oil, chemicals, or sewage, which are inevitable in a developed watershed. We respond to everything that is reported to us or looks suspicious, including a fair number of wild goose chases, but we believe it is worth it to be sure.

We also review proposed development in the watershed to ensure that water quality is not compromised. We protested, time and again, the siting of landfills. We protested the development of flood plains. We were not always successful; but sometimes we were successful, and in most cases -- in many instances -- we were successful because we had government as our ally.

We have surrounded our reservoirs with hundreds of acres of undeveloped buffer zones to help shield the water from pollution. That is a fact, and that remains a fact. Ours was one of the first efforts in the United States to scientifically quantify how much land is required for reservoir protection.

Hackensack Water's reservoir system covers 6000 acres of land, all of which is open space. About half of this land lies under our reservoirs and most of the rest of it -- 2500 acres, not 1000 -- surrounds and protects our water supplies.

The proposed legislation you are considering today relies heavily on the DEP report on buffer zones, which we have heard other testimony about, and which you certainly know, Senator, was sponsored by your Public Law 1988, Chapter 163.

There is a lot in the proposed bill today which we agree with, and well we should. The DEP report on buffers cautions against reliance on buffer zones as a sole component in water quality protection, and instead recommends precisely the kind of broad watershed management strategy we use, even to the point of echoing the need and the wisdom of a site-specific, scientific approach to determining what size buffer is required to protect a water supply reservoir.

But while the DEP report advocates a range of buffer zones from -- or, I should correct myself -- a minimum range of buffer zones from 50 to 300 feet, it has the wisdom to stop short of advocating a pat formula. I think you have heard other comments to that effect as well. We agree with that. We think there is good reason for that.

Legislation should not attempt to preempt good engineering judgment and capable professional and scientifically sound regulation. We think that could be dangerous. The New Jersey DEP already has the authority -- as another previous speaker pointed out -- to regulate water suppliers. Regardless -- I am departing from my written statement here a little bit -- it is certainly within your prerogative to enact legislation that goes beyond what is presently being done. Our position is that what is presently being done is what is necessary. If, in fact, however, you believe there is a need for this additional legislation, we will work with DEP to develop regulations that are sound and scientifically grounded, as we always have in our history.

I would like to say a few additional words about landfills. It is a sad fact that there are some landfills in our watershed. We don't like that. We have spoken out against this siting of landfills, but this was one of the cases where we were not successful. But let me remind you that we did not put landfills in the watershed. In most cases, local governments did; sometimes with State environmental approval.

I should note that most of these watersheds are in New York State -- most of these landfills. Some started as illegal dumps and still others were created by well-meaning industries following approved practices of the day, which only after a number of years and a great deal of scientific evolution were found not to have perhaps been as prudent as was thought then. Most of them are closed -- most of these landfills. Our preference is that they all be sealed.

Our response, however, to these landfills that we are stuck with, is to monitor them very carefully to make sure that if there is any trace of harmful leachate or surface runoff entering a water source, or a groundwater supply, that the environmental authorities are alerted and encouraged to take strong and decisive action.

We have not seen any significant degradation of our water quality due to these landfills or any other reason. Does that mean we are defending them? No, of course not. I have just said that.

I should mention, as additional proof, that most of the impurities we remove in our filtration process are from natural, not man-made, sources. Iron, manganese, and decayed leaves are by far the most predominant characteristics for which we must treat.

In closing, Senator, I have tried to provide you with an overview of the watershed protection activity the Hackensack Water Company conducts. I hope I have offered you some encouragement in fashioning your bill and fashioning the resulting regulations. I would like to say that we have had extensive water quality data and expertise. We offer them to the Committee, and any other resources we have that will help you to reach an objective and factually accurate conclusion to your work.

Thank you, Senator.

SENATOR CONTILLO: Is that a prepared statement you want to leave?

MS. GREEN: Yes, it is, and I have extra copies.

SENATOR CONTILLO: Okay. I was struck by the same question that Henry asked. Who paid for that ad I saw in the paper telling me about how wonderful the quality of my water is -- that full-page ad I saw?

MS. GREEN: I know the ad you are speaking of. That is part of the company's operating funds, and it is paid for by customers, just as pumping--

SENATOR CONTILLO: Customers?

MS. GREEN: Yes, sir.

SENATOR CONTILLO: As a ratepayer, I paid for that ad?

MS. GREEN: Yes.

SENATOR CONTILLO: Not the stockholders? Did you hear that, Ms. Kiernan? I think that is atrocious, that I, as a ratepayer--

MS. GREEN: I'm sorry you think so, sir.

SENATOR CONTILLO: --had to pay for an ad by Hackensack Water, for them to tell me that I am drinking clean water.

MS. GREEN: Well, we felt that was something that you needed to know.

SENATOR CONTILLO: You bet your life I need to know it, and so does every other citizen. We don't believe what they tell us, but it is infuriating to even consider that I paid for that as a ratepayer. Phew, you blew me out with that answer. I thought you were going to fudge on it.

MS. GREEN: I never fudge, Senator.

SENATOR CONTILLO: The councillor knows how I feel about the quality of water. I demonstrated it to him visually -- the quality of the Hackensack Water. When I have four times as much chlorine in the water that comes out of my tap as I have in my swimming pool-- I'm shocked that I had to pay for

that ad. We are going to write to the Board of Public Utilities Commissioners to ask them to examine that and make a recalculation of it.

Let me ask you another question: You seem to agree that they shouldn't be infringing on the watershed area of land, and nobody is accusing Hackensack Water Company of putting landfills--

MS. GREEN: No, I never accused anyone of making such an accusation.

SENATOR CONTILLO: We don't blame you for the landfill. There are lots of people who consider that that landfill has been used as a toxic dump site. There have been some criminal allegations made up there, but they were never followed through on.

MS. GREEN: That wouldn't be the first time.

SENATOR CONTILLO: Yes. Unfortunately, most of all landfills fall into that category. I think the question we are posing to the company is: Are the tests that you make now adequate, because you, yourself, have stated, that you don't want to see a landfill there? The New Jersey State Water Quality Inventory Report tells us that there is, indeed, leachate running out of the landfills there into the Hackensack water. You indicated that you think landfills are dangerous. They tell us that leachate is running into the stream. And you tell us that you can't find anything wrong with it.

Now, I hope you are testing for the right things in the right place at the right time. I don't know if you ever find dioxins floating in the water. You may have to go into the sediment; you may have to go into the animals. So, you know, I can test in my backyard for something in the wrong place, even though it is there. I would look to you to back off on the public relations procedure and concentrate more on water quality -- true water quality.

MS. GREEN: Senator, I cannot stress adequately enough that the water quality is number one, and that we believe, without a shadow of a doubt, that the testing we are doing is adequate, is correct, is in the right places. We absolutely believe in the results we are finding.

SENATOR CONTILLO: But you don't test the sediment or the animal life or the fish life--

MS. GREEN: No, we don't. That is not--

SENATOR CONTILLO: --which is where the dioxins would show up.

MS. GREEN: Well, that may be the case, Senator. If that is so, then it is probably something that either the State of New York or the State of New Jersey should test. That is their decision. Our water is not drawn from West Nyack. Our water flows through 15 miles of river and two reservoirs before it is used for purification, and it is not present at our intakes.

SENATOR CONTILLO: Does the Hackensack Water Company have this -- what do we call it? -- comprehensive protection program? Do you have a plan?

MS. GREEN: A plan?

SENATOR CONTILLO: A total plan for our area, yes.

MS. GREEN: Yes, we do. Basically, it is the program I have just outlined, with some things I have left out for brevity's sake.

SENATOR CONTILLO: Could you send a copy of that plan to this Committee?

MS. GREEN: I will certainly send you an outline of our program in more detail.

SENATOR CONTILLO: See, it is disturbing, in a sense. DEP, part of that Department -- fortunately, those people are not there anymore -- held that the buffer area, the watershed area, was taking on less importance; that everything could be filtered out, and yet we have heard testimony today that,



indeed, for you to allow the pollutants to enter the stream-- In some cases they have, you know, specific permits. I guess the NJPDES permits, where you permit-- One is Weyrhauser, and the other one, which is even more interesting, is Teledyne. They have permission to dump directly into the Oradell Reservoir, is that correct?

MS. GREEN: I don't know whether that is correct or not.

SENATOR CONTILLO: Well, according to this it is.

MS. GREEN: I would have to check that out, Senator. I am aware that there are a few NJPDES permits in the watershed and we monitor those very carefully, because as one of the earlier speakers pointed out, just because there is a permit does not mean that degradation is permitted. We would not look very kindly on any degradation whatsoever. In fact, we have gone after other cases where there have been problems and made them clean up their act.

SENATOR CONTILLO: Just on the other side of that coin, just because there is a permit and they adhere to the legal permit doesn't mean that degradation is not taking place, because of the standards.

MS. GREEN: That may be correct. I can't answer that, frankly.

SENATOR CONTILLO: Okay. There is no one else here to ask questions, so-- You know, it's funny. A number of people have talked about Old Tappan. If my son, and my aide at the time, had not read in the press that Old Tappan -- in Old Tappan, right against the reservoir, they were building with septic tanks, this bill would never have been introduced. But, he called me on the phone and said, "How can you allow anyone to build with a septic tank against a reservoir?" I said, "I don't believe it is possible." We found out that it was possible. We found out that anything is possible. There were no rules and regulations governing it. This is what generated this bill a number of years ago.

MS. GREEN: The existence of septic tanks in Old Tappan was taken into account in the review of the watershed properties, and provided for in the establishment of the buffer for those areas of Old Tappan that are not sewered as yet. I did mention that there is a sewerage program in the works. Granted, I do not believe the ground has been broken, but that is a solution that we at Hackensack Water have hoped for for a very long time.

SENATOR CONTILLO: But, are those buildings going to be built anyhow with septic tanks prior to the completion of a sewer plan?

MS. GREEN: I don't know, Senator. All I can say is, the septic tanks, and the fact that the entire town is served by septic tanks, has been taken into account in the establishment of the buffer at Lake Tappan.

SENATOR CONTILLO: Okay, thank you.

MS. GREEN: Thank you.

SENATOR CONTILLO: Frank, do you want to add anything?

F R A N K C A P E C E, JR., ESQ.: Senator, just two points: I am very appreciative of the fact that you are going to leave the record open. We are doing a more technical analysis of the bill. I know you will read that. As is usual -- the policy of the company -- we limit our participation at these kinds of public hearings, because we do have the advantage of participating at the hearings in Trenton. I suspect we will have more of an analysis of the bill at that point.

Just one last point: At that time, and in our analysis, we would like to point out to you our views regarding the sale of excess property. You didn't comment, but I would be presumptuous enough to say it is an issue you know quite a bit about. As you know, regarding the sale of excess property, the vast amount of case law that has come down throughout the country holds, in fact, that the benefit that accrues from the

sale of that property goes directly to the shareholders, not to the ratepayers. I think any confusion has to do with determinations that have been made by Boards of Public Utilities or their like around the country, but certainly not regarding any litigation. But in order to clarify any questions you may have -- though I candidly don't think you will -- but any questions that may arise, will also be included as part of our response to this bill.

SENATOR CONTILLO: Frank, it is a simple, little, two-and-a-half page bill. If you have any comments, I would appreciate them in this century -- all right? -- because we are not going to wait forever. I do not appreciate last-minute attempts to make changes to a bill that has been here since years ago, which is here again before you today. If you have any comments, I would like to see them.

MR. CAPECE: Senator, your appreciation notwithstanding--

SENATOR CONTILLO: Because we will have another public hearing before the bill is released.

MR. CAPECE: Let me be candid with you. I understand the pressures of a public hearing, but let us be candid. I don't think there has ever been an opportunity that we have avoided to be not only candid, but also prompt in our responses. To the best of my recollection, I have not yet been chastised by you, Senator, for being untimely in any of our comments, either pro or con to a bill.

SENATOR CONTILLO: I'll get to that.

MR. CAPECE: We will be timely again.

SENATOR CONTILLO: Okay.

MS. GREEN: Thank you.

SENATOR CONTILLO: All right, now let's see if we can get some of the people who signed up earlier on. Richard Kane, New Jersey Audubon Society.

R I C H A R D P. K A N E: Senator and ladies and gentlemen: I am Richard Kane, Conservation Director of the New Jersey Audubon Society. The New Jersey Audubon Society, with 12,000 members in New Jersey and a mission in conservation, environmental education, and wildlife research, appreciates the opportunity to comment on Senate Bill No. 2339, the Watershed Protection Act, and related issues which are a major concern of ours.

The watershed lands in New Jersey are some of the best lands for open space, water quality, air quality, flood control, and pollution prevention, especially non-point, and wildlife habitat in the entire State of New Jersey. Large tracts of open land were established around water supplies, sometimes by eminent domain, with good reason. It is cheaper to keep the supply clean and pure than it is to clean it up later. As it turns out, there was great foresight in this planning for other values as well. In some areas of our crowded State, watershed lands are virtually the only open space left. One thinks of populous Bergen and Union Counties immediately. In some areas of the State, they are the best quality open space, forest, and wildlife habitat left, not only in the area, but in the State. One thinks of the Pequannock Watershed immediately.

The first point is that the technology which allows the clean outflow from the pipe doesn't change the original value of the set-asides. It is costly to clean up water and pollution. Watershed buffers are cheap. Not only that, but they provide free air quality control, free flood control, free wildlife habitat, and recreational lands. These other values of watershed open space are equally as important as water quality and mutually interconnected, which leads to the second point:

The State of New Jersey has tremendous open space needs. The State outdoor recreation plan called for

373,000 acres of open space. The Governor's Council on the Outdoors called for \$800 million to deal with our open space needs for recreation and habitat. The State plan calls for ordered growth in infrastructure areas so open spaces can be preserved. A recent issue of "Scientific American" devoted to the subject of managing the planet earth, called attention to the importance of contiguous forest tracts for conserving species, which are being lost at a rapid rate. The contribution that watershed lands make to the open space inventory and to the conservation of resources should not be lost owing to a shortsighted, narrow view of watershed lands that looks only at short-term economic benefits and neglects to look at the cost of open space and the cost of benefits that open space provides.

The problem has been that watershed protection and conservation programs have operated under different agencies, when in fact a unitary approach is required. In nature, water quality, habitat, clean air, and healthy forests are all connected. Our first imperative has to be to keep as much watershed land in open space as possible, not to figure out how little we can get away with. A funding mechanism or mechanisms have to be found to accomplish this. One solution may be to divert moneys from regulatory and judicial mitigation and compensation awards to matching Green Acres programs for municipalities. Tax incentives, set-asides, some outright acquisition, and some condemnation all may have to be used together to get the job done. The point is that these lands are different in values and in importance from other kinds of lands and they have to be treated differently.

The rules and regulations to be adopted by NJDEP establishing buffer zones for reservoirs need to take into account non-point source pollution, drinking water quality, and open space conservation, since every agency is a land manager. The lands around various reservoirs differ greatly in size,

which suggests immediately that some of our buffer lands may be on the small side right now for all buffer functions. Wanaque is surrounded by thousands of acres; other reservoirs by much less. The assumption has to be that diversion of watershed lands to other uses would occur only rarely. In order to protect these lands, the procedure for reviewing land conveyance proposals should, at a minimum, include the following:

There should be a comprehensive EIS required both for the entire watershed land and the particular parcel to be conveyed. The parcel may be a critical piece of the whole and might compromise the integrity of the whole watershed buffer if conveyed. A good EIS would also include vegetation, animals in all taxa, and an evaluation of the piece in relation to the lands that surround it. The EIS should come under the jurisdiction of the Natural Resources side of DEP, so that it is coordinated with other natural resource programs. There should also be a citizens' advisory panel drawn from various fields of expertise to advise DEP on the conservation aspects of such a decision, as well as the water quality considerations. Just quickly, that panel might include soils; it might include a land trust representative; someone from the area of fish and game; someone from recreation; and from all of the various value sides of watershed lands.

No transfers of land should occur before regulations are in place. Land uses at odds with good conservation practice should not be permitted on lands intended to conserve water supplies. Such land uses probably need to be spelled out in the regulations.

In summary, the imperative for watershed lands is to keep as much as possible open, not to search for a supposed minimum. Mechanisms have to be found to fund the conservation of watershed lands. The mechanisms may have to be unusual because these are unusual lands, eminently worth saving.

Thank you very much.

SENATOR CONTILLO: Do you have a copy of that?

MR. KANE: Yes, I do.

SENATOR CONTILLO: Okay, thank you.

Is Chet Mattson here? (affirmative response from audience) Where are you hiding, Chet? Please come forward. I am not going to give you enough time to tell me how man pollutes this world. I am just not going to give you that much time, Chet, but go ahead.

C H E S T E R P. M A T T S O N: Okay, I'll cancel that part. My name is Chester Mattson. I am Director of Planning and Economic--

SENATOR CONTILLO: You may put that up on the blackboard, if you want, so everyone can see it. (referring to witness' material)

MR. MATTSON: A picture late in the testimony sort of revives those who sit on your side of the table. That is the idea.

SENATOR CONTILLO: Which side?

MR. MATTSON: Your side.

SENATOR CONTILLO: My side, yeah, okay. Thank you.

MR. MATTSON: I am the Director of Planning and Economic Development for Bergen County. I have prepared a statement that has three main points.

First I would like to say that I particularly liked and paid attention to Richard Kane's emphasis. He was emphasizing, as I would like to, the wider statewide focus of the possibilities for protecting watersheds the State across. He focused on how environmental quality can be gained by protecting natural systems adjacent to such features as reservoirs. I intend to do the same kind of thing. He talked about how land uses relate, in their conservation practices, to water quality in places like reservoirs, so I am glad to have been preceded by Richard Kane.

I would like to start with a couple of general statements about water. I have as the main point in making them that you have touched upon and have introduced legislation regarding what is, in my judgment, New Jersey's most compelling environmental issue. I think that drinking water quality has attained a level of supreme significance in our State, and I am glad to see this subject becoming what the State now deals with in your legislation.

I am going to focus a little bit on an article -- which I will provide you a copy of -- written by Peter Rogers in "The Atlantic Monthly." Peter Rogers is the Gordon McKay Professor of Environmental Engineering at Harvard University, and he is as good as any water quality and water supply expert in the country. I commend his writing to your attention, and I will be glad to share what I have of his work with you.

The visual aid I bring is of the water cycle taken from a "National Geographic" illustration. I will be making a couple of references to it.

The second thing I want to do after focusing on drinking water as the State's most compelling environmental issue, in my judgment right now, is to take as my point of departure for some comments, the water cycle. That is to say, water evaporates from the ocean, forms clouds, and some TV weatherman says it is going to rain tomorrow, and usually it does, and the rain falls from the sky. That establishes the pathways -- begins to establish the pathways that water takes en route to a reservoir and to our taps. It is protecting all of those pathways that are, in my judgment, very important in protecting drinking water quality. Water falls from the sky. It hits the landscape, and it either skids across it if it is paved, picking up hydrocarbons, and lands in a reservoir or a ponderous stream; or if it hits the earth, two things happen to it: It penetrates down to groundwater and sits in aquifers --



these are just underground basins and streams -- or it moves across the lens of soil into our reservoirs or ponds and lakes. In the travel, it picks up opportunities to be contaminated. Shutting off those opportunities is the subject of your legislation. And either in other legislation that you contemplate, or perhaps in expansions of this bill, there are opportunities to think of some more of those pathways, in addition to the excellent ones that you meant.

So, the water cycle, to me, becomes a way to find the places where you either solve problems or settle issues. Now, the different problems that you solve-- How to get to the moon is solving a problem. Settling issues, whether you go or not, is also another aspect of this thing. There are some issues to settle here: How much protection can you give water?

The third area I want to make a couple of comments on is, are the tools available to promote and protect drinking water quality? There are quite a batch of them. I am going to quote from, and make reference to several good tools that are listed in Volume 3 of the draft State Plan. I am fond of calling that the "Time/Life Handy Home Repair Kit for Municipal Planning Boards." How many steps are there available to ordinary mortals to protect the water supply? That volume is rich in examples.

First, a couple of thoughts just about water, particularly drinking water. Three-quarters of the world is water. Why isn't there more of it to use? It has something to do with the fact that we can't capture very much of it for drinking purposes at any given moment. So, while there is a lot of water that forms everyday and reforms, two things are very apparent: There is not an awful lot of it that we are able to capture and carry from year to year, from shortage to surplus and, therefore, small basins of water become very important to protect.

The second point about all of this water in the world, is that there is no new water. Every drop of water that we use, we're reusing. It fell someplace else some other time in history and went through the cycle and went back up into a cloud. So, any protective steps we can take because of legislation that you propose, not only protects the next rainfall, but tens of thousands of rainfalls that follow. We're talking about steps that have intergenerational impacts for us; that deal with the fact that there is no new water under the sun.

Generally, I am very happy to say to you that we have the technology and the management skills to deal with water quality -- drinking water quality. It is a matter of coming up with the right ideas and generating the will to do it.

What gets in the way of this puzzle most frequently, however, is the fact that we invent new contaminants every year, and every year we find new ways to measure the existing ones in our midst. Peter Rogers writes a lot about this, and I am only going to give you his conclusion: We discover and measure contaminants much more quickly than we can demonstrate their health effects. That is something we are going to be with forever. He calls it "the inexorable deficit." We cannot tempt ourselves to think that we will not protect our water until we understand all of the health effects. We are not going to understand them all in time. That is an issue to settle in your legislation, an approach to take. We've got to be willing to act on incomplete information, if we are going to protect our water supplies.

Rogers tells us that setting levels for contaminants -- that it is an never-ending game of catch-up. The public does not like that, but we have to come up with protective mechanisms that are put into place before all the data are in. We should not listen to people who make us want to wait. We can't afford to.

Groundwater: We only started looking at groundwater in this country in 1980. At that time, the EPA discovered that 34 states had major contamination in their groundwater, most of them being east of the Mississippi. So, groundwater is as important to protect, and as difficult or more difficult to protect than surface water. I don't know if you contemplate taking that on in future pieces of legislation or incorporating it into this one?

SENATOR CONTILLO: We are, and in many, many different ways.

MR. MATTSON: Excellent.

SENATOR CONTILLO: All the way from reduction of the original source-- You know, that is where it's at. We are almost fighting a rear guard action with what we are talking about today.

MR. MATTSON: That's right.

SENATOR CONTILLO: We are going to the source of this stuff, to be in it, to reduce it, to eliminate it.

MR. MATTSON: Excellent. You just saved yourself a half an hour.

SENATOR CONTILLO: Saved us a page? Chet, I haven't done this to anyone else, and I am loath to do it to you, but I have about 15 more people. If each one only takes six minutes, I can get them all on.

MR. MATTSON: Okay.

SENATOR CONTILLO: So, if you could kind of wrap up, I wouldn't object to it.

MR. MATTSON: The last point that Peter Rogers makes -- by way of kind of an introduction to this kind of a puzzle -- is that water supply and water quality for drinking water are largely in the hands of the states. The Federal government stays pretty much out of it, so this is a particularly important kind of environmental issue for the State to be involved in.

The second thing I would like to mention is-- I think I would like to give five or six examples of the kinds of tools that are available to protect water supply, either as part of buffer requirements or in addition to them. They focus on the fact that there are many pathways by which water reaches reservoirs, and we should be looking at them all.

First, protecting water supply sources: The draft State Plan has some wonderful sections in it. I am going to refer to just a few of them, and I will supply you with some writing with specific--

SENATOR CONTILLO: What did you call it?

MR. MATTSON: The draft State Development and Redevelopment Plan, Volume 3. It has 30 or 40 pages that are a kit bag of tools for you to consider for incorporating into the legislation. I will give you some examples. That draft State Plan, which takes a growth management approach, is very attractive to me as a way to get at water. We have been focusing on water as something that people pollute and as something to be protected from pollution. The major issues that relate to water in New Jersey now, are those that relate to how we use the land. Therefore, starting with a focus on how people use land is a productive way to gather ideas for this legislation. Here are some examples:

DEP and the counties and municipalities, suggests the draft State Plan, should prepare master plans at all those three levels that relate development to the availability of water, present and future. You should measure your present and your future needs. You should be giving permits or not, based on the storage capacity available now, the amount that will come, the treatment capacity now, the amount that will be available as we grow, and particularly the distribution capacity as we grow. This is a dimension of planning for water that contemplates future growth, and sets at local and county levels, as well as the State level, the kinds of standards that can protect us.

Second, growth capacity analysis then becomes a very important part of it. A town or a county should start with a growth capacity analysis as the basis for a water management plan, and then you come up with performance standards to protect both your surface and your underground water supplies. Development in this kind of a setting should be authorized only when it will not adversely affect water quality and drinking water supplies. That is getting back to land use as a focus of some of the things that ought to be in this bill -- could be put into this bill -- for you to consider.

Municipalities should participate, suggests the draft State Plan, in the management of public water systems. They should set up permits and service contracts with water purveyors as a way to conduct the land use control business. An interesting idea.

Another one: Municipalities, counties, and DEP should develop and encourage the use of landscaping design techniques that will conserve water supplies and reduce demand. These are kind of the best management practices of the kind that Dick Kane was talking about. I know he thinks of a lot of others, as well.

We should think about managing development densities and locations according to where our drinking water sources are and how well they are protected. This can be part of the local master planning process. There are a lot of places to lodge these kinds of controls. We ought to get maximum use out of our natural ecosystems. Natural ecosystems are very helpful in protecting water quality. So in the vicinity of surface water storage areas for drinking water, we ought to be very careful about restricting development on the one hand, and on the other, leaving natural ecosystems in place to help to treat pollutants that are already gathered in the water by the time they get that close to a reservoir.

Similarly, DEP, cities, and municipalities should develop management practices for non-point source pollution. The new word this week is "pointless" pollution.

SENATOR CONTILLO: Non-point.

MR. MATTSON: Yes, but it is kind of zippier if you call it "pointless." (laughter) You have talked a little bit about that, so I won't belabor it. But it should be in the kit bag of tools.

Counties and municipalities should require that new development in their jurisdictions incorporate management practices such as these as conditions of approval for development. Another one: DEP, cities, and municipalities should regulate the location, design, and development of structures that involve the use and storage and treatment and disposal of toxic and hazardous materials, so that none of that goes on near a reservoir. Those are things that can occur in county and local instruments, as well as at the State level.

DEP, cities, and municipalities should establish the provision of adequate water supplies and facilities under the conditions of approval of new development. I have already mentioned that one. Municipalities should identify and protect from on-site development, natural resources of particular significance. You think of stream corridors that lead to reservoirs; you think of potable water supply reservoirs; and you think of aquifers and aquifer recharge areas as natural resources that ought to be protected anyway, but which as protected, as Dick Kane mentioned, end up protecting your water quality as well.

There are others. Development capacity should be determined at local and county levels. That begins with analyzing the extent to which development can proceed in harmony with potable water quality.

Well, there are more, and I will give you some examples--

SENATOR CONTILLO: Well, Chet, those are all available to us in the State Master Plan.

MR. MATTSON: Yes, they are.

SENATOR CONTILLO: I appreciate that.

MR. MATTSON: I think they broadened their concept of buffer strips, A; and B, they broadened the number of places where protective steps can be lodged. Both should relate to the pathways of water as it falls through the air and starts to encounter the opportunities to become contaminated.

That is the general thrust of my remarks. Now, for my second half hour--

SENATOR CONTILLO: What you have also said to me is that you certainly do not subscribe to the idea that buffers are not necessary and we can do the job with a black box.

MR. MATTSON: Exactly. I didn't run on too much about Peter Rogers, but he does make a point that we all know: The further downstream in the use of water you start to protect against it being contaminated, the more it costs. The obvious--

SENATOR CONTILLO: The less effective it is.

MR. MATTSON: Yes, and the less effective it is. But wastewater that you have to treat after it has picked up its contaminants cost somewhere between 10 and 100 times as much as wastewater that is pretreated or, happily, not generated. So, the further down the process you get, the much more expensive it gets, and that is part of intercepting potable water quality early in its pathways.

SENATOR CONTILLO: Thank you, Chet.

John Sheridan? John, please identify yourself.

J O H N P. S H E R I D A N, JR., ESQ.: Mr. Chairman, my name is John Sheridan. I am an attorney with the law firm of Riker, Danzig, Scherer, Hyland & Perretti. I am here on behalf of a company known as the Samus Company, which is a developer in Somerset and Morris Counties; other areas of the State also, but principally in Somerset and Morris Counties.

First of all, let me say that I have enjoyed the hearing today. I thought it was lively. I heard a lot of things I hadn't heard before. I guess I didn't fully realize the background that led to this particular issue. Particularly, it seems to have a lot of Bergen County emphasis.

Let me say that I am not here to oppose the purpose of this legislation. Frankly, I would say, you know, any citizen of the State, any developer, anyone is concerned about clean water -- has to be concerned about clean water. I would also say that I am not here to speak about the watershed lands that are in either public ownership or that are in public utility ownership. I think that given appropriate mechanisms for compensation, if they are in order, that all of that land probably ought to be preserved. I think it is a very nice heritage for the State of New Jersey.

I am concerned about the legislation, notwithstanding general support for the purpose and general support for the preservation of existing watershed lands. The trouble I see is that people are using watersheds in very different ways here. There are statements where you are not sure whether they are talking about watersheds that are already totally owned in the public domain or the public utility domain, or whether they are talking essentially about all of New Jersey, because all of New Jersey is in one watershed or another.

Let me get back to my prepared text so I don't get out of some logical order. I believe that this legislation, the way it is presently drafted, could achieve its purpose, but I think you ought to go about it in a different way. I think it is an unwise and over broad delegation of authority to the Department of Environmental Protection. The legislation appears to be based on the December 1989 report from DEP to Governor Kean, the Legislature, and the Board of Public Utilities concerning buffer zones around public water supply reservoirs.



What started out as a legislative effort to prevent land immediately adjacent to a reservoir from being developed, now appears to give DEP almost unfettered discretion to control development within one-third of New Jersey. I reached this conclusion by reading of the proposed legislation, along with the above-mentioned report. This bill requires DEP to establish buffer zones for all watershed lands associated with public water supply reservoirs, including water supply intakes and tributaries. Watershed land is defined to mean those lands located above or upstream from a terminal water supply reservoir or surface water intake, including the lands surrounding tributaries or feeder streams entering the water supply reservoir.

How much land will be regulated by DEP under these definitions? The answer is provided by the DEP report -- 2802.2 square miles; see Table 6 of the report. The total square miles of New Jersey is 8204.37 square miles. Thus, more than one-third of New Jersey will be regulated as watershed buffer zones by DEP if this bill becomes law.

To put this in perspective, Bergen County is 246 square miles; Passaic is 198 square miles; Monmouth is 538 square miles; Burlington, 827; Mercer, 228; Camden, 225. From a review of Table 6, it appears that most of Bergen, particularly in the northern part, most of Passaic, Morris, Sussex, Warren, Hunterdon, Somerset, Middlesex, and Monmouth Counties will be subject to DEP regulation, along with portions of Atlantic and Salem.

What does this mean in practice? I don't know. There are no specific guidelines governing DEP in this bill, but in its report, DEP suggests a multi-zoned buffer approach. The first zone -- the protective zone -- would be what DEP describes as a minimal buffer of 50 to 300 feet. It is not clear to me whether the 50 or 300 feet is on each side of the river, stream, brook, or trickle. I am not sure what tributary means. I am not sure what feeder stream means.

The report indicates a larger buffer of more than 300 feet may be required to protect existing water quality. Presumably, nothing could be built in this protective zone. The second zone -- a special management zone -- would extend, "from the edge of the protective zone as far upland as would be necessary to achieve its intended function of providing regulation of land use activities occurring upslope of the protective zone." I would suggest to you that in a watershed, that is all lands, because as soon as you get as far upland as you can go, you will start into the next -- into the very next watershed. It couldn't otherwise be.

Within this zone, certain land uses may be prohibited. In this zone, in addition to certain land uses being prohibited, special BMPs, or best management practices, would be required to reduce sediments and pollutants. I happen to think that there is a lot of merit to best management practices in areas where they are needed, but I would just tell you, at this stage of the game, there is no definition of what is meant by "best management practices." So, are we basically saying to DEP: "Do whatever you want"?

All other watershed land would be in a standard BMP zone where standard non-point source pollution control measures would be implemented. Would DEP implement this report and its suggestions? I don't know, but I do know that this bill is essentially giving DEP carte blanche to do whatever it wants to do. It can regulate this 2808.2 square miles as it sees fit. DEP could decide that 500-foot or 1000-foot buffers are necessary. It could even decide that any development or redevelopment -- I should emphasize redevelopment -- is inappropriate in the entire area, if it wanted to. I don't think they would do that, but I think this bill would give them the authority to do that.

It is unwise to pass legislation without giving DEP specific guidelines. It is also--

SENATOR CONTILLO: I couldn't agree with you more.

MR. SHERIDAN: Pardon?

SENATOR CONTILLO: I couldn't agree with you more.

MR. SHERIDAN: It is also probably unconstitutional. It is also unwise to pass this legislation before DEP presents specific maps showing the effects that a buffer zone program of 300 feet on each side of every river, stream, brook, or trickle would have on developable land in the watershed areas covered by this legislation. When I use "watershed," I am using it the way it is used in the bill, which I think is all of northern and western and much of central New Jersey. I think at least that DEP should give examples of how this would work in one or more watersheds, so that the public could see the effects of such a program.

Is the Legislature going to leave it to DEP to decide whether these protective zones can be crossed by bridges, roads, and utilities?

What effect will this legislation have on sites designated for Mount Laurel housing, but not yet built?

How does this program square with the negotiated aspects of the statewide plan which are currently in the cross-acceptance program?

What effect will this legislation have on land municipalities have set aside for schools or other purposes?

Is the Legislature going to leave it to DEP to decide what happens to projects that are approved or in the process of being approved when this legislation and the regulations promulgated by DEP take effect?

Is the Legislature going to leave it to DEP to decide what happens to existing development within a protective zone if it is damaged or destroyed by fire, flood, or other calamity?

Is the Legislature going to pass this legislation without knowing the impact it will have on the tax bases of the municipalities affected? Right now, there are literally

thousands of tax appeals over the wetlands buffer zones which were going to reduce the tax bases in municipalities throughout this State. This is going to have a similar broad-based impact. We ought to know what that impact would be before we take these steps.

Is the Legislature prepared to pass this bill before the municipalities affected by this bill have an opportunity to assess and comment on a very specific proposal?

Even the wetlands legislation which has caused such controversy has specific standards to guide DEP in the adoption of its regulations. I urge this Committee to continue its work, but to go back to the drawing board and come up with a specific proposal, and then subject that proposal to a public hearing process so the Committee will have meaningful input from the affected parties. Three far-reaching bills of a somewhat similar nature went through extensive hearings and work sessions before final bills were adopted -- the statewide planning legislation, wetlands protection, and highway access management. This bill, in my view, is equally far-reaching. It is very laudable in its purpose. I believe some legislation is necessary and needed, but it should be put through a similar vigorous scrutiny once a detailed proposal is submitted to the public.

Just one thought on what ought to go into such legislation: I don't think protective buffers can be decided in a vacuum, without dealing with best management practices. I think, for instance, if a developer, if a municipality is willing to implement more rigorous best management practices, then it ought to get some leeway in terms of buffers.

But at any rate, I guess my basic point here is, I don't think there is enough guidance in this legislation for DEP. I don't think the municipalities around the State, and I don't think that the development community around the State will have enough input into this process if it is turned over to DEP before those guidelines are put into place.

I would urge the Committee to really work hard to establish some guidelines, and to know the impacts. Senator, maybe you didn't hear my comment, but I think one thing that really ought to be done is, take a couple of watersheds, have DEP lay out what would happen in these watersheds; what would happen in a watershed up in western Morris and Sussex Counties if you had 300-foot buffer strips around every brook, stream, river, tributary, and trickle of water. What would happen? What would that mean to those communities that are planning their future under the statewide plan for the next 100 years? What would we do to the statewide planning process that is already taking place -- is in the process of taking place?

SENATOR CONTILLO: Excellent testimony. You have focused in on some problems. The purpose of the hearing, of course, is to generate just those specific questions you have raised and specific direction to DEP. I have no intention of leaving this to DEP. Possibly though, my problem is coming from a different direction, maybe just diametrically opposed to the questions you raised about too much being done. I understand exactly what you are saying -- the potential, if you took this the way it could be done-- There are so many of us who worry that the opposite will happen; that we will have a meaningless set of buffers. So, I think they are going to get some very strong direction from the Committee.

Now, if you have specific suggestions, we would be very happy to read them.

MR. SHERIDAN: Mr. Chairman, maybe you could share with us, how do you see the process moving forward from here?

SENATOR CONTILLO: The fact that the State is on its knees financially will probably slow this process down. Normally I would say to you that I would be prepared to release this bill during the month of June. I am somewhat apprehensive that the budget crisis will come upon us, and this may get put off. But it is my intention to hold at least one more public

hearing. Not a public hearing, excuse me. There will be another Committee hearing before the bill is released, but there will be weeks and weeks between that and now. So, if you have specific recommendations, I would be happy to hear them -- not hear them, read them.

MR. SHERIDAN: Thank you very much.

SENATOR CONTILLO: Rosemarie Seery? I am going to try to take you now as quickly as I can, in the order in which you have signed up.

It's 5:00. We will be interfering with the judge if we stay after six. So please try to stick to your five minutes, if you can.

R O S E M A R I E S E E R Y: It was six minutes before.

SENATOR CONTILLO: I know, but it's down to five now.  
(laughter)

MS. SEERY: Only for public officials, right?

SENATOR CONTILLO: Public officials can't say anything in less than six minutes.

MS. SEERY: Less than what?

SENATOR CONTILLO: Public officials can't say things quickly, you know that.

MS. SEERY: Well, I ran for office last year, so do I get six minutes?

SENATOR CONTILLO: So, give you six minutes? You've got it.

MS. SEERY: I am Rosemarie Seery. Thank you for inviting me here. I am from West Nyack, New York. I was asked specifically to speak about where your water is coming from.

The water in the West Nyack area starts, probably, about four or five miles north of West Nyack in Lake Lucille, in northern New York, comes down through the Hackensack into Lake DeForest which, of course, was the Hackensack River which was dammed up, made into Lake DeForest, and then continues down into the Hackensack River through West Nyack, Blauvelt, the rest of Orangetown, and into New Jersey.

In the West Nyack area where I live, I have been fighting the hazardous waste sites there since August of 1983. It will be seven years. The Clarkstown Landfill is a 100-acre dump. It was an unregulated dump. It was just an open field up until the 1970s, when it became regulated by the Department of Environmental Conservation. There is also-- I will list the names of the dumps for you. These are all on the Superfund list of inactive hazardous waste sites. Now, let me preface that by saying that inactive does not mean they are closed. Unlike what Ms. Green said, they are not closed. Inactive just means that portions of these landfills may be that -- inactive -- but the rest of them are still being used.

Now, the Clarkstown Landfill is an inactive, but still being used landfill that has just gotten an extension because the town is supposed to be building a transfer station. They were supposed to be closed as of May 1; they have now been given an extension until September 1. That sits right on the Hackensack River.

On the other side of the Clarkstown Landfill is Grant Hardware. That is another site on the list. The list will be the Superfund list, so I don't have to keep repeating it. It is a rather long title. The Orange and Rockland Utilities sits on the Hackensack. The Dexter and Old Nyack Landfills were both on the inactive list, but they have recently been delisted. The Dexter site has been delisted; the Old Nyack Landfill is a four or five which, according to DEC, is considered delisted.

Further down, south of this area, but not much further south because this is all within a one-mile radius, are the Pineview Wells. These are 18 private drinking wells that were shut down by high levels of contamination due to TCE. That's trichloroethylene. Down from that, or actually right next to the Pineview Wells is the Chromaloy (phonetic spelling) Company, and just south of that is Xerox Corporation. So we

have six sites on the Superfund list. We have two sites which were just delisted. We have one site that was proposed for inclusion, called the Ryocite (phonetic spelling) -- proposed for inclusion on the Superfund list.

We also have two suspected sites that we, as citizens, are looking into in the area. One is a corporation known as Kay Freeze (phonetic spelling), and the other is the Old Ford Dump. Now, these are two sites that were both in the West Nyack area. We have reported them to DEC -- DEC being the Department of Environmental Conservation in New York. They have told us that they have not been able to find information.

SENATOR CONTILLO: They what -- have not been able to--

MS. SEERY: No, they tell us they haven't, but interestingly, of course, we have a citizen who has been looking through microfilm, and she has been able to find the names of Kay Freeze Corporation. Years ago, it was Kay Products, or Kay Research, so she, in fact, is finding information about this company having been in West Nyack. Right now, this Kay Freeze Corporation has been shut down by the state. It has highly contaminated the area up in the northern part of our county -- Rockland County. So we suspect that, in fact, Kay Freeze was in the West Nyack area. We may have another area that may go on the Superfund list.

The other area is part of a Pathmark shopping center, which was closed down. It sits right on the Hackensack River. It is called the Old Ford Dump. We found this out from some old-timers, who said that anytime you wanted to get any color of paint, you went to the Old Ford Dump. Well, they proceeded to build this Pathmark shopping center on top of it.

Again, we are finding out information that has yet to come to DEC's attention, in that they have just not done the required amount of study in order to have the state take it on as suspect sites. But we know these are suspect sites from the people in the area, and that is the way you start to find out your information.



Let me, for the sake of expediency-- I was really angry about Ms. Green's testimony. I live in an area where we are giving Toxic Valley Tours and, by the way, I would like to tell you that I have two tours going out. I offer anyone-- Unfortunately, this is how I spend my Sundays from one until three.

SENATOR CONTILLO: What do you call them?

MS. SEERY: Toxic Valley.

SENATOR CONTILLO: Toxic Valley Tours?

MS. SEERY: Toxic Valley is what West Nyack and that area is called. It's pretty sad, yes. These are--

SENATOR CONTILLO: What is the response of your DEC to this?

MS. SEERY: Well-- What is their response? They think we should set up-- We had a meeting with them. Bergen SWAN was represented there. We have formed the Watershed Alliance, which is a group -- a coalition -- of New York and New Jersey groups, to protect the watershed in this area. We met with DEC on April 24, and they suggested several different things. They may give us off-site testing of the Pyramid Corporation's property. They may give us testing. This is what has come out of our meeting with them.

They have suggested, and I suggest to you, that we have a Toxic Valley citizens' advisory committee. It would not only have experts on it -- scientists, engineers -- but it would also have representatives of the municipalities, as well as the citizens themselves, because the citizen groups, very often, are bringing this information to light.

The other things I think are important for you to know: Number one, the Spring Valley Water Company never protested the building of the Pyramid Mall. They never protested it. They sent letters; they questioned it. They said, "We are not so sure that this is a good idea. Maybe you could do something else." But they never protested it.

I said to the Spring Valley Water Company: "The landfills may not have been your problem. They may have been there." First of all, the Spring Valley and the Hackensack Water Companies have been there since the early 1900s. The Clarkstown Landfill was just developed somewhere around 50 years ago -- let's say even 60 years ago -- so where was the Water Company at that time? I suggested to them that the landfills in that particular area that are impacting on the Hackensack River-- I don't know why the Water Company has not, in all of these years, litigated to clean up that area. If you take the Toxic Valley Tour, which takes about an hour-and-a-half, and you can walk from one site to another, just to give you an idea of how close everything is to each other, there are rusted -- as that man said before -- pieces of metal there along the Hackensack. Why hasn't this been cleaned up? Why hasn't the Water Company stepped in and just said: "Get this stuff out of the water"? I don't think we are asking, as ratepayers, too much and, of course, I reiterate, litigation against the companies, against the municipalities-- This is what the Spring Valley and the Hackensack Water Companies should have been doing to try to get this area cleaned up years ago.

As usual, crisis. Crisis is what moves government; what moves bureaucracies and, unfortunately, I guess, is what the Spring Valley and Hackensack Water Companies are waiting for, because they are going to test. If the test results do not show contamination now, I guess they are just going to wait for a crisis. Are we going to wait-- I mean, that is what I hear coming out. Are they going to wait until they find something terrible and deadly?

Ms. Green spoke about a clean watershed. I know you have this picture. (holds up picture) This is not a clean watershed. Something that SPEDIES -- the SPEDIES permits, which is the State Pollution Elimination Discharge, blah, blah,

blah, okay?-- This Pyramid Corporation, if they are not able to get their permit to discharge their leachate from their dumps, as well as anything else from their buildings, into the Rockland County sewer district, they then-- There has been some talk of obtaining a SPEDIES permit to discharge into the Hackensack River.

I will warn you: There is Plan A, and there is Plan B. Right now, in Rockland County, the county sewer plant was just enlarged, but the Orangetown sewer plant is having real problems, and they sit side by side. The Orangetown sewer plant, right now, is under a moratorium, because they are discharging in excess of a million gallons per day into the Hackensack River -- untreated sewerage. So, Pyramid's permit very well may not come to be, as far as the discharging of their leachate into the Rockland County-- So then we may be looking at the Hackensack River.

Finally, I guess one thing-- There are tons of things that should be said here today. One is that this is a book that you can get through the Department of Environmental Conservation. However, it is almost impossible to get the book. As a matter of fact, this is April of '89. I have been trying to get 1990's book. But this lists all the hazardous waste sites that are on the Superfund list -- site after site. It gives details of site descriptions, and various different things. It talks about remedial action, legal action, assessment of health problems, and page after page on the sites in this area say there is groundwater contamination, surface water contamination -- page after page after page. This is straight from the state; straight from the state.

I think one thing that is very important is some legislation that we have pending in New York -- I was going to say Rockland County -- in New York. It is something called Title 13, or the Governor's Program Bill No. 133. It is to expand the environmental conservation law to include hazardous

substances as they appear in CIRCLA, which is the Federal Superfund law. To try to put that simply, in New York State, right now, we have a deficiency in our environmental conservation law. The deficiency, or loophole, which is what we are calling it, because a lot of the developers are using this loophole-- In order to be considered a hazardous waste site, you must know the point of origin. You must have a certain amount of quantity and quality. You have to know those things. Because so many sites that are on the Superfund list were before the regulations -- prior to the regulations -- they do not fit the--

SENATOR CONTILLO: With illegal dumping, nobody knows what is in them.

MS. SEERY: Exactly. They do not fit this criteria. So what we have now in New York State-- We have a new classification of dumps. That is called the Hazardous Substance Dump. But again, the Dexter and the Old Nyack Landfill, which are on the Pyramid property, have been delisted because of the loophole in the Environmental Conservation Law, because they don't fit the criteria for hazardous waste; not because they don't have hazardous waste, and they will certainly have hazardous substances on the site that are being discharged into the Hackensack River.

SENATOR CONTILLO: We have here-- You know, I have heard a lot about this. We have gotten reports from the New York State Department of Conservation. They have page after page here saying why it is okay to build up there. You know, it is difficult for me, from another State, to understand how you can say it is okay to build on a closed landfill; it's okay to build, or even disturb all of that land. They are going to allow them to put a mall on what was, at one time, a landfill? There isn't a landfill in this country, I would think, that doesn't have some hazardous material in it.

MS. SEERY: Well, the Dexter Landfill-- They know it was the site of an illegal operation. There was an investigation into organized crime, into the garbage hauling business, that began at the Dexter Landfill. While the state keeps saying that the Dexter Landfill is mixed with incinerator ash and municipal garbage, the reality is, it is 90% incinerator ash. And in New York State, incinerator ash is not hazardous waste; it is special waste.

SENATOR CONTILLO: Yeah, well, I'll tell you something: In my State, incinerator ash is a very, very expensive commodity to dispose of. It is shocking to me to hear that a landfill filled with incinerator ash can leachate into our drinking water, and the DEC says it is okay.

MS. SEERY: That's right.

SENATOR CONTILLO: In effect, the Hackensack Water Company is saying it is okay because, "We're testing it, and it looks fine to us." It's frightening.

I would just like to ask you two questions now: We have these pictures which are in the area you just talked about. The gentleman who took them is here. I want him to testify that he took these pictures and identify where he took them. I will then enter them into the record. Okay?

There is another person here. I don't know whether she signed up -- Estelle Marsico.

MR. MATIOSKA: She didn't sign up.

MS. SEERY: Oh, Estelle Marsico? Is she here today? No.

SENATOR CONTILLO: She is not. Well, we can enter her testimony. It is just shocking testimony.

MS. SEERY: The high levels of cancer in the area.

SENATOR CONTILLO: Yes, death by cancer in that little neighborhood.

MS. SEERY: Right. That is in about a three-block radius. That's all.

SENATOR CONTILLO: I see it. It's absolutely incredible.

MS. SEERY: Yeah. There were about 27 cases of cancer.

SENATOR CONTILLO: I am going to enter that into the record. We have the prepared testimony and the maps, and I will enter them into the record.

MS. SEERY: I just have to add: When we talk about cancer, that is the first thing everyone is concerned about. But there are chronic illnesses which are caused by chemical contamination, and very often people are not asked if they have extended illnesses, if they have respiratory conditions, if they have urinary track infections. There are so many other things that someone can live a lifetime with.

SENATOR CONTILLO: Particularly allergies, right?

MS. SEERY: And allergies, oh, sure; sure, absolutely.

SENATOR CONTILLO: I thank you very much.

MS. SEERY: Okay, thank you.

SENATOR CONTILLO: You had 15 minutes.

MS. SEERY: Did I, really, oh.

SENATOR CONTILLO: Yes, you did.

Larry, where are you -- Larry Kuttner? (response from audience) If you would come-- Maybe you could be the first one to be concise.

L A R R Y K U T T N E R: Yeah.

SENATOR CONTILLO: Are these the same pictures?

MR. KUTTNER: Yeah. I have here also a Federal topographic map indicating where these photographs were taken.

SENATOR CONTILLO: Fine. Would you testify to that, and we'll-- How do I enter these things into the record? Do I identify them, or--

MR. KUTTNER: Exhibit A or Exhibit B or whatever?

HEARING REPORTER: If you wish, we will include them, and they will just become part of the transcript. However, they cannot be reproduced in color.

SENATOR CONTILLO: Okay, that's fine. Larry, please identify yourself and what you have done.

MR. KUTTNER: Hello. I am Larry Kuttner, from the Bergen Save the Watershed Action Network. I live in Cresskill.

SENATOR CONTILLO: I'm listening, Larry.

MR. KUTTNER: One reason that this legislation is so important is because a company such as the Hackensack Water Company can be, besides a public utility providing water, also in the real estate development business, which is a conflict.

As you have just heard, in Rockland County, there are severe contamination problems occurring, and the Water Company is reluctant to deal with them -- to put it mildly. One contributing factor to that is, their sister company, Rivervale Realty owns approximately -- or purports to own approximately -- 350 acres in the area. A lot of these lands are in close proximity to the toxic sites which exist in Clarkstown. They are across the border. Most of the land is in Orangetown, a neighboring community where there are extensive watershed holdings. It is at the Clarkstown/Orangetown line where a lot of the real estate holdings end -- the buffer areas end -- and in Clarkstown where the toxic waste begins.

Approximately 100 of these acres were studied in the Havens & Emerson Report that was commissioned by the Water Company in 1984, which allowed those lands to be transferred. But there are additional lands -- approximately 250 additional acres -- that were transferred approximately around the same time, that were not studied. Apparently, they were not utility property, though I do not know that for a fact myself. A lot of those lands which they now wish to develop contain a lot of the feeder streams from the Lake Tappan Reservoir. The Water Company has not made any move to establish any buffers along these feeder streams. They will be developed up to the feeder streams.

SENATOR CONTILLO: Larry, I'm sorry; I was over in the corner there. Are you saying to me that the company that tested the water owns property in the area of the water they tested?

MR. KUTTNER: Yes, that is correct. They have approximately 350 acres held by their real estate subsidiary, plus additional land -- a very small amount of land, watershed land, which is maintained. There are buffers around the Lake Tappan Reservoir, but north of the Orangetown/Clarkstown line, there is not much of any buffer until you get up to the Lake DeForest.

The one thing that was mentioned in the Havens & Emerson Report was that the Water Company needed to acquire additional lands around feeder streams and such like that. They made the claim that because of the highly developed area, that these lands were not available. Well, in some cases in Bergen County, that is true, but in Rockland, a lot of that land is undeveloped and, in fact, a lot of that land is actually owned by the same company. It was just not in the utility base, as far as what I understand it to be. So, a lot of these--

SENATOR CONTILLO: Do you mean it was owned by the Rivervale Company?

MR. KUTTNER: Right, but it was not in the lands that were studied in the Havens & Emerson Report. So, obviously, legislation is necessary to compel the Water Company to acquire, for utility use, these lands along these feeder streams.

These photos, which we are going to be entering into the record-- Three of them are a major tributary along the Clarkstown Landfill. As you can see, debris -- an extraordinary amount of debris -- including metal drums and all manner of household and industrial odds and ends, along with sludge and oil, are visible in these photographs.



SENATOR CONTILLO: Will you comment on the color of the water for me?

MR. KUTTNER: There is just about every color in the spectrum. There's green, red, blue, and nasty brown colors. These are areas which have been in close proximity to a landfill for decades. The landfill has been steadily encroaching closer, from what I understand. Now, their supposed monitoring program does not seem to have detected, or to have detected it for approximately five years between 1976 and 1980, that the Dexter Landfill, which was an illegal landfill with organized crime origins, was operating in close proximity to the Hackensack River. So it is apparent that legislation is necessary to compel a more strict observance of what is going on in the watershed areas.

Another situation in New Jersey, in Bergen County, which is similar but fortunately not as drastic, is, the Passcack Brook, which connects Woodcliff Lake Reservoir and the Hackensack Reservoir-- There are, except for a few odd parcels, no buffers along this stream, which has led to problems of contamination, the most serious of which is in Westwood, a municipal landfill which operated for many years on the bank of the Passcack Brook. Strangely enough, this is directly adjacent to one of the small areas of watershed buffer area that the Water Company did own along with Passcack Brook. When that particular parcel was studied by the Havens & Emerson consultants they noted that some of the garbage had spilled into the buffer area. That landfill has been closed, though it has not been remediated. A recent tour of the site showed a lot of surface debris. Though apparently most of the debris is covered by soil, there are cinch pipes to evince the gases that are located periodically on the site.

There also apparently were some test wells installed for testing. I don't know how frequently that has been tested, though I understand that the test wells are very deep, so

perhaps they have not really hit the full extent of the contamination, which is on the surface and right adjacent to the brook, that is getting into the stream itself. . That is certainly something that should be addressed.

That is pretty much what I have to say at this point.

SENATOR CONTILLO: Thank you. I think we have adequately-- I would like to enter into the record the pictures that this witness has identified.

MR. KUTTNER: Should I give them to the--

SENATOR CONTILLO: Please, the photographs and the map identifying where they were taken, which is in the area of the Clarkstown Landfill.

Now, let me see: Carl Goldberg, New Jersey Builders Association?

Z I P P O R A H F L E I S H E R: (speaking from audience) Excuse me. We could go home if you could let me speak at this time.

SENATOR CONTILLO: Sure.

MS. FLEISHER: Would he mind giving me his place?

C A R L G O L D B E R G: No problem.

SENATOR CONTILLO: Go ahead, of course.

MS. FLEISHER: I'm sorry. I know what it's like. I have been at hearings all day.

SENATOR CONTILLO: I have no sympathy for you.

MS. FLEISHER: Well, I have been sleeping some.

SENATOR CONTILLO: I noticed. (laughter)

MS. FLEISHER: My name is Zipporah Fleisher. I am a member of the Clarkstown -- Director of the Rockland County Conservation Association. I was at a hearing this morning before the New York State Public Service Commission on the subject of a sale of a piece of land by the Spring Valley Water Company to Rivervale. Spring Valley is a subsidiary of the Hackensack, and Spring Valley sold to Rivervale, with no public participation in the bidding or anything, a piece of land which

was assessed by one of our legislators. When I tried to get the county government to join me in the case, they wouldn't come in because they didn't want to have to embarrass one of the legislators because he assessed the property so low so Rivervale could buy it at a bargain. That is the absolute truth.

I, myself-- I should give you my pedigree: I have been, since 1972, testifying before the Public Service Commission on Spring Valley Water Company cases. I represented the County of Rockland before the Public Service Commission in telephone company rate cases, which compared to the others is like playing chess as against checkers.

Anyway, the thing I want to express here, quickly, is that the whole structure of the utility being allowed to own -- as people have already mentioned here -- land that they can sell off-- There is something called a taping line around Lake DeForest, which is considered the line that would be safe for protection. The taping line did not include all the land that it should have, but one piece the Water Company had to buy because the seller wouldn't sell just a piece of it, turned out to have no sewers on it. So, when the developer bought it, the only consideration he was forced to abide by by the health department, was that whatever houses he built had to have sewerage first.

The property was sold for \$300,000. A few months later, Rivervale sold it for \$1.8 million, which, if you can do simple mathematics, is six times what they paid for it. It is evading giving to the ratepayers the money they deserve, which was the appreciation on the property that they, themselves, had been keeping in rate base all along. Now the Water Company, when the case was practically over, came in and started screaming that it shouldn't have been in the rate base, because it was outside the taping line. This is the kind of tactic that I have accused them of, and we have similar to that today.

When they see that they are losing in a case like this, they come in with some diversion. The diversion was that all of a sudden, this thing should not have been a rate base.

In any event, there is, by the New York State Public Service Commission, to their credit, a system of allotting the share that they feel a ratepayer deserves whenever there is too much money made. Con Ed now, for instance, is making more than they were allowed to make, and they had to give back, to the ratepayers. The share sometimes varies. It could be 60% for the ratepayers, 40% to the stockholders. Sometimes it is 75% to the ratepayers, 25% to the stockholders. But it doesn't all go to the stockholders, as it does when it is handled by a subsidiary. I believe, too, that the subsidiaries are an abomination. In the telephone company -- I don't know if you have watched that at all -- case right now, NYNEX has been fined \$1,300,000 for some marvelous cooperative buying they did for the sake of New England Tel and New Jersey Tel, where they instructed their people to take a 35% profit on everything sold to 150 computers, you know, to save these guys money. But anyway, that is the diversion.

I have another story: There is a village called Sloatsburg just north of the border of New Jersey on the Ramapo River. Sloatsburg has been having drinking problems for many years. They take their water from a lake called Possack (phonetic spelling), which is full of algae and silt and smells bad. The people in Sloatsburg buy their own drinking water quite often.

Now they have conned the Spring Valley Water Company, or conned -- or Spring Valley has conned Sloatsburg by saying, "We will serve you. We will take that Possack water and put it on top of the Ramapo River at Naoma Brook (phonetic spelling), and the brook will run down into the river and add enough water to the river so that we will be able to run the wells that are under the river and give you more drinking water. Now, the

wells that are under the river, at the time they were drilled-- That is called the Ramapo Well Field. They were drilled to give 14 million gallons a day to the Spring Valley Water Company as an additional supply. At the time, we told them that they hadn't tested the aquifer versus the river, and what the connection was. Nevertheless, they promised us that there was no connection and that there wouldn't be contamination from up above, nor would the "lack of flow" in the summertime be pumped down by the wells underneath.

So, Mahwah, which is in New Jersey, receives its drinking water from there. The Ford Plant used to withdraw water when it was functioning. I don't know what they are going to be doing in that area now for drinking water, whether they are or are not taking it out of the river. But we are objecting to the idea of putting the water on top of the river and sending it downstream where none of us in Rockland can take the water, but other people can. I don't know what Mahwah is doing about it.

Additionally, there is a sewer plant in Harriman, New York, which is upstream, which puts three million gallons a day of treated -- and I don't know whether we should put that word in quotes or not -- effluent into the Ramapo River. It is so bad that they now plan to put it, instead, over into the Corning sewer plant, which would eventually get it out into the Hudson. So, there will be three million gallons less of water on the Ramapo River. In the summertime, they found enough water on the top of the river to sustain pumping underneath without sucking it down. A test well was put in by the DEC, and they were supposed to test for 48 hours. Twenty-four hours after the well was started up, it went dry, which proved that the aquifer was starting to give way to the water and the river above.

SENATOR CONTILLO: This is very interesting, but how does it relate to what we are talking about?

MS. FLEISHER: It relates to what we are doing with Hackensack. The Hackensack people are using the well field underneath this river to supply Rockland with drinking water. You're talking about buffers and about the quality of the water, and I was giving you examples, after Ms. Green stood here -- sat here -- and said all of those things about how they handled Rockland, at least. I think you need to know that, because I don't think her picture of them was great.

Other things-- Well, let me say she did a good job for the company.

SENATOR CONTILLO: Well, she is paid by the company. No, she's paid by us, excuse me. She is paid by us to read things.

MS. FLEISHER: Well, I'm paid, but I don't need to be.

I think there are some rules which perhaps should be attended to either by the Public Service Commission or by an organization such as yours. If you are going to tolerate that these companies are allowed to have subsidiaries, they certainly should have to have public bidding on anything they settle. I think that, just like ordinary contractors which do business with municipalities, they should have to have three bidders and they should have to have public bidding. Had we known that 23 acres would be sold for \$300,000 in 1984, we could have stood right there and said, "That is a ridiculous price."

SENATOR CONTILLO: In New York State, you have the same situation where the water companies have a real estate subsidiary?

MS. FLEISHER: Yes, it's Rivervale.

SENATOR CONTILLO: Oh, it's the same group.

MS. FLEISHER: Right, right. The people on it are the stockholders. Some are stockholders and some are officers of the Water Company. The Orange and Rockland Power Company has four subsidiaries, and every one of the subsidiaries has as its

president the president of Orange and Rockland, the secretary of Orange and Rockland, and so forth. It is, I think, an unabashed drain of profits from the ratepayer.

SENATOR CONTILLO: Yes, I agree with you.

MS. FLEISHER: And we are, of course, trying to do something about that in our state. I do think you need to know about this sort of setup.

Thank you.

SENATOR CONTILLO: Thank you very much.

MS. FLEISHER: It has been a very interesting afternoon. I think you have run this hearing very pleasantly.

SENATOR CONTILLO: Thank you, Mr. Goldberg, for stepping aside for a moment. Will you please identify yourself.

MR. GOLDBERG: Certainly. My name is Carl Goldberg. I am here today on behalf of the New Jersey Builders Association. I am a builder in northern New Jersey; Vice President of the Metropolitan Builders Association; and I also serve as Vice Chairman to NJBA's Environmental Committee. I appreciate this opportunity to comment on Senate Bill No. 2339, the proposed Watershed Protection Act. I might add, we are relieved to hear your response to Mr. Sheridan's concerns -- one of the previous speakers -- and we share a great many of his concerns.

While we commend the sponsor for his interest and intent to protect our surface drinking water supplies from non-point source pollution and degradation, we have serious concerns with giving DEP unlimited authority to devise a multi-zoned buffer system around waterways in approximately 38% of the State.

As Mr. Evenson himself, of the DEP, mentioned earlier, nowhere in the legislation are the sizes of these buffer areas specified, nor are activities that are prohibited or allowed within the buffers specified. For this reason, we ask that the bill be amended, as I will outline later.

There is no question that an adequate and safe water supply is essential to the home-building industry as well as the public. We also do not dispute the fact that buffer zones around water supply sources serve a useful function and are a necessary component to a sound watershed management strategy. For this reason, the NJBA has helped to found a private corporation named Response, whose goal is to minimize and control non-point source pollution through public education and other means. We are also active participants on many DEP water resource advisory groups.

Lastly, as Mr. Mattson suggested, we are developing a system that quantifies best management policies and practices for the control of non-point source pollution. As stated earlier, we are concerned about granting DEP unlimited authority for establishing buffer zones for all watershed lands associated with public water supply reservoirs, their tributaries, and water supply intakes. The legislation does not place limitations on the size of these buffers, which could range anywhere from zero to thousands and thousands of feet.

We should not readily forget the years of debate that centered around the Freshwater Wetlands Act, in which a delicate compromise was reached on buffers, not the least of which are three lawsuits in which the courts have struck down DEP regulations. Unlike recent environmental legislation, this piece of legislation may, in fact, give too much discretion to DEP.

The NJBA is also concerned with the extent of watershed lands within which buffer areas are to be delineated. Using this bill's definition and DEP figures from its December 1989 report, approximately 38% of this State, or nearly two million acres, are affected. This is a far greater area than was examined by the New Jersey Board of Public Utilities in their April 1990 report, which was 1172 acres. We feel this discrepancy should be addressed. The legislation



should acknowledge that the width of the buffer areas will generally decrease as one gets further away from the water supply source.

As I mentioned earlier regarding some specific changes, the NJBA asks that, given the complexity of the methodology, that the bill be amended pursuant to DEP's request that the time frame within which DEP is to adopt rules be extended to two years. We also ask a limitation of the rules to the development of best management practices only, and clarify that no new permits will be required.

We also ask that ways be determined by which they can be revised and accomplish the objectives of this bill; for example, encourage the use of centralized wastewater treatment systems, as opposed to individual septics, and require DEP to explore the use of voluntary incentive programs to minimize non-point source pollution.

Most importantly, we urge the Committee to assure that the regulated community has ample opportunity for input and take steps to assure that DEP is responsive to public comments. To date, our experience with the rule-making process has been anything but responsive. Once regulations are proposed, DEP has been in the habit of not making any significant changes without a reproposal. To minimize this potential problem and to assure accountability, we suggest that there be some form of legislative oversight, so that this Committee is aware of the regulations that result from this effort. To this end, we recommend that DEP be required to hold two legislative hearings, in addition to the usual public hearings, on proposed buffer regulations. These hearings should provide for at least 30 days' notice after publication in the "New Jersey Register."

Secondly, like some of the other speakers have mentioned, we support a DEP watershed advisory committee to be created on which representatives of various interest groups,

including representatives of the building and development community, be placed to assure that balanced rules are adopted.

Frankly, Senator, our concerns mimic some of those described previously by Mr. Sheridan. It is imperative that the definitions in the legislation are refined so as to not preclude any new construction within a square area that represents approximately 38% of the State land.

Once again, thank you for this opportunity to address our concerns. We look forward to working with you on this issue of vital concern to all of our citizens. If you have any questions, I would be happy to answer them.

SENATOR CONTILLO: Thank you. Janet Schwarz, League of Women Voters of Northern Valley.

J A N E T   W .   S C H W A R Z: My name is Janet Schwarz, and I am here on behalf of the League of Women Voters of Northern Valley. The League strongly supports the watershed protection legislation which is being considered by your Committee. As Eric Evenson testified earlier, DEP has recommended a multi-zone approach -- buffer approach -- for protection of drinking water quality. While this approach is a necessary and important first step, we feel it needs to be expanded. It does nothing to protect the thousands of acres presently owned and maintained by the water utilities for watershed protection, which are at risk of being sold off for development, or, as in the case of the Hackensack Water Company in our area, have already been sold off.

The BPU report which Greta Kiernan referred to earlier says that there are 52,000 acres in this category. The DEP draft report on buffer zones stated that as more and more of these watershed lands are sold off and developed, there has been a deterioration of water quality conditions that has threatened the available supply of potable water.

Therefore, the League believes it is essential for this legislation to require that the DEP establish a watershed

land preservation master plan, as was called for in the original version of the 1988 Watershed Protection Act. This master plan would identify watershed protection areas that should be maintained for watershed protection, open space conservation or recreation needs, and watershed land that is suitable for development. The importance of a watershed land preservation master plan is illustrated in our area by the disposition of Hackensack Water Company watershed land, which has already been discussed.

Also, other people have talked about the toxic waste sites close to the river in Rockland County, New York. We feel that the legislation should include a requirement that the New Jersey DEP set up a mechanism to work together with New York State to prevent pollution -- or, to deal with pollution that crosses state lines.

We have more or less-- I think a lot of our testimony has already been covered, so I will just say one more thing: We strongly recommend that the rules and regulations adopted by DEP to protect water quality should extend to all land, whether publicly, privately, or utility owned.

I think I will stop there. I will hand in our full report.

SENATOR CONTILLO: I think that is what we are going to do. Does anyone have a three-minute speech they want to give?

MS. SCHWARZ: Thank you.

SENATOR CONTILLO: Three minutes? Okay, go ahead, Greg. You just got yourself three minutes.

G R E G O R Y G A G E: All right, no problem. A lot of what I was planning on saying has been said, so there is no reason to repeat it.

One thing I think should be noted is-- I guess there have been about three groups of people here today before you, who have testified, to some extent, toward weakening the

legislation in some form or another, or who are concerned with its far-reaching effects. Those happen to be developers and the Hackensack Water Company, which is a developer also. We should take note of that. What we are looking at, and what the legislation is intended for is protecting water -- water protectors -- and that is what the Water Company is supposed to be doing. They are not doing it, and I am glad to see that your legislation is aimed at doing that for us. We need someone out there protecting the water. It is obviously not the Hackensack Water Company.

We were talking about the article before -- "Earth Day Every Day" -- and there are a few things I just want to put on the record -- the public record -- because it is before us and it has been talked about. In the second paragraph, where it says: "Throughout our 121-year history, our environmental track record is undisputed--"

SENATOR CONTILLO: I almost threw up when I read that. (laughter)

MR. GAGE: Well, the reason I am mentioning this now is because I want this on the public record. Bergen SWAN has been around here, and we are disputing it. Okay? I want Hackensack to read this.

SENATOR CONTILLO: Greg, you'll have to put your name on the record.

MR. GAGE: Okay. But that aside, the things I would like to talk about are the debate between raw water quality versus the tap, and the importance of protecting it at its source. I cannot overemphasize the need for that. There has been some testimony here that comes out of the "Scientific American" magazine, where Dr. Marie LeRiviere (phonetic spelling) writes: "It has become apparent that the prevention of pollution and the restoration of bodies of water that are already polluted should gradually take precedence over the development of purification technologies." That is basically that, as we pollute our waters, it is going to cost a lot more.

Federal regulations which the Hackensack Water Company meets and exceeds-- I think we need to look at this somewhat, because on a scale of one to ten, one being heavily polluted waters, ten being a beautiful mountain stream, and let's give the Water Company a five in there, that they are coming in at five in Federal regulations, or four-- They are meeting or exceeding that.

As far as responsible water protectors and what direction we should be looking toward, we should be looking at improving the water, maybe moving from a five to six to seven, getting -- you know, going in the right direction. Development upon these lands, by the admission of the head chemist, Barry Schwartz of the Hackensack Water Company, will cause water degradation. I don't think there is any argument about this. That is moving in the wrong direction; that is not a responsible thing for the Water Company to be taking as its position.

In conclusion, I am very supportive of a lot of what was said in the DEP report. It needs to be taken quite a few steps further, and I am happy that your bill is doing that. It needs to address the realities of developed versus undeveloped lands in this State. We have talked about that before. I think in the end, any laws that are going to come up with specific recommendations as to what the buffers will be-- I think we need to have individual studies of various areas, because Bergen County is going to be different than Sussex County, and our concerns, our problems are different. We need to look at buffer lands as they apply to Bergen County. It is not easy to put buffers around the feeder streams and the tributaries. We need to address that.

The open space that was talked about earlier-- I think that needs to be more emphasized in this legislation, because I think that is an important component. It is certainly an important component of what we were talking about here in Bergen County.

One thing I would like addressed, or at least looked into, is environmental impact studies on projects that are going to be built. A lot of other states require this. We require it only for Federal studies or Federal projects in this State. I think it could be looked at here.

The last point I would like to make is, Bergen SWAN is in agreement -- so I don't have to state it all over -- on Tim Searchinger's statement earlier. I would like to just repeat that. It was beautiful; it said what we want to say. The one part of it that I would like to emphasize is the advisory board. I think -- and this is in closing--

SENATOR CONTILLO: You said, "In conclusion," and now you are saying, "In closing"?

MR. GAGE: This is in closing on the advisory board. I think public hearings provide a lot of valuable information toward bills. Certainly all of the public hearings that you have ever had -- and I have attended all of them -- have been very good. DEP and BPU-- Sometimes we have public hearings on the Evergreen Formula, and things are just not listened to.

SENATOR CONTILLO: That was a farce; it was an embarrassment.

MR. GAGE: It is for that reason-- There are a lot of precedents on having an advisory board for DEP on issues of this sort. I would like to see that included in this legislation. Okay?

SENATOR CONTILLO: Thank you. Now, you guys can keep it to three minutes. He did not.

MR. GAGE: I'm sorry.

SENATOR CONTILLO: You guys are next over here. I think we are almost down to the last-- Mr. Waldermyer will be next, and then Ella.

J O H N T R A Y N O R, JR.: I will be very brief. My name is John Traynor. I am on the Board of Directors of the Bergen County Audubon Society. We are a local chapter--

SENATOR CONTILLO: Didn't I do an Audubon Society earlier in the day?

D R. D A V I D H. H A L L: That was the New Jersey Audubon Society.

MR. TRAYNOR: You had New Jersey -- Rich Kane.

SENATOR CONTILLO: Okay.

DR. HALL: They are not related, actually.

MR. TRAYNOR: We are a branch of the National Audubon Society; New Jersey isn't.

SENATOR CONTILLO: Okay.

MR. TRAYNOR: We have over 2000 families as members in Bergen County. We are very concerned about preserving the buffer zones around the reservoirs as open space, particularly as wildlife habitat. We have made frequent visits to the areas around the reservoirs over the years, where we have led walks open to the general public and to various school groups.

We have assembled data concerning those species which breed on watershed lands. Among the approximately 50 species known to breed here, several are either rare or threatened. These include the great blue heron, the Coopers hawk, and many others. I have a listing of breeding birds in the reservoir area which I will submit.

SENATOR CONTILLO: We can incorporate that into the record.

MR. TRAYNOR: Right. The watershed lands and the surface of the reservoir are of particular importance during bird migrations. Several hundred species passing through New Jersey along the eastern migratory flyway must find rest and food before continuing on their journey. While these birds are protected from harm by international treaties, they rely on our providence in setting aside safe resting places along their journey. We know from our regular census of the fall migration that thousands of ducks stop for weeks to rest on Oradell Reservoir and Lake Tappan. We find more ducks here than in the rest of Bergen County at the time of our Christmas bird count.

Until ice covers the reservoirs, we typically encounter several thousand common and red-breasted mergansers, along with smaller populations of other water fowl. Threatened species, such as canvasback, green-winged teal, and wood ducks are also found at this time. During this season, it is not unusual to find a bald eagle fishing in our reservoirs.

SENATOR CONTILLO: How about the Canadian Geese?  
(laughter)

DR. HALL: They are there, too.

MR. TRAYNOR: I intentionally left them out.

SENATOR CONTILLO: I noticed that. That is why-- You didn't want to comment on that? (no response)

MR. TRAYNOR: The spring migration brings similar waves of birds to the watershed. The woods surrounding the reservoir are a haven for several dozen species of warblers, plus many types of flycatchers, sparrows, orioles, tanagers, and others.

Bergen County is critically short of open space, and there is no doubt that further development in the Hackensack watershed will directly impact wildlife, both as local breeding populations and for many more species in transit. Most of these species will not readily adapt to living in suburban backyards, apartment complexes, or industrial parks. Without suitable habitat, they will vanish from Bergen County, from New Jersey, and perhaps from the eastern flyway.

Our Society is 48 years old, and our members have documented the decline of wildlife populations through all of these years as our county as gone from rural open space to suburban sprawl to massive overcrowding. We believe it is imperative to protect all remaining open space in Bergen County. New development should be directed to upgrading the previously developed properties, rather than searching for cheap open space. It is time to redirect growth to redevelopment projects, upgrading our cities and towns so we



can be proud of all parts of our county, and preserving our natural heritage for future generations.

Thank you.

SENATOR CONTILLO: Thank you.

DR. HALL: I am David Hall. I am Director of Legislation for the Bergen County Audubon Society. I wanted to talk about a different concern in terms of maintaining water quality in the Hackensack watershed. I was really frightened hearing today that these lands were called "excess property" -- the buffered lands around the watershed. We really have a disagreement with that concept.

First of all, of course, putting in a filtration plant at the bottom of the reservoir system and filtering the water just before we drink it, does not do anything for the wildlife we are concerned about which are using the reservoir as a habitat right now. Anything going into the water system leaves them unprotected, so we worry about that.

But, moreover, the confidence of the engineering community and the filtration plant for protecting our drinking water seems overblown. Need we remind you of the recent fiasco in France with the filtration of Perrier water, for instance, where a lack of concern at the filtration plant led them to withdraw their whole product? A little overconfidence can lead to harming ourselves. Who wants to sponsor the Chernobyl of drinking water disasters here in New Jersey? Who can predict what sorts of pollutants will next enter the watershed? The general rule is that water quality testing lags several decades behind the chemical industry's inventiveness in creating new classes of toxic compounds. I have a degree in chemistry, so that comes to mind.

In addition, there are growing industries trying to encourage the public to spray their yards with toxic herbicides and pesticides, all of which flow down the street and into surface waters.

For example, it took decades of using DDT indiscriminately before we came to realize that it could cause general detrimental effects to wildlife, and perhaps, to ourselves. Today we know of surface waters in the eastern states that are irreversibly contaminated with PCBs, kepone, gasoline, trichlorethylene, mercury, and all sorts of things stemming from industrial processes or commercial establishments founded in the 1940s, '50s, and '60s. Regular testing for these compounds didn't begin until many years after their entry into surface waters.

"Modern" commerce and industry today may have moved beyond some of these procedures, but now we are just learning about new problems with dioxins, for instance, and other unintended chemical by-products. Again the same rule applies: dioxins were contaminating our environment for many years before anyone thought to test for them, years when the hazard was unrealized and the chemical product itself was undetectable by the state-of-the-art methods at the time.

Frankly, we do not know what new toxic compounds to test for today. We don't know which compounds will be invented next, and we don't know which new compounds will enter commercial use next. Furthermore, we don't know which compounds might be used by new tenants who move into developments in the buffer zones, if we develop them. What compounds would they use going right into the water supply we are talking about? Since New Jersey remains a key center for the chemical industry, this is a serious concern.

We Audubon members are frequent visitors to the remaining open spaces in Bergen County and around the State, so we are kind of "connoisseurs" of open space, as are the birds we like to study. We can tell you that any open space in the State, any field, meadow, or forest that is not under lock and key is constantly subject to midnight dumping of refuse, chemical drums, construction debris, and anything which costs a

lot of money to dispose of properly. The main reason we can rely on drinking any surface water is that our watershed buffer zones remain protected behind chain link fences.

If you allow new development within the buffer zones, no matter what regulations you write in Trenton, you can be assured that more dumping will immediately follow along the back property lines of each new development. Moreover, the new residents in these former buffer zones will demand the right to spray their properties with pesticides, herbicides, etc., just as they have learned to do elsewhere. Filtration plants may have their uses, but we would rather trust in chain link fences. There will always be new compounds coming into use that have no place in our water supply. Human nature being what it is, your regulations will rarely achieve the good results of a sturdy fence.

I think I will end here.

SENATOR CONTILLO: All right, thank you very much.  
Carl Waldermyer?

C A R L W A L D E R M Y E R: Yes, sir.

SENATOR CONTILLO: Please identify yourself.

MR. WALDERMYER: I am Carl Waldermyer, Highland Lakes Improvement Company. I echo everyone else's comments so far. My company is a water company. I am up in Highland Lakes, New Jersey. Right now, my company has 136 acres of the most pristine land. It has two reservoirs on it and a series of wells which, at one time, provided seasonal water to 1500 seasonal, summer residents. As these homes were converted to all-year-round residences, my customer base now is down to 175 customers. I still have five miles of water pipe to maintain aboveground.

There are many attendant problems with keeping and maintaining a system such as this, but we have done it. My problem is unique: I only need money. I am saddled with high debt. My customers-- It would be unconscionable to ask them

to go and pay anymore than what they are paying for right now. My problem stems from carrying my reservoir property. With 136 acres of land, the township -- in its ultimate wisdom -- has declined to give me any kind of a rate consideration on my taxes. Twenty percent of my gross receipts goes to paying real estate taxes in the town of Vernon.

Prudent management suggests something. My wife will not allow me to keep putting money into this company. That is the domestic problem I have. Aside from that, I have to come up, as proper, prudent management, with a solution to my excessive expenses of doing business. I have to try to increase my subscriber base, which is difficult, although I do have a couple of ideas on that.

So, what has happened with it-- I have not been working in a vacuum. For 18 months, I have been working with the Board of Public Utilities. We have reached a stipulation of agreement whereby in 90 days, I have to come back to them with a plan of action; either to abandon my reservoir property-- Since I only need 50,000 gallons a day, and I have 300,000 with a surface water diversion right now, my reservoirs provide me with an excess amount of water. I can very easily abandon that, and just reestablish a well field, which I have already explored. As such, by BPU agreement, I could dispose of this property properly, relieve my customers of the base of paying the real estate taxes, and bring an influx of much needed cash into the company, so that I could expand my subscriber base.

SENATOR CONTILLO: But then you will need the reservoir.

MR. WALDERMYER: Then I would need the reservoir again. I have come to grips with this with my own solution. About three months ago, I formed my own nonprofit corporation, called the Land Foundation, Inc. What I am trying to do is rescue my own watershed property in its entirety into a

nonprofit corporation. It might help you to know that it is a little bit of a paradox. By profession and degree, I am a civil engineer. I have my own managing consulting firm. I have been working, for the last eight years here in New Jersey, on major development projects, primarily coordinating site activities and water supply. So you would say that I am a developer sitting before you here who owns a watershed, and who owns a water company, and I am trying to stand on my head to prevent it from being sold. I am trying to keep it in its natural state. The BPU Rate Impact Study, which is a very well documented, very well orchestrated document -- and I concur with it-- Whatever the finite buffer is -- 100, 300, 500 feet around the reservoir -- fine.

What I would like to do, with my own unique situation, is maintain the entire property as the buffer -- the complete 136 acres -- if somehow I could come up with some sort of a funding formula where I could bring some reasonable funds to my water company, which direly needs them. I approached the New Jersey Conservation Foundation, Dave Ennison -- Dave Moore down there, and they concur that this-- Unless you are familiar with the area-- My property backs up-- My watershed property backs up right against the DEP acres. It is the most logical annexation part of that whole program.

SENATOR CONTILLO: Are you in Vernon Township?

MR. WALDERMYER: I am in Vernon Township, yes.

SENATOR CONTILLO: How close to the ski area are you?

MR. WALDERMYER: Well, I could throw a rock right across Breakneck Road. That is one of the things I am trying to use, since I do have surface water. My permit is for surface water, which is the most prestine property you have ever seen. I invite everybody to come on up. It is just beautiful.

I would like to sell that water to the ski areas for snow making. Right now, they are using a system of wells with sub-surface water. This would be the most logical thing to use.

SENATOR CONTILLO: Have you ever seen tan snow? That is how it comes out. When they get finished making their snow, that is what comes out.

MR. WALDERMYER: My water is absolutely-- It is fantastic water I have. But anyway, that being the fact, what I am groping with-- This is such a natural resource, that it will not be replenishable, for all the reasons that everybody said here today. The only thing I am trying to find out, and I need some help on, is, if I could issue a negative easement, which I have discussed with them New Jersey Conservation Foundation-- I can grant them a negative easement so there will never be any development rights on it.

Unfortunately, it will not bring any cash into my company which will help to service the debt and help my ratepayers. The only thing it could possibly do is eliminate the real estate taxes.

SENATOR CONTILLO: You know, currently, the State of New Jersey is the only one with transfer development rights for farmers. I don't know why it should be exclusively farmers.

MR. WALDERMYER: Yes. Well, we are trying to-- As I said, I have tried to explore it, you know, at the local and municipal levels, but I need some help. Any kind of input from the public would be deeply appreciated; whatever we could do in legislation. Green Acre funding is not available because I am not a municipal government. Being a problem solver, rather than one who just waits for something to happen, I started my own nonprofit. So, whatever help I can have from the Audubons, anybody out there-- You have to see this piece of property, and see it sold for development rights. Again, I am in the building and development industry myself. I feel that this should be retained as part of the conservation.

Now, the problem is, I have two proposals from developers which make such doggoned economic sense that I have to submit these to the Board of Public Utilities, unless I can

come up with an alternate plan. One is for a golf course, and the other one is for a housing development. I'm sure -- I know both developers -- they are very responsible developers. They will have the utmost of all concern for the entire environment. However, I would love to say, "Thank you, but no thank you. I have an alternate course." I would like to submit to the Board of Public Utilities a conservation program for maintaining the entire watershed into either my water company -- which I would like to keep the water diversion rights for-- But to maintain this, it is a nonregenerative rating resource we have. It is just a matter of time. Our world is going to have problems up there.

I have the surface water there that I can treat, and I can maintain. If I can just sort of land bank the water -- if that is not a paradox on words-- Basically, that is what I am trying to do: Land bank by reservoir system. So, Senator, whatever you might be able to do to help us, or any of the general public-- I need some help. My water company needs some help.

SENATOR CONTILLO: Well, as I said to you before, we have started with what we call development transfer rights. Those who have farms or open space, have a right to sell those development rights to the bank, and the bank, in turn, uses those development rights somewhere else where a developer will purchase them. You may look into that program. It is called Transfer of Development Rights. It's a bill that has been sponsored by Senator Dalton, and I think it is just about to be--

MR. WALDERMYER: Right. Phyllis Anderson, Sussex County Sewer Conservation Service, is very active in that. I have been working with her on other issues. Unfortunately, Senator, the economic time bomb is falling down on me. I have over \$300,000 in this company. My rate will not allow any kind of debt service whatsoever -- no interest, no repayment, you know, nothing.

So, it gets to be a personal stress factor, too, you know. I consider this as-- To write it off for lack of a better reason, it is a hobby, you know, whatever. But it just causes such a personal strain to keep putting this kind of money in there. You know, \$20,000 a year comes in; \$100,000 a year goes out. Over the short haul, I have been very fortunate to be able to do this, but for the long term, I just cannot afford to keep doing this. There has to be something out there, something like the funding, perhaps, from the Green Acre program.

Now, David Moore is trying to go to see if something perhaps can be worked out in that area, but just to delay it and to put it off for future study-- I have a very real problem with that, because the electric bill has got to be paid every month, and Carl has to pay it.

SENATOR CONTILLO: Who else supplies water out there?

MR. WALDERMYER: I'm sorry, sir?

SENATOR CONTILLO: Who else supplies water out there?

MR. WALDERMYER: Well, Hackensack is coming into Vernon. There is controversy, you heard, with the Stone Hill Water Company down there. They are coming in there, and there is grumbling about town -- around the community -- that under the Small Water Takeover Act, you know-- There are mechanisms in place to take over small companies like myself, and I will fight tooth and nail. Nobody will take me over.

But I do not have the resources available to be able to solve many problems. The irony with the Stone Hill operation is that I was the engineer who helped to build that system down there, and somehow my water company, which is the largest water company in the area, couldn't find its way in there to take that water company over, which would have been the salvation to the entire thing. But that is over and done with.

The only thing I am trying to do is expand my revenue base perhaps by selling my excess surplus water, the seasonal



water, which would be perhaps for golf course irrigation or for snow-making activities, or, God forbid, should there be a major aquifer problem with pollution, like we had a problem with gas station spillage, where 14 wells were knocked out-- I do have the water available if somehow somebody could come up with some ideas. You know, we would name some acreage for you, give you a plaque, whatever. I need some help.

SENATOR CONTILLO: Do we have a way of getting ahold of you if we--

MR. WALDERMYER: Yes, the Highland Lakes Improvement Company, 764-2151. You can get me 24 hours a day at 764-7127.

Thank you so much, Senator.

SENATOR CONTILLO: Thank you very much.

Let's see, we are getting down to the end now. I am trying to be fair and take you in the order in which you signed up.

M E Y E R K U P L E: Thank you very much, Senator Contillo. Really, everything I wanted to say has been said by a lot of fine people. They have covered everything very well. Dr. Horowitz did very well, and Mr. Searchinger from the EDF pointed out some very nice things, and a lot of other people.

Out of my little notes, I want to say a few words, as some of the folks said before me. But I am glad we are thinking alike nowadays. I was going to suggest a joint effort by the State of New Jersey and the State of New York, with the Department of Environmental -- with DEP over here and the DEC up there -- because of that Clarkstown poison that is coming down. The League of Women Voters mentioned that.

We should have, actually, a standing group of-- Pennsylvania also touches us, too. How do we know it is not coming from Pennsylvania in streams into our water systems? So, it could be a tristate committee that would meet time and again. What is coming down the river into our State? What is going into your state? And we could work together on the thing.

SENATOR CONTILLO: I think there is one that is called the Interstate Sanitation Compact between New York, New Jersey, and Connecticut. But none of the Governors would fund it last time, because they were getting tough with each other.

MR. KUPLE: Senator Contillo, 50 years ago, the Regional Plan Association was founded; you know that. It was going to tell the states what to do out here about the growth. No one ever listened, right? That affected railroads -- you name it. But now it's too late. I mean, you know, water is kind of hard to get. I am not going to schlepp it down from the Catskills, where I have my cabin.

And, speaking of the Catskills, I saw the Shokan Reservoir just last week. I was at a meeting in the Catskills. We had a meeting up at Bellaire with many people discussing the same subjects. I looked at that water supply -- Shokan. I looked at it many times. That is some buffer they've got, isn't it?

SENATOR CONTILLO: Isn't that beautiful?

MR. KUPLE: That is why the City of New York had the best water in America.

SENATOR CONTILLO: When I was a boy, it did.

MR. KUPLE: And when "Consumer Reports" did its report 10 years ago, or eight years ago, bottled Perrier, this one-- Forget it, they had great water. Now they have trouble with salinity from the highways coming into their reservoirs, which we are going to have, too.

I suggest that a commission be set up. When we get an advisory committee, we have the NRDC to go to. They have great scientists. We have the Environmental Defense Fund, and no political appointees. These should be independent scientists who are going to come in and say: "This is what you've got." When I need a good doctor, and I want an opinion, they are going to bring in a guy who is going to say, "You've got this" -- period. Right? And not give me a placebo.

SENATOR CONTILLO: Thank you.

MR. KUPLE: Thank you very much.

SENATOR CONTILLO: Ella Filippone?

DR. E L L A F. F I L I P P O N E: (speaking off microphone part of the time, as she uses map to demonstrate) I brought my map, Senator. Maybe if we have a minute before we--

SENATOR CONTILLO: Sure.

DR. FILIPPONE: My watershed map. Greg, can you give me a hand with this? (speaking to Mr. Gage in audience, who complies) This is the tough part to do, if we are going to do it fast.

SENATOR CONTILLO: It is going to be tough to put that on the record, Ella.

DR. FILIPPONE: Well, I want you to see it, because it was done--

SENATOR CONTILLO: Okay.

DR. FILIPPONE: --after the last Water Supply Master Plan.

SENATOR CONTILLO: Why don't you put it on that--

DR. FILIPPONE: Can you see it? It is an important map for everybody to take a look at. It shows the franchise areas of the water companies. The green here is Hackensack Water Company, and then you have the Passaic Valley Water Commission and Elizabethtown over there with the pink and white stripes. We put New Jersey on its side because I couldn't envision it all. So, we are talking about--

SENATOR CONTILLO: Oh, I see what you did.

DR. FILIPPONE: You see, we put it on the side. Killian Associates, the engineering firm, did this map. It was done about 10 years ago, and it showed all of your reservoirs. See, here is your Newark system; here is the Wanaque and the Monksville; Point View; Oradell; and Fulton. These black lines here are the distribution systems that take the water to the

urban area. What I think is important for you to notice is, there is a lot of color in the urban area. All the white on this map is groundwater dependent. So, when you start talking about watershed-- When we defined watershed, the Water Supply Master Plan -- by we, I am talking about the environmental organizations -- and ask for watershed aquifer protection, we were not talking, as the man said before, about the whole State. We were talking about the areas up here that protect around here. This is your Spruce Run, and that is Round Valley, and that is the Raritan Basin. And we were talking about the area around here. We were talking about the area around Lake Hopatcong.

Here we have a proposed reservoir. We are talking about the north watershed -- this area here, and this area here. (pointing to map) So, if you wanted to do an (indiscernible) evaluation, it is several towns. It is not the entire State.

This map gives you an idea as to where the water goes. We have to have the watershed protection for the water to get from here down to Newark, and we also need the watershed protection for the groundwater on which the people are dependent, because this surface water -- all this surface water -- follows these black lines to the urban area. So, where we are talking about protecting feeder streams and watersheds, we are talking about protecting the surface water that is sent down to the urban area, and we are also talking about the groundwater that is used locally. That is a very important concept to remember.

A couple of things: I gave you my statement, and I am going to go very quickly through it. But I think it is important to point out a couple of things to you.

SENATOR CONTILLO: Okay. We will add this statement to the record, and you can give us your verbal presentation. Please proceed.

DR. FILIPPONE: Yes, yes. On the anti-degradation policy: Back in the late '70s, under the Federal Clean Water Act, every state had to adopt an anti-degradation policy, and NRDC went to court. New Jersey was just a smidgen away from going to court before they adopted the anti-degradation policy. I have attached, as my Exhibit 1, this anti-degradation policy that EPA requires. However, it is only a policy in New Jersey; it is not law. I am suggesting to you that you make it law, because then we begin to require DEP -- mandate DEP -- to follow this policy.

I dragged it out of the files a couple of weeks ago when we started this back and forth with New York State. Nobody could really find the anti-degradation policy, which under the 208 Plans that were adopted in the late '70s New Jersey is required to enforce. Now, we applied it to our water classifications, but we are really not enforcing it. So I am suggesting that instead of letting it stay as a policy, we make it a law.

The other thing with regard to your watershed protection and buffer zones-- I want to point out something to you which you and I personally discussed at one time, and that is the buffers around reservoirs. In our opinion, we need Category I and Category II reservoirs. Your Category I reservoirs would be those which are publicly owned and that own all of the land around the reservoirs, like the Newark watershed, the Wanaque Reservoir, where we can have the buffer zone at least to the ridge line so that the entire catchment area is protected.

The Category II, which people are not going to like, but that is the way we are going to have to live with it, are those reservoirs like Oradell which are in an urban residential setting, where we are going to have to use good science so it is defensible in court. I am very fearful of the 50-foot/300-foot numbers being adopted by this other

legislature, and then finding some unfavorable or dissatisfied water company going to court and saying this was an arbitrary number. We are wrestling with this in wellhead protection now, exactly how to define what kind of wellhead protection areas we should have. So, it would be very important to include parameters of flow, vegetative covers, soils, slope, and all of those elements in determining the buffer zone.

SENATOR CONTILLO: Climate.

DR. FILIPPONE: Climate, rainfall, and time of year. One of the things that--

SENATOR CONTILLO: I think that is what the bill says.

DR. FILIPPONE: Yeah, yeah. That's good, because our Watershed Protection Committee has always said that in the winter months is when your buffer zone is not as effective as during the growing season. So you have to plant things in that buffer zone, or make sure that you have certain kinds of cover that absorb the pollutants anyway.

I want to also send you a copy of Marilyn's proposal on corridor protection. They are putting over a billion dollars in the corridor protection of their rivers and streams, as a result of the findings on their Chesapeake Bay Program.

I have included in here the need to upgrade the Soil Conservation Program, the issue with regard to Category One streams which are being degraded. While it has been mentioned many, many times before, I am sure that you are aware of the fact that we have testified -- the Passaic River Coalition has testified -- with the North Jersey Water District, on this system with New York on water classification. It is imperative that we not just request DEP, but that you direct DEP to go into the meeting with New York and establish some kind of bistate committee.

We have, with the North Jersey Water District, pushed and pushed and pushed. It was something that I happened to mention to candidate Florio last year, because we could not get

the same kind of an agreement out of New York State that they have given to Connecticut. Water that flows from New York to Connecticut is AA-Special, and water that flows from New York into New Jersey is now classified as "D," which is the pits. They are willing to bring it all the way up to "C," which is also unacceptable.

What this means is what the gals from New York were talking about: It is absolutely okay to send this stuff down to New Jersey. That is unacceptable, and I think it is time that the Legislature establish criteria whereby New Jersey DEP must make the same arrangement as New York has with Connecticut. I think that is an awfully high priority.

SENATOR CONTILLO: Wouldn't the Hudson River just about-- I mean, the Hudson River is probably so badly polluted, as it comes down, that they would never get up to the schedule, or the--

DR. FILIPPONE: Yes, but we have Ringwood Creek and Jennings Creek. Both of them flow into the Wanaque Reservoir. They are both, right now, categorized as "D."

SENATOR CONTILLO: These streams that flow into reservoirs--

DR. FILIPPONE: That's right.

SENATOR CONTILLO: --as opposed to water that flows into them.

DR. FILIPPONE: That's right.

SENATOR CONTILLO: Okay.

DR. FILIPPONE: The Ramapo River, some other streams that flow into the Hackensack-- They were all classified-- Everything along the border was "D." We wanted AA-Special. We then want the kind of interaction between the two states so we will get the proper--

SENATOR CONTILLO: I see in here -- in your written statement -- that you talk about your Blue Acres Fund.

DR. FILIPPONE: Yes, my Blue Acres.

SENATOR CONTILLO: Talk about that. I think I would like to hear about that.

DR. FILIPPONE: Okay.

SENATOR CONTILLO: I mean, I know about it, but I want you to put it on the record.

DR. FILIPPONE: We have -- as I have discussed with you before -- proposed a Blue Acres Fund, which would place a tax, or a surtax on users of water. We are talking about the use of 1000 -- a penny on 1000 gallons of water, which is not a lot of money. I have a chart here that talks about how much this would cost per family of three. So, if you had one cent on 1000 gallons of water, it would bring in over \$3 million annually, and it would cost a family of three 66 cents. We have just added it up--

SENATOR CONTILLO: Annually?

DR. FILIPPONE: Annually, yes. This would be money that is based on an annual average daily use of 990 million gallons per day, which is the water that is sold by the 25 major water purveyors. We have added 25% to it for the small guys around, and we have come up with these numbers. This is a starting point to talk from; it does not include the industrial and the commercial water users, but it is, you know, you and me, the ratepayers. That is how much. If you put a nickel on per 1000 gallons, you would bring in every year \$18 million, and it would cost a home with three people, \$3.30, \$1.10 a person.

So, it seems to us that there is a little bit more to be done on this. My Groundwater Protection Committee is working on it. I hope to have some additional information for you by, I would say, the end of June, because the City of East Orange owns a lot of watershed land in the Central Passaic Basin. They are now putting together some information for us, to show us why these watershed lands are taxed in the first place, and some of the parameters under which it would be



acceptable to take these kinds of funds and pay them -- or, to pay in lieu of taxes so they could keep these watersheds open.

That needs a little bit more study, but I think--

SENATOR CONTILLO: Yes, but it is a great concept, Ella.

DR. FILIPPONE: --the tax on the user will bring in a lot of money that can be used for good purposes. It should be used to protect the resources. When you look at the value of the land that Newark owns, and that some of these other large public purveyors own, it is going to be very costly.

The final thing I would like to say is, we have a real problem, Senator, with using public funds for private corporations that are stockholder-owned. When we look at the way these programs are managed, what we are talking about -- which is all very good, the buffer zones, the acquisition of watershed lands, all of these fine things-- We have a problem, however, in providing these same kinds of public funds and public benefits for stockholder-owned corporations. I think we are going to have to have BPU, or someone else, look at that very, very carefully, because they make their profit, they run with it, and we taxpayers should not have to pay for it.

SENATOR CONTILLO: Thank you, Ella.

DR. FILIPPONE: You're welcome.

SENATOR CONTILLO: I will keep this record-- Is there anyone here who still hasn't--

DR. FILIPPONE: Oh, one other thing: Sylvia Spaeth asked me to hand this note in to you.

SENATOR CONTILLO: Sure. If you want to put it on the record, read it.

DR. FILIPPONE: Yes. She says: "River Edge Environmental Protection Commission wants to go on record in support of as strong a bill as possible to preserve water quality and open spaces."

SENATOR CONTILLO: Thank you, Ella.

I will keep the record open. If anyone wants to add any additional testimony, we will append it at the end of the transcript. All right?

DR. FILIPPONE: Incidentally, if you ever want to borrow the map, it's yours.

SENATOR CONTILLO: I would have to get a station wagon.

DR. FILIPPONE: No, it fits in--

SENATOR CONTILLO: Oh, you fold it down neatly.

Okay. I have to be somewhere at 6:30, which is not possible. Algis, I am going to fly out of here. I had wanted to buy you a nice dinner, but I have to go.

MR. MATIOSKA: You and me both.

**(HEARING CONCLUDED)**

## **APPENDIX**





PACE UNIVERSITY SCHOOL OF LAW  
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May 23, 1990

State of New Jersey  
Senate  
Land Use Management and Regional Affairs Committee

To the Committee:

I am an attorney for the Hudson River Fishermen's Association (HRFA) and the Natural Resources Defense Council, and an adjunct Professor of Law at Pace University Law School. I supervise Pace's Environmental Litigation Clinic, which represents HRFA in citizens suits against polluters in the Lower Hudson/Long Island Sound area.

Much of our effort in the past few years has been directed at the pollution of New York City's supply reservoirs and their watershed areas. The driving factor behind this degradation has been the siege of development in the watershed areas. Well over 100 point sources--sewage treatment plants and industries--currently discharge wastes directly into streams which are tributary to our reservoirs. Many of these dischargers regularly violate their permits, but even those that comply degrade the waters, since their permits are not set at levels to protect drinking water quality. Further problems are caused by increases in runoff contaminated by the fertilizers, pesticides, sediments and other chemicals which result from development.

Uncontrolled development in the watershed areas has been a disaster for Croton reservoir system in Westchester and Putnam Counties. The Croton is the smallest of New York's three reservoir watersheds, contributing about 10% of the supply. Once among the finest drinking water in the world, the Croton has declined to borderline quality due to the chemicals and nutrients that regularly enter the system by point and nonpoint discharges. Parts of the system suffer from severe eutrophication (algae) problems. Because the watershed is no longer high quality, the City must construct a filtration plant, at a cost of \$3-4 hundred million, which it hopes will remove many of the impurities in the water.

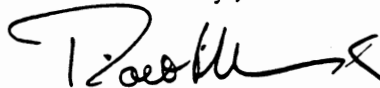
The City now recognizes that special steps are needed to protect its watershed resources, especially if its upstate Catskill supplies are to avoid a fate similar to the Croton. Failure to adequately protect the Catskill supplies would result in added filtration costs of \$5 billion or more, as well as the degradation of an invaluable resource. Albert Appleton, the

City's new Department of Environmental Protection commissioner has announced plans to implement a multifaceted protection program, which will include greater involvement in permit reviews for development and discharge permits, prosecution of violators, and cooperation with local authorities in watershed areas. While we strongly support Commissioner Appleton's new approach, the effectiveness of his program would be greatly aided by, and indeed may depend on, state regulation which establishes special guidelines for state and local agencies with permitting and regulatory authority in watershed areas.

What is happening in New York is also happening throughout the East Coast, as improper development and industry advances in water supply areas. Many states and cities are taking steps to address this serious problem, often adopting detailed land use controls in water supply watersheds. We commend the Committee's interest and efforts to address this issue, and urge the State of New Jersey to adopt a watershed management program sufficient to protect its reservoirs from degradation. Without such protections, the continued quality and safety of its water supply may be in jeopardy, subject to the depredations which unfortunately are characteristic of inadequately controlled development of our natural resources.

Due its special importance, we have made watershed protection a priority in our advocacy program. We have studied the steps that other states and localities have taken to address the issue, as well as the problems facing New York, and we are in the process of preparing detailed recommendations for the State's and the City's consideration. We would be happy to make the results of our research available to the Committee, and to otherwise support your efforts to enact a proper program for New Jersey.

Sincerely,

A handwritten signature in dark ink, appearing to read 'R. F. Kennedy', with a stylized flourish at the end.

Robert F. Kennedy, Jr.

Scientific Techniques in Watershed Management  
For Protection of Surface Sources of Drinking Water

David Gordon  
Scientific and Technological Issues  
in Environmental Law  
Professors Ottinger and Long

# SCIENTIFIC TECHNIQUES IN WATERSHED MANAGEMENT FOR PROTECTION OF SURFACE SOURCES OF DRINKING WATER

## INTRODUCTION AND LEGAL BACKGROUND

Historically, the management of watershed resources has been focused on their development for productive uses, including agricultural irrigation, hydroelectric power, transportation, flood control, and recreation. In recent years, however, as understanding of land use and its effects has progressed, and as appreciation for the scarcity of unpolluted water has mounted, planners and researchers have sought to develop and implement comprehensive watershed management methodologies to protect water resources from the problems caused by development.

Recent federal law has emphasized watershed management and the control of nonpoint pollution as strategies for restoring and preserving surface waters. The Clean Water Act amendments of 1987 require states to identify serious nonpoint problems and develop management programs to control those problems. The statute requires management programs to identify the "best management practices" to reduce the pollution problem, and to be developed and implemented on a watershed-by-watershed basis to the maximum extent practicable.[1]

A recent federal regulation under the Safe Drinking Water Act recognized the value of watershed management in protecting drinking water supplies. The regulation requires water systems to adopt safeguards to minimize the potential for contamination of surface supplies by certain microorganisms, and watershed management is one of the permitted alternative control strategies.[2] To qualify as an effective safeguard under the regulation, a program must characterize the hydrology of the watershed with respect to the activities likely to cause adverse effects on water quality, and monitor and control those activities. The regulation identified land use control as a fundamental means to minimize such adverse effects.[3]

This paper is intended as the scientific component for a legal and policy study of watershed management to protect surface sources of drinking water. It presents an overall view of the scientific principles and techniques in managing watersheds for surface water preservation, and many of the methods and procedures discussed will be useful in developing watershed controls to satisfy the federal requirements.\* The topic

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\*It is still uncertain which measures will be required or recommended because the final federal guidelines for evaluating the effectiveness of watershed controls have not yet been published (they are expected in the spring of 1990), and no program has yet been evaluated. In all likelihood, the required control techniques will vary with the particular situation.



integrates knowledge in a variety of scientific fields and processes, including the physical and chemical nature of the pollutants, the potential for degradation, natural hydrologic and ecologic processes and their disruption, and investigative and modeling techniques to plan responses. This paper focuses on the breadth of scientific knowledge involved in sound watershed management, and on the integration of the various scientific areas of knowledge where required.

## I. POLLUTION OF FRESH SURFACE WATER RESOURCES

Man's alteration of the watershed environment, through development, agriculture, and other activities, results in the release of a variety of substances into surface waters. These include substances brought into the watershed by man as well as substances occurring naturally which are transferred into the waters. Many of these contaminants have an adverse effect on the quality and cost of the drinking water supply, and if uncontrolled can end the usefulness of an aquatic system as a drinking water source.

### A. Sediment pollution

Sediment consists of particles of solid materials that don't dissolve in water, but are carried by the flowing action of water. These contaminants include clays, fibrous asbestos particles and organic materials from decomposition of plant and animal debris in soil.[4] Sediment pollution is also referred to as suspended or settleable solids due to the particles' physical state in the water. The particles tend to absorb and carry other pollutants, including organic chemicals, nutrients and heavy metals, and provide a medium for the growth of bacteria and other disease organisms. The ability of sediment to absorb other pollutants and deliver them effectively into receiving waters makes it a major concern for controlling nonpoint pollution.

The deposition of sediment in streams and lakes is a serious degradation in its own right, and leads to further degradation of these waterways. Deposition of sediment increases water treatment costs. It depletes the storage capacity of lakes and reservoirs, worsening the threat of flooding in prone areas, and it eventually requires the water supply system to dredge the accumulated sediment in the reservoir. When deposited in rivers and streams, sediment will alter the streamflow and lead to accelerated streambank erosion. Sediment deposition also alters the ecological balance of the waters. It is a primary cause of turbidity, thus reducing light penetration, and it destroys spawning grounds for fish and habitat for benthic (bottom dwelling) organisms.[5]

## B. Microbiological organisms

Microbiological pollutants include bacteria, viruses, fungi, algae and protozoa. Many microbiological organisms in surface water, especially bacteria, viruses and protozoa, may cause serious health problems. The EPA has become increasingly concerned about drinking water contamination by viruses and Giardia lamblia cysts, and has promulgated the regulation discussed above requiring safeguards to control it.

Fungi and algae cause unpleasant tastes and odors, and are expensive and difficult to treat, although they are not known to cause disease.[6]

## C. Heavy metals

Many heavy metals, including cadmium, lead, mercury, chromium and zinc, have debilitating or toxic effects either in the short term or due to long term exposure. Due to the tendency of metals to precipitate out of water with neutral or alkaline pH, and to bond or be absorbed onto particulates, the benthic deposits of those particulates may be especially contaminated.[7] Since they are "conservative" pollutants (i.e. they are not broken down by biochemical metabolic processes) the concentration of metals will undergo significant magnification in the food chain. Major sources of metal deposition into surface waters include: stormwater runoff, municipal and industrial wastewater, precipitates from airborne pollution, sediment, septic systems, instream pollution sources, agricultural runoff, and landfill leachate.[8]

## D. Organic chemicals

Many organic solutes in drinking water are carcinogenic, and thus pose a serious threat to human health. At least 423 organic chemicals have been identified in fresh water, 325 of which have been found in treated water.[9] The potential health problems and incidence of cancer due to tainted drinking water is difficult to ascertain; epidemiological studies are difficult to conduct because of the interactions with other factors and the long term (20 to 30 year) latency for most cancers.[10]

In addition, many organic chemicals are broken down in the water by organisms that require oxygen for the breakdown process. The presence of these chemicals thereby creates a "demand" for oxygen in the water, depleting the water of its dissolved oxygen. Water quality parameters known as "biochemical oxygen demand" ("BOD") and "chemical oxygen demand" ("COD") measure the concentration of these chemicals in the water. High BOD and COD levels are commonly the result of sewage discharges, but may result from any significant loading of organic material, including sediments. Depletion of oxygen in surface waters kills fish and other

aerobic (oxygen using) organisms, and creates conditions favorable for anaerobic organisms. This significantly alters the ecology of the water and leads to a variety of water quality problems. Anaerobic conditions are unsuitable for drinking water supplies.

#### E. Nutrients and eutrophication

Nitrogen and phosphorus are the primary plant nutrients of concern for water quality. They are commonly present in decaying organic matter, sewage, and fertilizers which are washed into surface waters. Excessive nutrient loading into lakes and reservoirs leads to algae blooms, and greatly accelerates the lake aging process, known as eutrophication. Typically, either nitrogen or phosphorus is the limiting nutrient for the growth of algae in a given aquatic ecosystem; i.e. loading that nutrient will have a direct effect on algal growth since the other nutrients necessary for further growth are already present in sufficient quantities.

Eutrophication is a natural process, but may be rapidly accelerated by man in a phenomenon known as "cultural eutrophication." Eutrophication is characterized by a high degree of fertility in the water and a consequently high level of plant biomass production, including lush growth of algae and weeds. The algae blooms cause taste and odor problems and higher treatment costs for water supply systems. The decay of this matter creates a significant demand on dissolved oxygen and may hasten the premature destruction of the lake or reservoir as a source of drinking water as well as its other environmental values. Eutrophication is also a strong indication that other types of pollution such as sediment, pesticides or other hazardous compounds are present in the water supply.[11] As such, it may represent a major health and safety concern for water supply systems.

#### F. Heat

Thermal loading of lakes and rivers can cause several problems with respect to water supply. The biological activity of the system is increased, worsening any existing problems with respect to the growth of algae, bacteria, and other microorganisms. Higher temperatures accelerate the water's corrosive action, which results in damage to water treatment and distribution equipment. In general, the lowest possible water temperatures is desirable for water supply purposes.[12] Thermal loading can be caused by removal of riparian vegetation, inflow of stormwater, and industrial thermal discharges.

## II. LONG TERM DEVELOPMENT AND WATER POLLUTION

### A. Point sources and sewage treatment

Point sources are by definition discrete and confined conveyances which discharge pollutants into surface waters. The classic example of a point source is an effluent pipe from a sewage treatment plant or an industrial facility. Point source discharges directly into the water are the most commonly perceived sources of surface water degradation. Industrial dischargers are major contributors of toxic pollutants, both organics and heavy metals. Sewage treatment plants contribute nutrients and BOD from human sewage as well as toxics introduced by households and industry.

Degradation from sewage is a characteristic problem of human use of an area. Each person in the U.S. uses about 75 gallons of water per day for domestic purposes, a large fraction of which is returned to municipal sewage treatment systems. Estimates of total industrial wastewater are difficult to make, but they are in the range of 300 gallons per capita per day.[13] Households are a source of many types of pollutants other than human excrement, because many chemical products are disposed into the sewage system.

Even where sanitary sewers are designed to remove high proportions of pollutants, significant degradation may result. First, certain pollutants such as heavy metals generally are not removable by treatment plants. Also, many sewer systems are susceptible to disruption from heavy or moderate storm loads. In combined sewer systems, stormwater flows can overload the system causing combined sewer overflows (CSOs), in which sewage is washed through untreated. CSO loadings from storms may be many times larger than the loads ordinarily discharged from sewage treatment plants and may equal or exceed total ordinary sewage flows in the aggregate.[14] Even where the systems are not combined, leaks from the system and overflows due to percolation of stormwater into cracked sewer pipes are common causes of contamination in surface waters.

Point source discharges of pollutants were brought under direct federal regulation by the Clean Water Act in 1972. Since that time, controls on point sources have helped reduce their share of the pollution load so that nonpoint sources are now the dominant cause of surface water degradation on the United States.

### B. Nonpoint pollution

Nonpoint pollution is conveyed primarily by runoff from storms

flowing over the land surface.\* Three basic processes work to transport pollution to streams and lakes. First, a pollutant may dissolve into the flowing water. Second, insoluble substances may be transported in a suspended state in which the flow drags individual particles along. Third, pollutants may be adsorbed (attached to the surface) to dissolved or suspended particles. [15] The physical and chemical properties of the pollutants determine their path and mode of travel.

Washoff and transport of sediment is a primary mechanism by which nonpoint pollutants enter surface waters. The sediment is itself a major pollutant, and other pollutants become attached to the sediment particles. Phosphorus contamination in particular is closely associated with sediment loadings.[16] For this reason, reduction of sediment removal and transport is often a focal point of control techniques.

#### 1. Rainfall and hydrologic force of runoff

Factors that determine the sediment accumulation in runoff include rainfall size and intensity, vegetative cover and soil erodability, slope steepness, and erosion controls.[17] Soil loss is very sensitive to the slope of the land; differences in steepness of slope can produce order of magnitude differences in computed soil loss from small land areas.[18] Disturbance and removal of the land's vegetative cover is also an important factor in soil erodability, and is the primary reason that agriculture and construction are major contributors to sediment loading.

The sediment yields due to rainfall and runoff are also very sensitive to the magnitude of the water's hydrologic force. Studies have shown that sediment concentrations may vary by factors as high as 35 depending on the magnitude of runoff. In addition, those yields tend to be extremely concentrated in time. More than half of the annual sediment pollution into a stream may be loaded during the worst storms, whose aggregate discharge period amounted to no more than one day in duration, and whose aggregate runoff volume was no more than ten percent of the total.[19]

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\*Stormwater runoff discharges may technically be considered either point or nonpoint pollution depending on the mode of discharge into receiving waters. Stormwater is often collected into pipes and discharged, or brought into combined sewer systems, either of which would make its release technically a point source discharge. Nevertheless, this paper will treat all stormwater as nonpoint, to emphasize the land use aspects of its creation and pollutant washoff.

## 2. Urban land

Urban land is a major source of nonpoint pollution. In addition to sewage treatment plants and industrial point sources, urban land creates runoff with high levels of contamination. For some contaminants, including BOD and phosphorus [20], the concentrations found in stormwater runoff are comparable to sewage treatment plant effluent. Concentrations of suspended solids in runoff are comparable to raw sewage [21], and may be as high as 10 to 20 times the concentrations in treated sewage.[22] Urban runoff also contains high quantities of toxic heavy metals such as lead, mercury and zinc.[23] Microbiological life, nutrients, and organics are also found in urban stormwater.[24]

The extent to which nonpoint pollution from land development degrades water quality depends on the type and intensity of development, and in particular the amount of urbanization. A much higher proportion of rainfall is converted to runoff in commercial and industrial areas than in residential areas.\* Land development characteristics which have an impact on water quality include the percentage of impermeable cover, the percentage of area served with storm sewers, runoff generation characteristics, sediment yield, sewage generation, and water usage.[25] Heavy development generates 200 times more sediment per square mile than agriculture, and 1,000 times more than woodland areas.[26]

## 3. Impervious surfaces and runoff

The creation of impervious surfaces is the primary determinant of land development's long term effect on receiving surface waters. Impervious surfaces reduce the proportion of rainfall which infiltrates into the soil column, causing greater quantities of polluted surface runoff. In addition, a greater quantity of pollutants which would otherwise be retained by natural cover builds up on impervious surfaces and is available to be carried off by the runoff.

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\*See Burby et al, Drinking Water Supplies: Protection Through Watershed Management, 1983, p.8-10.

Although the type and intensity of development is commonly seen as the key polluting factor, one study has found that the relative mix of developed land uses may have little effect when control measures are used. Instead, the study found that the preservation of open space was seen as the key to water quality preservation, so that if development were to occur, it should be concentrated in suitable areas rather than allowed to sprawl. See Occoquan Basin Study, 1982, pp.92-94, discussed infra at p.23.

a. Increased hydrologic force, total runoff and peak flow

Most rainfall onto natural terrain is absorbed into the ground, but impervious surfaces result in extremely high rates of conversion of rainfall into surface runoff. The percentages of rainfall converted to runoff for various land uses have been estimated based on field studies in a number of areas. The coefficients range from 10-20% in forested areas to 40-50% in cultivated areas to 90-100% in highly urban areas.[27] Construction activities in particular increase rates of runoff substantially, due to elimination of vegetation, compaction of soil, and exposure of subsoil.[28]

In addition to the total volume increase in polluted runoff, impervious surfaces increase the size of peak flows during and after storms. The increases in peak flows in turn provide greater hydrologic force for the removal of pollutants by scouring and sediment transfer, and subsequent transport into surface waters. Peak flow increases also contribute to downstream flooding and degradation of streambanks due to excessive flushing.

b. Loss of infiltration

In densely developed areas, infiltration of stormwater into subsoil is virtually nil.[29] The loss of infiltration is itself a serious effect of increased runoff, aside from the increased pollution caused. Infiltration is a valuable source of purified groundwater. In addition, infiltration and groundwater recharge is important to maintain dry weather streamflow and a steady rate of discharge into receiving streams. In contrast, high runoff rates result in larger peak flows, increasing the likelihood of flooding and low flow periods.

c. Buildup of pollutants and sediments

Contaminants tend to accumulate on impervious surfaces over time, and are not subject to the biological and chemical assimilation processes available on natural terrain. Studies have indicated that contaminants from impervious sources are the predominant pollutants in urban stormwater runoff.[30] Pollutants which build up on impervious surfaces may pollute surface waters through airborne transference, as well as through runoff.

4. Special pollutant-creating activities

a. Agriculture

Agricultural areas are a major source of runoff pollution. Their sediment production is extremely high because of the lack of vegetative cover. Pesticides and fertilizers are heavily used, and are washed off with the soil during rainstorms. Animal

wastes from farms and feedlots pose a special problem because they are washed into surface waters untreated. In many areas their absolute volume is much greater than human waste. Animal wastes contribute BOD, nutrients, and bacteria, along with the eroded silt, chemicals, and dissolved salts that are other common agricultural runoff pollutants.

#### b. Construction

Construction causes more sediment pollution per unit of land than any other activity. Without control measures, the loading rate of sediment during construction can be from 10 to 100 times as great on a per acre basis as the loading rate before development.[31] The estimated cost of removing the sediment from reservoirs to restore lost storage space was estimated at \$1 billion per year nationwide in 1970.[32] Since sediment concentrations also affect the loading of other pollutants, control of sediment runoff from construction sites in reservoir watersheds is an important step in maintaining high quality water supply.

#### c. Roads and motor vehicle transportation

Motor vehicle transportation is also an important cause of water pollution related to development. First, motor vehicles produce extensive air pollution which may enter surface waters through precipitation or settling. In addition, automobiles are a major source of asbestos [33] and heavy metals such as zinc, lead and copper.

A great deal of sediment builds up on roads, which deliver the pollutants over the impervious surfaces through storm rainage systems into receiving waters. Soil loss from unstable roadbanks also contributes heavy sediment loads.[34]

Other runoff pollutants attributable to roads and vehicles include de-icing salts, oil and grease, and increases in temperature from hot pavements. Runoff of de-icing salts leads to abnormally high chloride levels, and some of the de-icing salt additives and their derivatives are toxic to humans, fish and animals.[35] Also, roads, like most impervious surfaces, heat up rapidly in sunshine. A study on Long Island found that stormwater runoff may increase stream temperatures by 10 to 15 degrees F. When delivered to surrounding waters, this heat load can lead to stratification and dissolved oxygen deficiencies.[36]

A comparison of runoff analysis studies demonstrates how land uses affect the composition and the resultant pollutants in runoff. Two studies of runoff in the Durham, North Carolina area were generally consistent with each other, but showed fundamental differences with a study of the Saddle River, New Jersey area. The North Carolina data showed suspended solid concentrations an



order of magnitude higher than the New Jersey data. This was probably due to the higher rate of construction in the Durham area than in Saddle River, which was already heavily developed. In contrast, the New Jersey study showed concentrations of lead two to three times as high as the Durham data, probably due to the increased automobile density there. (These studies were conducted in the 1970s, when lead additives in gasoline were much more prevalent than now.)[37]

#### d. Failing septic tanks and subsurface

Pollution from failing septic tanks is a serious problem in most developing areas. Failure of septic tanks may be caused by geologic factors such as unsuitable soils, a high water table, excessive grade, or by poor construction or maintenance.[38] They are properly considered only a temporary means of disposal, since the waste assimilative capacity of the soil will be depleted or exhausted after some time. A high percentage of septic tanks fail after a short period.[39] Septic tanks may impact surface water quality either by surface discharges, or by release of pollutants into groundwaters which recharge a surface body.[40]

### C. Special vulnerability of reservoirs

The primary goal of most watershed management programs is to ensure the integrity of the water quality in its lakes and reservoirs, the usual surface sources of drinking water. Lakes and reservoirs are particularly vulnerable to contaminants, serving as pollutant "sinks".[41] While streams and rivers flush pollutants downstream, lakes and reservoirs tend to trap pollutants and accumulate them in the water column, bottom sediments and aquatic life. The longer pollution abatement is delayed for a lake, the more expensive restoration is likely to be and the greater the risk of irreversible damage.[42]

Within any given reservoir, several factors affect its susceptibility to accelerated eutrophication. In particular, reservoirs with greater water circulation and volume and shorter average residence time will be more able to withstand nutrient loads. The deeper the reservoir and the more regular its coastline (fewer bays), the more resistant the lake will be to eutrophying effects.[43]

## III. RESPONSES AND CONTROL TECHNIQUES

### A. Filtration and treatment

The classic response to degradation of surface drinking water supplies is filtration, whereby suspended contaminants in water

are removed while passing through a porous material such as sand. Before the actual filtration process, chemical coagulants must be added to the water and large particles allowed to settle out. Then, as the water is passed through the filter medium, three processes act to remove contaminants: straining, where large particles are caught in the pores of the filter medium at its surface, and flocculation and sedimentation, where the impurities coagulate and settle in the interstices of the filter. The filter functions at optimum efficiency when coagulation causes a significant amount of the impurities to be trapped and removed in the filter's interstices.[44] Finally, the filter must be backwashed to remove the accumulated floc.

Although filtration is the most common engineering solution, it has significant drawbacks as a purification strategy. It is extremely expensive, and the possibility of equipment or process breakdown is a continual threat to the dependability of the supply.

Most importantly, treatment and filtration will not ensure removal of all types of contaminants. For example, conventional treatment processes are only partially effective in removing toxic chemicals such as synthetic organic compounds, due to the very low concentrations which may be of concern.[45] The problem is exacerbated by the proliferation of new industrial chemicals which may contaminate water supplies. In addition, filtration and treatment may not be useful to remove viral contaminants such as infectious hepatitis.[46]

## B. Best Management Practices and Land Use Planning

### 1. Basic theory and goals

There are many different means available for control of nonpoint pollution. Preventive and remedial conservation and control mechanisms may be effected at each different stage of the process of conversion of land based materials to water pollution. "On-site" mechanisms may prevent or reduce the generation of pollutants at their source, or prevent the pollutants from entering runoff or storm water. The runoff itself can be abated, by maintaining the permeability of the ground, and thus allowing for significant levels of infiltration. Minimizing the conversion of infiltration to runoff will also allow for greater removal of suspended pollutants from the runoff, reduced assimilation of new pollutants due to hydrologic pressure, and increased groundwater recharge. Any individual means or technology may have a synergistic effect on pollution reduction, effecting reductions at more than one stage of the process.

The techniques for abating or diminishing nonpoint pollution are commonly referred to as "Best Management Practices," or "BMPs."

BMPs have been employed for many years to help prevent soil erosion in agricultural areas. Lately, more attention has been focused on the use of BMPs to minimize the degradation of waters from urban runoff.

Urban BMPs can be divided into two general classes: structural and nonstructural. Structural techniques involve fixed physical structures, including detention basins, infiltration facilities such as trenches and percolation ponds, and porous pavement. Nonstructural measures include street sweeping, grassed swales, open spaces, marsh vegetation, filter strips, urban forestry and land use planning.[47] Both structural and nonstructural controls may be applied to pollution caused by development and general land use, or directed at specific activities such as automobile transportation, construction, or agriculture.\*

## 2. Structural BMPs for development

The most common structural BMPs for developed land involve the provision of storage to attenuate the runoff peak and remove settleable materials.[48] Both dry and wet detention basins (stormwater ponds) are used to store excess stormwater and release it at a controlled rate. Significant removal of pollutants depends on design which provides detention long enough to allow silt sized particles to settle. Removal includes biological removal, primarily with respect to nutrients and BOD, as well as sedimentation. Periodic removal of settled sediment is necessary.[49] Detention basins offer substantial pollution control benefits for all land uses,[50] but because they require extensive area, they are best suited for lower density suburban zones and new development. In commercial and other developed zones with limited area, measures such as parking lot storage may be more practicable for stormwater detention.[51]

The flow of stormwater runoff may also be regulated by temporarily damming various sewer pipe segments to provide extra storage capacity. This has been done principally in combined storm and sanitary systems, but may be applied to separate storm sewers as well. This procedure does not provide any treatment, but it allows more efficient use of subsequent treatment facilities.[52]

Other structural BMPs control the runoff volume by diverting

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\*For a comprehensive analysis of BMPs for development, see Tourbier, Joachim Toby and Richard Westmacott, Water Resources Protection Technology: A Handbook of Measures to Protect Water Resources in Land Development, Urban Land Institute, Washington, D.C., 1981.

stormwater directly into the soil column. Examples of these measures are infiltration trenches and pits, dutch drains, and porous and modular pavement. Unlike detention basins, these volume controls are especially useful for high density land uses with large parking lots.[53] However, because they rely directly on infiltration, these volume controls are not useful in shallow or relatively impermeable soils, or areas with a high water table. They could be useful on more soil types if used in conjunction with detention basins to minimize required draw-down times. Volume controls may require frequent maintenance if land disturbance upstream causes heavy siltation,[54] but they are efficient removers of runoff pollution. Because they work to increase infiltration, they may have an impact on groundwater quality.

### 3. Nonstructural source controls for development

Nonstructural controls may be employed either on a particular development site or to a developed area as a whole. When applied to a particular site, nonstructural BMPs implement "natural engineering" principles, which utilize existing site features to improve stormwater detention and infiltration.[55] Stormwater is routed to areas such as depressions, grassy areas, wetlands, buffer strips, and other open spaces instead of being routed away in a storm sewer system.

Nonstructural BMPs are often the most appropriate and cost-effective pollution control techniques for already developed areas, due to the high retrofit costs of most structural controls. A common example is vacuuming or sweeping to remove accumulated pollutants from roads and parking lots before they are washed away in stormwater. As discussed above, motor vehicle traffic produces extensive deposits of pollutants on these surfaces. Soil and other pollutants lost from construction, cultivation, landscaping, and other land uses also accumulate on roads and parking lots.

Because of its applicability to pollutant accumulation on paved traffic surfaces, vacuuming and sweeping are especially appropriate in highly developed commercial areas.[56] However, its effect as a removal device is limited for those pollutants which tend to concentrate in very fine suspended materials.[57] Also, the frequency of cleaning is important, in part to reduce the potential washoff load [58], in part because many of the pollutants become airborne and transported to surface waters.[59]

Another example of an areawide nonstructural control is the use of innovative technologies to identify failing septic systems. Aerial infrared color photography enables the investigator to discern areas impacted by sewage contamination, and has recently been applied to identify other nonpoint sources of pollution,

including livestock, cropland, construction sites, and mining operations. Stereoscopic viewing of paired infrared photos provides a three dimensional image of the ground, allowing analysis of topographic features and drainage patterns important to controlling nonpoint pollution. Such photographic techniques have proven to be a cost effective means for to monitor nonpoint pollution.[60]

#### 4. Land use

The most important BMP for water pollution prevention is control of land use. Land use controls are the most effective ways of minimizing disruption to natural surface drainage and infiltration patterns, thus retaining the natural pollutant treatment processes of the land. They also may reduce the possibility of the generation of pollutants which will pose a threat to drinking water supplies and other uses of surface waters. This latter objective is the focus of the federal regulation cited above, to the extent it addresses land use controls.

Water supply managers have long known that improper practices and development in close proximity to reservoirs and feeder streams can cause degradation, and have retained buffer zones adjacent to the waters. To be effective, however, controls must be applied throughout the entire catchment area; otherwise, activities in even a small unregulated portion may negate or reduce the benefits of management.[61]

The most cost effective and environmentally satisfactory land use for runoff pollution control is preservation of open space.[62]

Where development occurs, land uses should be planned to maintain natural drainage patterns and minimize impervious area. Development should be avoided in areas where hydrologic processes are especially subject to disruption, such as groundwater recharge zones or steep slopes. By using watershed runoff models, planners can pattern development to minimize adverse impact on receiving surface waters, primarily by preserving natural pollutant removal processes to the extent possible.

In addition to basin-wide planning controls, the design of individual developments will have a significant effect on their runoff pollution, especially as a result of impervious surfaces. For example, in any given development, a cluster layout minimizes the impervious area necessary for roads and walks for any given level of overall density.\* Impervious area may be further

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\*Cluster designs also minimize the developer's utility costs, because they reduce the areas which must be serviced by utilities.

reduced by reducing street width and substituting grassed drainage swales for paved curbs and gutters. Runoff peaks and erosion may be reduced by the use of vegetation, mulch, and grade stabilization in landscaping.[63]

#### 5. Activity controls

Agriculture and construction cause special pollution problems because of removal of vegetative cover and consequent erosion. As a result, specialized BMPs have been developed for these activities. Agricultural BMPs have been employed for many years to control soil loss and erosion, and include practices such as reduced tillage, contour farming, crop rotation, and cultivation of vegetative cover.[64] Similarly, a variety of management practices for construction sites, such as temporary filters, runoff diversions, traps, and vegetative covers have been devised to keep uncovered and disturbed sediments from entering the runoff stream.[65]

Activities which directly introduce outside pollutants onto the land or waters should be limited as well. Again, agriculture poses special dangers, due to the use of fertilizer and pesticides. BMPs have been developed to control the types used, and the method and timing of their application.[66] In addition, point source inputs from sewage plants and industry and the storage of chemicals should be limited and strictly regulated, and eliminated if necessary to maintain drinking water quality. Activities by individual landowners and the general public which cause degradation are more difficult to control; public education may be useful in minimizing the pollution resulting from the household use of fertilizers and disposal of toxic chemicals.

#### C. Choosing the best suited protection technology

The objective in implementing runoff controls is to limit the runoff from any specific development to its natural magnitude,[67] and to preserve the pre-development hydrologic and hydraulic characteristics.[68] The choice of BMP's applicable to a particular development will depend on 1) their physical suitability, given the area's soil type, water table and hydrology, 2) the control benefits required, such as peak discharge reduction, volume retention, groundwater recharge and streambank erosion control, 3) the expected efficiencies of pollutant removal,[69] and 4) the particular activities to be controlled, if any.[70] In general, the best strategy is the control nearest the site where pollutants are generated.[71]

Some BMP control measures may have adverse environmental impacts, which also must be evaluated when choosing a technique to be applied. The environmental values which may be impacted include: flow characteristics and quality of surface water, recharge and quality of groundwater, soil erosion and drainage, and vegetation

and wildlife habitat.[72] Other land use objectives and cultural factors such as aesthetics and safety may also be taken into account in choosing the proper control technique.

#### IV. PREDICTIVE AND MODELING TECHNIQUES AND EVALUATIVE PROCESSES

##### A. The value of systematic planning

Although random and uncoordinated use of the techniques and guidelines discussed above would protect water quality better than a failure to incorporate these considerations at all, systematic evaluation and prediction of water quality pollution and protective measures offers many advantages. First, it is likely to reveal the least costly way to obtain given increases in water quality. Second, it can be used to determine the measures necessary to maintain the high quality levels required for drinking water sources. Also, it allows for objective evaluation of individual activities and land uses, and combinations thereof.

Most importantly, a systematic evaluation provides a supportable, objective basis for the consistent application of control requirements throughout the watershed. It also may be required to support the application of comprehensive land use controls, which are a necessary component of a watershed management plan.[73]

##### B. Watershed modeling

Modeling is the scientific tool used to predict the impact of land uses and activities in the watershed on water quality. A model, as applied here, is a mathematical representation of the hydrologic and other physical and chemical processes involved in runoff and pollution. The model as a whole is a system of mathematical relationships representing the overall pollution process. Each individual equation or set of equations represents a subsystem or component process. The models for predicting watershed pollutant loads are typically complex and suited for computer application.

A watershed pollution model must simulate or estimate the effects of a variety of interrelated processes. To estimate the generation of pollutants, the model should consider natural features such as topography, soils and geology, vegetative covers, precipitation and streamflow patterns, wetlands and floodplains, and land use activities such as transportation, residences, commerce, industry, agriculture, and silviculture.[74] Estimating the induction of these pollutants into surface runoff will depend on the same factors. To produce workable estimates, the model must simulate the flow of runoff in each area of the watershed, based on the hydrologic

characteristics of the area and the magnitude, speed and direction of runoff flow in adjacent areas. In turn, the delivery of pollutants into the surface waters will depend on these hydrologic patterns, the downgrade land uses and runoff controls, and point source discharges in the watershed.

Finally, the model should estimate the pollutant assimilative capacity of the receiving streams and lakes to determine the extent of the resulting degradation of those waters. The ability of flowing streams to transport and disperse the pollutants must be assessed along with the processes which break down or remove some of the pollutants. Those pollutants which are susceptible to such removal, such as BOD, are nonconservative; others whose concentration is changed primarily by inflow and outflow, such as most metals, are conservative.

#### 1. General application models

Although a unique model is produced for each individual watershed management problem, the study need not start from scratch. General application models exist which simulate or estimate the interaction of several of the physical and chemical processes involved. A given model may address any functionally sequential combination of these processes, depending on its focus and purpose. The results of one model may be used as input to another where the study requires consideration of processes not fully addressed by any individual model.

##### a. Example: STORM model

The Corps of Engineers STORM model is an example of a general application model which simulates a variety of processes to estimate runoff quantity and quality. The model is oriented toward aiding in the selection of storage and treatment facilities to control storm runoff and land surface erosion.[75] The following discussion of the STORM model relates to its application in a study of land use effects on eutrophication in the Pequannock watershed in northern New Jersey, the source of drinking water for the city of Newark.\*

STORM computes the quantity of surface runoff resulting from rainfall in an area based on precipitation and the type of land use. STORM assesses the hydrology related parameters associated with each land use category, including depression storage,

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\*The model used was actually a version of STORM prepared by Camp, Dresser and McGee for the study. See, Rosenberg, Myron S., Robert A. Kimball and Robert P. Shubinski, "Predicting Eutrophication Impacts of Development," in Watershed Management: Proceedings of the Symposium, American Society of Civil Engineers, New York, 1980, p.517ff.



percentage imperviousness and other physical properties to estimate runoff,[76] and integrates that result with surrounding areas to simulate the hydrologic processes of the watershed.

STORM also calculates the entrance of pollutants into runoff waters based on land use. The primary pollutant focused on is suspended solids (sediment). For undeveloped land, sediment removal was estimated by a modified form of the Universal Soil Loss Equation\*, and depended on various physical parameters such as soil erodability, slopes, vegetative cover, and rainfall intensity. For developed land uses, the model utilizes exponential relationships between sediment buildup in dry periods and washoff in wet periods.[77]

If a pollutant other than sediment (for example, phosphorus) is being studied, coefficients are used to convert the runoff of sediment (known as "total suspended solids" or "TSS") to phosphorus. These ratios also vary by land use category.[78]

STORM's output provides information regarding the quality and quantity of surface runoff pollutants under different land use conditions, primarily for urban watersheds. Certain non-urban areas can be considered. Erosion can be computed in addition to

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\*The Universal Soil Loss Equation (USLE) estimates sediment loading into runoff in tons per acre per year. It is expressed as follows:

$$A = R K L S C P$$

where A is the total soil loss per unit area; R is the rainfall factor; K is the soil-erodibility factor; L is the slope length factor; S is the slope steepness factor; C is the cropping (vegetative cover) factor; and P is the erosion control practice factor. Stream Corridor Management, p.32. USLE is an example of a simple model that is commonly input into other models and studies to explain a particular set of interactions.

Some versions of USLE contain a final factor, the sediment delivery ratio (Sd). See, e.g. Hammer, Thomas, Planning Methodologies for Analysis of Land Use/Water Quality Relationships, U.S. E.P.A., 1976, p.192. The sediment delivery ratio represents the proportion of runoff sediment at the point of generation which is actually delivered into the receiving stream or reservoir. Sd is dependent on factors such as proximity of the erosion site to the receiving waters and the geological characteristics of the area. It is used when USLE estimates the pollutant load into receiving waters for an assessment of a given site. When USLE is input into more sophisticated models, such as STORM, hydrologic transport of the sediment is simulated, and the sediment delivery ratio is not necessary.

the basic water quality parameters of suspended and settleable solids, BOD, nitrogen and phosphate.[79]

#### b. Aquatic water quality models

In order to assess water quality effects and/or degradation to receiving streams and reservoirs based on pollutant loadings, the STORM results must be entered into a stream or lake system simulation model. As with the land based runoff component, many aquatic water quality models have been developed and are available for use by planners and modelers. Most of these models are based on a mass balance principle, where the concentration of a pollutant is estimated by accounting for the quantity of the pollutant entering the stream or reservoir, the transport of the pollutant through the system, and the reactions within the system that either increase or decrease the concentration.[80]

Aquatic water quality models simulate the dispersion and assimilation of pollutants due to river flows, and the effect of lake stratification, mixing and flushing on pollutant concentrations. In addition, these models will estimate the decay of nonconservative pollutants such as BOD. Loadings from point sources such as sewage treatment plants as well as the runoff results should be input into the receiving water model in order to gain a reliable estimate of water quality effects.

#### 2. Calibration and verification of models

Calibration and verification are important steps to ensure a prepared model's utility for a given study. Calibration is a process by which a model's parameters are adjusted to apply to the particular study area.\* To calibrate, the model is run using input from observed data, and the results are compared with the output variables from the same data. The model parameters and the model itself are then adjusted to bring the results into conformance with the observed data. This is accomplished by successive runs of the model, as well as with the use of statistical techniques which result in the minimization of the error in the model. Calibration is usually a trial and error process, and reflects modeling technique as much as an "art" as a science.[81]

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\*One researcher advises planners to carefully consider whether to proceed with model calibration or avoid it due to its high expense in relation to overall modeling costs. He argues that, in cases where comparative evaluation of land use controls is more important than absolute predictive accuracy, calibration may not be worth the cost. He does not discuss whether confidence in an uncalibrated model is justified, even for purely comparative purposes. See Hammer, pp.63-64.

The model must then be verified to ensure its accuracy with respect to the studied processes. Model verification requires a set of input and output data independent from those used in calibration. For complex models or large study areas, verification can be done in two steps, with a smaller area serving as a preliminary test of accuracy before running the entire model.[82] A model is verified if the predictions using given data inputs compares favorably with the observed outputs. The criteria for determining this consistency depend on the nature of problem, the type of model developed and its purpose, and the extent of the reliability of the available data.[83]

The Pequannock watershed model cited above is an example of the dependence of the verification process on the particular needs of the study. Because the study focused on phosphorus as the key pollutant, coefficients were needed to convert STORM's TSS output to phosphorus. Conversion ratios were chosen based on information from other studies. When applied in the model, phosphorus generation for undeveloped areas was estimated at 0.01 lbs./acre/yr., which was at the far low end of the range of reported values (0.01-0.68 lbs./acre/yr.). Nevertheless, the conversion ratio was accepted as adequate, because the study required conservative estimates for phosphorus load.[84]

### C. Study methodology--Occoquan Basin Study

#### 1. Background

Models may be used in a variety of ways to investigate watershed pollution and evaluate protection strategies, depending on the available data, the activities and processes studied, and the resources and requirements of the investigation. A comprehensive methodology for using computer models to determine watershed-scale land use impacts on reservoir quality is demonstrated by the Occoquan Basin Study.\* The Occoquan Basin Study was conducted by the Fairfax County (Va.) Office of Comprehensive Planning in the early 1980s to investigate the continuing deterioration of the Occoquan Reservoir, a source of drinking water for over 600,000 people near Washington, D.C. Accelerated eutrophication was the most serious threat to the reservoir's water quality and its long term utility as a source of drinking water. The eutrophication had persisted even after the sewage treatment plants in the watershed had incorporated advanced wastewater treatment measures, which minimize nutrient discharges, so runoff was determined to be the primary factor in the reservoir's deterioration.

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\*Fairfax County, Office of Comprehensive Planning. Occoquan Basin Study, 1982.

## 2. Choice of water quality goal

The study assessed the impact of various combinations of land uses and BMPs on water quality, focusing on a particular water quality goal. Phosphorus was chosen as the target pollutant, since it was the limiting nutrient and therefore the most likely cause of continued eutrophication. A specific concentration of chlorophyll a (a measure of eutrophication related to phosphorus loading) was chosen as a water quality target at a level which would prevent further degradation of the reservoir, considering already existing and committed development.[85]

## 3. Development of the model

The Northern Virginia Planning District Commission (NVPDC) developed a sophisticated model, the Occoquan Basin Computer Model, which used a series of engineering equations to simulate the the receiving water quality problems caused by nonpoint pollution loadings and for assessing alternate management strategies. The model was divided into submodels simulating the pollutant washoff and instream processes of the watershed. As a whole, the model simulated the conversion of rainfall to runoff, the washoff of pollutants from the land surface, the delivery of runoff and associated pollutants to receiving waters, the release of subsurface pollutants in base flow, the addition of sewage treatment plant loadings, and the stream and reservoir response to pollutant loadings. The watershed was divided into 15 sub-basins (39 sq. mi. average) that were linked by 12 stream channels and three reservoirs.[86]

The model's parameters were derived from data on the basin's soil characteristics, ground cover, drainageways, and hydro-meteorologic conditions, together with rates of pollution runoff for different land uses measured in field studies conducted by NVPDC and the Occoquan Watershed Monitoring Laboratory. In the field studies, runoff pollution from 21 small, single land use watersheds (26 acre average), covering a wide variety of land uses, was continuously monitored for one year by means of automatic sampling equipment. Model streamflow parameters were calibrated by comparing simulated and measured values for a five year period; calibration for water quality parameters compared values for a three year period. A separate three year data set was used for model verification.[87]

Due to the time and expense of running the Occoquan Model, the Office of Comprehensive Planning developed a simpler "desk top" model for use in the study. The desk top model is an approximation of the Occoquan Computer Model's simulations of conversion of rainfall to runoff and washoff of pollutants from the land surface, and was based on NVPDC's field monitoring results. It calculates the amount of phosphorus runoff generated by various land use/BMP combinations. The data required includes

the study area acreage in each land use, the runoff pollution rate for the individual land uses, and BMP pollution reduction efficiency estimates (which also vary for each land use). Sample runs showed the desk top model to be a good approximation of the Occoquan Model for runoff pollution estimates.[88]

#### 4. Study strategy

For its input, the study formulated 3 different BMP requirement patterns and five different land use control patterns to be applied over the 104 sq. mile area of land controlled under the study.\* The BMP requirements modeled were:

##### 1. The existing BMP requirement

No existing developments will have BMPs. BMPs will serve 75% of the acreage on each new development site. Detention ponds are the primary BMP.

2. More BMP coverage, with high efficiency volume control BMPs for more intense land uses. Vacuum sweeping would be required in apartment and commercial development. Still, no BMPs will be required in existing areas. This alternative represents more emphasis on site planning techniques, and commitments provided by the developer.

3. Detention ponds or volume control BMPs are applied to 75% of new development acreage, and vacuum street and parking lot sweeping (assumed to be the most cost-effective technology for retrofit to existing development) applied to 75% of the acreage of new and existing development. The county would provide some of these BMPs.

The 5 alternative land use plans, each plotted with specificity over the study area, were:

1. The existing land use plan, with some high density and much medium density development, and a large area less dense than 1 du/ac (dwelling unit per acre)

2. Same as above but no area less dense than 1 du/ac

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\*The area for which the land use controls were developed was the 104 sq. miles of the Occoquan watershed in Fairfax County, although the entire watershed covers 584 sq. miles, in parts of four counties. The study area subject to restrictions thus contributed only 17% of the total phosphorus loading of the reservoir. For purposes of the study, phosphorus loading from the other areas was assumed to continue at a consistent rate. See Occoquan Basin Study, pp.24-27.

3. The existing zoning, regardless of the plan--mostly medium density (between 1-4 du/ac)

4. A hypothetical land use pattern reflecting maximum development. Significant open space and low density development remained.

5. The amount of further development possible that can be accommodated without additional BMPs while meeting water quality goals. Existing patterns of commercial, high density and low density use would be projected.

## 5. Findings

By inputting sets of BMP requirements and land use patterns independently in the model, the study was able to produce valuable practical results. It found that the water quality goal would not be achieved if planned or full development continued. But if a comprehensive program of BMP controls were instituted, a land use plan that is almost as intense as the existing Plan could meet the water quality goals.[89] Current BMPs would be sufficient to meet the water quality goal only if new development were severely limited.[90]

The study also uncovered some important comparisons between the polluting effects of different land uses.\* The results showed that the most important land use factor in preserving water quality was the proportion of area left in open space or low density development (less than .2 du/ac.) [91] Such non-urban land performed better than more intense residential uses in phosphorus runoff, even if the other uses had BMPs.[92] Nevertheless, comprehensive BMPs were found to be effective in reducing the phosphorus pollution impact of development.[93]

In contrast, the differences in pollution between moderate residential uses and more intensive uses such as commercial development were not found to be major, especially when BMP controls were required. The ratio between total area of undeveloped land uses and total area of urban land uses were found to have a greater impact on water quality than the relative mix or distribution of urban land uses. In fact, the study found pollution control economies of scale with respect to the

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\*Because the study area was only a small portion of the watershed (see footnote above), its comparative results, (i.e. comparisons of the relative effects of different land uses and BMPs) are more useful for a general understanding of watershed management than the study's specific recommendations for meeting the water quality goals. Of course, the comparative results are still subject to the usual constraints on generalization, such as comparability of soil types, slopes, rainfall, etc.

application of BMPs in more heavily developed areas.[94] Therefore, the study concluded that development, if necessary, should be concentrated in the most suitable areas rather than allowed to sprawl. Under that type of plan, comprehensive BMP controls may be applied cost effectively, and the maximum amount of non-urbanized land would be preserved. As a result, the study recommended a modified land use plan based on the designation of two-thirds of the study area as non-urban use and a more intense BMP plan in the developed area.[95]

## CONCLUSION

Watershed management is an increasingly important strategy for maintaining the quality of drinking water supplies. It requires control of nonpoint pollution, as well as the more familiar regulation of point sources. A management program for nonpoint pollution will essentially involve land use regulation: control of the pattern and intensity of development, and measures to abate the pollution which results from human use of the areas which are developed.

The fundamental principle of most watershed management techniques is that natural pollution containment processes should be disrupted as little as possible. In particular, natural hydrology and infiltration patterns should be maintained. Techniques have been developed to evaluate and minimize the contamination of surface waters due to land use and human activity and should be used to ensure the preservation and enhancement of water quality. The failure to adequately monitor and control these effects will lead to certain degradation of the waters, and possible loss of these resources for drinking water purposes.

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For Presentation to the New Jersey Senate  
Land Use Management and Regional Affairs Committee  
May 23, 1990

## STATE AND LOCAL WATERSHED PROTECTION EFFORTS

### A. State Watershed Protection Law

Historically, few states have regulated or provided for comprehensive watershed protection. In general, these protections have been left to affected localities to enact. In the last few years, however, many states have become increasingly concerned about reservoir contamination, and have enacted measures to provide for protection. These programs span a wide range of protective rigor, from North Carolina's comprehensive land use regulations for watershed areas to New Jersey's attempt to require water suppliers to retain control of their buffer lands. Following is a sample of some prominent or innovative programs.

#### 1. Delaware

1989 House Bill No. 264

This bill would establish a Water Resource Protection Areas Program for surface supply and groundwater recharge protection. It requires the state Department of Natural Resources and Environmental Conservation to develop criteria for defining such areas and to prepare maps depicting them. Once designated, counties and municipalities having land use control jurisdiction would have to develop land use requirements for these areas, including density, lot size, impervious surface, stormwater quality, sewage and hazardous substance restrictions. It would also require counties to establish a procedure ensuring that water resource impact analyses are conducted as part of the rezoning, subdivision, and land development processes and are considered in the review process. The bill has passed in the House; it is currently being considered by the Senate Natural Resources Committee.

Information on the bill is available from:

Bernard Dworsky  
Administrator  
Water Resources Agency for New Castle County  
2701 Capitol Trail  
Newark, Del. 19711  
(302) 731-7670.

## 2. Massachusetts

House 1380 [check current bill #]

This bill would enact significant restrictions on activity within 400 feet of a reservoir or tributary of the Metropolitan District Commission's reservoir system, which supplies most of eastern Massachusetts. It would prohibit all alterations, and all new storage and discharge of pollutants within 400 feet of the banks of a reservoir or 200 feet of a tributary. In addition, the law would prohibit or severely restrict discharges of sewage and hazardous materials, the creation of impervious surfaces, solid waste disposal, and the storage of a variety of common chemicals including petroleum within 400 feet of a tributary, and in bordering wetlands and floodplains. Current law only prohibits point sources within 20 miles of an intake. Mass. Stats. ch. 111 sec 167.

The bill would also require the Department of Environmental Quality Engineering to submit rules and regulations for pollution prevention and sanitary protection for all other sources of water supply in the state. Current rules and regulations, as required by ch. 92 sec.108, are vague and ineffective. The law has recently received final approval in the House and will be considered by the Senate.

For more information, call David Barenberg, aide to Rep. David Cohen, at (617) 722-2410

In addition, Massachusetts has taken an active approach to implement the requirements of the federal Surface Water Treatment Rule (SWTR), which requires a strong watershed protection program for unfiltered water supplies. The Department of Environmental Protection (DEP) has been coordinating the water systems' self-evaluation and sampling for SWTR since January, 1990, and expects to propose new regulations in June, 1990. DEP has also published criteria to determine if filtration will be required [1] and guidelines for the minimum information required for a supply to qualify to avoid filtration.[2] Essential watershed characteristics must be provided on an overlay map delineating special watershed protection areas, contamination sources, eroded soils and land uses in the watershed. In addition, risks from current uses must be assessed and control mechanisms must be

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1. See Attachment 3 to January 17, 1990 letter from David Y. Terry, Acting Director of DEP's Division of Water Supply to Public Water Suppliers.

2. Massachusetts DEP Division of Water Supply. "Watershed Resource Protection Plan Policy: Protection of a Watershed Resource Protection Plan," Division of Water Supply Policy 89-09, January 19, 1990.\*\*\*\*\*

described for both current and future sources of potential contamination.

For information on Massachusetts's SWTR implementation, contact:

Massachusetts Department of Environmental Protection  
Division of Water Supply  
One Water Street  
Boston, Mass. 02108  
David Y. Terry, Acting Director

### 3. Connecticut

In 1977 Connecticut established requirements for water suppliers' retention of watershed lands, and set up a permit system to apply the requirements in individual cases. The implementing regulations prohibit the sale of buffers and adjacent steep areas, and set up a detailed scheme to classify other watershed lands and evaluate proposed sales.

Connecticut has also rewritten its zoning authorization law to require local authorities to consider water supply protection issues in adopting zoning regulations and development plans. Secs. 8-2 and 8-23. These land use restrictions must be applied to potential sources as well as existing ones. The Department of Environmental Protection and the Department of Health Services has prepared a draft guidebook to assist municipalities in implementing local watershed protection programs.[3] The guidebook describes a variety of regulatory and nonregulatory programs to protect watersheds, and specifies the considerations and procedures necessary to implement an adequate overall program. Final publication and circulation of the completed Guidebook is expected in autumn, 1990.

The state commissioner of health services is authorized to submit testimony in local zoning, planning or permitting hearings which might affect water supplies and to appeal any such rulings. Sec. 25-32f. In addition, the commissioner is authorized to issue a cease and desist order for activities which will result in substantial damage to a supply. Sec. 25-32g.

For more information on Connecticut's program, contact:

Gary Johnson  
Connecticut Department of Health Services  
Water Supplies Section  
150 Washington Street

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3. "What, Why and How to Protect Watersheds: A Guidebook for Local Watershed Protection Programs," Working Draft, March 1988.

Hartford, Conn. 06106  
(203) 566-1253

For information on the watershed protection Guidebook, contact Bob Hartman, Connecticut Department of Environmental Protection at (203) 566-7049.

#### 4. North Carolina

N.C. General Statutes sec.143-214.5 is the premier example of a comprehensive, statewide regulatory system for controlling land use and other activities in drinking water source watersheds. It is designed to overcome the jurisdictional conflicts which occur when a city's supply watersheds are outside its territory.

The law requires the North Carolina Environmental Management Commission (EMC) to adopt rules for the classification of supply watersheds, and to assign each supply watershed the appropriate classification. It also requires EMC to adopt rules for specific watershed management standards applicable to each classification, and allows EMC to designate critical areas.

Local governments are required to draft protective programs consistent with the rules for supply watersheds within their jurisdiction, regardless whether they use the supply. The local programs, which are required to include an implementing local ordinance providing for maintenance, inspection and enforcement procedures, must be submitted to the state for approval. The ordinances should include, at a minimum, controls on development density, or performance-based alternatives to density controls which are based on sound engineering principles. The EMC must provide a model local watershed ordinance assist the local governments.

If a local government fails to adopt a satisfactory program, the EMC is authorized to assume responsibility for watershed protection. The EMC is given enforcement authority against ordinance violators. Penalties are provided for noncomplying localities.

The state has recently proposed new criteria for classification of supply watersheds, amending DEHNR T15: 02B sections .0100 and .0211. These regulations provide detailed standards for development and other restrictions, including limitations on point sources, depending on the quality classification of the protected waters. Under proposed sec. .0104(b) local governments are free to adopt more stringent controls.

More information on North Carolina's program can be obtained from Ed Holland of the Orange Water and Sewer Authority (CWASA) at (919) 968-4421 (see separate discussion infra) or Steve Zoufaly of the state Division of Environmental Management at (919) 733-5083.



## B. Local Watershed Management Authorities

### 1. Austin, Texas

Austin has developed a comprehensive protection ordinance for both drinking water supply and non-supply watersheds, to protect recreational and aesthetic resources as well as drinking water supply.. The ordinance provides for standards and restrictions on development and procedures for site plan review. It specifically includes areas outside the city but within its "extraterritorial jurisdiction" under Texas law. Development controls include restrictions on impervious surfaces and requirements for structural mitigation, depending on the proximity to the streams and reservoirs and the type of development. In addition, the ordinance protects critical environmental features such as wetlands from improper development. The ordinance also has provisions for transfers of development rights to temper hardships caused by the restrictions.

City of Austin  
Environmental and Conservation Services Department  
P.O. Box 1088  
Austin, Texas 78701

### 2. Baltimore, Maryland

The Baltimore Regional Council of Governments coordinates the implementation of the action strategy to protect the city of Baltimore's supply.[4] The action strategy was based on a 1984 agreement among the City of Baltimore and Carroll and Baltimore Counties, where the majority of the watershed areas lie, and the appropriate state agencies. Small portions of the watershed areas are also in Harford county and in Pennsylvania.

The strategy is in the form of an Action Plan [5] which contains a long list of actions for the agencies to take. The strategy focuses on control of phosphorus contamination from agricultural sources, municipal sewage, and urban runoff. The list of actions to control agricultural and rural pollution is particularly extensive. The Action Plan contains few precise standards and no coercive regulatory structure, and each appropriate state, county or local agency having jurisdiction is free to develop its own solutions to particular problems. These agencies have generally complied with the strategy, partly because the system provides water to much of the surrounding area.

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4. See, Reservoir Watershed Protection Subcommittee.  
Action Strategy for the Reservoir Watersheds, 1984.

5. Id., pp.24-38.

Baltimore Regional Council of Governments  
2225 North Charles Street  
Baltimore, Md. 21218-5767  
Philip S. Clayton, Acting Director  
Development Planning  
(301) 554-5617

Each agency's progress in implementing each point of the strategy is assessed and published annually.[6] These reports and other information on the Action Plan is available from:

Regional Planning Council  
2225 North Charles Street  
Baltimore, Md. 21218  
(301) 554-5617

### 3. Fairfax County, Virginia

An important example of protective land use planning based on watershed modeling is provided by Fairfax County's implementation of the Northern Virginia Planning District Commission's Nonpoint Pollution Management Program (see separate discussion below). Fairfax contains approximately 15% of the watershed, including the parts most subject to urbanization and development. To assess the impact of various projected land uses and BMPs on the water quality in the reservoir, Fairfax's Office of Comprehensive Planning conducted the Occoquan Basin Study[7] in the early 1980s, using a computer model derived from NPVDC's. Based on the results of the Study, Fairfax significantly amended its comprehensive land use plans, adopting 5 acre minimum lot zoning in much of its area of the watershed. The rezoning was upheld when challenged in court, based on its justifiable concern that uncontrolled development would degrade the water supply, as demonstrated by the Study.[8]

Fairfax County Office of Comprehensive Planning  
Environmental and Heritage Resources Branch  
4050 Legato Road, Suite 800  
Fairfax, Va. 22033  
Bruce G. Douglas  
(703) 246-1339

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6. See, e.g. Reservoir Watershed Protection Subcommittee. 1988 Action Report for the Reservoir Watersheds.

7. Fairfax County Office of Comprehensive Planning. Occoquan Basin Study, 1982.

8. See, Aldre Properties Inc. v. Board of Supervisors of Fairfax County, Virginia, et al, Chancery Nos. 78463-A, 78476, 78450, 78425 (19th Judicial Circuit), 1985.

#### 4. Massachusetts Water Resources Authority

The Massachusetts Water Resources Authority supplies water to 2 million people in Boston and 34 other cities and towns in eastern Massachusetts. MWRA receives water from the huge Quabbin Reservoir in central Massachusetts and the Wachusett Reservoir, through which Quabbin water passes en route to the metropolitan region. The reservoirs and watershed lands are under the jurisdiction of the Metropolitan District Commission (MDC) Division of Watershed Management, a separate state agency. In 1986 MWRA adopted a Long Range Water Supply Program to plan for the water supply needs of its service area. MWRA is presently developing scope-of work guidelines to assist MDC in implementing a watershed control program to comply with SWTR.

In addition, MWRA has a policy to encourage communities to protect local sources of water which are not part of the MWRA supply, but are used by cities which could demand MWRA supply if the local sources become contaminated. Pursuant to that policy, MWRA has sponsored the Metropolitan Area Planning Council's Cambridge Watershed Protection Plan to safeguard the city of Cambridge's supply watersheds (see below).

Massachusetts Water Resources Authority  
Charlestown Navy Yard  
100 First Avenue  
Boston, Mass. 02129

#### 5. Metropolitan Area Planning Council

MAPC is the officially designated regional planning agency for the cities and towns in the Boston metropolitan area. It has produced the Cambridge Reservoir Watershed Protection Plan [9] in order to support MWRA's and the Cambridge Water Board's efforts to safeguard the Cambridge water supply. It is actively involved in seeking to have the Plan's controls adopted by the towns which comprise Cambridge's supply watersheds. The Plan's main focuses are abating toxic pollution, and minimizing the chances for a catastrophic toxic discharge. The Plan recommends a variety of control measures, including stricter regulation of chemical and salt storage, landfills and septic systems; wetlands protection; runoff controls through site plan review and discharge permits; zoning overlay districts to exclude potentially hazardous uses; increased environmental impact review of proposed projects; and preparation of local chemical spill emergency response plans. MAPC is working to have the Plan's recommended measures implemented by the appropriate local or state agencies. Its efforts to gain participation from local communities is useful study in the implementation of extraterritorial watershed

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9. Metropolitan Area Planning Council. Cambridge Reservoir Watershed Protection Plan, Boston, Mass., 1989, 2 vol.

controls without overall state enforcement and coordination.

Metropolitan Area Planning Council  
60 Temple Place  
Boston, Mass. 02111  
(617) 451-2770  
Martin Pillsbury  
Program Manager, Water Resources

#### 6. Northern Virginia Planning District Commission

The Northern Virginia Planning District Commission (NVPDC) has been centrally involved in the management of the water resources of the Occoquan River basin since the early 1970s. The Occoquan Reservoir is the source of drinking water for 660,000 people near Washington, D.C., and its watershed covers 580 square miles in parts of four counties in northern Virginia. NVPDC's Occoquan Basin Nonpoint Pollution Management Program is an excellent example of intergovernmental cooperation and rational land use planning for water resource protection.

In 1971, the Virginia State Water Control Board called for advanced wastewater treatment in parts of the watershed due to concern about accelerated eutrophication in the Occoquan Reservoir. As the new plant was being built, NVPDC conducted a 208 planning study which found that nonpoint sources were also a significant cause of the nutrient pollution of the reservoir. NVPDC then developed a sophisticated model to simulate the water quality impacts of nonpoint pollution loadings from development, and instituted the Occoquan Basin Nonpoint Pollution Management Program to advise local governments on implementing their individual nonpoint management programs.

Under the Program, each jurisdiction having land use authority is responsible for implementing its own controls, with NVPDC providing advice and technical guidance. The computer model is used to evaluate specific elements of the local programs, and to review applications for development in participating jurisdictions.

Northern Virginia Planning District Commission  
Maureen G. Novotne  
Water Resources Engineer  
7535 Little River Turnpike  
Suite 100  
Annandale, Va. 22003  
(703) 642-0700

#### 7. Orange Water and Sewer Authority

OWASA is a local water authority which supplies the cities of Carrboro and Chapel Hill, and Orange and Chatham Counties, N.C.. Except for Chapel Hill, all of these exercise some jurisdiction

over the watershed for University Lake, a major source of the supply. OWASA has recently proposed a comprehensive watershed land use program for the University Lake watershed based on minimum lot sizes, maximum impervious areas and other restrictions. Their proposal resulted from the recommendations of the University Lake Watershed Study, an environmental engineering evaluation of the watershed and its possible continued degradation, prepared by Camp Dresser and McKee.

Orange Water and Sewer Authority  
400 Jones Ferry Road  
P.O. Box 366  
Carrboro, N.C. 27510  
(919) 968-4421  
Edward A. Holland, AICP  
Research and Planning Administrator

#### 8. Triangle J Council of Governments

Triangle J Council of Governments (TJCOG) is an association of governments in the Raleigh, N.C. area. In the early 1980s, TJCOG published a set of guidelines for protecting the Falls of the Neuse Reservoir, the primary source for the city of Raleigh, and Jordan Lake from degradation. The guidelines had a tiered structure of restrictions on new development in the watersheds, based on distance from the reservoirs. Since much of the watershed area fell outside of the jurisdiction of the TJCOG governments, the guidelines were largely advisory, and many localities failed to adequately implement the program. This failure led the state to adopt its statewide watershed regulatory program. TJCOG is now involved in monitoring water quality in the local lakes and reservoirs.

Triangle J Council of Governments  
100 Park Drive  
P.O. Box 12276  
Research Triangle Park, N.C. 27709  
Kimberly Brewer  
Director of Resource Conservation  
(919) 549-0551

#### 9. Water Resources Agency for New Castle County

New Castle County has a Water Resource Protection Area program which spurred the proposed adoption of the proposed statewide program (see discussion above). The Resource Protection Areas include lands critical for both surface and ground water protection. The ordinance requires that residential developments in reservoir watersheds have 10 acre minimum lot sizes and maintain the predevelopment rates of recharge and runoff. In addition, commercial and industrial development, the use of hazardous chemicals, and waste disposal are all prohibited in watershed areas. The ordinance also has strict limitations on

these activities in 100 year floodplains and adjacent steep slopes upstream from water supply intakes.

Water Resources Agency for New Castle County  
2701 Capitol Trail  
Newark, Del. 19711  
Bernard Dworsky, Administrator  
(302) 731-7670.



PACE UNIVERSITY SCHOOL OF LAW  
CLINICAL LAW CENTER

33 CRANE AVENUE  
WHITE PLAINS, N.Y. 10603  
(914) 681-4333  
FAX (914) 681-4391

WATERSHED PROTECTION AGENDA FOR NEW YORK CITY

I. IMMEDIATE WATERSHED PROTECTION MEASURES

Sewage treatment plants

Upgrade City-owned plants and improve training for plant operators

Enforce permits for non-City owned plants  
Monitor DEC enforcement by reviewing DMRs

Regulate connections to current plants

Sampling

Increase frequency and quality of monitoring and sampling throughout the watersheds

Storage and use of chemicals

Develop and update regulations relating to use, storage, and handling of contaminants including chemicals, pesticides, salt, waste disposal, etc.

II. SHORT TERM CONTROL PROGRAM

2 requirements for more comprehensive watershed protection:

- 1) Study watershed areas and map needs
  - Review water quality, land uses, hydrology, soils, etc.
- 2) Create coalitions with local people
  - Educate local citizens about the need for protective measures
  - Involve local governments and groups in process
  - Regulate for mutual advantage

Update watershed regulations to include criteria for developing specific rules, especially where cooperation with state or local governments or citizen groups is necessary.

Review proposed development

## Critical environmental areas

Work with local governments and citizens to identify critical watershed areas requiring heightened review

## SPDES permits

Require nutrient removal

Use new DEC phosphorus TOG--push for phosphorus removal on all new and retrofitted plants

Assess assimilative capacity of watersheds as a whole and require SPDES permitting to assure non-degradation

## SEQR review

Work with local agencies to ensure that DEP receives notice of, and is given involved agency status in, review of all important permit applications in watersheds.

Use involvement vigorously to protect watersheds from potential degradation

In reviewing commercial development, assess effect of inducing further growth

## Urban runoff

Assess the amount runoff pollution caused by development and its impact on receiving waters

Determine when stormwater discharges will constitute substantial degradation for purposes of SPDES regulation

Work with local authorities to develop maximum densities and impervious areas to reduce runoff volume. Also develop guidelines for Best Management Practices to limit runoff problems from those areas that are to be developed.

## Septic systems

Work closely with local authorities to develop more stringent regulation to protect against septic system failure. Require development to be sewered where necessary

## Wetlands

Map wetlands to determine protection priorities. Keep local citizens informed of the importance of wetlands related to water quality concerns

Once determined, review activity in all critical wetlands,



including those less than 12.4 acres.

Agricultural nonpoint loading

Organize working groups with SCS and local farmers to minimize pollution from agricultural runoff. This is especially important in the Cannonsville area.

III. WATERSHED MODEL

Use model to reassess preliminary determinations and identify protection parameters for those areas not previously assessed, including:

- Identification of critical areas
- Classification of wetlands
- Nutrient loading and assimilative capacity of waters
- Nonpoint pollution and land use restrictions and runoff controls
- Guidelines for review of development, sewerage, and other permits

## LEGISLATIVE AND REGULATORY REFORM

### Public Health Law Sec.1100 et seq.

#### 1. Clarify regulatory authority

SPDES. DEP and other water suppliers should be given authority to establish stricter effluent limitations or require specific treatment processes, including removal of phosphorus and other nutrients. DMRs should be sent to DEP as well as DEC.

Wetlands. DEP and other water suppliers should be given authority to regulate activities in watershed wetlands, or alternatively in wetlands adjacent to watercourses, if the wetlands are otherwise unregulated. If the wetland is regulated, the authority should be concurrent with the other regulating body (i.e. DEC or the locality).

Development. DEP should be given authority to intervene in, and require mediation for, any development which might tend to degrade water quality. Factors to be considered expressly include runoff and storm sewage, and capacity to further intensify land use.

Chemical storage and use, and waste disposal. Allow DEP and other water suppliers to monitor and inspect all activities on watershed land which may lead to chemical contamination of reservoirs, including pesticide use and waste disposal. Grant DEP and other water suppliers concurrent authority to enforce all laws and regulations relating to such uses, including state Environmental Conservation Laws and regulations. Authorize DEP and other suppliers to set forth regulations for activities which are not otherwise preempted by statute. If possible, provide that no state law relating to such activities preempts otherwise valid watershed regulations.

Agricultural runoff. Create authority for DEP and other suppliers to consult with local SWC offices to develop adequate runoff controls.

#### 2. Planning

DOH should promulgate guidelines for watershed management controls sufficient to satisfy federal SWTR avoidance requirements. DEP should have independent authority in NYC watersheds, provided that the City's guidelines are at least as protective as DOH's. Guidelines should include designation of critical areas and other use zones, and address activities such as types of discharges and maximum densities or impervious area for each zone. Mitigative measures should be considered. Localities would then have option to designate restrictions to satisfaction of DOH or allow water supplier to create restrictions.

### 3. Enforcement

DEP should be given equal and concurrent responsibility for enforcement of violation of any watershed standard or rule or regulation.

Authority to assess penalties for violations should be increased to \_\_.

DEP should have authority to deny water supply to noncomplying town or municipality.

#### SPDES

Upgrade classification of all tributaries of water supply sources to a class no less protected than the downstream source.

Require load analysis of entire basin sufficient to preserve water quality classifications in reservoirs.

#### Public Health Law

Increase minimum lot size necessary for exemption from subdivision review, from 5 acres to 10 [?] acres.

#### SEQR

The DEP and other water suppliers must receive notice of, and be given involved agency status for, review of all [Type I] SEQR actions in watersheds.

All applications for building permits of more than \_\_ units, subdivisions of more than \_\_ acres, rezoning or zoning variances of more than \_\_ acres, SPDES permits, sewerage or septic systems, solid waste transport and disposal permits, etc. [list others] on watershed lands should be classified as Type I actions.

The DEP, at its option, may be the lead agency for any Type I action in the watersheds.

The DEP may designate buffer zones around reservoirs and tributary streams, or other watershed areas requiring special protection, as critical environmental areas, in which all discretionary action is presumed to require an EIS.

#### NYC Watershed Regulations

1. Develop and update regulations relating to use, storage, and handling of contaminants including chemicals, pesticides, salt, waste disposal, etc.

2. Develop standards for sewage treatment plants and other SPDES discharges.

3. Designate critical environmental areas for protection of reservoirs and tributaries. Map wetlands and prepare guidelines for restrictions on their use.

4. Provide procedure for modeling and mapping of watershed lands and guidelines for restrictions on discharges and development based on protective zones.

Statement by  
**Martha Green**  
**Vice President-Public Affairs**  
**Hackensack Water Company**

*Before the New Jersey Senate*  
*Land Use and Regional Affairs Committee*  
*May 23, 1990*

I want to thank you for the opportunity to speak before you concerning Senate Bill 2339, and other issues that I know are on your mind. In addition, I will ensure that responses are provided after the hearing to questions raised here today by committee members and other speakers.

The subject of the hearing and the name of the bill is watershed protection. We're delighted to see attention focused on the value of a comprehensive watershed protection program, which until recently was an unheralded and unappreciated science. But not for us.

**Background**

Hackensack Water is the water supplier to 750,000 people in Bergen and Hudson Counties. Since its founding in 1869 the company's principal source of water supply has been the upper, or freshwater (as distinguished from the tidal) portion of the Hackensack River. During the first 6 decades of this century, as the demand for water in northern New Jersey grew, Hackensack Water built a series of reservoirs to supplement the natural river flow. That water system today consists of four reservoirs which hold 13.5 billion gallons of water.

All of the federal and state drinking water quality regulations that exist have the ultimate objective of ensuring that what comes out of the tap is safe to drink. And our water complies with these standards by a wide margin of safety. But we don't concentrate our efforts with what comes out the tap, you might say we start at the raindrop.

The freshwater portion of the Hackensack River drains a bi-state watershed encompassing 72,000 acres. At least half of that land is in New York. The watershed is home to more than a quarter of a million people. Countless thousands work here. The watershed includes schools, gas stations, office buildings, shopping malls, and unfortunately, a few landfills (which I will discuss specifically in a moment).

Our water supply is unique among major surface water supplies in the United States in the respect that the watershed is not far away in the hills like the supplies serving New York City, the Boston or Los Angeles; it's right here, overlapping the area we serve.

### **Watershed protection requires a comprehensive approach**

The developed nature of our watershed requires a special vigilance on our part. Always has, always will. Our approach has evolved over the years to adapt to changing conditions and technological capability. Our approach is a comprehensive, multi-faceted watershed management strategy—not a reliance on one or another technique.

We have a clean watershed and a good quality raw water supply. In the last 30-40 years, our raw water supply has gotten cleaner.

The single most important pro-environment event in our watershed was the completion of sewers throughout the watershed during the late 1970s. That did not occur without our help. We invested \$1 million in the Rockland County sewer system. In the 50s we built and operated our own sewer in Westwood for quite a few years before donating it to the BCUA when it was formed. And we have donated hundreds of acres of land in easements to facilitate sewer construction. As a result, there is no sewage discharge in the Hackensack watershed. (The 3 remaining towns served by septic systems include Old Tappan, which has a sewerage program in the works.)

### **Testing**

We're not required to do any watershed monitoring. Yet we do so aggressively.

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The company patrols the remote corners of the 72,000-acre watershed, testing water quality in feeder streams miles from our reservoirs. We test water samples from 38 locations throughout our watershed on a monthly basis—more often and other locations as needed. Water at our intakes and reservoirs is tested continuously.

An example of this part of our program is the accelerated monitoring we're doing in the upper Hackensack River near West Nyack where concerns have arisen about the discovery of traces of dioxin near an old landfill. Dioxin was not found in the water, nor was there any dramatic evidence of other contamination from this landfill. These results did not particularly surprise us, because we've been monitoring this location for decades.

It was our watershed monitoring program that first detected a volatile organic discharge from an industrial site in Tenaflly into a tributary to the Hackensack River. Local authorities and DEP were called in through our efforts.

Our people are always there to assist state or county authorities with cleanup efforts in the case of spills of gasoline, oil, chemicals or sewage. We respond to everything that's reported to us or looks suspicious, including a fair number of wild goose chases.

#### **Land use review**

We review proposed development in the watershed to ensure that water quality is not compromised. We protested the siting of landfills. We protested flood plain development. We were not always successful. But sometimes we were successful, and in many instances we've been able to count government as our ally.

#### **Protective reservoir buffer zones**

We've surrounded our reservoirs with hundreds of acres of undeveloped buffer zones to help shield the water from pollution. In fact, ours was one of the the first efforts in the United States to scientifically quantify how much land is required for reservoir protection.

Hackensack Water's reservoir system covers 6,000 acres of land, all of which is open space. About half of this land lies under our reservoirs and most of the rest of it—2,500 acres—surrounds and protects our water supplies.

**DEP report advocates a comprehensive watershed strategy**

The proposed legislation you're considering today relies heavily on the DEP report on buffer zones, performed under Public Law 1988, Ch. 163, which you sponsored, Senator Contillo.

The bill has a lot in it that we agree with. And well we should. The DEP Report on buffers cautions on reliance on buffer zones as a sole component in water quality protection, and instead recommends precisely the kind of broad watershed management strategy we use, even to the point of echoing the site-specific, scientific approach to determining what size buffer is required to protect a water supply reservoir.

But while the DEP report advocates a range of buffer zones from 50 to 300 feet, it has the wisdom to stop short of advocating a pat formula. We think that's for a good reason.

Legislation should not attempt to pre-empt good engineering judgment and capable, professional and scientifically sound regulation. We think that could be a dangerous trap. The New Jersey DEP already has the authority to regulate water suppliers.

It's certainly within your prerogative to enact legislation that goes beyond what is being done. Our position is that what's necessary is already being done. Is there really a need for an additional layer of legislation? We don't believe so.

Nevertheless, if the legislation passes and DEP receives the mandate to develop new regulations, we will work with them, as we have throughout our history, to ensure that the regulations are sound and scientifically grounded.



**How did landfills get into a public water supply watershed?**

I'd like to say a few additional words about landfills. It's a sad fact that there are some landfills in our watershed.

We don't like having landfills anywhere near our water supplies. We've spoken out against the siting of landfills, but we were not always successful. We didn't put landfills in the watershed. In most cases local governments did, sometimes with state environmental approval. Some started as illegal dumps and still others were created by well meaning industries following approved practices of the day. Most are now closed. Our preference is that they all be sealed.

Our response to these landfills that we're stuck with is to monitor them carefully. To make sure that if there is any trace of harmful leachate or surface runoff entering a water source (or groundwater supply) that the environmental authorities are alerted and encouraged to take strong and decisive action.

We haven't seen any significant degradation of our water quality, due to these landfills or any other reason. Does that mean we're defending them? No way.

I should mention as additional proof, that most of the impurities we remove in our purification process are from natural, not man-made, sources. Iron, manganese, and decayed leaves are the characteristics we must treat for.

In closing, Senators, I've tried to provide you with an overview of the watershed protection activity Hackensack Water Company conducts. We have extensive water quality data and expertise. After the hearing we will provide any additional information or technical data—or any other resource necessary to enable the committee to reach an objective and factually accurate conclusion in their work.

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MAY 29 1990



**COUNTY OF BERGEN**  
**DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT**  
Administration Building • Court Plaza South • 21 Main St • Hackensack, N.J. 07601-7000  
(201) 646-3130

**William D. McDowell**  
County Executive

**Chester P. Mattson**  
Director

May 24, 1990

Senator Paul Contillo  
90 Main Street  
Hackensack, NJ 07601

Dear Senator Contillo:

Enclosed is written testimony on S. 2339, from which I delivered an abbreviated version on May 23, 1990 at your hearing in Paramus.

Sincerely yours,

  
Chester P. Mattson  
Director of Planning &  
Economic Development

CPM/kb  
Enclosure

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Testimony of Chester P. Mattson  
Bergen County Director of Planning and Economic Development  
May 23, 1990  
Senate Land Use Management and Regional Affairs  
Committee Hearing: Paramus Borough Hall

Good afternoon Senator Contillo. I am pleased to be able to offer these thoughts about your bill, S. 2339.

I have gathered my thoughts into 3 sections:

- o Some general statements about how we use and protect our drinking water. My main point here is how compellingly important it is to regard the protection of drinking water quality and quantity as a resource issue of supreme significance in our state. I will be drawing some of my remarks from an excellent piece by Dr. Peter Rogers, printed in the Atlantic Monthly of July, 1983. I attach a copy. Dr. Rogers is the Gordon McKay Professor of Environmental Engineering at Harvard University and an national outstanding expert in this area.
- o I will recite next a brief description, using a National Geographic Magazine diagram, of the water cycle. I believe this to be a good way to define the problems to solve and the issues to settle in protecting drinking water quality.
- o Thirdly, I will offer some ideas for the variety of approaches that are available for choice in protecting drinking water safety and quality. Some of the possible approaches to choose among focus on stream protection. Others focus on emission and effluent standards. Still others adopt the environmental management technique known as Critical Areas -- the Pinelands Commission and the Hackensack Meadowlands Development Commission followed this format. Others focus primarily on land use as the best way to organize a protective strategy for a resource like drinking water quality. I am one who believes in this latter strategy. It is particularly relevant in situations where developed spaces outnumber or are coming to outnumber the undeveloped spaces.

I. Some general statements about drinking water quality and quantity.

- o We have available to us the technology and the management skills to deal effectively with the depletion and the contamination of drinking water. The job, and you are tackling it here, is to marshall them for use.
- o We now discover and measure contaminants much more quickly than we can demonstrate their long term health effects. Dr. Rogers indicates, in the piece I mentioned above, that it will always be like this. He refers to this as the "inexorable deficit" in public understanding. In this context, setting levels for contaminants is a "never ending game of catch-up." That is to say, we will rarely be in a position to know the health effects of the contaminants we must protect ourselves against, particularly in matters of drinking water quality. But we must stay on the safe side of this important issue. The public doesn't like such ambiguities. We must learn, however, how best to live with them.
- o The way we used to manage our chemical wastes over the last several decades has left many convinced that we cannot or will not plan for such complex issues. But we are planning now, and can. Nonetheless, a strong legacy of doubt looms in the background. It has to be acknowledged in undertakings such as the Bill you are developing.

For example, storing chemical wastes in a safe place, or moving them to one, was the major thrust of public policy for over 20 years. Only now, with New Jersey in the forefront as usual, we are focusing on limiting the creation of new contaminants while we clean up the mess left behind.

- o One result of this history is that the extent of contamination of surface waters by unconventional pollutants is still not yet fully known. For example, only in 1980 did the Federal government (Council on Environmental Quality) first gather comprehensive data on ground water contamination. They found that contamination had already occurred in 34 states and in nearly every one east of the Mississippi.
- o The initial and major focus, based on such findings, has been on the sources of contamination. As recently ago as 1982, the EPA inventoried 80,263 pits, ponds and lagoons where industrial, municipal, agricultural and mining wastes were being impounded.

The EPA also inventoried 16.6 million septic tanks across the nation, and observed that the chemicals people use to clean and flush these can often be more harmful than the wastes they contain.

- o While the initial result of such findings has been some degree of despair, we have gained tremendous knowledge and experience from the nationwide efforts to clean up these sites. In the process, we have discovered that the cost of cleaning a contaminated site is somewhere between 10 and 100 times that of treating wastes or pre-treating wastes before disposing of them.

The cheapest of all, and the thrust of a statewide pollution prevention program now, is not to generate the waste in the first place or to pre-treat it very early in its cycle of disposal. That is to say, the earlier we intervene in the waste generation-waste disposal process, the cheaper it is to protect against toxic contamination. This is a new management axiom that pertains particularly to the protection of our drinking water supplies.

- o While these pollution control mechanisms have begun at the Federal level, the protection of drinking water quality is largely in the hands of the States. Our state laws are complex, having evolved over a long period. Thus it is in our interest, in legislation such as you propose, to plan wisely and comprehensively here at the state level.

That is to say, you are proposing legislation of the right type and for initiation by the right level of government intervention. You will notice in the third portion of my testimony that I believe that counties and municipalities can play strong roles in drinking water protection as well.

- o In our favor is the fact that industry has already sharply reduced its demand for water, to the result that much smaller volumes of polluted water are present to deal with. This fact is the by-product of the Clean Water Act of 1972, which, in funding sewage treatment plants, called attention to the cost efficiency of reducing the amount of waste water to treat. Water managers now project that, by the year 2000, industry will be using 62% less water than it did in 1975.
- o As costs for garbage and sewage mount -- with both of these in response to earlier views that water and air were somehow free to use and waste -- the need to protect ourselves from high drinking water costs

becomes ever more imperative. We must keep our drinking water pure in as many ways as we can, and the earlier we intervene in the water cycle, the better and cheaper our results will be.

- o Even though the world is three quarters water, we are not able to capture, for storage and use, large amounts of drinking water. So the protection of the sources we have is of particularly vital importance.
- o Agriculture uses 83% of the water that we use in the United States. As to the remaining 17%, the average amount of publicly-supplied water (for all non-agricultural purposes) is about 180 gallons per person per day, of which 120 go to households and for municipal use (street washing, fire fighting, etc.). That is to say, 2/3 of the water not used for agriculture is used by the citizens of our state in their daily lives. So here is a case where the people we protect are the major users of the resource.
- o In 1983, 83 million Americans got their water from wells. Wells draw their water from aquifers, which are underground basins and streams. These are as important to protect as our surface water reservoirs.
- o While a lot of rain falls (4.2 billion gallons over the United States in a typical year), only about 1.4 billion gallons is available for use. But yearly fluctuations reduce this to 675 billion (or approximately by half). The point here is this: the amount of drinkable water we can carry from wet years to dry years is quite small, so conserving and protecting our supply is a very good habit to get into in wet years in order to best prepare us for the dry years.

But the major thrust of all of these points is that we have to be on the safe side of every portion of these equations.

- o The rate of recharge of ground water is slow -- usually less than 10% per year. The first point here is that extracting ground water from wells is expensive and that the recharge of the sources (the aquifers) is slow. It's very easy to mount a deficit in a aquifer -- that is, it is very easy to be drawing water faster from an aquifer than we are allowing it to recharge through the soil. The second point is that once an aquifer is contaminated below ground, the self-cleansing (replacement) process is slow. Further, pumping out aquifers to treat contaminatin is either not feasible or VERY

expensive.

- o Between 1965 and 1980, only about 6% of the \$52 billion Federal budget for water projects went to the northeast --where 24% of the nation's population resides. So the level of federal investment has favored heavily the storage and delivery of irrigation water in the Southwest and West. Where drinking water quality problems are most intense -- east of the Mississippi -- the least Federal investment has occurred. This in another dimension for us, as a state, to attend to.
- o Inadvertently, by stimulating where development goes, the pattern of funding for sewage treatment and collection systems has a large impact on our water supply needs. Drinking water needs are much better measured by the size of the sewer pipes in the ground than by the size of the sewage treatment plants that we have constructed. Dr. Rogers book on this topic is a classic.

That is to say, the pipes that carry the sewers are sized much larger than are the treatment plants they lead to. This is done to protect against the heavy costs digging up and replacing smaller pipes with larger pipes later. The effect of this "savings" technique has been to generate much heavier development patterns above the collection system than the size of the original sewage treatment plant suggested.

So when we are calculating our water supply needs, we should pay particular attention to the growth potential of the sewers now underground or planned.

II. The water cycle is the key to tracking a drop of potential drinking water as it falls from the sky. The "pathways" it takes lead either to groundwater or to a surface water feature like a pond, reservoir or stream. To gain maximum protection for drinking water quality we must maximize on our ability to protect best those drops of water which will become the ones we drink.

- o Water evaporates from the ocean (and other, much smaller surface water bodies), forms clouds, and, after Channel 4 says it will, falls as rain.

If water hits a paved surface or building, its travel is speeded to the nearest patch of earth or the nearest stream. Along this route, water headed for water supplies picks up any contaminants that associate with pavement and parking lots. Along

these pathways, water also encounters fertilizers from farms and lawns, and pesticides from both.

So the potential for contaminating drinking water starts early in the water cycle. In fact, even as water is forming as droplets into clouds, it is already encountering and attaching itself to sulphur compounds (and others). By the time these droplets reach the earth, many have become acid rain.

- o Water that finds its way to "recharge points" -- the places where water most easily penetrates the soil to underground basins (aquifers) -- becomes the source of the drinking water we draw from wells. Soils are known as one of the most important water purifiers. That is, water "loses" to soil, enroute to aquifers, some of the pollutants it has already picked up along this "pathway."
- o Other drops of water careen across paved surfaces and find their ways into rivulets, streams and rivers, some of which are dammed for drinking water purposes. The streams that lead to our reservoirs, then, become particularly important to protect from contamination. Managing land uses along these pathways, as well as at aquifer recharge points, offers a particularly effective way to protect drinking water quality.

As is the case with aquifer recharge through soils, the soils through which water moves to surface water bodies are also important to protect as purifying "screens" for water quality.

Plants that grow in these soils also become "screens" that help purify the water of contaminants before it reaches our reservoirs. So natural vegetation -- the kind that doesn't require pesticides and fertilizers -- is to be regarded as one of the important water purification mechanisms we have available to us. I will comment more about this in section III of this testimony.

The major point I'm after here is this: the less pavement and the more natural vegetation around our reservoirs, the better protection we will have put in place for drinking water quality. Buffers, then, need not just be visualized as green "collars" around reservoirs. They should be visualized, too, as green corridors around streams and, indeed, as landscaping patterns that extend INTO the developed areas surrounding reservoirs. More on that, too, below.



The thrust here is that land management, both for natural buffers and for the types of buildings and their landscaping, are part of the drinking water quality protection equation.

### III. Protection and Management Techniques

- o A word about problems to solve and issues to settle. First, a definition. Problems are what we solve. Figuring out how to get to the moon was a problem to solve. Issues are what we settle. Deciding whether or not to go to the moon was an issue to settle. Protecting drinking water quality involves both.
- o Protecting drinking water quality, in the maximum number of ways we can reasonably do this, involves more than counting the parts per billion in known pollutants. It involves protecting drinking water quality from contaminants yet undiscovered and from the health effects of existing contaminants whose implications we will not understand perhaps for years.

So one important issue to settle here is to decide whether or not the limits of present scientific knowledge should constrain our actions. They should not, in my judgment. I make particular reference to Dr. Peter Rogers' scientific assertion that, because we discover and measure contaminants much more quickly than we can demonstrate their health effects, we will always be caught in this "inexorable deficit" in public understanding. We must live with the ambiguity, not dismiss it in my judgment.

- o One important way to get at protecting water quality is to incorporate the developed environment and the natural environment into one planning regimen. The Hackensack Meadowlands Act and the Pinelands Protection Act incorporated this approach. Elsewhere, for examples, so did the legislation managing Adirondack Park, California's coastline, the wetlands of Illinois, New Jersey's Coastal Resources.

When these techniques are used primarily for environmental purposes, they are called the "Critical Area" approach. As development occurs and critical areas are managed in the presence of increasing growth and development, this technique becomes known and used as "Growth Management." This latter approach offers a particularly fertile source for tools to protect drinking water quality.

This is particularly true in New Jersey just because we have so much more growing to do. So we must not only contemplate the methods we need today to protect the water supplies we have today; we must also contemplate the ways we will protect tomorrow's newer and larger water supplies for the newer and larger growth we can predict in the years ahead. Buffer standards must take this into account, for one example.

- o A second array of tools comprises the more traditional "effluent" and "emission" standards. Water reaching the shores of a reservoir should not exceed specific concentrations of pollutants. This approach offers one of the last barriers to water contamination, in contrast to the more preventive methods described above.
- o Stream buffers and corridors have been in use and can be put to use for many other purposes than for drinking water quality protection. Many of these other stream corridor tools can be adapted to drinking water quality protection.

For example, scenic corridors most frequently seek to preserve natural vegetation borders as part of protecting their natural character. As noted above, bands of natural vegetation also serve as water purification devices. So it becomes attractive to "overlay" these techniques which have complementary scenic, open space, and drinking water quality benefits wrapped together.

The Draft State Development and Redevelopment Plan offers a wide variety of growth management tools that are directly applicable to protecting drinking water quality and quantity. I recite several typical such management approaches below, with reference to the page number where they can be found in Volume III of the Draft State Plan. As you have heard me say on other occasions, Senator, I refer to this Volume as the "Time-Life handy home repair kit" for an impressive array of county and municipal planning efforts.

- o From page 1-175: Protecting water supply sources.

The DEP, counties and municipalities should prepare Master Plans related to the availability of water to serve current and future needs, its storage and treatment, and its distribution. They should also identify critical areas that are important to water supply protection. As well, they should assess the likely impacts of development on water supply sources.

- o From page 1-176

The state, its counties and municipalities should develop performance standards to protect surface and underground water supplies. Development should be authorized only when it will not adversely affect water supply. As well, they should develop region-wide or county-wide aquifer management programs.

- o From page 1-177

Municipalities should participate in the management of public water systems through permits or service contracts with water supply entities.

- o From page 1-178

Municipalities, counties and the DEP should develop and encourage the use of landscaping design techniques that will conserve water supplies and reduce demand.

- o From page 1-179

Municipalities, in cooperation with counties and the New Jersey DEP, should limit new development served by on-site waste water disposal systems (septics, for example) to locations and densities where service and groundwater sources of drinking water supplies are protected.

- o From page 1-180

Municipalities, in cooperation with counties, regional entities and the New Jersey DEP, should maximize the use of natural systems for the protection of service and groundwater sources of water supplies, and restrict the location and construction of development that involves the discharge of pollutants that may contaminate surface or groundwater supplies through non-point source pollution.

The state should develop best management practices for non-point source pollution, groundwater recharge and stormwater management. Counties and municipalities should require new development within their jurisdiction to incorporate these practices as a condition of approval.

- o Page 1-181

The New Jersey DEP, in cooperation with regional entities, counties and municipalities, should regulate the location, design and development of structures that involve the use, storage, treatment or disposal of toxic and hazardous materials to avoid the contamination of surface and groundwater supplies. Such uses should also be periodically monitored to ensure that no fugitive emissions or discharges

occur from such storage facilities.

o Page 1-183

The New Jersey DEP, in cooperation with other state departments, counties and municipalities should establish the provision of adequate water supplies and water supply facilities and the condition for approval of new development.

This is an example of the Growth Management approach, where we focus not only on protecting present water supplies but look ahead, both in our development planning and our water supply planning, to the needs for protecting larger supplies of drinking water for larger populations of residents and employees.

o Page 3-215

Municipalities, in cooperation with counties and appropriate state departments, should identify and protect from on-site development, natural resources of local, regional and state significance, including steep slopes, ridge lines, pristine watersheds, trout streams, wetlands, stream corridors, potable water supply reservoirs, aquifers and aquifer recharge areas, rivers, habitats of an endangered and threatened plant and animal species, and unique natural systems in the rural development areas.

Notice here, as I mentioned above, that the protection of other natural resources offers opportunities for protecting our potable water supplies as well. This offers a way, for example, to incorporate certain types of open space planning into protecting potable water.

"Best management practices" which relate to these kinds of goals could include the following:

- requiring all point and non-point discharges to meet established water quality standards prior to reaching the boundary of any parcel of land or any surface body of water related to drinking water quality;
- requiring for 100% on-site detention of the net increase in surface water run-off that is created by the development;
- requiring that development be designed and located so as to preserve the maximum amount of natural vegetation on each permitted development site. Only the area needed to provide a building pad, required off-street parking and access could be cleared of natural vegetation in particularly sensitive places.

- o From page 3-217

Municipalities should determine development capacity by first analyzing the extent to which development may be supported while maintaining the quality of water in water quality.

This brings to local Master Planning efforts the determination of a base intensity for new development that is compatible both to present and future drinking water quality needs.

- o From page 3-220

Municipalities, in cooperation with counties and appropriate state departments, should maintain Master Plans, development regulations and capital programs which have as their purpose to protect and preserve large, contiguous tracts and corridors of sensitive natural resources (such as surface water supplies).

When protecting sensitive resources like drinking water supplies, municipalities should require, where feasible, that new development be located near to existing development.

- o From page 3-222

The New Jersey DEP, in cooperation with counties and municipalities should ensure that open space and recreation lands in environmentally sensitive areas be given high priority for public acquisition in advance of development.

This is an example of leveraging and synchronizing state, county and municipal actions in ways that get the best return on public investments and avoid the all-too-familiar counter productive pursuit of different public investments on adjacent parcels. In this case, open space funds are brought into synchrony with investments in roads and sewers to the result that critical resources such as aquifers are protected rather than threatened.

- o From page 3-223

The state, regional agencies, counties, municipalities and the private sector should, through detailed and integrated planning, prevent degradation and maintain and enhance the capability of water resources to support potable water supplies.

- o From page 3-224

Municipalities, in consultation with counties and appropriate state departments, should manage the use and intensity of development so that on-site waste water treatment facilities (septics, for example), either individually or in combination with other development, are effective in protecting surface and groundwater from pollution.

Summary:

Three different sets of points are pursued in this testimony:

- o Drinking water is a compellingly vital resource to protect. Contamination's effects are often not understandable until long after we should have protected, as best we could, against them.
- o Tracing the path of water, particularly the water that we will rely upon for drinking purposes, is profitably done by following the water cycle -- the path of a drop of water as it forms into clouds, falls as rain, and is delivered over land or through soil to reservoirs and to underground basins. b
- o Growth management tools, a growing arsenal that focuses not only on critical resources but on the types of development that affect them, offers a productive array of drinking water quality protection devices.

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The threats to the resource are real,  
but not insurmountable

# THE FUTURE OF WATER

BY PETER ROGERS

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IS THERE A "WATER CRISIS" IN THE UNITED STATES? The impression has certainly been created in recent years that there soon won't be enough water to go around, and that much of what is left is likely to be poisoned. The 1982 report on the state of the environment by The Conservation Foundation, a nonprofit group devoted to the study of environmental policy, describes how excessive consumption of surface water has led to a reliance on groundwater, which has itself been depleted, and also stressed by contamination. In 1981, Robert Harris, a member of the Council on Environmental Quality during the Carter Administration, told a *New York Times* reporter that drinking water is "a significant public health hazard." An ongoing study conducted by the Environmental Protection Agency lends some support to Harris's charge. By last fall, the EPA had found that the groundwater supplies of 29 percent of the 954 cities in its sample were contaminated, chiefly by toxic wastes that had leached out of landfills.

A review of the popular press is a good way to gauge the conventional view of most questions. The cover of the June issue of *Science* 81 showed a rancher, a suburban householder, a miner, and an Indian gathered grimly around a water pump, with the caption: "Rationing the Colorado: Who Gets the Last Drop?" A quick look through back copies of *The New York Times* yields the following: the headline "Efforts to Gain 'Fishable-Swimmable' Waters Appear to Falter" (October 12, 1982); Representative Robert Edgar, of Pennsylvania, arguing on the op-ed page, "Is America running out of water? Yes. . . ." (September 23, 1982); the headline "Depletion of Underground Water Formation Imperils Vast Farming Region" (August 11, 1981); and the headline "Toxic Chemicals Loom as Big Threat to the Nation's Supply of Safe Water" (August 13, 1981).

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Perhaps the most complete compendium of these concerns to date is Fred Powledge's recent book *Water: The Nature, Uses, and Future of Our Most Precious and*

Abused Resource, which is devoted to a description of what Powledge calls "the water crisis." Powledge writes that "the United States has entered a period of grave emergency in its supply of water," and that as far as contamination is concerned, "there is little indication that anybody knows what to do about it." He says, "We are learning that there is no escaping the poisons . . . at least with our current technology."

Most of what one reads about the pollution of water in every region, and the short supply in some parts of the country, is true. It is not true, however, that nothing can be done. Water's depletion and contamination are not irreversible. We have the technology and management skills to rise to the challenge: only the will to do so has been lacking.

Unfortunately, for many people, the response to news of contamination and shortage—or to the way in which the news is presented—is fear rather than determination. The anxiety arises in part from the fact that since the turn of the century we have been able to take unlimited amounts of clean water for granted. But as recently as the end of the nineteenth century, the mortality and morbidity rates from water-borne diseases were very high. (Because they remain high for the majority of the world's population, the United Nations has designated the 1980s the "International Drinking Water Supply and Sanitation Decade.") The engineering achievements of the nineteenth century and the early years of the twentieth were, in effect, too successful: as water in short supply and of poor quality became a distant memory, purity and plentifulness began to be assumed rather than systematically safeguarded.

ALTHOUGH THE RESULTS OF OUR POOR STEWARDSHIP are not beyond repair, they should not be minimized. Of these, contamination is by far the most notorious. In 1974, the Safe Drinking Water Act, which Congress passed largely in response to the efforts of environmentalist groups, forced many communities, often for the first time, to search for chemical contaminants in their water supplies, as well as for the traditionally monitored biological sources of pollution. People have been quite surprised by the exotic toxic chemicals that were

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ILLUSTRATIONS BY THEO RUONAK



idea - don't let new supplies be used  
with the same profligacy.

native of regulation -  
catch-up

found, and are still being found. Disclosures of the reckless disposal of toxic wastes, which, by leaching into the earth, can contaminate groundwater as well as soil, have not inspired confidence in either government or industry, and the addition of Times Beach, Missouri, to a long roster of contaminated sites has led many people to question the safety of their own surroundings.

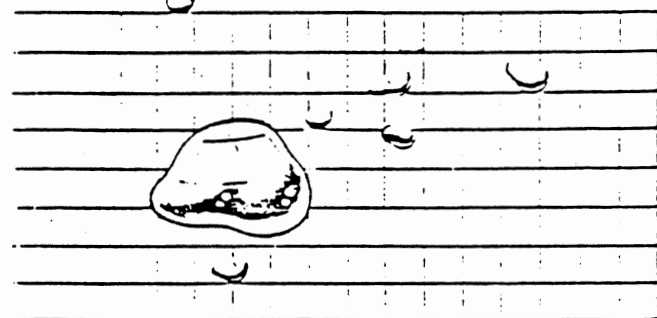
Some contaminants are showing up in water not because they have been recently introduced but because scientists have only recently become able to measure them in small concentrations. Moreover, the science of assessing the amount of contaminants in water is a good deal more precise than the science of assessing the effects of contaminants on human health. Here we find that definitive judgments are extremely difficult to make. Although much work remains to be done to improve these assessments, scientists may never know more about the toxic effects of many chemicals than they do now. Too many variables (what statisticians call "noise")—occupation, personal habits, diet, the presence of environmental insults other than the chemical in question, and so forth—exist in any given geographic area to allow clear linkages of diseases to specific contaminants. This frustration is not likely to diminish significantly with time: it represents an inexorable deficit in scientific understanding.

The public has little tolerance for the ambiguities that complicate statements about contaminated water's effects on health. Confronted with the lack of sure knowledge, many people assume that they are being manipulated for devious reasons. Often, in fact, the suspicion is well founded. Although the uncertainties about toxicity ought to be a warrant for extreme caution in any effort to purify water, they have served also as a refuge for manufacturers and the overseers of landfills, who can cite the uncertainties as a way of understating their liability once contamination is discovered. Under these circumstances, rational debate on how best to protect water is hard to sustain.

Safeguarding water's quantity and quality are two parts of a single enterprise—management—and most of the threats to water in this country stem directly from the fact that it is a common resource that has been managed chiefly in the service of private profit. Believing that water is limitless, we have made it available to industry and agriculture essentially at zero cost, and with few stipulations. Therefore, we should not be surprised or offended by the profligacy with which these users have exploited it. Few corporate officers who look to the bottom line of a financial balance sheet would insist on investing large sums to conserve or clean up a resource for which their companies did not have to pay much in the first place.

To worsen the consequences of this fundamental error, the country's shortsighted and rudimentary control of the environment makes it inevitable that the regulators will trail behind those regulated. Even as we restrict the permissible levels of some contaminants we discover others, and must set regulations on those as well, in a never-end-

ing game of catch-up. Similarly, as we undertake large and costly engineering projects to transfer water to farms and factories in regions where it is dwindling, we ensure that the practices that have led to a supply's depletion will persist. Both these obstacles are chiefly matters of policy, however, and policy—unlike the laws of nature—can be changed.



POOR PLANNING IS PARTICULARLY OBVIOUS IN THE country's efforts to deal with chemical wastes, which are a chief source of water's contamination. Although a variety of treatment methods have been developed to make hazardous wastes safe, most wastes have been either stored untreated or indiscriminately dumped. Unfortunately, storage is at best a temporary solution, and an unreliable policy for the future.

The annual tonnage of hazardous wastes produced in the U.S., and other data equally fundamental to any reckoning of the threat to the water supply, are by no means firm. The EPA and other government agencies have not been collecting data for long, and the release of interim numbers to the scientific community and the press has given rise to inconsistent but often-cited figures. For example, a lengthy report on hazardous wastes, which Congress's Office of Technology Assessment (OTA) published in March, cited an estimate by the EPA that between 28 million and 54 million tons of federally regulated hazardous wastes are released in the U.S. each year. The OTA estimates that the total is instead somewhere between 255 million and 275 million tons. The enormous difference between these estimates, which is explained by the OTA's more liberal definition of hazardous wastes, can only complicate the government's efforts to control them. Moreover, within both the OTA's estimate and the EPA's, the margins for error are so wide—at least 20 million tons—that either one alone is a poor basis for policy.

Since no one can say precisely how many tons of hazardous wastes are produced in the U.S. each year, the fact that no sure figures are available on the extent to which chemicals have infiltrated the nation's water should come as no surprise. The United States Geological Survey (USGS) oversees more than 500 stations around the country, which supply regular information on the quality of surface water. These stations do not keep track of all pollutants, however. They do not measure most of the potentially toxic chemicals, and those they do test for



elude detection at the low concentrations that would be expected in large volumes of water—concentrations at which the pollutants may nevertheless have significant adverse effects. Thus, although the data the USCS does provide indicate that the country has been able to hold its own with respect to conventional pollutants, such as municipal sewage, the extent of contamination of surface water by unconventional pollutants is barely known.

As for groundwater, no systematic monitoring has been undertaken. Instead, we have only incidental evidence, brought to light, by and large, by concerned individuals. In the San Gabriel Valley of California, for example, thirty-nine wells that supplied water to thirteen cities had to be closed in 1980 when they were found to be polluted by high concentrations of trichloroethylene (TCE), an industrial solvent and degreaser. Seven municipal wells and thirty-five private wells near Atlantic City, New Jersey, had been closed by March of 1982, after wastes from a chemical dumpsite were found to have seeped through the sandy soil into groundwater. In Bedford, Massachusetts, four wells providing 30 percent of the town's drinking water were closed in 1978 when they proved to have been contaminated by high concentrations of dioxane and TCE, among other toxic chemicals. By 1979, drinking water in a third of the communities in Massachusetts had been found to be contaminated. In the spring of 1980, the federal Council on Environmental Quality compiled all the reports of groundwater contamination that had been filed at the EPA's regional offices. The results showed that contamination had occurred in at least thirty-four states: in nearly every state east of the Mississippi River, and in the less industrial western states as well.

Although the EPA is conducting tests of drinking-water wells scattered nationwide, it has concentrated chiefly on locating potential sources of contamination. By the end of 1982, the agency had found 80,263 pits, ponds, and lagoons in which industrial, municipal, agricultural, and mining wastes are impounded. Fewer than 10 percent of these sites have been investigated, and of these, only half are being checked on a regular basis to ensure that clean-up is proceeding. In addition to these impoundments, approximately 16.6 million septic tanks routinely disperse their effluent—about 300 billion gallons a year—into the ground. Septic tanks can be a source of chemical as well as biological water pollution, because of the popularity of cleaning fluids sold to flush out sludge. The fluids contain TCE and benzene, which are both known carcinogens. Finally, the 14,000 active municipal landfills, many of which receive industrial wastes as well as the solids from sewage-treatment plants, and the 73,000 active industrial landfills generally are unlined and leach their contents into ground and surface waters.

Given the volume of contaminants released into groundwater, the fact that they have taken so long to show up may seem puzzling. But most of the chemicals are tasteless and colorless, and therefore

low—but nevertheless potentially toxic—concentrations. Moreover, water travels through the ground quite slowly: a contaminant may emerge in a well years after it was released from a source even a short distance away.

**T**HE INSIDIOUSNESS OF THE POISONS, THEIR WIDE geographic distribution, and the frequency with which they appear when tests are conducted understandably provoke reactions of panic or despair. Remedies do exist, however. We can insist that manufacturers reduce the amount of waste they produce; we can treat the wastes before disposing of them; we can treat water after it has been polluted; finally, we can restore an entire area after wastes have been discharged. Of course, some combination of these strategies is also possible. It is generally recognized, however, that the cost of cleaning a site after untreated wastes have been dumped is somewhere between ten and a hundred times the cost of treating wastes before disposing of them. The first two options are therefore clearly the best policy.

Any landfill, no matter how well engineered, is likely to leak eventually. Thus, to start with, landfills might be designed in such a way that the leaks would be directed into collectors; even then, they will have to be checked over a much longer period than the thirty years now required by the EPA, because of the extreme corrosiveness and long lives of many of the chemicals contained. Beyond this, technologies for treating wastes are already in place at many manufacturing plants, and the advantages and disadvantages of potential improvements on these should be explored. Segregating the harshest wastes before they are released to a treatment facility (rather than shipping them in mixed form), and altering manufacturing processes to make their by-products more benign and to allow for recycling, appear to be relatively cheap but effective ways to control potential contaminants at their source. Wastes can also be burned. Incineration is not appropriate for all chemicals, however. The most toxic ones must be subjected to extremely high temperatures—an expensive and not yet perfected technology—to keep the gases given off from polluting the air. Dumping hazardous wastes in canisters in the ocean and injecting them in the earth at a depth of 5,000 feet or more—that is, far below easily accessible water tables—are two other possibilities. (Even now, in many coastal cities, the effluent of sewage-treatment plants is freely discharged into the ocean.) Both plans are risky, however, because they bring untreated wastes into direct contact with the environment. Eventually, canisters will leak or break up in the ocean, but, according to proponents of this strategy, the wastes released would be so diluted that their toxicity would be nil. Shifts in ocean currents could defy this theory, though, and wash the wastes in close enough to shore to pose a threat after all. The chemicals could also be ingested by fish and find their way

migrate upward along unsuspected fault lines: earthquakes and other unforeseen geophysical phenomena could disturb them too. Chemically breaking down batches of wastes into less toxic forms or decomposing them with bacteria are perhaps the best tactics tried so far, because they ensure that all hazards have been eliminated before a substance is released from a plant.

There is no doubt that, at a price, the country can safely handle its wastes. Prices quoted by nine large firms that treat chemical wastes to bring them up to acceptable safety standards range between \$55 and \$240 per metric ton. Generously assuming a price of \$250 a ton to treat 54 million tons of hazardous wastes a year (the maximum volume estimated by the EPA), the annual cost would be about \$13.5 billion. This cost could rise, of course, as more chemicals are analyzed and found dangerous.

Is \$13.5 billion, or more, a year a high or a low price to pay for the safe disposal of chemical wastes? There is no easy answer to this question. Consider, however, that this sum represents 2 percent of the annual contribution of manufacturing to the GNP, and 0.4 percent of the GNP as a whole. It should also be kept in mind that this \$13.5 billion would not be lost, as payments for imported oil are. Rather, it would create and stimulate a substantial industry—and jobs—in its own right.

A task more arduous than controlling wastes before they assault the environment is cleaning them up after the fact. How a site is cleaned up varies with its proximity to houses and drinking-water supplies, the type of soil, the disposition of groundwater, the specific chemicals dumped, and how they were dumped (in liquid or solid form: in containers or not). Generally, though, problem dumpsites can be handled in one of three basic ways: isolating the site by surrounding it with trenches lined with clay or some other nonporous material, and lining and capping the site itself; diverting the flow of any water through the site, underground or on the surface; removing the wastes and the soil and water they have polluted, decontaminating them by one of the methods cited earlier, and storing them at a controlled landfill.

These options are not uniform in cost. Clearing a contaminated site and treating everything removed from it entails a good deal of money and labor, but once the task is accomplished, little else is required. In contrast, steering water away from a contaminated site is less expensive initially, but purification plants nearly always must be built to ensure that the water is truly safe, and so maintenance costs can be high. Moreover, regular tests for toxicity are essential, no matter how a contaminated site is handled. The EPA's crisis-management strategy has been simply to transfer the contents of a dumpsite, without treating them, to other landfills, which are themselves prone to leaks. Although the EPA's response has the advantage of being fast and relatively cheap in the short term, its ultimate wisdom and cost-effectiveness are dubious.

The obstacles to cleaning up hazardous wastes, like the

obstacles to treating them, are economic, and therefore political, rather than technical. The OTA reports that some 15,000 uncontrolled dumpsites are in need of attention. The total cost is estimated at between \$10 billion and \$40 billion—many times the \$1.6 billion that the federal government expects to collect from chemical manufacturers for its environmental "Superfund," established in 1980. If the country chooses to accept the expense, however, the goal is within reach.

ASIDE FROM THE STEPS THE COUNTRY CAN TAKE TO protect water from contamination, there are ways to protect the public from the toxic effects of contaminants already in water. No contaminants appear to have an irreversible effect. What we put in water, we can usually extract—at some cost. Indeed, only the cost and long-term efficacy of the available technologies remain to be established.

The most reliable method that has been developed so far is the granular-activated-carbon (GAC) filter—essentially ground-up charcoal. (Other filter mediums, such as synthetic resins, are also being studied.) The filter works by a physical process called "adsorption." Molecular attraction causes the chemicals flushed through a carbon filter to adsorb, or stick, to the carbon's surface. Once the grains of carbon are covered completely, they are either restored by being subjected to a high temperature, which drives off the chemicals adsorbed (if the filter is a large one, at a municipal plant), or discarded (if it is small, attached to a household tap). There is little risk involved in the disposal of household filters, because they are small and because, in any case, the molecular bond is extremely strong.

A special advantage of carbon filters for municipal drinking water is their proven ability to trap not only chemical wastes that have infiltrated the system from outside but also unwanted chemical by-products of chlorination. The great reduction in water-borne diseases in the U.S. has been sustained by chlorine, which rids water of harmful bacteria. It turns out, however, that chlorine reacts with natural as well as man-made chemicals in water to create a family of chemicals known as trihalomethanes, one of whose members is chloroform, which has been shown to cause cancer in animals. Flushing water that has been disinfected with chlorine through a carbon filter at the end of the treatment cycle can efficiently remove trihalomethanes and any other hazardous organic chemicals present, according to a report released in 1980 by the National Academy of Sciences. The report cautions that further study is needed to make sure that potentially toxic chemical reactions do not occur on the carbon and that no micro-organisms build up in the filters, but it concludes that there is already "ample evidence for the effectiveness of GAC," and advocates the filter for municipal supplies threatened by contamination.

In 1978, the EPA proposed carbon filters as the option of

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choice for the control of hazardous chemicals in water. Soon after, a group of ninety investor-owned water utilities, the Coalition for Safe Drinking Water, was formed to resist any EPA requirement on that score. Although the coalition expressed doubts about how well the filters would work, their underlying complaint was cost. Studies sponsored by the EPA in response to the coalition's objections have shown that for cities with a million or more residents, the cost of water would rise between 17 and 21 percent. In relative terms, one could argue that the increased cost would be large. But in absolute terms, and considering how cheap water is everywhere in the U.S. at present, the increase would be modest: based on the EPA's figures, for a family of four it would range between \$11.81 and \$60.25 a year.

Many water utilities have been using carbon filters to control taste and odor and to treat waste water; some have installed them specifically to control toxic chemicals. In Europe, many cities have been using carbon filters for this purpose alone for several years. So far, however, the EPA has not ordered any utilities to install carbon filters. The EPA does require large community systems—representing about 54 percent of the American population—to test for trihalomethanes and other contaminants. People who are concerned that their water might not be safe could ask their utilities for the results. Local health departments may also be able to provide this information, and some may even be willing to accept a sample and test it themselves. Independent tests of domestic water supplies are expensive, but they are the only recourse for the 33 million Americans whose water comes from their own wells.

Fortunately, some of the household-sized carbon filters on the market do a very good job of ridding water of chloroform, trihalomethanes, and other toxic chemicals. Consumer Reports reviewed fourteen of them in its February, 1983, issue, and rated five "very good" or "excellent." The three best were Culligan Super Gard SG-2, at \$175 (\$23 for replacement cartridges); Sears 3464, at \$23 (\$7.50 for replacement cartridges); and AMF-Cuno AP50T, at \$67 (\$12 for replacement cartridges). The magazine gave the Sears filter its "best buy" rating, because of its effectiveness and low cost. In Rockaway Township, New Jersey, a dozen houses relying on contaminated well water have been fitted with such small carbon filters, and tests show that the water is up to acceptable safety standards.

An investment in the treatment of contaminated water need not be an endorsement of the uncontrolled release of hazardous substances into the environment. But treating contaminated water can protect the public health for relatively low additional costs while the country goes about cleaning up the mess it has already made. (incineration)

A good engineering approach is to be very conservative, and to set the highest standards affordable. It is legitimate to ask whether or not the cost of improving the quality of water is too high, but it is also legitimate to ask, compared

agriculture, and households now pay for water, it does seem large. But if we compare the cost with the value of water that won't make us sick, it is small. By any standard of comparison, the eventual expense that is likely to result from current policies, which protect water only haphazardly at best, will be enormous.

ALTHOUGH BY NOW IT IS A COMMONPLACE TO SAY that we live in an era of limits, water is still managed in accord with presumptions, laws, and institutions that do not reflect a recognition of these limits. Abei Wolman, professor emeritus of environmental engineering at Johns Hopkins University, and one of the world's foremost experts on water supply, was quoted in *The New York Times* on August 9, 1981, as saying:

Water is cheaper than dirt. That means there is no orderly design as to when and where to use it. In a vast country such as ours we have never been able to organize a thoughtful, logical national plan, and I am very doubtful we ever will.

One does not have to be an economist to see the problem of underpricing. Common sense tells us that people waste commodities that they do not value highly, or commodities that, though valued highly, are supplied cheap.

Both in the Southwest, where water shortages are permanent and likely to worsen if present consumption rates continue, and in the Northeast, where shortages are periodic and rarely dire, water prices are extremely low. Indeed, they are lower by half here than they are in Europe. People in Frankfurt, Germany, pay \$2.82 per thousand gallons, whereas in Los Angeles, which is significantly more arid than Frankfurt, people pay only \$0.60 per thousand gallons. This disparity in prices is reflected in the sharp contrast in rates of consumption between the U.S. and Europe. The average amount of publicly supplied water for all nonagricultural purposes in the U.S. is about 180 gallons per capita per day ("gpcd"), of which 120 gallons go to households and for municipal uses, such as street washing and fire fighting, the rest goes to manufacturing and businesses. Yet in countries with comparable levels of social and economic development, consumption is a fraction of the U.S. rate. The rate in Germany, for example, is 37 gpcd; in Sweden, 54 gpcd; in France, 30 gpcd; and in the United Kingdom, 53 gpcd.

cost per family per year

DEP's new law

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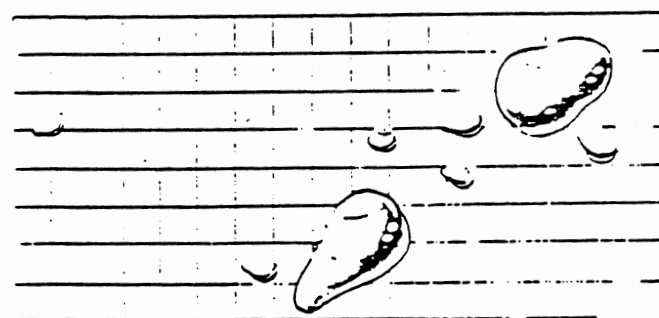
180 gpcd NYC

ences in water consumption in these societies. Consider that in New York City, where water prices are on a par with those elsewhere in the East, the rate of consumption is reported to be 180 gpcd, and supplies to most residential users are unmetered. (As it turns out, the rate of consumption in cities where water is metered is roughly half the rate in cities without meters.) In Boston, water prices are also in the range of prices elsewhere in the East, yet the rate of consumption is 233 gpcd—well above the national average. As much as 40 percent of that amount is lost to leaks in the system. Best guesses as to the effect of doubling Boston's 1978 price of \$1.18 (now down, to \$1.00) per thousand gallons suggest that consumption would be reduced at most to 160 gpcd—still four times Frankfurt's rate of 40 gpcd.

Something else in addition to price seems to influence water consumption in the U.S. Americans may be able to recognize, in a theoretical way, the pressures that serve to diminish supply, but they seem unable to keep conservation in mind when devising distribution schemes that borrow from reserves necessary for the future, when confronted with the need to renovate old and wasteful utilities, and when watering lawns and taking showers. Thus, even where water is least plentiful in the U.S., prices rarely reflect supply. Indeed, prices are lowest where water supplies are lowest: \$0.53 in El Paso and \$0.59 in Albuquerque, compared with \$1.73 in Philadelphia or \$1.00 in Boston. Moreover, a rise in price does not seem to provoke a commensurate decline in demand. Perhaps American prices are so low that even when they are raised they fail to make an impression on consumers. Can the average homeowner even remember the amount of his last water bill? And how does that expense compare with the cost of an evening's entertainment, or a tank of gas?

However low the price of municipal water in the U.S. appears in comparison with prices in other countries, it is high in comparison with what American farmers pay. The price of agricultural irrigation water in the U.S. ranges between about \$0.009 and \$0.09 per thousand gallons, and federal subsidies make up the difference between price and cost. The amount of subsidy in the more arid parts of the country is staggering, in fact. In eighteen western federal irrigation projects that the U.S. Department of the Interior studied in 1980, the government was providing between 57 and 97 percent of the costs over the lifetimes of the projects. This works out to an amortized value of between \$58 and \$1,787 a year for every acre subsidized. Kenneth Frederick, an economist at Resources for the Future, Inc., a nonprofit organization for the study of environmental questions, based in Washington, D.C., wrote in his book Water for Western Agriculture, published in 1982, that for all Bureau of Reclamation projects, water subsidies total, on average, at least \$500 per acre over the life of a project. Thus, for a 160-acre farm, the subsidy might total \$80,000, and in some water-short regions it could be as high as \$286,000. Until recently, a 160-acre farm was the largest

eligible for federally subsidized water under the 1902 Reclamation Act. An amendment to the act was passed last summer, however, which raised the ceiling to 960 acres for individuals and to 640 acres for corporations. The amendment merely acknowledged the fact that the Bureau of Reclamation had been providing subsidies to farms larger than 160 acres for some time. Simple arithmetic shows that for the largest farms now eligible, the subsidy can rise to between \$480,000 and \$1,715,510 per farm. Senator Daniel Patrick Moynihan, of New York, who has been persistent in calling for more rational water policies, argued on the Senate floor that the bill represented "all that is wrong with federal involvement in water resources: chaos, arbitrariness, inequity, and waste."



**W**ATER IS NOT LIMITLESS, BUT, CONTRARY TO THE views of alarmists, there is no absolute danger that it will run out. The U.S. as a whole can count on at least fifty years without serious shortages, even at the present wasteful rates of consumption. Extremely difficult choices will have to be made soon in some regions, however, and almost everywhere methods of allocating present supplies and developing new ones need to be more conservative. For water's quantity as for its quality, it is not nature that could prove intractable but policy. The nation has the power to abandon various water-intensive activities in favor of others less demanding on supplies, and the opportunities are numerous enough to make the transition relatively painless.

Annual precipitation in the continental U.S. is about 4,200 billion gallons per day (bgd), on average. Of this amount, 1,400 bgd should be available for all our uses; the rest evaporates. But yearly fluctuations in precipitation further diminish the supply, in ninety-five out of a hundred years, to 675 bgd. The variability of precipitation should be obvious to everyone this year. Rainfall has been well above normal rates in all parts of the country. Notwithstanding the costs that will result from flooding and soil erosion, these rains could bring important benefits: increased supplies in surface reservoirs, an increased volume of groundwater, and increased soil moisture to ease the demand for irrigation. Unfortunately, though, the amount of water that can be carried over from wet years, such as this one, to drier years is quite small, because the capacity of American reservoirs to store it is limited.

12x According to the U.S. Water Resources Council, the na-



tion's total average daily consumption in 1975—the most recent year for which the council made an estimate—was 106 bgd. Of this amount, fully 33 percent was used in agriculture. Improved irrigation efficiencies could reduce this share substantially. A tremendous asymmetry exists between agriculture, which consumes 83 percent of the nation's water but contributes only 3 percent to the GNP, and manufacturing, which consumes less than 6 percent of the water but contributes 27 percent to the GNP.

Nearly a quarter of the total amount of water consumed in the U.S. is drawn from the ground. Between 1950 and 1975, the demand for groundwater increased 140 percent. Groundwater accounts for half of the irrigation water used in the West, and some appealing features make it a prime target for development. First, a tremendous quantity is stored in American aquifers—underground streams and basins. The Water Resources Council estimated in 1978 that more than a thousand times the amount of water consumed in 1975 lay within 2,500 feet of the surface. Second, groundwater can be used to even out the natural fluctuations in precipitation from year to year. And third, in many areas, groundwater is the only source that remains to be appropriated.

Unfortunately, in addition to those advantages, there are some drawbacks. Extracting water from the ground demands a good deal of energy. Also, the rate of replenishment, or "recharge," is slow—typically less than 10 percent a year, and only slightly faster in years like this, when precipitation is above average. These drawbacks are now becoming critically evident in the West, where since 1950, development has depended largely on groundwater sources. As a result, annual withdrawals of water in excess of the amount recharged to an aquifer—"overdrafts"—range between 4 and 95 percent in those regions in which farm acreage is increasing most rapidly. In Texas and the Oklahoma High Plains (the site of the vast Ogallala aquifer), the annual overdraft is equivalent to the unregulated flow of the Colorado River—approximately 14 million acre-feet a year. (An acre-foot is the amount of water needed to cover one acre to a depth of one foot.) In all of the western states, the overdrafts exceed 20 billion gallons a day, or 22.4 million acre-feet a year. In the remaining states, overdrafts have been less substantial, rising to one billion gallons. These data show that enough water to irrigate 10.7 million acres is being withdrawn in excess of replenishment from American aquifers. Although overdrafts for short periods do no harm, for the long term they deplete aquifers, and pumping costs rise as a result.

CONSUMPTION HAS MEANING ONLY IN TERMS OF supply, and supply is not always easy to predict, because it is subject to technology, politics, and the economy, as well as to natural constraints. For example, a serious effort has been made during the past fifteen years to modify weather in ways likely to increase precipitation.

These techniques—seeding clouds with silver-iodide crystals, for example—are still experimental, but they may prove workable eventually. A problem that engineers have yet to solve is that efforts to increase rainfall in one area might decrease it in another. Then there is desalinization—a technology that has attracted a good deal of publicity and that has been employed successfully in harshly arid parts of the world, such as the Middle East and some islands in the Caribbean. However, desalinization is well enough established now to support the prediction that in the U.S. it will always be too expensive for farming purposes—the only source of demand that could seriously deplete supply here.

Just as human intervention can enhance the water supply, human intervention can diminish it. For example, if the federal government were to impose a ban on overdrafts of groundwater, the supply available to consumers could drop by 25 percent in the country as a whole, and by an even greater percentage in the West. The burning of fossil fuels may have provoked a buildup of carbon dioxide in the atmosphere, and evidence is accumulating that if such a buildup has indeed occurred, the small changes in temperature that will result will lead gradually to large changes in rainfall in the country's mid-latitudes. According to Roger Revelle, a member of a panel on the buildup of carbon dioxide in the atmosphere which was convened by the National Academy of Sciences, if the average air temperature increased by several degrees centigrade at a latitude of about 40° north, a 15 percent decline in precipitation would follow, reducing the flow of the Colorado River system, for example, by half. This could create major agricultural dislocations in Colorado, Utah, and Arizona. Revelle says that a decline in precipitation at this latitude across the U.S. might begin to be felt within the next fifty years. So far, though, the change in the earth's atmosphere and its potential effect on weather are only hypotheses.

The effect of politics and the economy on the country's water supply is easy to demonstrate. A huge federal pork barrel is based in part on the construction of dams and the transfer of water from one basin to another, both of which serve to increase a water supply when it runs short. Between 1965 and 1980, \$52 billion was spent on all water-resource projects—inland waterways, ports and harbors, multi-purpose dams, and so forth—by four federal agencies: the U.S. Army Corps of Engineers, the Bureau of Reclamation, the Tennessee Valley Authority, and the Soil Conservation Service.

The Bureau of Reclamation's Central Arizona Project is a good example of how the money is used. This project has been under construction since 1973, and is 38 percent complete. Ultimately, it will divert 1.2 million acre-feet of water a year from the Colorado River basin to the cities of Phoenix and Tucson, and to the agricultural land in between. The water has to be lifted 1,200 feet over a granite reef to a 300-mile-long aqueduct. Most of the water is intended to compensate for the depletion of aquifers by

Wow  
 farmers for irrigation; the project will not provide enough water to allow for any expansion in irrigated farmland, or for any further development of cities and industries.

The bureau estimates the project's final cost at between \$1.4 billion and \$2 billion; estimates made by others are substantially higher. When federal agencies undertake projects like this one, they pay most of the cost; the share borne by the beneficiaries is very small. Moreover, only 6 percent of the \$52 billion budget for water projects between 1965 and 1980 was allocated to the Northeast, where 24 percent of American taxpayers reside, and where water systems are generally old—in need of renovation and expansion. The West received 35 percent of the expenditures, though its share of the population is only 17 percent. As a result of this inequity, many congressional representatives of states and districts outside the West have opposed western water-reclamation projects in recent years; indeed, no major package of water-resource projects has been authorized since 1976. A good deal of money remains to be spent, however. According to the General Accounting Office, the cost of the 289 authorized projects still under construction by the Bureau of Reclamation and the Army Corps of Engineers totals \$57.4 billion; of this sum, \$22 billion had been spent by the end of fiscal year 1981. Another 645 projects have been authorized, with funds yet to be appropriated.

One can object to expensive water projects on the narrow grounds that if they are truly needed, then the beneficiaries should pay for them. But the question of their financing aside, many water projects entail no riders to ensure that the increased supplies will not merely perpetuate a wasteful status quo, in which users who have consumed water indiscriminately can persist in doing so. Federal water projects attract development in regions that have already been developed to a point that strains existing supplies, and they encourage farmers to cling to thirsty crops and inefficient irrigation practices that ought to be abandoned. For example, water supplied by the Bureau of Reclamation to the Grand Valley of Colorado is so highly subsidized that the farmers rely on flood irrigation—they simply cover entire fields with water. Flood irrigation uses up to six times more water than "big wheel" and fixed-sprinkler systems, which are themselves by no means the most advanced and efficient techniques available.

If water and water rights were freely bought and sold, the demand for water would be easier to control: the market would help to establish the most efficient use of the resource. But most water supplies and rights are protected under legal and institutional arrangements that have been worked out over time in accord with objectives other than equity and economic efficiency. The two major legal doctrines—riparian rights and prior appropriation—were designed to secure the land titles of settlers. Riparian rights, which are observed chiefly in water-abundant eastern states, allow the owner of land adjacent to a body of

regional water issue: 6% of fed water budget (52m) was in NE—where 24% of pop lives  
 water to make use of the water so long as no inconvenience is caused to his neighbors. Prior appropriation, which is observed in water-short western states, ranks the claims of settlers according to how early their homesteads were established. When a property owner fails to exercise his rights, they lapse. The doctrine is analogous to the pressure on a manager within a corporation to spend all the money budgeted or suffer a cut in funds the following year. Thus, prior appropriation, far from being an incentive for farmers to use less water, is an incentive for them to use as much as they can. In many cases, water rights are attached to parcels of land or specify particular uses. As a result, late arrivals—industries, municipalities, or other farmers—often have trouble acquiring water at any price.

If Indian water rights in the western states are ever enforced, they will reduce substantially the amount of water available to everyone else in those states. The Winters Doctrine, based on the 1908 Supreme Court ruling in *Winters v. United States*, holds that when the federal government claims land for any purpose (specifically, to create an Indian reservation), it at the same time implicitly claims sufficient water to accomplish the purpose for which the land was set aside. At present, Indian water rights remain unquantified, but the Navajos, for example, could legitimately claim as much as a third of the flow of the Colorado. In New Mexico, pending claims by several tribes add up to many times the present allocations of water to all the irrigated farmland in the state. state

Water is largely in the hands of the states, and it was only in the nineteenth century—with the passage of the Rivers and Harbors Act of 1826, which established federal control over interstate navigation; the Refuse Act of 1899, which controlled dumping in navigable waters; and the Reclamation Act of 1902, which established a federal role in enhancing water supplies in the West—that the federal government involved itself at all. The state laws are complex, having evolved, much like federal tax laws, over a long period, and there is little chance that a single national code will ever be devised, much less approved, to replace them. In fact, such a code would not even be desirable in this country, where there is so much variation in supply and demand from one region to another. But it is clearly in the interest of the states, perhaps with the guidance of the federal government, to plan equitably in ways that exploit the legal structure rather than conflict with it.

WATER RIGHTS MAY BE UNBREAKABLE, BUT THEY can be bent. For example, a state might offer grants to farmers to offset the cost of adapting farms so that they consume water more efficiently. In exchange, the state would be entitled to the surpluses achieved—water that could then be diverted for municipal and industrial uses, and to increase reserves. Alternatively, since the economic return on water for agriculture is significantly lower than the return on water for manufac-

turing, industries in arid parts of the country might be enabled, through state intervention, to meet their needs by a mechanism as simple as competitive bidding.

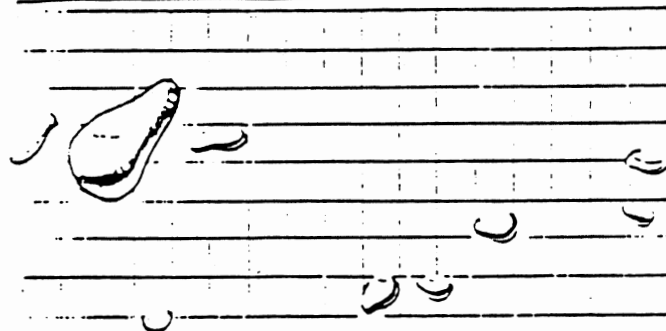
Arizona's Groundwater Management Act—the first comprehensive state law to limit the pumping of groundwater—is a worthy precedent for the thoughtful redistribution of water. It was the severity of groundwater shortages in that state that prompted construction of the Central Arizona Project, but the project will supply only two thirds of the water needed by the year 2000, at current rates of consumption. Thus, the act calls for wells to be registered, and levies fees on the water withdrawn. It calls on farmers to improve irrigation efficiencies, and if these efficiencies are not adequate by the year 2005, it allows the state to buy and retire as much farmland as necessary to restore the natural balance. The act also requires housing developers to secure state certification that a 100-year supply of water is available before construction can proceed.

Harvests need not suffer if farmers use less water than their water rights entitle them to: the agricultural and social optimums rarely coincide, and, given the subsidies, there is no reason why they should. On average, irrigated crops consume only 33 percent of all the water that a farmer withdraws. At farms dependent on surface water, irrigation efficiencies are typically less than 45 percent. At farms dependent on groundwater, the efficiencies are better than 60 percent. The difference is a matter of economics. Irrigation water from surface supplies, which reaches farms through federal or privately managed canal systems, costs a good deal less than groundwater, which farmers must pump themselves. With improved irrigation systems, these efficiencies could rise to between 65 and 75 percent, or higher.

Many farmers—not just those in Colorado's Grand Valley—irrigate by flooding. Alternatives to this practice are "permanent furrow systems," which collect rainwater and surplus irrigation water and channel it to storage ponds for future use; concrete or plastic pipes that carry water underground from the water source to the furrows, reducing the losses to evaporation and seepage incurred by open channels; and "drip irrigation," in which plastic tubes feed small increments of water directly to the roots of each plant. Drip irrigation both inhibits evaporation and allows plants to be fed only as much water as they need: farms in Israel using this method have been reported to achieve efficiencies as high as 95 percent.

Besides reducing total water consumption, farmers might also tap supplies of brackish water, for which there is no competing demand. A rule of thumb in agriculture holds that "if you can drink the water, it's all right to use it for irrigation." Yet some crops—barley and cotton, for example—can flourish with brackish water. Crops less tolerant of salt, such as corn and beans, can also be grown in brackish water if it is supplied in such quantity that the salt is washed past the roots. Running tiled drains under

the root zones of the plants also helps to keep salt concentrations low. Brackish water occurs inland as well as near the sea. Thus, adapting drainage systems to accommodate brackish water and growing crops that can thrive on it—leaving sweet water for other uses—are conservation options for farmers everywhere in the U.S., not just those in coastal regions. Brackish water could also be substituted for sweet in air-conditioners, washing machines, and industrial washing and rinsing processes.



THE HOMILY "MOTHER NATURE KNOWS BEST" IS AS true of water as of any other environmental resource. In many arid regions of the U.S., farmers have been able to cultivate crops that are more water-intensive than the resource ultimately can support, because water is cheap. But when a water supply is exploited to the limit of its capacity, nature asserts itself in ways that should force farmers to conserve. As a water table drops, pumping becomes more expensive. For a while, farmers may persist in their withdrawals, choosing to pay for more fuel to run the pumps, or to drill new wells. Eventually, however, the cost will rise higher than farmers can afford, and at that point they will abandon their farms or turn to the crops that can thrive with little or no irrigation, such as sorghum, wheat, and soybeans.

Society can be content with this self-regulating system so long as the irrigated crops lost are not essential to health or economic survival. The system can be hard, however, on the farmers at its mercy, and some form of government subsidy ought to be made available to compensate them at least partially for the cost of converting to different crops. Such compensation is sure to cost much less than the federal projects conceived to increase water supplies artificially.

Does the nation depend on crops irrigated with water from the Ogallala aquifer? Do we need Arizona's cucumbers? The most recent comprehensive study of the question, conducted last year by Kenneth Frederick, shows that we do not. Frederick found that out of a national total of 547 million acres of cropland and pastureland, only about 61 million acres are irrigated. The Center for Agricultural and Rural Development, at Iowa State University, which is the leading research group on American agricultural needs, has predicted that only 32 million irrigated acres will be needed to meet the demand for food and fiber in the U.S. in the year 2000. The Center asserts that even this

By 2000, industry will withdraw 62% less water than in 1975, while consumption rises by 150%. Recycling, cost of treating wastewater is a big incentive.

acreage can be irrigated at lower cost, in both water and dollars, using existing technologies. Clearly, if irrigated acreage can safely decline by half over the next twenty years, the country does not desperately need to water the desert, nor does it need to devote so much of the water it consumes to the task. With a decline in irrigated farmland, and the adoption of more efficient irrigation methods, an enormous amount of water can be saved for drinking and other uses.

Industry has already markedly reduced its demand for water, as a result (unintended) of the Water Pollution Control Act, which Congress passed in 1972. Predictably, economic constraints have proved a powerful motive for change. The act requires industries to treat their own effluents, or to pay others to do so; to cut that cost, firms have found it in their interest to produce less waste. The Water Resources Council estimated in 1978 that by the year 2000, industry will withdraw 62 percent less fresh water than it did in 1975, although its consumption of water will increase by as much as 150 percent. Industries will make up the difference by recycling the water they do withdraw from the nation's supply.

Industries can reduce their demand for fresh water substantially merely by keeping a cleaner house. A large textile plant in São Paulo, Brazil, was able to use 30 percent less water within two years after the city levied a nominal charge for the treatment of its effluent, and the reduction was virtually costless. The plant resorted to such simple practices as shutting off taps when no water was needed and using some wash waters more than once. Where plants are being replaced or renovated, changes in manufacturing processes can also bring about large savings. A new paper-pulping technology developed in Sweden has been demonstrated to use half as much water as conventional processes while nearly doubling productivity: the new process gets ninety-five tons of paper from a hundred tons of wood, as compared with the fifty tons yielded by other means. These savings are realized at a price, however, since the alternative technology requires more fuel and a tenth of the usual manpower.

The nation's demand for energy is another source of stress on the water supply. However, although this demand is sure to rise substantially in the future, the amount of water consumed to generate electricity from steam is not likely to rise commensurately. In fact, steam-power plants will consume about 11 percent less water in the year 2000 than they did in 1975, according to the Water Resources Council's last forecast, even though the amount of water they require could be seven times greater. The huge difference between these two figures will be accounted for by improved technologies for cooling water, so that more of it can be recovered. For example, a shift away from evaporative cooling towers to non-evaporative cooling towers, in which condensed water is collected rather than released, cuts the water lost in cooling virtually to zero.

The synthetic-fuels industry, which converts coal and oil

shale into more efficient sources of energy, is based chiefly in the West. Although it has been stalled by the buyer's market in oil, its revival will place it in fierce competition for water that is already running short. A coal-gasification plant that can produce 250 million cubic feet of gas a day will require between 3,000 and 15,000 acre-feet of water a year. A coal-liquification plant that can produce 50,000 barrels of fuel a day will require between 5,000 and 10,000 acre-feet of water a year. An oil-shale plant that produces 50,000 barrels of oil a day will require between 2,000 and 9,000 acre-feet of water a year. These are small amounts of water, however, in comparison with agriculture's requirements. A coal-liquification or -gasification plant would use only enough water to irrigate between 1,000 and 5,000 acres, with harvests worth about \$250,000. If the same amount of water were used to produce synthetic fuels, it would be worth many times that sum. In 1981, Noel Gollehon and other economists at New Mexico State University studied the likely economic and social consequences of a 40 percent cut (1,245,000 acre-feet) in the water available to agriculture in Montana, Wyoming, Utah, Colorado, Arizona, and New Mexico—states for which synthetic-fuel plants have been proposed. The impact was measured in terms of the loss of income and employment directly related to agriculture and peripheral to it. The \$23 million a year and 900 jobs estimated to be lost are not trivial figures. But when these losses are weighed against the income and employment generated by industries producing the equivalent of a million barrels of oil a day, they become a good deal less disturbing. (no numbers?)

ALTHOUGH REASONABLE PRICING IS NOT THE ONLY solution to the country's poor stewardship of water, it would have powerful ramifications. No state can be expected to refuse a dam or waterway as long as the federal government promises to foot the bill, even though such schemes may delay its coming to grips with the true sources of a shortage. No consumer in any category can be expected to use less water as long as water bills do not reflect the need. Industry cannot be expected to pay for adequate treatment as long as its failure to do so is met at most by nominal fines and more often by silence. Finally, water utilities cannot be counted on to be careful of chemical contamination, and to take steps to prevent it, as long as the EPA is too timid to insist.

The consumers of water must be made aware of its cost for any effort at conservation to succeed. Consider, for example, the aftermath of the federal Water Pollution Control Act, which provided substantial subsidies for the construction or renovation of municipal sewage systems. By 1982, grants to municipalities totaled about \$35 billion. The EPA estimates that by the year 2000, an additional \$118 billion will be needed to bring the country's sewerage systems into compliance with the act's standards. Because

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construction costs, but nothing for land or maintenance, it ensured that communities would turn to conventional plants, which are expensive to build but cheap to maintain, and which require little land. By the same token, it ensured that communities would avoid innovative systems, which typically cost little to build and relatively more to maintain, and which require large tracts of land. (Innovative sewage treatments tend to rely on nature itself; they employ liquid sewage to irrigate and fertilize crops or they decompose sewage biologically in oxidation ponds or meadow-marsh systems.) The terms of the grants have since been changed in a way that partially corrects this defect, and compels communities to pay close attention to a project's true cost. In 1985, the government's share will drop to only 55 percent for conventional treatment plants, but it will remain at 75 percent for innovative systems. The grants will still cover only the cost of construction, however, and, as a result, a community's incentive to innovate is still not obvious. According to the EPA, the new grant policy is likely to leave a shortfall of \$23 billion—or 24 percent—between the cost of the new or improved systems needed to achieve federal standards and the probable contributions of the federal government and communities to that cost.

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The Reagan Administration has effectively eliminated the three federal bodies that were in a position to correct the nation's faulty planning: the Council on Environmental Quality, the Water Resources Council, and the Office of Water Resources Technology. Staffs and budgets were cut back to nearly zero. Even though the Council on Environmental Quality was composed of too many lawyers and too few scientists and engineers, it played an important role in educating the public about the threats to water and the progress toward solutions. The Water Resources Council studied on a continuous basis the adequacy of water supplies in all parts of the country. The Office of Water Resources Technology, in the Department of the Interior, was the major funding agent for studies of water's proper management. The role of all these groups was essentially critical. By consistently pointing out the flaws in how water is being managed, they made an enemy of the EPA, whose administrators did not appreciate negative evaluations of their performance. They also alienated the four agencies holding the purse strings of the government's water projects, and their chief constituencies—farmers, real-estate developers, mining companies, and so on. Last year's amendment to the rules on access to federally subsidized water is only one example of the power of these constituencies to influence the government's control of the resource.

Reagan cutback's.

A bill proposed by Representative Edgar, of Pennsylvania, to set up a national commission on groundwater, appears on its face to be a good first step in changing the traditional priorities of water management. Yet, although the bill's intention is worthy enough, such a commission is surely premature. Water policy is already thoroughly fragmented: the Department of the Interior and the USGS have chief jurisdiction over problems of quantity, and the EPA over problems of quality, but no agency is trying to look at the nation's water in all its aspects. Even when it was functioning, the Water Resources Council, which might have studied the interrelationships between supply and purity, and the competing demands of the states, did not do so effectively. Before a commission on groundwater is appointed, there ought to be a commission on water. Such a commission should seek ways to resolve the battles between East and West, and to integrate the activities of the various agencies. And it must do so without engaging in the partisan politics in which these agencies are so often embroiled. The American people are owed a careful explanation of the choices they face, both as taxpayers and as consumers of water.

Perhaps, after all, this country can prove Abel Wolman wrong, and devise a "thoughtful, logical national plan" for water. First on the agenda is to compel users to appreciate water's economic value. Prior to the energy crisis, one would not have believed that Americans could curb their appetite for oil. Ten years of rising prices have provoked amazing changes in behavior. The adjustments have not been easy, but many of the ones most feared by politicians and citizens—the charge of \$1 or more for a gallon of gas, for example—have come to pass with no real peril to the common good. Higher prices could influence water consumption just as radically, and with less trauma.

Higher prices by themselves will not untangle the snarl of competitive demands for water in regions where it is running short in absolute terms. But higher prices can reveal the true economic value of water, and make the political choices among these demands clearer. Similarly, the public health is not merely in the domain of cost-benefit analyses. Standards of water purity are ideally studied with no consciousness of the financial burdens they would impose. These burdens must then be confronted, however, and borne as part of our commitment to ourselves and to future generations. Compared with the nation's other expenses, these burdens will not be so very large. Insofar as a water crisis exists, it is a crisis of political will. If the country acts wisely, and is willing to pay the price, it can prevent politics from transforming the water crisis of the headlines into a true crisis in the natural world. □

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NEW JERSEY SENATE

PAUL J. CONTILLO

CHAIRMAN, SENATE LAND USE MANAGEMENT  
AND REGIONAL AFFAIRS COMMITTEE

VICE CHAIRMAN, SENATE ENVIRONMENTAL QUALITY COMMITTEE  
SENATOR, 38TH DISTRICT (BERGEN)

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201-487-0044  
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The attached enclosure was relayed to Senator Contillo at his May 23 hearing on Watershed Protection. The documents contained in the submission raise questions about the potable water quality of the Hackensack River north of the New Jersey-New York state line in Rockland County.

Testimony of Estelle Marsico, West  
Nyack resident, November 22, 1988,  
before the N Y S Assembly Standing  
Committee on Environmental Conservation

MY NAME IS ESTELLE MARSICO.

I'M 61 YEARS OLD, AND MY  
HUSBAND JOE AND I LIVE IN  
WEST NYACK, BEHIND THE POST  
OFFICE, ON WEST STREET.

I WAS BORN IN WEST NYACK, ON  
OLD HILL ROAD. JOE WAS BORN  
ON BENSON AVENUE AND HAS  
LIVED IN THIS AREA ALL HIS  
LIFE.

IN 1948, WHEN WE BOUGHT  
PROPERTY TO BUILD A HOUSE,  
WEST STREET WAS JUST A DIRT  
ROAD IN THE MIDDLE OF FARM  
COUNTRY. WE HAVE LIVED IN  
THAT HOUSE FOR 35 YEARS.

ABOUT A WEEK AGO, I TOOK A  
LITTLE DRIVE AROUND OUR  
NEIGHBORHOOD, STARTING AND  
ENDING FROM OUR HOUSE. ABOUT  
TWO AND A HALF MILES ALTOGETHER.

I TOOK THIS RIDE BECAUSE 10  
YEARS AGO, WHEN MY HUSBAND  
JOE WAS 53, HE CAME DOWN  
WITH PROSTATE CANCER. HE HAD  
ALREADY HAD A HEART ATTACK

WHEN HE WAS 33.

THEN, 6 YEARS AGO, JOE HAD  
ALL AT THE SAME TIME A  
MASSIVE PULMONARY EMBOLISM,  
CONGESTIVE HEART FAILURE,  
PLURASY, PNEUMONIA AND  
H-VIRUS INFLUENZA.

PRIOR TO THAT, HE WORKED IN  
THE CLARKSTOWN LANDFILL FOR  
13 YEARS. BUT AFTER ALL THIS  
ILLNESS HE RETIRED ... DUE  
TO DISABILITY, NOT BECAUSE  
HE WANTED TO.

WE HAD RELATIVES, COUSINS,  
THAT LIVED A BLOCK AWAY ON  
KLEIN AVENUE. IN THEIR  
FAMILY ALONE, THERE WERE 3  
CASES OF CANCER ... THE  
HUSBAND, WIFE AND WIFE'S  
BROTHER. THE HUSBAND AND  
BROTHER DIED OF CANCER. THE  
WIFE, WHO IS A TEACHER IN  
WEST NYACK, HAD A MASTECTOMY  
THEN ABOUT A WEEK AGO, I  
REALIZED SOMETHING MY  
DAUGHTER HAS BEEN TELLING ME

OVER AND OVER AGAIN FOR  
QUITE A FEW YEARS.

CONNIE'S BEEN IN THE FLORIST  
BUSINESS FOR 13 OR 14 YEARS,  
AND SHE DOES A LOT OF  
FUNERAL AND HOSPITAL  
BUSINESS. FOR A LONG TIME,  
SHE'S BEEN TELLING ME, "HOM,  
YOU'LL NEVER GUESS WHO'S GOT  
CANCER" ... OR, "HOM, YOU  
KNOW WHO DIED OF CANCER?"

THAT'S WHAT MADE ME TAKE  
THAT LITTLE TRIP A WEEK AGO.  
BECAUSE I REALIZED THAT  
CONNIE WAS RIGHT--THERE WERE  
A LOT OF PEOPLE THAT I KNOW  
WHO HAD CANCER, HAVE CANCER,  
OR HAVE DIED OF CANCER JUST  
IN THAT LITTLE AREA THAT I  
DROVE AROUND.

WHEN I SPOKE TO SOMEONE  
ABOUT THIS, THEY SAID THEY  
WOULD MAKE A MAP OF THE RIDE  
I TOOK ... AND OF THE CASES  
OF CANCER AND HEART TROUBLE  
IN THAT AREA THAT I

49X

PERSONALLY KNEW OF.

HERE'S THE MAP.

(UNCOVER MAP)

THE RED "X'S" ARE CASES OF  
CANCER THAT I AM ACQUAINTED  
WITH. THERE ARE PROBABLY  
OTHERS THAT I DON'T KNOW  
ABOUT.

THE GREEN CHECKS ARE HEART  
CASES. AND PEOPLE WHO I KNOW  
WHO HAVE DIED ARE MARKED  
WITH A "D."

THE TOTALS WITHIN THIS  
AREA ARE: 45 CASES OF  
CANCER, 21 HEART CONDITIONS,  
AND 18 DEATHS FROM CANCER,  
PLUS ADDITIONAL DEATHS FROM  
HEART ... ALL WITHIN JUST  
THE PAST 8 OR 10 YEARS.

MOST OF THESE PEOPLE HAVE  
LIVED IN THIS AREA FOR AT  
LEAST 8 TO 10 YEARS, AND  
SOME FOR 25 TO 30 YEARS OR  
MORE. WHEN MY NEXT-DOOR  
NEIGHBOR MOVED TO

CALIFORNIA, HE ALREADY HAD  
CANCER AND LATER DIED OF IT.

LET ME POINT OUT A FEW AREAS  
OF SPECIAL INTEREST ON THIS  
MAP.

ON WEST STREET, WHERE I  
LIVE, THERE ARE 3 HOUSES IN  
A ROW WITH CANCER AND 2  
DEATHS. 1 HOUSE HAS 2 HEART  
CONDITIONS. ACROSS THE  
STREET ARE 2 MORE HOUSES, 1  
WITH CANCER, 1 WITH HEART.

KLEIN AVENUE HAS MY  
RELATIVES' HOUSE WITH 3  
CASES OF CANCER AND 2  
DEATHS. ALSO ON BENSON,  
KLEIN AND WEST NYACK ROAD, 5  
MASTECTOMIES THAT I KNOW OF.  
ON ADELE ROAD, 5 HOUSES WITH  
CANCER.

ON HOBE STREET, 7 HOUSES  
WITH CANCER.

I WANT TO TELL YOU WHY I  
HAVE DECIDED TO COME FORWARD  
WITH THIS INFORMATION.

I HAVE CHILDREN AND  
GRANDCHILDREN WHO LIVE AND  
WORK IN THIS AREA. THERE ARE  
A LOT OF CHILDREN WHO LIVE  
THERE.

BUT WE'RE THE OLDER  
GENERATION NOW. I'M 61, MY  
HUSBAND IS 63 ... OUR  
PARENTS ARE DEAD, AND WE'RE  
THE OLDER GENERATION.

BUT NOW ... WE'RE DYING OFF!

THAT MEANS MY CHILDREN ARE  
GOING TO BE THE OLDER  
GENERATION BEFORE THEIR  
TIME. THEY'RE NOT GOING TO  
HAVE A CHANCE TO REACH 75 OR  
80 YEARS OLD. BY THE TIME  
THEY REACH MY AGE, THEY'RE  
GOING TO BE DEAD ... UNLESS  
SOMETHING IS DONE ABOUT  
THIS.

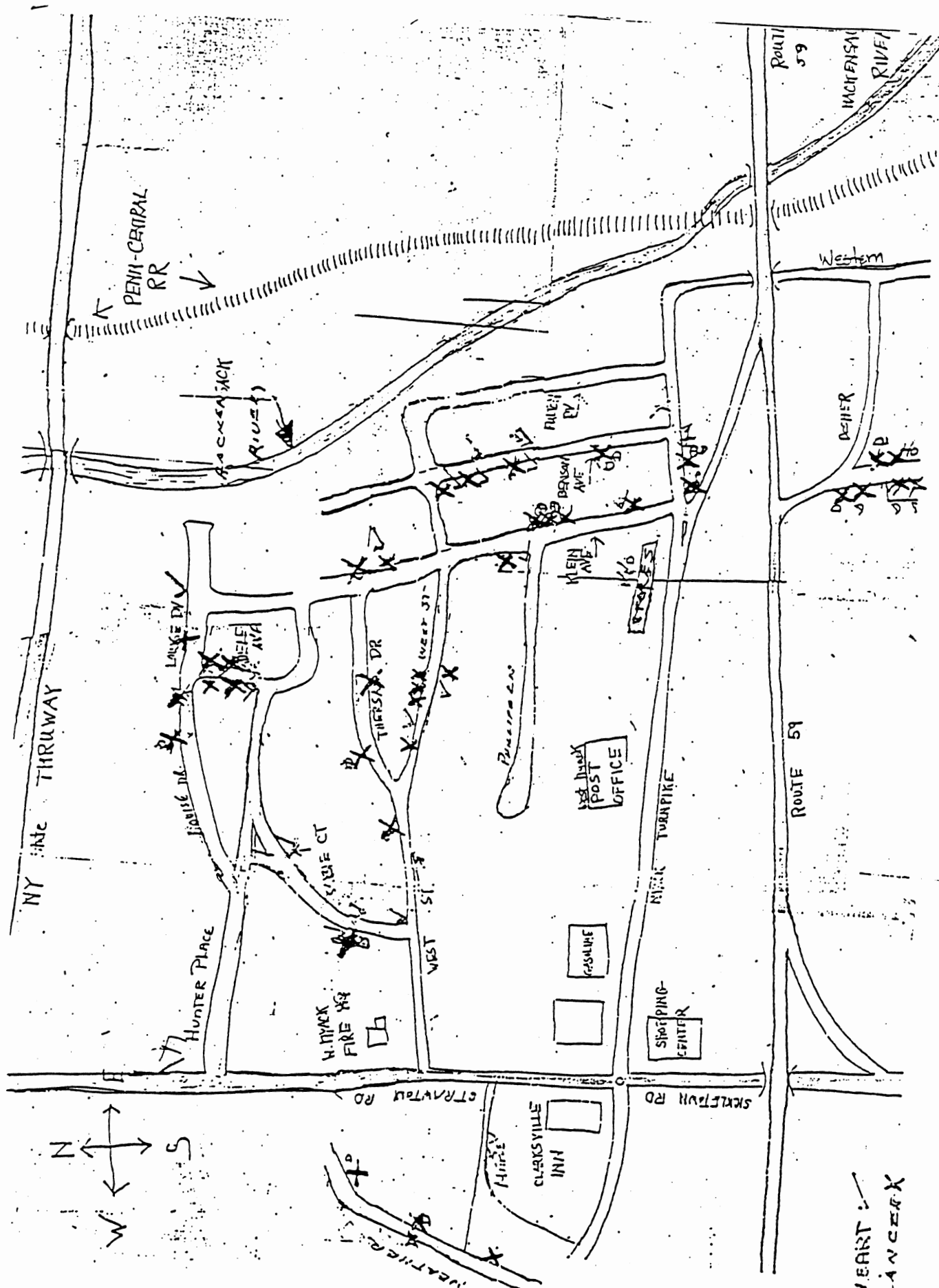
WHEN I TOLD MY FRIEND ABOUT  
THIS WHO MADE THE MAP, SHE  
SAID, "YOU SHOULD SPEAK TO  
SOMEBODY ABOUT THIS!"

AND I SAID, "SURE, BUT WHO?  
WHO CAN YOU TALK TO?"

THANK YOU.

81x

HEART:—



December 28th, 1989

Mr. John Grant, County Executive  
11 New Hempstead Road  
New City, N.Y.

Dear Mr. Grant,

Thank you for the courtesy extended to myself and Mrs. Voorhis during our meeting of December 19th of this year.

The following list of names represents people who resided in that small area of West Nyack who developed cancer of some sort. It does not contain residents who have since moved from the area and are developing symptoms of the disease, nor does it contain the many household pets who died as a result of this ailment.

THERESA DRIVE

Bill Larity - Deceased  
Sullo - Deceased

SABLE COURT

Mrs. Flaherty - Deceased

ADELE ROAD

TROY FAMILY 2 people, 1 Deceased  
GALLEY Deceased  
McGRAIN Deceased  
MATTEA Deceased  
MURRAY

LOUISE DRIVE

JOSEPH CARLEO Deceased  
GROSSO Deceased  
SEARS 2 Infants, 1 Lost  
1 born with Kidney Disorder

HEATHER LANE

GEORGE FRANTZEN Deceased  
Mrs. RAMMEY Deceased  
PATRICIA O'CONNOR Deceased  
ROBERT MAHON Deceased

NYACK TURNPIKE (Rt. 59)

PISANO Deceased  
CLEARWATER  
MARGE GAGLIONE

HOBE DRIVE

CATHERINE ENTWISTLE

HOBE DRIVE cont.

VELLA Deceased  
FLORENCE FORD Deceased  
NATALE Deceased  
TIETZ Deceased

KLEIN AVE.

Mrs. RUDDEN Deceased  
SARACENO  
SIGERIST Deceased  
JOSEPH MARSICO Deceased  
CAY MARSICO  
THOMAS QUINN Deceased  
WILLIAM MULLER Deceased  
FRANK SALVO Deceased

BENSON AVE.

HILDA COSTINO  
BOB MOYER Deceased  
MARION MILLER Deceased

WEST STREET

JOSEPH MARSICO  
FRANK HARTE  
MARY SULLIVAN Deceased  
TIM SULLIVAN  
PETE DANIELS Deceased  
MARCO  
S. EUSTIS

This list of people was compiled with the help of residents of the area through personal knowledge. I am sure we missed a few.

John V. Perrella  
938 Flint Court  
Valley Cottage, N.Y.  
10989

25 Sunset View Drive  
West Nyack NY 10994  
December 20, 1989

Mr. John Grant, County Executive  
County Office Building  
11 New Hempstead Road  
New City, NY 10956

Dear Mr. Grant,

Enclosed please find the list of names and addresses you requested during our meeting on December 19, 1989. This list represents the residents of Sunset View Drive that have been diagnosed with cancer since 1980. I am only familiar with my immediate street and not aware of any illness in the neighboring areas.

As I stated during our meeting, I think we are living in a very fragile and questionable Community. The time has come when we must do all that is necessary to guarantee the health and wellbeing of our children and grandchildren. Again, I implore you as both our County Executive and a life long resident, to use your power and influence to insure that every possible precaution is taken in the next few months when ground is broken for the Palisades Center.

I sincerely appreciate your time and consideration in this matter and trust that you will respect our need for confidentiality. I will look forward to hearing from you in the near future.

Sincerely,

*April Voorhis*

April Voorhis



Total number of homes located on Sunset View Drive,  
West Nyack = 19

House numbers start at #12 and are sequenced in fours  
ending with #54.

| <u>Name</u>                     | <u>House #</u> | <u>Cancer Type</u> | <u>Age Group</u> |
|---------------------------------|----------------|--------------------|------------------|
| John "Zoot" Simms (D)           | 16             | Lung               | Late 50's        |
| Kent Voorhis                    | 25             | Hodgkins           | 17               |
| Nancy Riley                     | 37             | Hodgkins           | 30's             |
| Jean Hohenberger (D)            | 44             | Uterine            | Late 50's        |
| Owen Gene McShane               | 45             | ?                  | 50's             |
| Ann Lalone (D)                  | 46             | Breast             | Late 50's        |
| Edith Ceasar                    | 46             | Breast             | 30's             |
| Ruth Burghess                   | *53            | Breast             | Late 50's        |
| *(moved to State of Washington) |                |                    |                  |
| Dan Malone                      | 54             | ?                  | 70's             |

Total = 19 Homes

9 Families affected by cancer since 1980

ALSO PANCs - F. ~~LATE~~ LATE 40'S  
47 No Cancer since 1980

Burahess  
(moved)

Gronowski

McShane

Bruechner

Riley

Carney

Templin

Voorthis

Sunset View

Rielly / Malone

Stenkowski

Caesar (LAlone)

Hohenberger

Sauter

Thresher

Lavacello

Di Angelo Simms

Drive

New Family

Bake

No. Greenbush RD.

86x



## COUNTY OF ROCKLAND

### ROCKLAND COUNTY DEPARTMENT OF HEALTH

The Dr. Robert L. Yeager Health Center  
Pomona, New York 10970  
(914)354-0200

JOHN T. GRANT  
County Executive

ISRAEL PRAISS, M.D. Sc.D.  
Commissioner

January 9, 1990

Mr. John V. Perrella  
938 Flint Court  
Valley Cottage, N.Y. 10989

Dear Mr. Perrella:

John T. Grant, the County Executive, shared with me the concerns you discussed and the letters which you submitted to his office and asked me to respond on his behalf. I will address each of the concerns separately.

1. Pyramid Mall Project:

I'm sure you are aware that for several years, the Health Department has been working with State and local governments to address environmental problems believed to exist on certain properties which now constitute the Pyramid Mall Project. The properties of concern are: (1) the Dexter Landfill; (2) the old Nyack Town Dump; and (3) the Raia Property located on the south side of Route 59.

When we learned that these properties were to be included in the Pyramid Mall Project we were concerned that construction activities at these sites might release pollutants to the surrounding areas. In order to address these concerns we strongly advocated and supported the Department of Environmental Conservation's position that prior to initiation of work at the site, exhaustive studies be undertaken to determine the extent of the environmental problems existing at these sites.

A number of studies were carried out by consultants hired by the previous sites' owners, the developers of the proposed Pyramid Mall Project, and in one case, the Town of Clarkstown.

These studies included extensive testing of soil and ground water. The tests' results were carefully reviewed and studied by the DEC's technical staff, who determined that no significant levels of pollution exist at these sites. Accordingly, the DEC has deleted the Dexter property from its list of possible inactive hazardous waste sites. A similar action pertaining to the old Nyack Dump site is now under consideration by the DEC. The results of the tests for the Raia Property, which will be used to construct an access ramp to the mall from Route 59, indicated that no health hazards would be created by this construction.

In spite of the DEC's confirmation that these sites are not to be considered anymore as inactive hazardous waste sites, the Pyramid Mall Project developers have offered, in an effort to further reassure the public, to remove all materials from these sites and place them in the Clarkstown Landfill. Whether or not this action will indeed provide additional benefit to the public remains to be determined.

Let me assure you that the County Executive's Office and the Health Department will continue to closely monitor the Pyramid Mall Project and will institute all required measures to protect the health and safety of our residents.

## 2. Issue of Excess Cancer in Neighboring Areas:

Beginning in the mid-1970's, mass media publicity concerning the presence of carcinogenic chemicals in the environment caused a number of County residents to request investigations into what they believed were excessive numbers of cancers occurring in their neighborhoods. In view of the numerous requests, it was decided to study cancer occurrence in Rockland County in each of its 34 census tracts. Many people prefer studies specific to their street or block; regretfully, this cannot be done because the number of cancer cases in each street and block is too small to allow for meaningful statistical interpretations.

This investigation of cancer occurrence by census tracts for 1978-1982 came to be known as the Rockland County Cancer Cluster Study. The Rockland County Health Department in collaboration with the New York State Health Department initiated this study with the purpose of determining whether or not there was an unusually high number of cancer cases in our County, in 1983 and completed it in the fall of 1986.

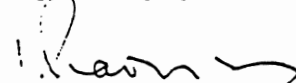
In order to determine whether there were excess cancers in Rockland County, a total of seventeen (17) cancer sites were analyzed in men and nineteen (19) cancer sites in women. To summarize the overall results of this study, it was noted that Rockland County does not have a problem of excess cancers;

indeed, the number of cancer cases was relatively small, especially when one considers the fact that they occurred over a five-year period and generally the patterns of site-specific incidence were consistent with those for upstate New York (with lung, colo-rectal and prostate cancers being most common in men, and breast, lung and colo-rectal cancers most common in women).

Although this Study indicated that Rockland County does not have an unusual excess of cancers, it is important to reiterate some of the facts regarding this disease. Cancer is a common disease. One of every three persons will develop it during his lifetime, and it eventually affects three out of every four families. The number of people with cancer is increasing in most communities because more people are living to the ages of greater cancer occurrence. Furthermore, I am sure you know that cancer is not a single disease, but a collection of diseases with distinct risk factors, clinical manifestations, therapies and prognoses. We know that most of the causes associated with cancer are factors related to lifestyle such as smoking, alcohol consumption, diet as well as occupational exposures to asbestos, benzene, and ionizing radiation. Environmental agents such as pollution of the air, water and soil are believed to account for only a small fraction (about 5%) of total cancer mortality. Because of the many factors involved, a link between environmental factors and cancer is very difficult to establish and prove.

We currently continue to work with the New York State Health Department attempting to analyze a similar cancer data for the years 1983-1988. This study has already begun but regretfully, it is a rather laborious task and it will take some additional time for its completion. Let me assure you that we will share this information with you and the other residents of our County as soon as it is available. Should you have any further questions or would like more detailed clarification on any of these issues, please do not hesitate to call me.

Very truly yours,

  
Israel Praiss, M.D., Sc.D.  
Commissioner of Health

IP:jt  
cc: John T. Grant

John V. Perrella  
938 Flint Court  
Valley Cottage, N.Y. 10989

Clarkstown Planning Board  
Town of Clarkstown  
Maple Ave.  
New City, N.Y.

January 9th, 1990

Gentlemen,

At the last Public Hearing concerning the proposed development of the Pyramid Mall, I had the opportunity to address the Planning Board.

My concerns pertained to the possible negative impact disturbing old land-fills would have on the quality of life in the immediate area, and also the environmental impact this construction would have on the Hackensack River, which is the main source of drinking water for the customers of the Nyack Water Company, and almost 800,000 water customers in Bergen County, New Jersey.

Since that evening I have conducted additional research and now would appreciate it if the Clarkstown Planning Board would address the following important questions pertaining to this matter. I am enclosing maps and other information for your inspection.

Interviewing a number of residents of the area in West Nyack bounded by Old Rt. 59, Strawtown Road, and the Thruway, which includes streets such as Theresa Drive, Klein Ave., West Street, etc., I discovered an alarming number of cases of serious illnesses with many resulting in death. This area is a lowland and for the most part many of these homes are built on filled in ground. It is bounded on the East by the Hackensack River, and on occasions when the river overflows, sections of Theresa Drive and the far end of Klein Ave. have been flooded. Far to the East in another area of West Nyack bounded by the Thruway and Rt. 303, and North of Rt. 59, with streets such as No. Greenbush Road, Greenbush Road, Stony Hill Lane, Broome Blvd., Allegany Ave., Cayuga and Chemons Courts, No. and So. Delaware Avenues, and Sunset View Drive, a similar pattern of serious illnesses can be found. This puzzled me for this area is not in the flood plain, and in fact located on a slight incline where the quality of air may be better. The answer may possibly be found by reviewing the enclosed map of the Distribution System of the Nyack Water Company.

The Nyack Water Treatment and Filtering Station is located on the bank of the Hackensack River. From there a 20" Main line carries water along Rt. 59 going East. It cuts North on Besso Street and then turns East and travels along Virginia Ave., circumvents the cloverleaf going under Rt. 303, and then proceeds up the hill toward Central Nyack and Nyack itself. This Main is running through filled in land, in a definite flood plain, and while flowing through Virginia Ave. is dangerously close to the old Dexter Land Fill.

For some reason, not known to us at this time, an 18" pipe was tapped into this Main somewhere in the vicinity East of Hogan's Diner. This 18" line proceeds North for a few hundred yards, turns East and follows a path crossing under Rt. 303 South of the Thruway. It then supplies all the Nyack Water customers in the Greenbush Road, Broome Blvd., and Sunset View area with their drinking and cooking water. The map clearly shows us that before these 2 Mains reach a point on Rt. 59, East of Rt. 303 to flow into the Nyack they travel through filled in bottomless land, flood plains, and in the case of the 18" pipe through or between the Old Nyack Land-Fill and the Dexter

90X

Land-Fill. I am not questioning the reasoning or the circumstances that supported Main Water lines carrying drinking water to follow a path, and in fact make a detour North off Rt. 59 bringing them even closer to Two known Land-Fills, however my current questions pertain to the potentially dangerous effect a large scale construction project may further have on these Main Water Supply Lines.

My questions are as follows:

Were these lines installed before the property was a Land Fill, during the operation of the Land Fill or after the Land Fill Was Closed?

What were the Specifications as to the materials used, the type of pipe? the composition of the bed they lie in? The technology used in sealing the joints?

Who was the General Contractor? Are the inspection reports available?

When was the last time these pipes were inspected to check for any leakage or corrosion of pipes to insure the residents and customers that in no way any leachate or toxic elements from the Land Fills had infiltrated the water system?

At the Treatment Plant is Chlorine used?, and to what extent?

Is it true that when Chlorine is added to toxic water, a chemical reaction may occur producing Chloroform, a known carcinogen?

What provisions can be made to insure the quality of water carried by these lines during construction?

What will be the effect be in terms of water stoppage in the event of a construction accident rupturing a Main?

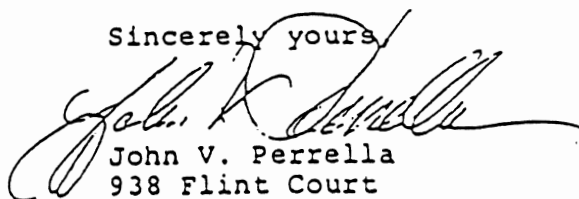
During constructio can these lines withstand the tremors caused by heavy equipment rolling above them? Can they survive the blasting of rock on the job site?

Will there be testing of the quality of water on a scheduled basis during construction?

And finally, is it possible for the Nyack Water Company and the Pyrimad Co. to reroute these lines, before any construction begins.

Copy to:  
Rockland County Board of Health  
Nyack Village Board  
N.Y. State DEC  
Bergen County Board of Health  
N.Y. State Dept. of Health  
Larry Kutner, Bergen Swan

Sincerely yours,

  
John V. Perrella  
938 Flint Court  
Valley Cottage, N.Y.

VILLAGE OF NYACK



OFFICE OF THE MAYOR  
NYACK, N.Y. 10960-2697  
914 • 358 • 0548

January 13, 1990

Mr. John Perrella  
938 Flint Court  
Valley Cottage, NY 10989

Dear Mr. Perrella,

Thank you for your correspondence regarding the  
Nyack Water Distribution system.

I have referred all the documents to the Chairman  
of the Nyack Water Commission for his attention.

Yours sincerely,

A handwritten signature in cursive script that reads "Kieran Quinn".

Kieran Quinn  
Mayor

cc: L. Cooke, NWD Chairman





THE ASSEMBLY  
STATE OF NEW YORK  
ALBANY

JOSEPH R. HOLLAND  
Assemblyman 92nd District

ALBANY OFFICE  
Room 544  
Legislative Office Building  
Albany, New York 12248  
(518) 455-5735

DISTRICT OFFICE  
257 S. Middletown Road  
Nanuet, New York 10954  
(914) 623-4300

COMMITTEES  
Aging  
Education  
Governmental Operations  
Veterans Affairs

January 16, 1990

Nyack Water Company  
12 North Broadway  
Nyack, New York 10960

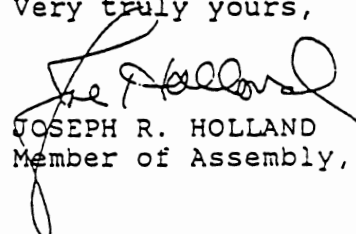
Dear Sir or Madam:

I have been contacted by a constituent who is concerned about the purity of the water in your main feeder lines, and the possible seepage of impurities into these lines.

Is the water passing through the main feeder lines checked for purity, specifically, after the pipes cross Route 59 and head east toward the Village of Nyack?

Thank you in advance for your attention and response to this question of concern.

Very truly yours,

  
JOSEPH R. HOLLAND  
Member of Assembly, 92nd A.D.

JRH:jta

cc: John V. Perrella  
938 Flint Court  
Valley Cottage, NY 10989

FEB 15 1990

VILLAGE OF NYACK  
BOARD OF WATER COMMISSIONERS

COMMISSIONERS

Leonard Cooke, *Chairman*  
Keith Taylor, *Vice Chairman*  
Michael Kaneletz  
John Ward  
Jeanne Nelson

OFFICE

Telephone 914-358-0641

12 North Broadway  
Nyack, N.Y. 10960

Michael Lovaglio, *Superintendent*  
Eileen Colarelli, *Secretary*

February 7, 1990

Hon. Joseph R. Holland  
257 Middletown Road  
Nanuet, N.Y. 10954

Dear Assemblyman Holland,

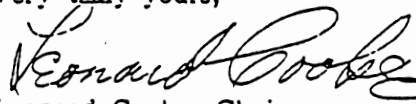
This is in reply to your letter of January 16, 1990 relative to the purity of the water in the main feeder line from our treatment plant in West Nyack. Be advised that the water pressure in the mains from the plant to Route 303 exceeds 130 pounds per square inch. Accordingly, seepage of ground water into these mains is physically impossible.

With regard to water quality, as the water flows east toward the Village, one of the points that we monitor on a routine basis is the Texaco Station on Route 303 near the Thruway interchange which is sampled on a weekly basis. Never, in the past year since sampling was commenced at this location have the results of bacteriological analyses been anything less than satisfactory.

Please be assured that the Village of Nyack Water Department conscientiously conforms to the requirements of the State and County Health Departments in order to assure its customers of a safe, palatable water supply.

We trust this satisfactorily answers your query.

Very truly yours,

  
Leonard Cooke, Chairman  
Board of Water Commissioners

NLL:bc

0412

0413

94X



# Laboratory Resources INC

A UNITED WATER RESOURCES COMPANY

363 Old Hook Road  
Westwood, New Jersey 07675-3235  
201) 666-6644 • FAX: (201) 666-7978

NJ Certification # 02046

NY Certification # 10588

Rockland Cnty Health Dept  
Dr. R.L. Yeager Hlth Complex  
Sanatorium Road Building D  
Pomona, N.Y. 10970  
Attn: Judi Korchak

Date of Report: 01/24/90  
Work Order #: 90-01-253  
Date Received: 01/17/90  
Client #: 001050  
P.O. #:

| <u>PARAMETER</u>           | <u>West Nyack</u> |
|----------------------------|-------------------|
| STANDARD PLATE COUNT (/mL) | <1                |
| TOTAL COLIFORM (/100 mL)   | 1                 |
| IRON                       | 0.730             |
| CHLORIDE                   | 63.7              |

*Ken Sam DH*  
Laboratory Manager

These results indicate that at the time of testing the water was found to contain coliform bacteria. The water was therefore NOT of satisfactory sanitary quality when the sample was collected and should NOT be used for drinking and cooking purposes.

95x

All results expressed as mg/L unless otherwise stated  
(See reverse for additional information)

New York State Department of Environmental Conservation

Wildlife Pathology Unit  
Wildlife Resources Center  
Delmar, New York 12054



Thomas C. Jording  
Commissioner

February 12, 1990

Clarkstown Planning Board  
Clarkstown Town Hall  
10 Maple Avenue  
New City, New York 10956

Dear Planning Board:

The Wildlife Pathology Unit, of the New York State Department of Environmental Conservation has done some limited sampling in the vicinity of the Dexter Landfill and the Old Nyack Landfill (See the attached map, sample numbers and data).

We have more analyses underway for dioxins and dibenzofurans, and we have only completed a preliminary assessment of the data. However, it is clear that a variety of toxics were found in the periphery of the landfills and in their drainages. Elements, such as cadmium, copper, lead, and zinc, were found well above expected background levels. In addition, traces of the insecticide DDT and its metabolite DDD were found, as were environmentally significant levels of PCB's. A variety of Polynuclear Aromatic compounds, some of which are believed to be tumor promoters or carcinogens for animals were also identified.

I understand there is a need to get this data to the board swiftly, so I am sending it prior to the completion of the dioxin and dibenzofuran analyses. The variety and levels of contaminants found by the Wildlife Pathology Unit indicate the need for a thorough review of the existing data, and need for further scientific investigation before these sites are converted to other land uses.

I shall send you additional data and evaluation in the near future.

Sincerely,

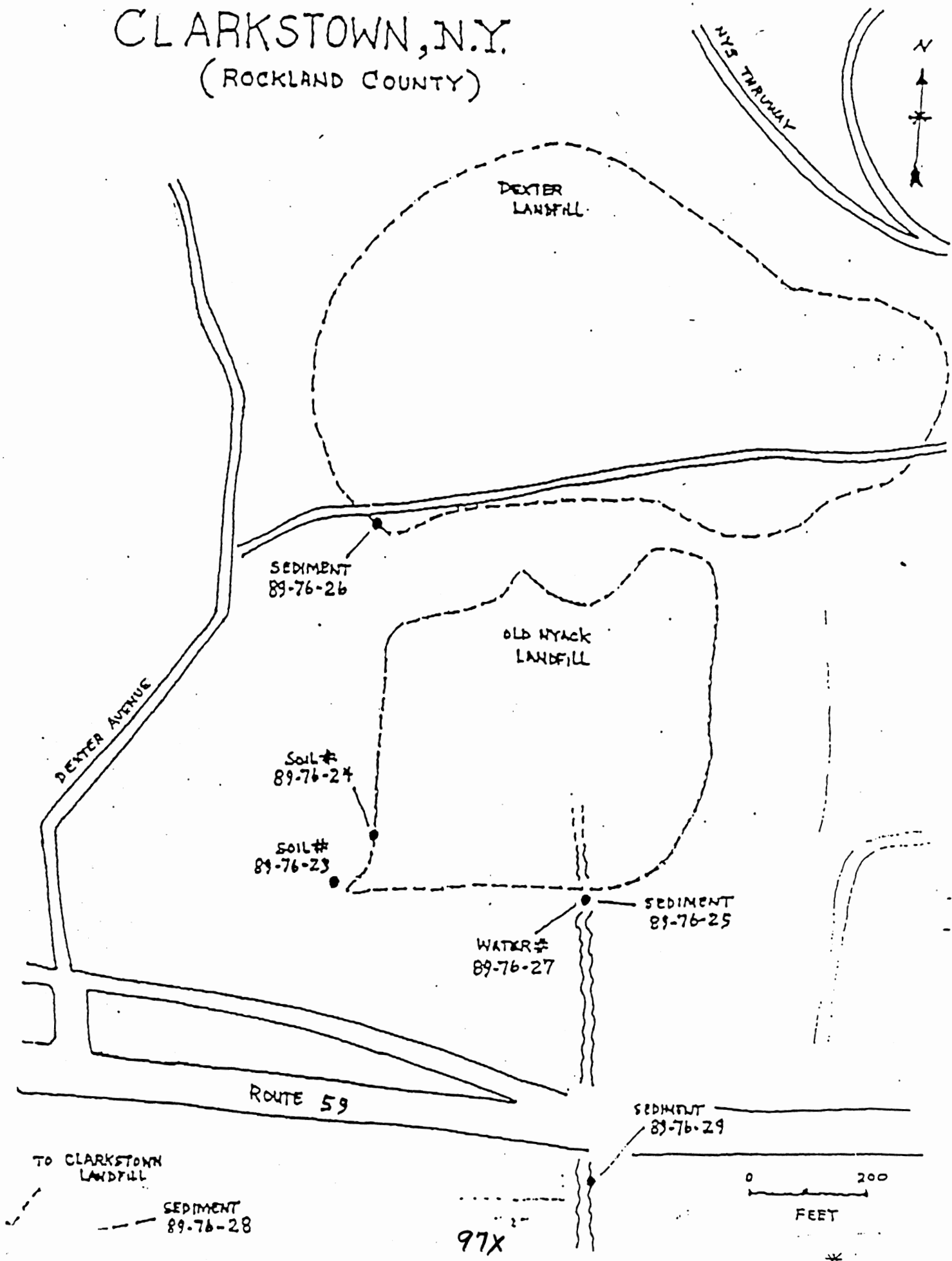
Ward B. Stone  
Associate Wildlife Pathologist

Enclosure  
WBS:rd

96X

# CLARKSTOWN, N.Y.

(ROCKLAND COUNTY)



## WHITEMAN OSTERMAN &amp; HANNA

ATTORNEYS AT LAW

ONE COMMERCE PLAZA

ALBANY, NEW YORK 12260

(518) 449-7600

TELECOPY (518) 449-3345

CABLE ADVOCATE ALBANY

MICHAEL WHITEMAN  
 MELVIN H. OSTERMAN, JR.  
 JOHN HANNA, JR.  
 JOEL L. HODES  
 PHILIP H. GITLEN  
 SCOTT N. FEIN  
 ALICE J. KRYZAN  
 DANIEL A. RUZOW  
 PHILIP H. DIXON  
 KEVIN M. YOUNG  
 GUNTER DULLY  
 JAMES W. LITTLE  
 RICHARD E. LECKERLING

MARGARET J. GILLIS  
 NEIL L. LEVINE  
 JONATHAN P. NYE  
 HEATHER D. DIDDLE  
 DONALD S. STEFANSKI  
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 MARY JANE BENDON COUCH  
 JEAN F. GERBINI  
 JOHN T. KOLAGA  
 JONATHAN WOOD  
 JANE C. ASSAF\*

KATHRYN GIRARDOAT HART\*\*  
 TERRESA M. BAKNER  
 LAURENCE DEUTSCH  
 JUSTIN R. MURPHY  
 ELIZABETH M. MORSS  
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 CHARLENE D. FLESZAR  
 CARLA E. HOGAN  
 JOHN P. STOCKLI, JR.

\*ADMITTED IN MASSACHUSETTS ONLY

\*\*ADMITTED IN OHIO ONLY

BUFFALO OFFICE

1700 LIBERTY BUILDING  
 BUFFALO, NEW YORK 14202  
 (716) 854-4420  
 TELECOPY (716) 854-4428

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FEB 20 1990

DEPT. OF PLANNING  
 AND DEVELOPMENT  
 10 MAPLE AVENUE  
 NEW CITY, N.Y. 10956

February 16, 1990

VIA OVERNIGHT COURIER

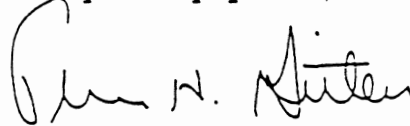
Mr. Rudolph Yacyshyn  
 Chairman  
 Town of Clarkstown Planning Board  
 10 Maple Avenue  
 New City, New York 10956

Re: Pyramid Company of Rockland

Dear Mr. Yacyshyn:

Enclosed is correspondence with the New York State Department of Environmental Conservation Division of Hazardous Waste Remediation regarding the recent analytical data submitted to the Town of Clarkstown Planning Board by Ward Stone and my correspondence with your consultant, George M. Raymond, regarding the same subject.

Very truly yours,

  
 Philip H. Gitlen

Enclosures

01021690.amc

98X

WHITEMAN OSTERMAN & HANNA

MICHAEL WHITEMAN  
MELVIN H. OSTERMAN, JR.  
JOHN HANNA, JR.  
JOEL L. HODES  
PHILIP H. GITLEN  
SCOTT N. FEIN  
ALICE J. KRZYAN  
DANIEL A. RUZOW  
PHILIP H. DIXON  
KEVIN M. YOUNG  
GÜNTER DULLY  
JAMES W. LITTLE  
RICHARD E. LECKERLING

ATTORNEYS AT LAW

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ALBANY, NEW YORK 12260

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JUSTIN R. MURPHY  
ELIZABETH M. MORSE  
WILLIAM C. SCHOELLKOPF  
CHARLENE D. FLESHAR  
CARLA E. HOGAN  
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HEATHER D. DIDOEL  
DONALD S. STEFANSKI  
KENNETH S. RITZENBERG  
MARY JANE BENDON COUCH  
JEAN F. GERBANI  
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JONATHAN WOOD  
JANE C. ASSAF

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FEB 16 1990

FEB 16 1990

Mr. George M. Raymond  
President  
George M. Raymond Associates, Inc.  
555 White Plains Road  
Tarrytown, New York 10591

Re: Pyramid Company of Rockland

Dear Mr. Raymond:

Yesterday I received a copy of Ward Stone's letter to the Clarkstown Planning Board and the laboratory analytical reports which were annexed to that letter. Although that analytical data confirmed and was consistent with prior analytical and other environmental data developed on behalf of Pyramid Rockland Company by Malcolm Pirnie, Inc. and on behalf of the Town of Clarkstown by Leggette Brashears, I was concerned that the Clarkstown Planning Board might be confused by Mr. Stone's letter.

Accordingly, I requested that the New York State Department of Environmental Conservation Division of Hazardous Waste Remediation (which, as you know, was responsible for the reclassification of the Dexter and Old Nyack Landfills) promptly confirm to the Town of Clarkstown Planning Board that the new analytical data provided by Mr. Stone merely confirms prior investigations and does not affect the appropriateness of the previous determinations by the New York State Department of Environmental Conservation respecting the classification and closure of these landfills. A copy of my letter to the Department of Environmental Conservation is enclosed.

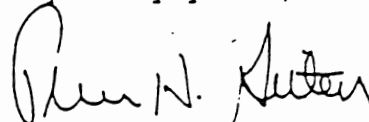
Earlier today I received the enclosed letter of this date from the Assistant Director of the New York State Department of Environmental Conservation's Division of Hazardous Waste Remediation in which it is concluded that the analytical data provided by Mr. Stone are "commensurate with data already in [DEC's] site files," and that DEC's decisions "regarding the

classification of these sites are reaffirmed by this recently acquired data."

Moreover, as to the pendency of additional data respecting the presence of dioxin or benzofurans, Mr. Goddard confirmed that it would be expected that trace levels of these compounds would be present in the incinerator waste deposited in the Dexter Landfill and that such presence would be consistent with use of the Dexter Landfill for disposal of incinerated municipal waste.

I hope that the enclosures reassure the Clarkstown Planning Board respecting the current status of the Dexter and Old Nyack Landfills.

Very truly yours,



Philip H. Gitlen

Enclosure

01021690.amc



WHITEMAN OSTERMAN & HANNA

MICHAEL WHITEMAN  
MELVIN H. OSTERMAN, JR.  
JOHN HANNA, JR.  
JOEL L. HODES  
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FEB 20 1990

DEPT. OF PLANNING  
AND DEVELOPMENT  
10 MAPLE AVENUE  
NEW CITY, NY 10956

February 15, 1990

VIA HAND DELIVERY

Mr. Charles Goddard  
Assistant Director  
Division of Hazardous Waste Remediation  
50 Wolf Road  
Albany, New York 12233

Re: Dexter and Old Nyack Landfills

Dear Charles:

As we discussed earlier today, enclosed is a copy of a letter dated February 12, 1990 from Ward Stone to the Clarkstown Planning Board and the laboratory analytical reports annexed to that letter.

Based upon Malcolm Pirnie's quick review of these laboratory reports, it appears that this additional analytical data merely confirms the vast compilation of analytical and other environmental data which has been developed over the past four years by the independent technical consultants for the Pyramid Rockland Company, all of which were performed pursuant to Orders on Consent with the New York State Department of Environmental Conservation and were monitored by New York State Environmental Conservation personnel. In addition, the Town of Clarkstown retained a second independent engineering consultant -- Leggette Brashears -- which performed additional sampling and investigation of the landfills, and their work confirmed the prior findings of Malcolm Pirnie.

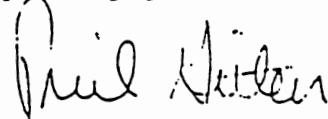
Unfortunately, the implication of Mr. Stone's letter to the Clarkstown Planning Board -- which is currently considering a Final Supplemental Environmental Impact Statement on a proposed Site Plan which includes closure plans for the two landfills -- is that this additional analytical data bears upon the site development plan and closure plans. As you know, however, the site development and closure plans were prepared following full consideration of the exhaustive environmental investigation of these landfills. The new analytical data provided by Mr. Stone merely confirms those prior investigations and, accordingly, does not in our view affect the

101X

appropriateness of the previous determinations by the New York State Department of Environmental Conservation respecting the classification and closure of the landfills.

Your prompt confirmation of the foregoing to the Town of Clarkstown Planning Board is absolutely necessary so that the Planning Board will not be confused by this additional data.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Phil Gitlen", written in a cursive style.

Philip H. Gitlen

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
50 Wolf Road, Albany, New York 12233



Thomas C. Jorling  
Commissioner

FEB 16 1990

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FEB 20 1990

DEPT OF ENVIRONMENTAL  
CONSERVATION  
100 NASSAU ST  
NEW YORK, NY 10038

Philip H. Gitlen, Esq.  
Whiteman, Osterman & Hanna  
One Commerce Plaza  
Albany, New York 12260

Dear Mr. Gitlen:

Re: Recently Acquired Chemical Data from DEC  
Pathologist Ward B. Stone for:  
Dexter Site 344012  
Old Nyack Site 344006

Our technical staff have examined the referenced data, which you provided with your letter of February 15, 1990. Based upon review of these data at face value, without quality assurance and without knowledge of the sampling techniques, we conclude that the concentrations are commensurate with data already in the site files. Concerning future data submittals, we would expect trace levels (low parts per trillion) of dioxin and benzofuran to be present in the incinerator wastes deposited in the Dexter Landfill.

Our decisions regarding the classification of these sites are reaffirmed by this recently acquired data. These data do not indicate the presence of hazardous waste, as defined by statute and regulation. The concentration levels are consistent with levels which would be expected at landfills used for the disposal of mixed municipal waste and incinerator ash.

Sincerely,

Charles N. Goddard, P.E.  
Assistant Director  
Division of Hazardous Waste Remediation

10 3X

TOTAL P.02

John V. Perrella  
938 Flint Court  
Valley Cottage, N.Y. 10989

Anita Grabalsky, Toxics Bureau  
New York State Dept. of Health  
2 University Place  
Albany, N.Y. 12203-3313

March 9th, 1990

Dear Ms. Grabalsky,

On January 9th, 1990 I sent a letter to the Clarkstown Planning Board with copies to the N.Y. State Dept. of Health. I stated my concerns pertaining to the negative effect on the Health of the customers of the Nyack Water Company if any construction were to be permitted by the Pyramid Company on the site before re-routing Main Water Lines that traverse the former Land-Fills that will house the new Pyramid Center Shopping Mall.

This letter is written to up-date the Jan. 9th letter. To provide new information and evidence that not only must the Main Lines be replaced, but also the intake valve must be moved to a site further North and upstream. The present site of the intake valve is directly in the path of dangerous run-offs and drainage that will occur during blasting of rock and excavation of these former Land-Fills.

The Pyramid Company has agreed to replace the Main Lines, but has not mentioned moving the site of the intake valve. Nor have they informed the public of the technology and materials to be used to insure a safe supply of drinking water during and after construction.

I do believe that it is time the New York State Dept. of Health entered the picture, and for the following reasons.

- 1- Any replacement lines to be installed using 1990 State of the Art materials and technology and mechanical joints at connecting ends.
- 2- That the intake valve be moved further upstream providing cleaner water to enter the treatment plant.
- 3- That ALL WORK PERTAINING TO THE WATER PROJECT BE STARTED AND COMPLETED BEFORE ANY BLASTING OR ESCAVATION/DISTURBING OF FORMER LAND-FILLS COMMENCES.
- 4- That a member of the New York State Dept. of Health inspect and supervise the stages of work.

Ms. Grabalsky, I have enclosed a copy of a water test result that was conducted January 17th as requested by a Nyack Water Co. Customer and certified by a Lab. A second test was performed and the results were the same. A third test was done before a negative result was found. All times the Nyack Water Co. tested the water also, and found no trace of Coliform Bacteria and deemed the water safe to use.

I strongly suggest that the N.Y. State Dept. of Health, Toxics Bureau involve itself in this serious situation.

Cordially,

104X



THE ASSEMBLY  
STATE OF NEW YORK  
ALBANY

JOSEPH R. HOLLAND  
Assemblyman 92nd District

ALBANY OFFICE  
Room 544  
Legislative Office Building  
Albany, New York 12248  
(518) 455-5735

DISTRICT OFFICE  
257 S. Middletown Road  
Nanuet, New York 10954  
(914) 623-4300

COMMITTEES  
Aging  
Education  
Governmental Operations  
Veterans Affairs

March 9, 1990

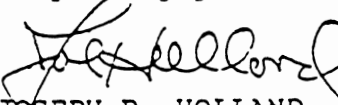
Israel Praiss, M.D.  
Commissioner of Health  
Rockland County Health Department  
Bldg. D, Health Complex  
Pomona, New York 10970

Dear Dr. Praiss:

Thank you for speaking to me last week with regard to the very high coliform reading recently taken in West Nyack. I understand that this situation has been corrected by the introduction of a concentration of chlorine into the system and that you have adjusted your testing schedule to a higher frequency.

However, I am still concerned about the very serious health problem that this reading could cause in the West Nyack area, especially in light of the fact that a new water line is about to be installed. For my peace of mind and for the protection of our West Nyack residents, I respectfully request that testing be done on at least a weekly basis until the new line is fully operational, and also that additional residential and business locations be tested during this period.

Very truly yours,



JOSEPH R. HOLLAND  
Member of Assembly, 92nd A.D.

JRH:jta

cc: April Voorhis  
Joseph Raso  
John V. Perrella

3/22/90

Dear Ward;

The attached article was in today's paper. Pyramid started working today despite our lawsuit regarding the Nyack water system.

I called Supervisor Holbrook of Clarkstown to discuss the cancer statistics that I got out of the 1980 Cancer Cluster Study done in Rockland, just to make sure that he was aware that the neighborhood most severely affected by contamination of the water supply happens to be in Clarkstown (West Nyack). I told him:

1. In West Nyack (census tract with population of 6,622) in 1980 there were 91 cases of cancer overall. In 1988 there were 45 cases of cancer in the small neighborhood described by Marsico that is supplied by the Nyack Water System.

These people get a full dose of whatever chemicals might be washing out of the landfills into the Hackensack right at the point of the water intake valve(s).

2. In the Village of Nyack in 1980, the total number of cancers observed exceeded the total number of cancers expected by 16%.

Holbrook said that the decision to go ahead with site preparation was the DEC's, because regardless of what you say, your colleagues keep insisting that the whole situation is innocuous. He said the only way to stop Pyramid is to get your associates to agree with your position.

TIME IS RUNNING OUT!!!

Gloria

106X

Observed and Expected Numbers of Cancer Cases  
1978-1982 By Site and Sex  
New York State Cancer Registry

Town of: CLARKSTOWN Census Tract: 112  
Village of: WEST NYACK

= 6,622

| Site (ICD-9) |           | Males          |                       | Females  |          |
|--------------|-----------|----------------|-----------------------|----------|----------|
|              |           | Observed       | Expected <sup>a</sup> | Observed | Expected |
| All Sites    | (140-208) | 46             | 43                    | 45       | 46       |
| Oral         | (140-149) | 2              | 2                     | 2        | 1        |
| Stomach      | (151)     | 3              | 1                     | 1        | 1        |
| Colon        | (153)     | 5              | 4                     | 3        | 5        |
| Rectum       | (154)     | 2              | 2                     | 1        | 2        |
| Liver        | (155)     | 0              | 0                     | 0        | 0        |
| Pancreas     | (157)     | 2              | 1                     | 1        | 1        |
| Lung         | (162)     | 9              | 10                    | 2        | 4        |
| Breast       | (174)     |                |                       | 17       | 14       |
| Uterus       | (179-182) |                |                       | 2        | 3        |
| Cervix       | (180)     |                |                       | 1        | 2        |
| Ovary        | (183)     |                |                       | 2        | 2        |
| Prostate     | (185)     | 5              | 5                     |          |          |
| Testis       | (186)     | 0              | 1                     |          |          |
| Bladder      | (188)     | 0              | 3                     | 0        | 1        |
| Kidney       | (189)     | 5 <sup>b</sup> | 1                     | 0        | 1        |
| Brain        | (191)     | 0              | 1                     | 1        | 1        |
| Thyroid      | (193)     | 1              | 0                     | 0        | 1        |
| Lymphoma     | (200-202) | 4              | 2                     | 2        | 2        |
| Leukemia     | (204-208) | 0              | 1                     | 2        | 1        |
| Other        |           | 5              | 6                     | 6        | 4        |

a. Expected number derived by applying age-sex-specific rates for Upstate New York to the 1980 population of Census Tract 112 in Rockland County.

b.  $p < .025$

1978-82  
Total cancer cases in ~~1980~~ = 91  
Compare with 45 cases in 1988 in  
and small neighborhood drinking Nyack water.  
107X

Observed and Expected Numbers of Cancer Cases  
1978-1982 By Site and Sex  
New York State Cancer Registry

Town of: ORANGETOWN Census Tract: 131 = 6,428  
Village of: NYACK

| Site (ICD-9) |           | Males           |                       | Females  |          |
|--------------|-----------|-----------------|-----------------------|----------|----------|
|              |           | Observed        | Expected <sup>a</sup> | Observed | Expected |
| All Sites    | (140-208) | 83 <sup>b</sup> | 63                    | 75       | 73       |
| Oral         | (140-149) | 6 <sup>b</sup>  | 2                     | 4        | 1        |
| Stomach      | (151)     | 3               | 2                     | 0        | 2        |
| Colon        | (153)     | 14 <sup>b</sup> | 7                     | 6        | 9        |
| Rectum       | (154)     | 3               | 3                     | 2        | 3        |
| Liver        | (155)     | 0               | 1                     | 2        | 0        |
| Pancreas     | (157)     | 1               | 2                     | 1        | 2        |
| Lung         | (162)     | 22 <sup>b</sup> | 13                    | 4        | 7        |
| Breast       | (174)     |                 |                       | 24       | 19       |
| Uterus       | (179-182) |                 |                       | 5        | 5        |
| Cervix       | (180)     |                 |                       | 5        | 2        |
| Ovary        | (183)     |                 |                       | 0        | 3        |
| Prostate     | (185)     | 11              | 10                    |          |          |
| Testis       | (186)     | 2               | 1                     |          |          |
| Bladder      | (188)     | 3               | 5                     | 2        | 2        |
| Kidney       | (189)     | 3               | 2                     | 0        | 1        |
| Brain        | (191)     | 0               | 1                     | 2        | 1        |
| Thyroid      | (193)     | 0               | 0                     | 1        | 1        |
| Lymphoma     | (200-202) | 2               | 3                     | 5        | 3        |
| Leukemia     | (204-208) | 3               | 2                     | 3        | 2        |
| Other        |           | 9               | 6                     | 9        | 7        |

a. Expected number derived by applying age-sex-specific rates for Upstate New York to the 1980 population of Census Tract 131 in Rockland County.

b.  $p < .025$

Total cancers observed = 158  
Total cancers expected = 136  
22

108X



SUMMARY OF CANCER CLUSTER INVESTIGATIONS  
IN ROCKLAND COUNTY

Since the fall of 1983, the New York State Department of Health and the Rockland County Health Department have been conducting a series of investigations related to citizens' concerns over the possibility of elevated cancer incidence in their Rockland County neighborhoods.

A total of 10 census tracts, which include the Villages of Thiells, Pomona, Spring Valley, New City, Palisades, West Nyack, Pearl River, Monsey and Sloatsburg were investigated.

The purpose of this investigation was to determine whether or not there indeed was an unusually high number of cancer cases in these census tracts. In order to assess the situation in Rockland County, rates for upstate New York were used to calculate the expected population. Both incidence and mortality data for all cancers combined and site-specific cancers (i.e. oral, colon and rectum, other digestive organs, lung, breast, kidneys, female and male reproductive organs, urinary tract, leukemia, lymphoma, and

thyroid) were investigated. A total of 19 of the most common cancer sites were examined among females and 17 in males.

For the majority of the cancers analyzed in this study the number of observed cancers in Rockland County was similar to those expected.

In several census tracts, the number of observed cancers was significantly lower than expected:

101 (Thiells):

Incidence of all cancers combined in females (47 observed, 65 expected)  
Incidence of breast cancer (7 observed, 18 expected)  
Incidence of cancer of reproductive organs in females (2 observed, 10 expected)

105 (Pomona):

Incidence of all cancers combined in females (52 observed, 79 expected)  
Incidence of lung cancer in males (7 observed, 16 expected)

115 (Spring Valley):

Incidence of colorectal in males (13 observed, 23 expected)  
✓ Incidence of oral cancer in males (0 observed, 6 expected)  
Incidence of reproductive cancers in females (12 observed, 23 expected)

116 (Monsey):

✓ Incidence of all cancers combined in males (55 observed, 90 expected)  
Incidence of prostate cancer (6 observed, 14 expected)  
Mortality of all cancers combined in males (34 observed, 50 expected)  
Incidence of lung cancer in females (3 observed, 9 expected)

117 (Sloatsburo):

Incidence of all cancers combined in males (13 observed, 24 expected)

✓ 121 (Monsey):

Incidence of lung cancer in males (7 observed, 19 expected)

On the other hand, a few census tracts revealed a statistically significant higher cancer than expected.

108 (New City):

Incidence of leukemia in males (9 observed, 4 expected)

Mortality of all cancers combined (74 observed, 55 expected) in females

114 (West Nvack):

Incidence of testicular cancer (6 observed, 2 expected)

Mortality of all cancers combined in females (73 observed, 50 expected)

121 (Monsey):

Incidence of thyroid cancer in males (3 observed, 0.5 expected)

128 (Pearl River):

Incidence of kidney cancer in males (7 observed, 1 expected)

✓ 134 (Palisades):

Incidence of all cancers combined in males (92 observed, 74 expected)

It is important to note that when reference is made to greater than expected or statistically significant cancers, the numbers are small. The greater than expected cancer mortality in females in census tracts 108 and 114 were due to lung cancer.

Not all census tracts in Rockland County were analyzed but only those for which requests for investigation from County residents were received. However, the data as a whole suggests that Rockland County does not seem to have a problem regarding excess cancers.

Further investigation of incident cancers that were significantly high (thyroid, testicular and leukemia) will be undertaken by the Rockland County Health Department in collaboration with the New York State Health Department. The Rockland County Health Department has already finished the review of all available medical data on cancer kidney patients. A history of smoking was documented among most of these patients.

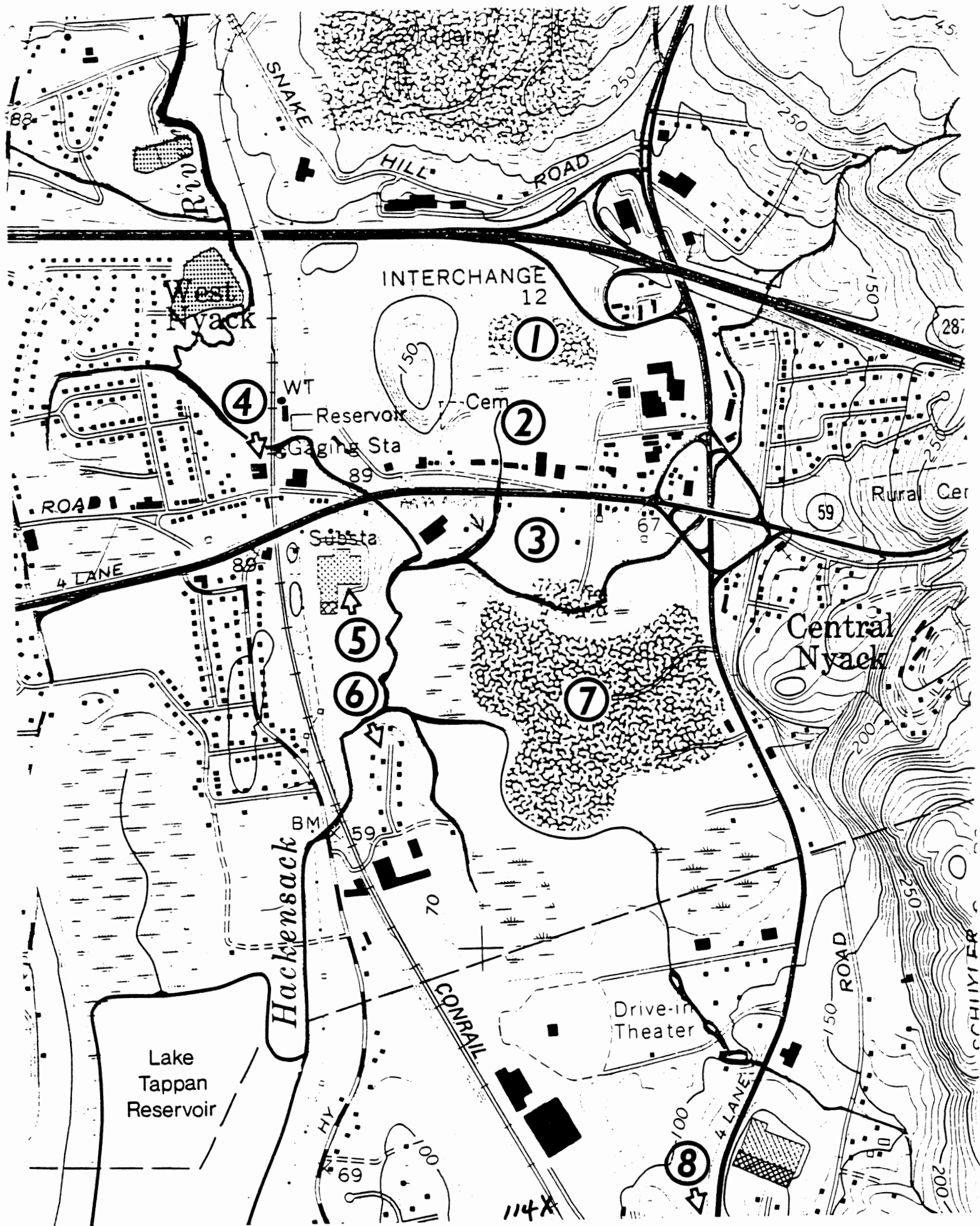
Cancer is a common disease. One of every three persons will develop it during their lifetime, and it eventually affects three out of every four families. The number of people with cancer is increasing in most communities because more people are living to the ages of greater cancer occurrence.

Much more research is necessary before the causes of cancer are well understood. Current knowledge, however, suggests that the leading preventable cause is cigarette smoking. Dietary practices such as excessive alcohol consumption and

the eating of high fat foods are also believed to be important. In fact, tobacco and diet may account for as many as two-thirds of all cancer deaths. Other avoidable risk factors include excessive sunlight, ionizing radiation, and occupational exposure to asbestos, benzene or vinyl chloride.

It is important to realize that many cancers can be effectively treated if they are diagnosed in their early stages. Screening for cancers of the breast, cervix, rectum, colon, and prostate, for example, helps to identify these diseases before the onset of symptoms and at a time when they are usually the most curable. Many persons could reduce their chances of developing or dying from cancer by adopting a healthier lifestyle and by visiting their physician for a cancer-related checkup.

For further information on preventive action related to cancer, contact the Rockland County Health Department (B. Bergad, Ph.D., 354-0200, Ext. 2507) or the American Cancer Society (A. Kobre, 358-5101) and American Lung Association (949-2150).









Testimony of the League of Women Voters of Northern Valley  
in support of Senate Bill No. 2339, the proposed  
"Watershed Protection Act"

Senate Land Use Management and Regional Affairs Committee

May 23, 1990

Paramus Borough Hall

My name is Janet Schwarz and I wish to testify on behalf of the League of Women Voters of Northern Valley which represents members in the following towns: Alpine, Closter, Cresskill, Demarest, Dumont, Harrington Park, Haworth, Northvale, Norwood, Old Tappan and Rockleigh. The League has been concerned for many years with environmental policy in New Jersey. Last year we conducted a comprehensive study on the relationship between the sale of Hackensack Water Co. watershed lands and the protection of water quality. We concluded that the sale for development of these lands would jeopardize the supply and quality of our drinking water.

Consequently, the League strongly supports the watershed protection legislation proposed by this committee which would require the Dept. of Environmental Protection to adopt rules and regulations establishing buffer zones for all watershed lands associated with public water supply reservoirs, including water supply intakes and tributaries for the purpose of protecting drinking water quality.

Last December, the DEP issued a report, entitled "Evaluation and Recommendations Concerning Buffer Zones Around Public Water Supply Reservoirs," which was mandated by the Watershed Protection Act of 1988. The report recommends a multi-zone buffer approach for protection of drinking water quality. This would consist of an undeveloped vegetative buffer strip 50 to 300 feet wide around reservoirs plus restrictive land-use activities and best management practices in the remainder of the watershed area.

While this approach is a necessary first step, it provides only minimal protection. It does nothing to protect the thousands of acres presently owned and maintained by the water utilities for watershed protection and which are at risk of being sold off for development--or, as in the case of Hackensack Water Co. in our area, have already been sold off. The DEP draft report on buffer zones stated that "as more and more of these watershed lands are sold off and developed," there has been a "deterioration of water quality conditions that has threatened the available supply of potable water."

Therefore, the League believes that it is essential for this legislation to also require the DEP to establish a "Watershed Land Preservation Master Plan," as was called for in the original version of the 1988 Watershed Protection Act. This master plan would "identify watershed protection areas that should be maintained for watershed protection, open space, conservation, or recreation needs and watershed land that is suitable for development."

The importance of a "Watershed Land Preservation Master Plan" is illustrated in our area by the disposition of Hackensack Water Co. watershed land. Since 1984, approximately 1000 acres of vital watershed

protective land have been transferred by Hackensack Water Co. to its sister company, Rivervale Realty, and 700 acres are slated for development. There is a deed restriction on the other 300 acres limiting its use to golf courses only. However, loopholes in the agreement could open the way for future development. These lands, which border three reservoirs and the Hackensack River, are essential for water supply protection. This transfer of land took place despite the fact that according to a 1983 study commissioned by Hackensack Water Co. "the area of protective land owned by Hackensack Water Co. is generally less than average" compared to 40 existing reservoir sites. Also the same study recommended that the company consider purchasing approximately 800 acres adjacent to the reservoirs, now in private hands, to protect the water supply.

The importance of protecting watershed lands is further underscored by the discovery in recent weeks of dioxin and other toxic chemicals in the mud several hundred feet from the Hackensack River in Rockland County, N.Y. There are eight toxic waste sites close to the river in this area, which pose a threat to our drinking water.

Water utilities argue that the land is no longer needed due to the development of advanced water treatment technologies. They say that raw water can be treated so that it meets all EPA and state standards. There is evidence that relying primarily on technology has serious limitations:

1. Technology is increasingly expensive and even the most advanced treatment facilities have limits. For example, the new Hackensack Water Company's state of the art treatment plant, completed in 1989 at a cost of \$63.5 million, has no effect on pesticides, herbicides or fertilizers, which are widely used in our area. Also, ozone treatment has no effect on heavy metals, such as lead, mercury and cadmium, and no effect on PCB's.
2. Experts disagree on whether standards provide a sufficient level of protection: standards have not been developed for many contaminants; they are often based on what is economically and technologically feasible rather than on health risk (which is often difficult to determine); the health risks of exposure to contaminants in combination over a long period are unknown.
3. According to a Connecticut Council on Water Company Lands report, "regulatory schemes respond to violations after they occur; thus, there is a serious gap between the response of a regulatory agency and the elimination, if possible, of the specific hazardous substance. In addition, the cost of monitoring environmental quality and enforcing environmental standards

is frequently prohibitive."

4. Water utility treatment of raw water does nothing to protect water quality in rivers and streams which support fish and wildlife.

The League of Women Voters supports strong and effective legislation to protect the water supply in our state. We strongly recommend that the rules and regulations adopted by the DEP to protect water quality should extend to all land, whether publicly, privately or utility owned. It is only in this way that we can avert the threat of serious contamination to the water supply.



## *Bergen County Audubon Society*

--For Immediate Release--

My name is John Traynor. I am on the Board of Directors of the Bergen County Audubon Society, a local chapter of the National Audubon Society. We have over 2000 families as members in Bergen County. We are very concerned about preserving the buffer zones around the reservoirs in Bergen County as open space, particularly as excellent wildlife habitat. Our society has made frequent visits to survey the populations of bird species in the watershed at all times of the year. We have led walks, open to the general public, and to various school groups for many years.

We have assembled data concerning those species which breed on watershed lands. Among the approximately 50 species known to breed here, several are either rare or threatened. These species include the Great Blue Heron, the Coopers Hawk and others.

The watershed lands and the surface of the reservoir are of particular importance during bird migrations. Several hundred species passing through New Jersey along the Eastern migratory flyway must find rest and food before continuing on their journey. While these birds are protected from harm by international treaties, they rely on our providence in setting aside safe resting places along their journey. We know from our regular census of the fall migration that thousands of ducks stop for weeks to rest on Oradell Reservoir and Lake Tappan. We find more ducks here than in the rest of Bergen County at the time of our Christmas Bird Count. Until ice covers the reservoirs, we typically encounter several thousand Common and Red-breasted Mergansers along with smaller populations of other water fowl. Threatened species, such as Canvasback, Green-winged Teal, and Wood Duck are also found at this time. During this season, it is not unusual to find a Bald Eagle fishing from the reservoirs.



## *Bergen County Audubon Society*

The spring migration brings a similar wave of birds to the watershed. The woods surrounding the reservoir are a haven for several dozen species of warblers, plus many types of flycatchers, sparrows, orioles, tanagers, and others.

Bergen County is critically short of open space, and there is no doubt that further development in the Hackensack watershed will directly impact wildlife, both as local breeding populations and for many more species in transit. Most of these species will not readily adapt to living in suburban backyards, apartment complexes, or industrial parks. Without suitable habitat they will vanish from Bergen County, from New Jersey, and perhaps from the Eastern flyway.

Our society is 48 years old, and our members have documented the decline of wildlife populations through all of these years as our county has gone from rural open space to suburban sprawl to massive overcrowding. We believe it is imperative to protect all remaining open space in Bergen County. New development should be directed to upgrading the use of previously developed properties rather than searching for cheap open space. It is time to redirect growth to redevelopment projects, upgrading our cities and towns so that we can be proud of all parts of the county, while preserving a natural heritage for future generations.

submitted by John Traynor Jr.  
221 Knox Ave.  
Cliffside Park  
NJ 07010  
(201) 943-1066

# NEW JERSEY BREEDING BIRD ATLAS

The objective of this project is to determine the breeding birds of New Jersey and their distribution. This is to be accomplished during a five year survey. The state has been divided into small areas of about 10 square miles for easy observation by an individual or small group. I have taken on the surveying of the three areas shown on the map. If anyone would like to assist me, please give me a call. In addition, information you may gather in casual visits is also welcome.

As you can see, this is not a census of how many of each species can be found, but a survey of which species are resident nesting birds in the survey region.

The Raccoon Ridge Bird Observatory is coordinating the efforts throughout the state. In addition to being a historical record, the data will be used to identify areas and species for preservation efforts, and to prepare environmental impact statements which could influence decisions concerning land use proposals.

The presence of breeding birds is judged by the following criteria:

## Possible Breeding (PO)

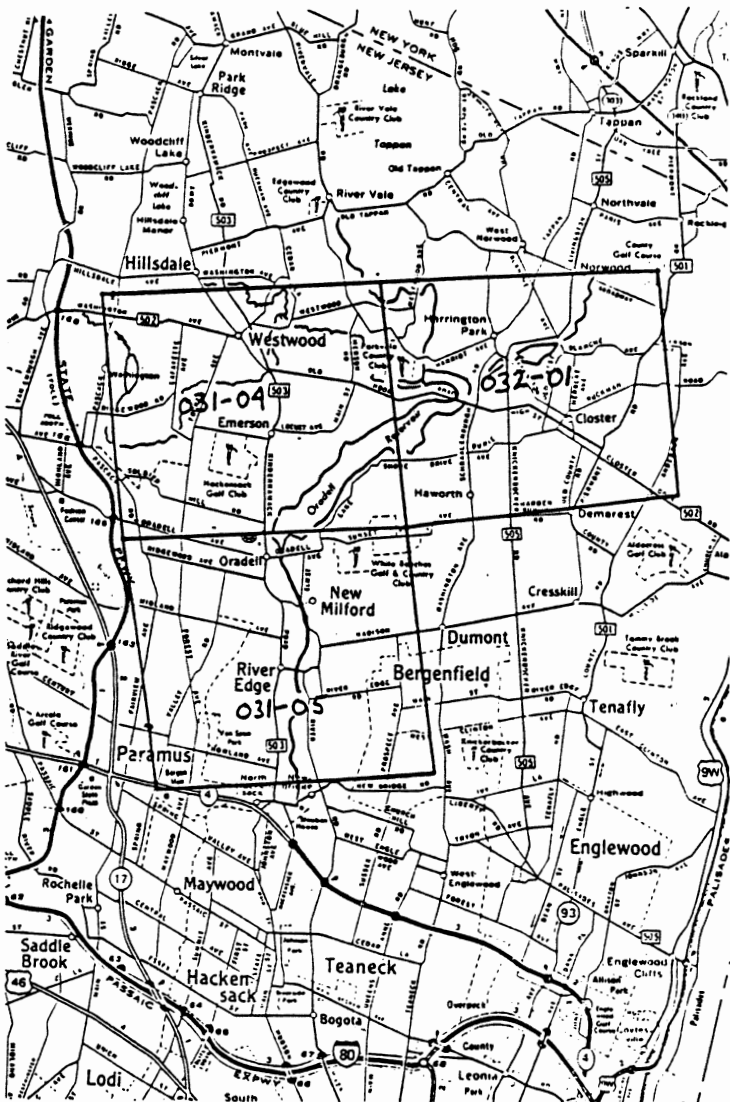
- x Species observed in breeding season in possible nesting habitat but no other indication of breeding noted.
- x Singing male(s) present (or breeding call heard) in breeding season.

## Probable Breeding (PR)

- P Pair observed in suitable habitat in breeding season.
- S Singing male present (or breeding calls heard) on more than one date in same place. This is a good indication that a bird has taken up residence if the dates are a week or more apart.
- T Bird (or pair) apparently holding territory. In addition to territorial singing, chasing of other individuals of the same species often marks a territory.
- D Courtship and display, agitated behavior or anxiety calls from adults suggesting probable presence nearby of a nest or young; well developed brood patch or cloacal protuberance on trapped adult (for banders). Includes copulation.
- N Visiting probable nesting site.
- B Nest building by wrens, woodpeckers, and monk parakeet.

## Confirmed Breeding (CO)

- DD Distraction display or injury feigning; agitated behavior and/or anxiety calls are only "D" under Probable Breeding.
- NB Nest building by any species except wrens, woodpeckers and monk parakeet.
- UN Used nest found. Caution: these must be carefully identified if they are to be counted as evidence. Some nests are persistent and very characteristic; most are very difficult to identify correctly. If in doubt, forget it.
- FE Female with egg in oviduct (for banders).
- FL Recently fledged young (including downy young of precocious species -- waterfowl, shorebirds, etc.) This code should be used with caution for species such as blackbirds and swallows which may move soon after fledging. Recently fledged passerines are still dependent on their parents and are fed by them.
- FS Adult carrying fecal sac.
- FY Adult(s) with food for young. Some birds (gulls, terns and raptors) continue to feed their young after they have fledged, and even after they have moved considerable distances to young in a neighboring block. Be especially careful on the edge of a block. Care should be taken to avoid confusion with courtship feeding (D under Probable).
- ON Adult(s) entering or leaving nest site in circumstances indicating occupied nest. NOT generally used for open nesting birds. It should be used for hole nesters only when a bird enters a hole and remains inside, makes a change-over at a hole, or leaves a hole after having been inside for some time. If you simply see a bird fly into or out of a bush or tree, and do not find a nest, the correct code would be "N" under Probable.
- NE Identifiable nest and eggs, bird sitting on nest or eggs, identifiable eggshells found beneath nest, or identifiable dead nestling(s). If you find a cowbird's egg in a nest, it is NE for cowbird, and NE for the identified nest's owner.
- NY Nest with young. If you find a young cowbird with other young, it is NY for cowbird and NY for identified nest owner.



DEWEY CLARK

# 262-7657

OUR PROJECT NEEDS YOUR HELP

122X

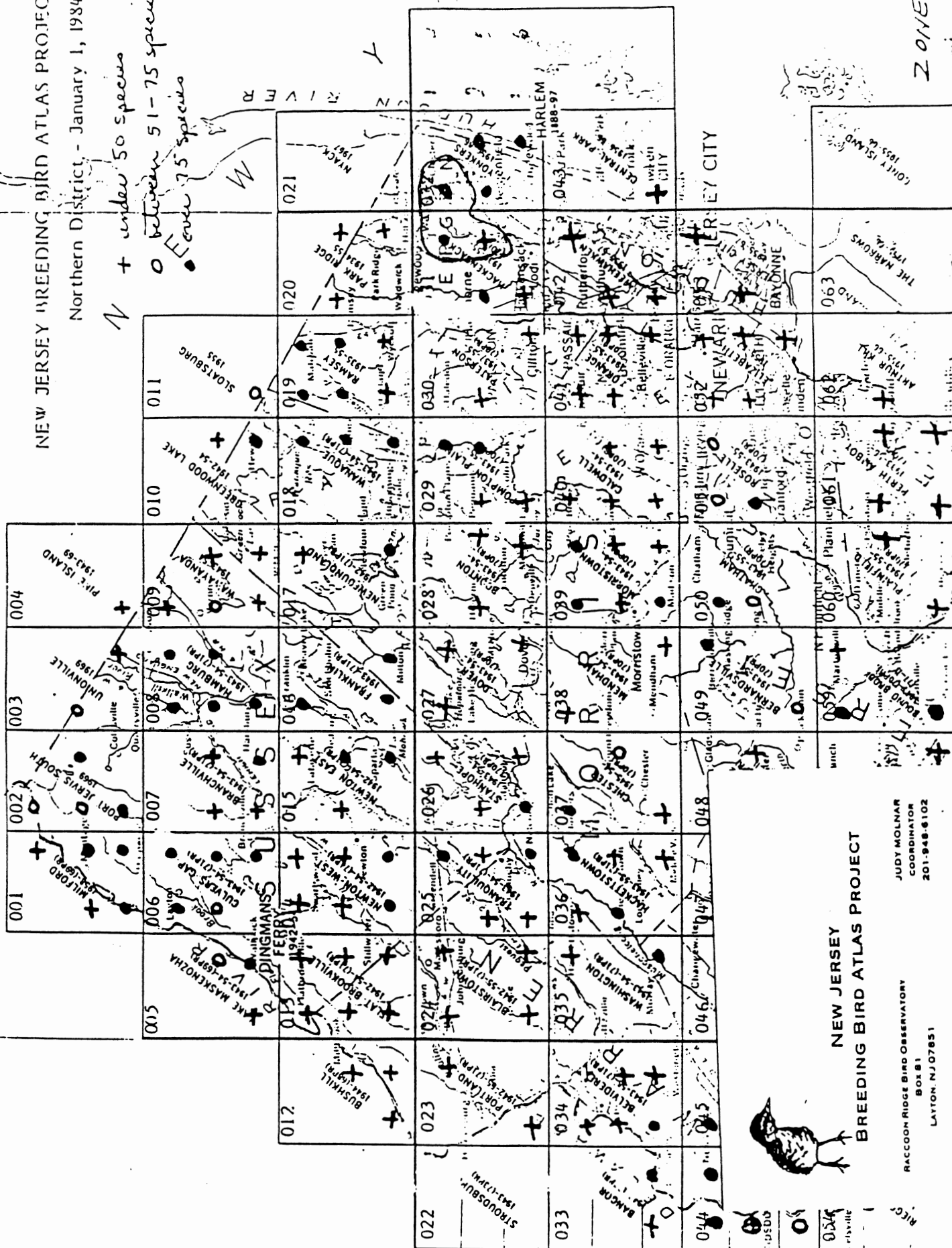
# NEW JERSEY BREEDING BIRD ATLAS PROJECT

Northern District - January 1, 1984

✓ + under 50 species

○ between 51-75 species

● over 75 species



## NEW JERSEY BREEDING BIRD ATLAS PROJECT

RACCOON RIDGE BIRD OBSERVATORY  
BOX 81  
LAYTON, NJ 07851

JUDY MOLNAR  
COORDINATOR  
201-948-6102



REC'D

0544

0533

123X

ZONE 1



MAP # 001 Emerson,  
BLOCK # 04 Haworth,  
Oradell, Westwood

| Name                       | A.O.U.# | Po | Pr | Co |
|----------------------------|---------|----|----|----|
| Mallard                    | 142     |    |    |    |
| Duck, Wood                 | 144     |    |    |    |
| Ruddy                      | 167     |    |    |    |
| Goose, Canada              | 172     |    |    |    |
| Heron, Green               | 201     |    |    |    |
| Black crowned Night        | 202     |    |    |    |
| Killdeer                   | 273     |    |    |    |
| Pheasant, Ring necked      | 309     |    |    |    |
| Turkey                     | 310     |    |    |    |
| Rock Dove                  | 313     |    |    |    |
| Mourning                   | 316     |    |    |    |
| Hawk, Red tailed           | 337     |    |    |    |
| Kestrel, American          | 360     |    |    |    |
| Great Horned               | 375     |    |    |    |
| Parakeet, Monk             | 382     |    |    |    |
| Cuckoo, Yellow billed      | 387     |    |    |    |
| Black billed               | 388     |    |    |    |
| Kingfisher, Belted         | 390     |    |    |    |
| Woodpecker, Hairy          | 393     |    |    |    |
| Downy                      | 394     |    |    |    |
| Flicker, Common            | 412     |    |    |    |
| Swift, Chimney             | 423     |    |    |    |
| Hummingbird, Ruby throated | 428     |    |    |    |
| Kingbird, Eastern          | 444     |    |    |    |
| Flycatcher, Great Crested  | 452     |    |    |    |
| Phoebe, Eastern            | 456     |    |    |    |
| Pewee, Eastern Wood        | 461     |    |    |    |
| Jay, Blue                  | 477     |    |    |    |
| Crow, Common               | 488     |    |    |    |
| Fish                       | 490     |    |    |    |
| Starling                   | 493     |    |    |    |
| Bobolink                   | 494     |    |    |    |
| Cowbird, Brown headed      | 495     |    |    |    |
| Blackbird, Red winged      | 498     |    |    |    |
| Meadowlark, Eastern        | 501     |    |    |    |
| Oriole, Orchard            | 506     |    |    |    |
| Northern                   | 507     |    |    |    |
| Grackle, Common            | 511     |    |    |    |
| Boat tailed                | 513     |    |    |    |
| Finch, Purple              | 517     |    |    |    |
| House                      | 519     |    |    |    |
| Goldfinch, American        | 529     |    |    |    |
| Sparrow, Vesper            | 540     |    |    |    |
| White-throated             | 558     |    |    |    |
| Chipping                   | 560     |    |    |    |
| Field                      | 563     |    |    |    |
| Sparrow, Song              | 581     |    |    |    |
| Swamp                      | 584     |    |    |    |
| Towhee, Rufous-sided       | 587     |    |    |    |
| Cardinal                   | 593     |    |    |    |
| Grosbeak, Rose-breasted    | 595     |    |    |    |
| Blue                       | 597     |    |    |    |
| Bunting, Indigo            | 598     |    |    |    |
| Dickcissel                 | 604     |    |    |    |
| Tanager, Scarlet           | 608     |    |    |    |
| Swallow, Cliff             | 612     |    |    |    |
| Barn                       | 613     |    |    |    |
| Rough-winged               | 617     |    |    |    |
| Waxwing, Cedar             | 619     |    |    |    |
| Vireo, Red eyed            | 624     |    |    |    |
| Warbling                   | 627     |    |    |    |
| Warbler, Black and white   | 636     |    |    |    |
| Blue-winged                | 641     |    |    |    |
| Golden-winged              | 642     |    |    |    |
| Yellow                     | 652     |    |    |    |
| Ovenbird                   | 674     |    |    |    |
| Yellowthroat, Common       | 681     |    |    |    |
| Chat, Yellow-breasted      | 683     |    |    |    |
| Redstart, American         | 687     |    |    |    |
| Sparrow, House             | 688     |    |    |    |
| Mockingbird, Northern      | 703     |    |    |    |
| Catbird, Gray              | 704     |    |    |    |
| Thrasher, Brown            | 705     |    |    |    |
| Wren, Carolina             | 718     |    |    |    |
| House                      | 721     |    |    |    |
| Nuthatch, White breasted   | 727     |    |    |    |
| Red breasted               | 728     |    |    |    |
| Titmouse, Tufted           | 731     |    |    |    |
| Chickadee, Black capped    | 735     |    |    |    |
| Carolina                   | 736     |    |    |    |
| Kinglet, Golden-crowned    | 748     |    |    |    |
| Gnatcatcher, Blue-gray     | 751     |    |    |    |
| Thrush, Wood               | 755     |    |    |    |
| Robin, American            | 761     |    |    |    |

MAP # 032 Closser,  
BLOCK # 01 Demarest,  
Harr. Pk, Hawthorth, Norwood

| Name                       | A.O.U.# | Po | Pr | Co |
|----------------------------|---------|----|----|----|
| Mallard                    | 142     |    |    |    |
| Duck, Black                | 143     |    |    |    |
| Goose, Canada              | 172     |    |    |    |
| Heron, Green               | 201     |    |    |    |
| Black crowned Night        | 202     |    |    |    |
| Savannah Upland            | 261     |    |    |    |
| Spotted                    | 263     |    |    |    |
| Killdeer                   | 273     |    |    |    |
| Black Dove                 | 313     |    |    |    |
| Mourning                   | 316     |    |    |    |
| Vulture, Turkey            | 325     |    |    |    |
| Hawk, Northern             | 331     |    |    |    |
| Hawk, Sharp-shinned        | 337     |    |    |    |
| Kestrel, American          | 360     |    |    |    |
| Great Horned               | 375     |    |    |    |
| Parakeet, Monk             | 382     |    |    |    |
| Cuckoo, Yellow billed      | 387     |    |    |    |
| Black billed               | 388     |    |    |    |
| Kingfisher, Belted         | 390     |    |    |    |
| Woodpecker, Hairy          | 393     |    |    |    |
| Downy                      | 394     |    |    |    |
| Pileated                   | 405     |    |    |    |
| Red headed                 | 406     |    |    |    |
| Red bellied                | 409     |    |    |    |
| Flicker, Common            | 412     |    |    |    |
| Swift, Chimney             | 423     |    |    |    |
| Hummingbird, Ruby throated | 428     |    |    |    |
| Kingbird, Eastern          | 444     |    |    |    |
| Flycatcher, Great Crested  | 452     |    |    |    |
| Phoebe, Eastern            | 456     |    |    |    |
| Pewee, Eastern Wood        | 461     |    |    |    |
| Jay, Blue                  | 477     |    |    |    |
| Crow, Common               | 488     |    |    |    |
| Fish                       | 490     |    |    |    |
| Starling                   | 493     |    |    |    |
| Bobolink                   | 494     |    |    |    |
| Cowbird, Brown headed      | 495     |    |    |    |
| Blackbird, Red winged      | 498     |    |    |    |
| Meadowlark, Eastern        | 501     |    |    |    |
| Oriole, Orchard            | 506     |    |    |    |
| Northern                   | 507     |    |    |    |
| Grackle, Common            | 511     |    |    |    |
| Boat tailed                | 513     |    |    |    |
| Finch, Purple              | 517     |    |    |    |
| House                      | 519     |    |    |    |
| Goldfinch, American        | 529     |    |    |    |
| Sparrow, Vesper            | 540     |    |    |    |
| Sparrow, Song              | 581     |    |    |    |
| Swamp                      | 584     |    |    |    |
| Towhee, Rufous sided       | 587     |    |    |    |
| Cardinal                   | 593     |    |    |    |
| Grosbeak, Rose breasted    | 595     |    |    |    |
| Swallow, Cliff             | 612     |    |    |    |
| Barn                       | 613     |    |    |    |
| Tree                       | 614     |    |    |    |
| Bank                       | 616     |    |    |    |
| Rough-winged               | 617     |    |    |    |
| Waxwing, Cedar             | 619     |    |    |    |
| Vireo, Red eyed            | 624     |    |    |    |
| Warbler, Black and white   | 636     |    |    |    |
| Blue winged                | 641     |    |    |    |
| Yellow                     | 652     |    |    |    |
| Ovenbird                   | 674     |    |    |    |
| Yellowthroat, Common       | 681     |    |    |    |
| Sparrow, House             | 688     |    |    |    |
| Mockingbird, Northern      | 703     |    |    |    |
| Catbird, Gray              | 704     |    |    |    |
| Thrasher, Brown            | 705     |    |    |    |
| Wren, Carolina             | 718     |    |    |    |
| House                      | 721     |    |    |    |
| Nuthatch, White breasted   | 727     |    |    |    |
| Red breasted               | 728     |    |    |    |
| Titmouse, Tufted           | 731     |    |    |    |
| Chickadee, Black capped    | 735     |    |    |    |
| Thrush, Wood               | 755     |    |    |    |
| Vireo                      | 756     |    |    |    |
| Thrush, Hermit             | 759     |    |    |    |
| Robin, American            | 761     |    |    |    |
| Tanager, Scarlet           | 608     |    |    |    |

124X

|                      |                                    |                      |                                      |                      |                                       |                      |                                   |
|----------------------|------------------------------------|----------------------|--------------------------------------|----------------------|---------------------------------------|----------------------|-----------------------------------|
| POSSIX 1<br>PROBIP 2 | PIED-BILLED GREBE<br>006.0-4       | POSSIX 1<br>PROBIP 2 | BLUE-WINGED TEAL<br>140.0-1          | POSSIX 1<br>PROBIP 2 | YELLOW-CROWNED NIGHT HERON<br>203.0-5 | POSSIX 1<br>PROBIP 2 | CHUCKER<br>288.2-9                |
| POSSIX 1<br>PROBIP 2 | GREAT BLACK-BACKED GULL<br>047.0-5 | POSSIX 1<br>PROBIP 2 | SHOVELER<br>142.0-9                  | POSSIX 1<br>PROBIP 2 | KING RAIL<br>208.0-0                  | POSSIX 1<br>PROBIP 2 | BOEWHITE<br>289.0-2               |
| POSSIX 1<br>PROBIP 2 | HERRING GULL<br>051.0-8            | POSSIX 1<br>PROBIP 2 | WOOD DUCK<br>144.0-7                 | POSSIX 1<br>PROBIP 2 | CLAPPER RAIL<br>211.0-5               | POSSIX 1<br>PROBIP 2 | RUFFED GROUSE<br>300.0-7          |
| POSSIX 1<br>PROBIP 2 | LAUGHING GULL<br>058.0-1           | POSSIX 1<br>PROBIP 2 | RUDDY DUCK<br>167.0-9                | POSSIX 1<br>PROBIP 2 | VIRGINIA RAIL<br>212.0-4              | POSSIX 1<br>PROBIP 2 | RINGED-NECKED PHEASANT<br>309.1-6 |
| POSSIX 1<br>PROBIP 2 | GULL-BILLED TERN<br>063.0-4        | POSSIX 1<br>PROBIP 2 | CANADA GOOSE<br>172.0-2              | POSSIX 1<br>PROBIP 2 | SORA<br>214.0-2                       | POSSIX 1<br>PROBIP 2 | TURKEY<br>310.0-5                 |
| POSSIX 1<br>PROBIP 2 | FORSTER'S TERN<br>069.0-8          | POSSIX 1<br>PROBIP 2 | MUTE SWAN<br>178.2-2                 | POSSIX 1<br>PROBIP 2 | BLACK RAIL<br>216.0-0                 | POSSIX 1<br>PROBIP 2 | ROCK DOVE<br>313.1-0              |
| POSSIX 1<br>PROBIP 2 | COMMON TERN<br>070.0-5             | POSSIX 1<br>PROBIP 2 | GLOSSY IBIS<br>186.0-6               | POSSIX 1<br>PROBIP 2 | COMMON GALLINULE<br>219.0-7           | POSSIX 1<br>PROBIP 2 | MOURNING DOVE<br>316.0-9          |
| POSSIX 1<br>PROBIP 2 | ROSEATE TERN<br>072.0-3            | POSSIX 1<br>PROBIP 2 | AMERICAN BITTERN<br>190.0-0          | POSSIX 1<br>PROBIP 2 | AMERICAN COOT<br>221.0-3              | POSSIX 1<br>PROBIP 2 | TURKEY VULTURE<br>325.0-8         |
| POSSIX 1<br>PROBIP 2 | LEAST TERN<br>074.0-1              | POSSIX 1<br>PROBIP 2 | EASTERN LEAST BITTERN<br>191.0-9     | POSSIX 1<br>PROBIP 2 | AMERICAN WOODCOCK<br>228.0-6          | POSSIX 1<br>PROBIP 2 | NORTHERN HARRIER<br>331.0-0       |
| POSSIX 1<br>PROBIP 2 | BLACK SKIMMER<br>080.0-3           | POSSIX 1<br>PROBIP 2 | GREAT BLUE HERON<br>194.0-6          | POSSIX 1<br>PROBIP 2 | COMMON SNIFE<br>230.0-2               | POSSIX 1<br>PROBIP 2 | SHARP-SHINNED HAWK<br>332.0-9     |
| POSSIX 1<br>PROBIP 2 | COMMON MERGANSER<br>129.0-6        | POSSIX 1<br>PROBIP 2 | COMMON EGRET<br>196.0-4              | POSSIX 1<br>PROBIP 2 | WILLET<br>258.0-9                     | POSSIX 1<br>PROBIP 2 | COOPER'S HAWK<br>333.0-8          |
| POSSIX 1<br>PROBIP 2 | RED-BREASTED MERGANSER<br>130.0-3  | POSSIX 1<br>PROBIP 2 | SNOWY EGRET<br>197.0-3               | POSSIX 1<br>PROBIP 2 | UPLAND SANDPIPER<br>261.0-4           | POSSIX 1<br>PROBIP 2 | GOSHAWK<br>334.0-7                |
| POSSIX 1<br>PROBIP 2 | HOODED MERGANSER<br>131.0-2        | POSSIX 1<br>PROBIP 2 | LOUISIANA HERON<br>199.0-1           | POSSIX 1<br>PROBIP 2 | SPOTTED SANDPIPER<br>263.0-2          | POSSIX 1<br>PROBIP 2 | RED-TAILED HAWK<br>337.0-4        |
| POSSIX 1<br>PROBIP 2 | MALLARD<br>132.0-1                 | POSSIX 1<br>PROBIP 2 | LITTLE BLUE HERON<br>200.0-8         | POSSIX 1<br>PROBIP 2 | KILLDEER<br>273.0-0                   | POSSIX 1<br>PROBIP 2 | RED-SHOULDERED HAWK<br>339.0-2    |
| POSSIX 1<br>PROBIP 2 | BLACK DUCK<br>133.0-0              | POSSIX 1<br>PROBIP 2 | CATTLE EGRET<br>200.1-6              | POSSIX 1<br>PROBIP 2 | PIPING PLOVER<br>277.0-6              | POSSIX 1<br>PROBIP 2 | BROAD-WINGED HAWK<br>343.0-6      |
| POSSIX 1<br>PROBIP 2 | GADWALL<br>135.0-8                 | POSSIX 1<br>PROBIP 2 | GREEN HERON<br>201.0-7               | POSSIX 1<br>PROBIP 2 | WILSON'S PLOVER<br>280.0-1            | POSSIX 1<br>PROBIP 2 | BALD EAGLE<br>352.0-4             |
| POSSIX 1<br>PROBIP 2 | GREEN-WINGED TEAL<br>139.0-4       | POSSIX 1<br>PROBIP 2 | BLACK-CROWNED NIGHT HERON<br>202.0-6 | POSSIX 1<br>PROBIP 2 | AMERICAN OYSTERCATCHER<br>286.0-5     | POSSIX 1<br>PROBIP 2 | PEREGRINE FALCON<br>356.0-0       |

|                     |   |                        |                     |   |                           |                     |   |                        |                     |   |                        |
|---------------------|---|------------------------|---------------------|---|---------------------------|---------------------|---|------------------------|---------------------|---|------------------------|
| POSSIX 1<br>PROBP 2 | 360.0-4   | AMERICAN KESTREL       | POSSIX 1<br>PROBP 2 | 409.0-7   | RED-BELLIED WOODPECKER    | POSSIX 1<br>PROBP 2 | 490.0-7   | FISH CROW              | POSSIX 1<br>PROBP 2 | 549.0-8   | SHARP-TAILED SPARROW   |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 364.0-0   | OSPREY                 | POSSIX 1<br>PROBP 2 | 412.0-2   | COMMON FLICKER            | POSSIX 1<br>PROBP 2 | 493.0-4   | STARLING               | POSSIX 1<br>PROBP 2 | 550.0-4   | SEALY SPARROW          |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 365.0-9   | BARN OWL               | POSSIX 1<br>PROBP 2 | 416.0-8   | CHUCK-WILL'S WIDOW        | POSSIX 1<br>PROBP 2 | 494.0-3   | BOBOLINK               | POSSIX 1<br>PROBP 2 | 558.0-6   | WHITE-THROATED SPARROW |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 366.0-8   | LONG-EARED OWL         | POSSIX 1<br>PROBP 2 | 417.0-7   | WHIP-POOR-WILL            | POSSIX 1<br>PROBP 2 | 495.0-2   | BROWN-HEADED COVBIRO   | POSSIX 1<br>PROBP 2 | 560.0-2   | CHIPPING SPARROW       |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 367.0-7   | SHORT-EARED OWL        | POSSIX 1<br>PROBP 2 | 420.0-2   | COMMON NIGHTHAWK          | POSSIX 1<br>PROBP 2 | 498.0-9   | RED-WINGED BLACKBIRD   | POSSIX 1<br>PROBP 2 | 563.0-9   | FIELD SPARROW          |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 368.0-6   | BARRED OWL             | POSSIX 1<br>PROBP 2 | 423.0-9   | CHIMNEY SWIFT             | POSSIX 1<br>PROBP 2 | 501.0-4   | EASTERN MEADOWLARK     | POSSIX 1<br>PROBP 2 | 567.0-5   | DARK-EYED JUNCO        |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 372.0-0   | SAX-WHET OWL           | POSSIX 1<br>PROBP 2 | 428.0-4   | RUDY-THROATED HUMMINGBIRD | POSSIX 1<br>PROBP 2 | 506.0-9   | ORCHARD ORIOLE         | POSSIX 1<br>PROBP 2 | 581.0-7   | SONG SPARROW           |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 373.0-9   | SCREECH OWL            | POSSIX 1<br>PROBP 2 | 444.0-4   | EASTERN KINGBIRD          | POSSIX 1<br>PROBP 2 | 507.0-8   | NORTHERN ORIOLE        | POSSIX 1<br>PROBP 2 | 584.0-4   | SWAMP SPARROW          |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 375.0-7   | GREAT HORNED OWL       | POSSIX 1<br>PROBP 2 | 452.0-3   | GREAT CRESTED FLYCATCHER  | POSSIX 1<br>PROBP 2 | 511.0-2   | COMMON GRACKLE         | POSSIX 1<br>PROBP 2 | 587.0-1   | RUFUS-SIDED TOWHEE     |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 382.6-5   | MONK PARAKEET          | POSSIX 1<br>PROBP 2 | 456.0-9   | EASTERN PHOEBE            | POSSIX 1<br>PROBP 2 | 513.0-0   | BOAT-TAILED GRACKLE    | POSSIX 1<br>PROBP 2 | 593.0-3   | CARDINAL               |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 388.0-2   | BLACK-BILLED CUCKOO    | POSSIX 1<br>PROBP 2 | 461.0-2   | EASTERN WOOD PEWEE        | POSSIX 1<br>PROBP 2 | 517.0-6   | PURPLE FINCH           | POSSIX 1<br>PROBP 2 | 595.0-1   | ROSE-BREADED GROSBEAK  |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 390.0-8   | BELTED KINGFISHER      | POSSIX 1<br>PROBP 2 | 465.0-8   | ACADIAN FLYCATCHER        | POSSIX 1<br>PROBP 2 | 519.0-4   | HOUSE FINCH            | POSSIX 1<br>PROBP 2 | 597.0-9   | BLUE GROSBEAK          |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 393.0-5   | HAIRY WOODPECKER       | POSSIX 1<br>PROBP 2 | 466.4-9   | WILLOW FLYCATCHER         | POSSIX 1<br>PROBP 2 | 529.0-2   | AMERICAN GOLDFINCH     | POSSIX 1<br>PROBP 2 | 598.0-8   | INDIGO BUNTING         |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 394.0-4   | DOWNY WOODPECKER       | POSSIX 1<br>PROBP 2 | 467.0-6   | LEAST FLYCATCHER          | POSSIX 1<br>PROBP 2 | 540.0-7   | VESPER SPARROW         | POSSIX 1<br>PROBP 2 | 604.0-0   | DICKCISSEL             |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 397.0-1   | YELLOW-BILLED CUCKOO   | POSSIX 1<br>PROBP 2 | 474.0-7   | HORNED LARK               | POSSIX 1<br>PROBP 2 | 542.0-5   | SAVANNAH SPARROW       | POSSIX 1<br>PROBP 2 | 608.0-6   | SCARLET Tanager        |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 405.0-1   | PILEATED WOODPECKER    | POSSIX 1<br>PROBP 2 | 477.0-4   | BLUE JAY                  | POSSIX 1<br>PROBP 2 | 546.0-1   | GRASSHOPPER SPARROW    | POSSIX 1<br>PROBP 2 | 610.0-2   | SUMMER Tanager         |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |
| POSSIX 1<br>PROBP 2 | 406.0-0   | RED HEADED WOODPECKER  | POSSIX 1<br>PROBP 2 | 488.0-1   | COMMON CROW               | POSSIX 1<br>PROBP 2 | 547.0-0   | HENSLow'S SPARROW      | POSSIX 1<br>PROBP 2 | 611.0-1   | PURPLE MARTIN          |
| S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0    | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 | S 3<br>UN 10        | FE 11<br>FL 12<br>FS 13<br>FY 14<br>ON 15<br>NE 16<br>NY 17 | CONF 8<br>DD 9<br>ND 0 |



|   |         |                       |   |         |                              |   |         |                         |   |         |                        |
|---|---------|-----------------------|---|---------|------------------------------|---|---------|-------------------------|---|---------|------------------------|
| POSSIX 1<br>PROBIP 2                            | 612.0-0 | CLIFF SWALLOW         | POSSIX 1<br>PROBIP 2                            | 645.0-1 | NASHVILLE WARBLER            | POSSIX 1<br>PROBIP 2                            | 683.0-4 | YELLOW-BREASTED CHAT    | POSSIX 1<br>PROBIP 2                            | 735.0-2 | BLACK-CAPPED CHICKADEE |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 613.0-9 | BARN SWALLOW          | POSSIX 1<br>PROBIP 2                            | 648.0-8 | NORTHERN PARULA              | POSSIX 1<br>PROBIP 2                            | 684.0-3 | HOODED WARBLER          | POSSIX 1<br>PROBIP 2                            | 736.0-1 | CAROLINA CHICKADEE     |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 614.0-8 | TREE SWALLOW          | POSSIX 1<br>PROBIP 2                            | 652.0-1 | YELLOW WARBLER               | POSSIX 1<br>PROBIP 2                            | 686.0-1 | CANADA WARBLER          | POSSIX 1<br>PROBIP 2                            | 748.0-7 | GOLDEN-CROWNED KINGLET |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 616.0-6 | BANK SWALLOW          | POSSIX 1<br>PROBIP 2                            | 654.0-9 | BLACK-THROATED BLUE WARBLER  | POSSIX 1<br>PROBIP 2                            | 687.0-0 | AMERICAN REDSTART       | POSSIX 1<br>PROBIP 2                            | 751.0-1 | BLUE-GRAY Gnatcatcher  |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 617.0-5 | ROUGH-WINGED SWALLOW  | POSSIX 1<br>PROBIP 2                            | 657.0-6 | MAGNOLIA WARBLER             | POSSIX 1<br>PROBIP 2                            | 688.2-5 | HOUSE SPARROW           | POSSIX 1<br>PROBIP 2                            | 755.0-7 | WOOD THRUSH            |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 619.0-3 | CEDAR WAXWING         | POSSIX 1<br>PROBIP 2                            | 658.0-5 | CERULEAN WARBLER             | POSSIX 1<br>PROBIP 2                            | 703.0-0 | NORTHERN MOCKINGBIRD    | POSSIX 1<br>PROBIP 2                            | 756.0-6 | VEERY                  |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 624.0-6 | RED-EYED VIREO        | POSSIX 1<br>PROBIP 2                            | 659.0-4 | CHESTNUT-SIDED WARBLER       | POSSIX 1<br>PROBIP 2                            | 704.0-9 | GRAY CATBIRD            | POSSIX 1<br>PROBIP 2                            | 759.0-3 | HERMIT THRUSH          |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 627.0-3 | WARBLING VIREO        | POSSIX 1<br>PROBIP 2                            | 662.0-9 | BLACKBURNIAN WARBLER         | POSSIX 1<br>PROBIP 2                            | 705.0-8 | BROWN THRASHER          | POSSIX 1<br>PROBIP 2                            | 761.0-9 | AMERICAN ROBIN         |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 628.0-2 | YELLOW-THROATED VIREO | POSSIX 1<br>PROBIP 2                            | 663.0-8 | YELLOW-THROATED WARBLER      | POSSIX 1<br>PROBIP 2                            | 718.0-3 | CAROLINA WREN           | POSSIX 1<br>PROBIP 2                            | 766.0-4 | EASTERN BLUEBIRD       |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                        |
| POSSIX 1<br>PROBIP 2                            | 629.0-1 | SOLITARY VIREO        | POSSIX 1<br>PROBIP 2                            | 667.0-4 | BLACK-THROATED GREEN WARBLER | POSSIX 1<br>PROBIP 2                            | 721.0-8 | HOUSE WREN              |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         |   |         |                        |
| POSSIX 1<br>PROBIP 2                            | 631.1-5 | WHITE-EYED VIREO      | POSSIX 1<br>PROBIP 2                            | 671.0-8 | PINE WARBLER                 | POSSIX 1<br>PROBIP 2                            | 722.0-7 | WINTER WREN             |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         |   |         |                        |
| POSSIX 1<br>PROBIP 2                            | 636.0-2 | BLACK & WHITE WARBLER | POSSIX 1<br>PROBIP 2                            | 673.0-6 | PRAIRIE WARBLER              | POSSIX 1<br>PROBIP 2                            | 724.0-5 | SHORT-BILLED MARSH WREN |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         |   |         |                        |
| POSSIX 1<br>PROBIP 2                            | 637.0-1 | PROTONOTARY WARBLER   | POSSIX 1<br>PROBIP 2                            | 674.0-5 | OVENBIRD                     | POSSIX 1<br>PROBIP 2                            | 725.0-4 | LONG-BILLED MARSH WREN  |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
| UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                       | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                              | UN 10 FE 11 FL 12 FS 13 FY 14 ON 15 NE 16 NY 17 |         |                         |   |         |                        |
| POSSIX 1<br>PROBIP 2                            | 638.0-0 | SWAINSON'S WARBLER    | POSSIX 1<br>PROBIP 2                            | 675.0-4 | NORTHERN WATERTHRUSH         | POSSIX 1<br>PROBIP 2                            | 726.0-3 | BROWN CREEPER           |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
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| POSSIX 1<br>PROBIP 2                            | 639.0-9 | WORM-EATING WARBLER   | POSSIX 1<br>PROBIP 2                            | 676.0-3 | LOUISIANA WATERTHRUSH        | POSSIX 1<br>PROBIP 2                            | 727.0-2 | WHITE-BREASTED NUTHATCH |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
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| POSSIX 1<br>PROBIP 2                            | 641.0-5 | BLUE-WINGED WARBLER   | POSSIX 1<br>PROBIP 2                            | 677.0-2 | KENTUCKY WARBLER             | POSSIX 1<br>PROBIP 2                            | 728.0-1 | RED-BREASTED NUTHATCH   |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
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| POSSIX 1<br>PROBIP 2                            | 642.0-4 | GOLDEN-WINGED WARBLER | POSSIX 1<br>PROBIP 2                            | 681.0-6 | COMMON YELLOWTHROAT          | POSSIX 1<br>PROBIP 2                            | 731.0-6 | TUFTED TITMOUSE         |   |         |                        |
| S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                       | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                              | S 3 T 4 O 5 N 6 B 7 CONF 8 DO 9                 |         |                         |   |         |                        |
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- SX Nest building by wrens, woodpeckers, and Monk Parakeet.

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- UN Used nest found.
- FE Female with egg in oviduct.
- FL Recently fledged young.
- FS Adult carrying fecal sac.
- FY Adult(s) with food for young.
- ON Adult(s) entering or leaving nest site, indicating occupied nest. Not generally used for open nesting birds.
- NE Identifiable nest and eggs, bird sitting on nest or eggs, identifiable eggshells found beneath nest, or identifiable dead nestling(s).
- NY Nest with young.

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| Species                 | PO     | PR | CO | A  | Species                    | PO     | PR | CO | A  | Species                | PO     | PR | CO | A | Species                   | PO     | PR | CO | A |
|-------------------------|--------|----|----|----|----------------------------|--------|----|----|----|------------------------|--------|----|----|---|---------------------------|--------|----|----|---|
| Pied-billed Grebe       | 006    |    |    |    | American Bittern           | 190    |    |    |    | Piping Plover          | 277    |    |    |   | Short-eared Owl           | 367    |    |    |   |
| Great Black-backed Gull | 047    |    |    |    | Eastern Least Bittern      | 191    |    |    |    | Wilson's Plover        | 280    |    |    |   | Barred Owl                | 368    |    |    |   |
| Herring Gull            | 051    |    |    |    | Great Blue Heron           | 194    |    |    |    | American Oystercatcher | 286    |    |    |   | Saw-whet Owl              | 372    |    |    |   |
| Laughing Gull           | 058    |    |    |    | Common Egret               | 196    |    |    |    | Chukker                | 288.2  |    |    |   | Screech Owl               | 373    |    |    |   |
| Gull-billed Itern       | 063    |    |    |    | Snowy Egret                | 197    |    |    |    | Bobwhite               | 289    |    |    |   | Great Horned Owl          | FL 375 |    |    |   |
| Forster's Itern         | 069    |    |    |    | Louisiana Heron            | 199    |    |    |    | Ruffed Grouse          | 300    |    |    |   | Monk Parakeet             | 382.6  |    |    |   |
| Common Itern            | 070    |    |    |    | Little Blue Heron          | 200    |    |    |    | Ring-necked Pheasant   | 309.1  |    |    |   | Yellow-billed Cuckoo      | FL 397 |    |    |   |
| Rosette Itern           | 072    |    |    |    | Cattle Egret               | 200.1  |    |    |    | Turkey                 | 310    |    |    |   | Black-billed Cuckoo       | XL 388 |    |    |   |
| Least Itern             | 074    |    |    |    | Green Heron                | 201    |    |    | NY | Rock Dove              | 313.1  |    |    | N | Belted Kingfisher         | ON 390 |    |    |   |
| Black Shimmer           | 080    |    |    |    | Black-crowned Night Heron  | 202    |    |    |    | Mourning Dove          | ND 316 |    |    |   | Hairy Woodpecker          | S 393  |    |    |   |
| Common Merganser        | 129    |    |    |    | Yellow-crowned Night Heron | 203    |    |    |    | Turkey Vulture         | 325    |    |    |   | Downy Woodpecker          | FL 394 |    |    |   |
| Red-breasted Merganser  | 130    |    |    |    | King Rail                  | 208    |    |    |    | Northern Harrier       | 331    |    |    |   | Pileated Woodpecker       | 405    |    |    |   |
| Hooded Merganser        | 131    |    |    |    | Clapper Rail               | 211    |    |    |    | Sharp-shinned Hawk     | 332    |    |    | T | Red Headed Woodpecker     | 406    |    |    |   |
| Hallard                 | FL 132 |    |    |    | Virginia Rail              | 212    |    |    |    | Cooper's Hawk          | 333    |    |    |   | Red-bellied Woodpecker    | D 409  |    |    |   |
| Black Duck              | D 133  |    |    |    | Sora                       | 214    |    |    |    | Goshawk                | 334    |    |    |   | Common Flicker            | NY 412 |    |    |   |
| Gadwall                 | 135    |    |    |    | Black Rail                 | 216    |    |    |    | Red-tailed Hawk        | 337    |    |    |   | Chuck-will's Widow        | 416    |    |    |   |
| Green-winged Teal       | 139    |    |    |    | Common Gallinule           | 219    |    |    |    | Red-shouldered Hawk    | 339    |    |    |   | Whip-poor-Will            | 417    |    |    |   |
| Blue-winged Teal        | 140    |    |    |    | American Coot              | 221    |    |    |    | Broad-winged Hawk      | 343    |    |    |   | Common Nighthawk          | 420    |    |    |   |
| Shoveler                | 142    |    |    |    | American Woodcock          | 221    |    |    |    | Bald Eagle             | 352    |    |    |   | Chimney Swift             | D 423  |    |    |   |
| Wood Duck               | P 144  |    |    |    | Common Snipe               | 230    |    |    |    | Peregrine Falcon       | 356    |    |    |   | Ruby-throated Hummingbird | 428    |    |    |   |
| Ruddy Duck              | 167    |    |    |    | Willet                     | 258    |    |    |    | American Kestrel       | 360    |    |    |   | Eastern Kingbird          | BD 44  |    |    |   |
| Canada Goose            | 172    |    |    | NY | Upland Sandpiper           | 261    |    |    |    | Osprey                 | 364    |    |    |   | Great Crested Flycatcher  | S 452  |    |    |   |
| Mute Swan               | 178.2  |    |    |    | Spotted Sandpiper          | DD 263 |    |    |    | Barn Owl               | 365    |    |    |   | Eastern Phoebe            | NY 456 |    |    |   |
| Closely Ibis            | 197    |    |    |    | Killdeer                   | 273    |    |    |    | Long-eared Owl         | 366    |    |    |   | Eastern Wood Pewee        | ND 461 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Acadian Flycatcher        | 465    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Willow Flycatcher         | 466.4  |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Least Flycatcher          | 467    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Horned Lark               | 474    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Blue Jay                  | NY 477 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Common Crow               | NY 488 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Fish Crow                 | 490    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Starling                  | NY 493 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Bobolink                  | 494    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Brown-headed Cowbird      | 495    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Red-winged Blackbird      | NE 498 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Eastern Meadowlark        | 501    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Orchard Oriole            | 504    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Northern Oriole           | NY 507 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Common Grackle            | FY 511 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Boat-tailed Grackle       | 513    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Purple Finch              | 517    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | House Finch               | FL 519 |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | American Goldfinch        | X 529  |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Vesper Sparrow            | 540    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Savannah Sparrow          | 542    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Henslow's Sparrow         | 547    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Sharp-tailed Sparrow      | 549    |    |    |   |
|                         |        |    |    |    |                            |        |    |    |    |                        |        |    |    |   | Seaside Sparrow           | 551    |    |    |   |

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|-------------------------|--------|----|----|---|----------------------------|-------|----|----|---|------------------------|-------|----|----|---|---------------------------|--------|----|----|---|----------------------|--------|----|----|---|
| Pied-billed Grebe       | 006    |    |    |   | American Bittern           | 190   |    |    |   | Piping Plover          | 277   |    |    |   | Short-eared Owl           | 367    |    |    |   | Acadian Flycatcher   | 465    |    |    |   |
| Great Black-backed Gull | 047    |    |    |   | Eastern Least Bittern      | 191   |    |    |   | Wilson's Plover        | 280   |    |    |   | Barred Owl                | 368    |    |    |   | Willow Flycatcher    | 466.4  |    |    |   |
| Herring Gull            | 051    |    |    |   | Great Blue Heron           | 194   |    |    |   | American Oystercatcher | 286   |    |    |   | Saw-whet Owl              | 372    |    |    |   | Least Flycatcher     | 467    |    |    |   |
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| Gull-billed Tern        | 063    |    |    |   | Snowy Egret                | 197   |    |    |   | Bobwhite               | 289   |    |    |   | Great Horned Owl          | 375    |    |    |   | Blue Jay             | 477    |    |    |   |
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| Roseate Tern            | 072    |    |    |   | Cattle Egret               | 200.1 |    |    |   | Turkey                 | 310   |    |    |   | Black-billed Cuckoo       | 388    |    |    |   | Starling             | 493    |    |    |   |
| Least Tern              | 074    |    |    |   | Green Heron                | 201   |    |    |   | Rock Dove              | 311   |    |    |   | Belted Kingfisher         | 390    |    |    |   | Mockingbird          | 495    |    |    |   |
| Black Skimmer           | 080    |    |    |   | Black-crowned Night Heron  | 202   |    |    |   | Mourning Dove          | 316   |    |    |   | Hairy Woodpecker          | 393    |    |    |   | Brown-headed Cowbird | 497    |    |    |   |
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| Mallard                 | FL 132 |    |    |   | Virginia Rail              | 212   |    |    |   | Cooper's Hawk          | 333   |    |    |   | Red-bellied Woodpecker    | 409    |    |    |   | Northern Oriole      | 507    |    |    |   |
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| Wood Duck               | FL 144 |    |    |   | Common Snipe               | 230   |    |    |   | Peregrine falcon       | 356   |    |    |   | Ruby-throated Hummingbird | 428    |    |    |   | Veery Sparrow        | 540    |    |    |   |
| Muddy Duck              | 147    |    |    |   | Willet                     | 258   |    |    |   | American Kestrel       | 360   |    |    |   | Eastern Kingbird          | NY 434 |    |    |   | Savannah Sparrow     | 542    |    |    |   |
| Canada Goose            | 172    |    |    |   | Upland Sandpiper           | 261   |    |    |   | Osprey                 | 364   |    |    |   | Great Crested Flycatcher  | 452    |    |    |   | Henslow's Sparrow    | 547    |    |    |   |
| Pute Swan               | 178.2  |    |    |   | Spotted Sandpiper          | 263   |    |    |   | Horn Owl               | 365   |    |    |   | Eastern Phoebe            | 456    |    |    |   | Sharp-tailed Sparrow | 549    |    |    |   |
|                         |        |    |    |   |                            |       |    |    |   |                        |       |    |    |   | Eastern Wood Pewee        |        |    |    |   | Seaside Sparrow      |        |    |    |   |

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| Species                 | PO    | PR | CO | A | Species                    | PO    | PR | CO | A | Species                | PO     | PR | CO | A | Species                   | PO    | PR | CO | A | Species              | PO    | PR | CO | A |
|-------------------------|-------|----|----|---|----------------------------|-------|----|----|---|------------------------|--------|----|----|---|---------------------------|-------|----|----|---|----------------------|-------|----|----|---|
| Pied-billed Grebe       | 006   |    |    |   | American Bittern           | 190   |    |    |   | Piping Plover          | 277    |    |    |   | Short-eared Owl           | 367   |    |    |   | Acadian Flycatcher   | 465   |    |    |   |
| Great Black-backed Gull | 047   |    |    |   | Eastern Least Bittern      | 191   |    |    |   | Wilson's Plover        | 280    |    |    |   | Barn Owl                  | 368   |    |    |   | Willow Flycatcher    | 466   |    |    |   |
| Herring Gull            | 051   |    |    |   | Great Blue Heron           | 194   |    |    |   | American Oystercatcher | 286    |    |    |   | Saw-whet Owl              | 372   |    |    |   | Least Flycatcher     | 467   |    |    |   |
| Laughing Gull           | 058   |    |    |   | Common Egret               | 196   |    |    |   | Chukker                | 288.2  |    |    |   | Screech Owl               | 373   |    |    |   | Horned Lark          | 474   |    |    |   |
| Gull-billed Tern        | 063   |    |    |   | Snowy Egret                | 197   |    |    |   | Bobwhite               | 289    |    |    |   | Great Horned Owl          | 375   |    |    |   | Blue Jay             | 477   |    |    |   |
| Forster's Tern          | 069   |    |    |   | Louisiana Heron            | 199   |    |    |   | Ruffed Grouse          | 300    |    |    |   | Monk Parakeet             | 382.6 |    |    |   | Common Crow          | FL48  |    |    |   |
| Common Tern             | 070   |    |    |   | Little Blue Heron          | 200   |    |    |   | Ring-necked Pheasant   | 309.1  |    |    |   | Yellow-billed Cuckoo      | FY397 |    |    |   | Fish Crow            | 480   |    |    |   |
| Roseate Tern            | 072   |    |    |   | Cattle Egret               | 200.1 |    |    |   | Turkey                 | 310    |    |    |   | Black-billed Cuckoo       | D388  |    |    |   | Starling             | ON493 |    |    |   |
| Least Tern              | 074   |    |    |   | Green Heron                | UN201 |    |    |   | Rock Dove              | N313.1 |    |    |   | Belted Kingfisher         | 390   |    |    |   | Bobolink             | 494   |    |    |   |
| Black Skimmer           | 080   |    |    |   | Black-crowned Night Heron  | P202  |    |    |   | Mourning Dove          | NE316  |    |    |   | Hairy Woodpecker          | FY393 |    |    |   | Brown-headed Cowbird | FL495 |    |    |   |
| Common Merganser        | 129   |    |    |   | Yellow-crowned Night Heron | 203   |    |    |   | Turkey Vulture         | 325    |    |    |   | Downy Woodpecker          | N394  |    |    |   | Red-winged Blackbird | UN398 |    |    |   |
| Red-breasted Merganser  | 130   |    |    |   | King Rail                  | 208   |    |    |   | Northern Harrier       | P331   |    |    |   | Pileated Woodpecker       | 405   |    |    |   | Eastern Meadowlark   | 501   |    |    |   |
| Hooded Merganser        | 131   |    |    |   | Clapper Rail               | 211   |    |    |   | Sharp-shinned Hawk     | 332    |    |    |   | Red-headed Woodpecker     | 406   |    |    |   | Orchard Oriole       | 506   |    |    |   |
| Mallard                 | FL132 |    |    |   | Virginia Rail              | 212   |    |    |   | Cooper's Hawk          | 333    |    |    |   | Red-bellied Woodpecker    | S409  |    |    |   | Northern Oriole      | FYE   |    |    |   |
| Black Duck              | 133   |    |    |   | Sora                       | 214   |    |    |   | Goshawk                | 334    |    |    |   | Common Flicker            | NY412 |    |    |   | Common Grackle       | FL521 |    |    |   |
| Cadwall                 | 135   |    |    |   | Black Rail                 | 216   |    |    |   | Red-tailed Hawk        | FL337  |    |    |   | Chuck-will's Widow        | 416   |    |    |   | Boat-tailed Grackle  | 523   |    |    |   |
| Green-winged Teal       | 139   |    |    |   | Common Gallinule           | 219   |    |    |   | Red-shouldered Hawk    | 339    |    |    |   | Whip-poor-Will            | 417   |    |    |   | Purple Finch         | X517  |    |    |   |
| Blue-winged Teal        | 140   |    |    |   | American Coot              | 221   |    |    |   | Broad-winged Hawk      | 343    |    |    |   | Common Nighthawk          | 420   |    |    |   | House Finch          | FL519 |    |    |   |
| Shoveler                | 142   |    |    |   | American Woodcock          | 221   |    |    |   | Bald Eagle             | 352    |    |    |   | Chimney Swift             | X423  |    |    |   | American Goldfinch   | D529  |    |    |   |
| Wood Duck               | ON44  |    |    |   | Common Snipe               | 230   |    |    |   | Peregrine Falcon       | 356    |    |    |   | Ruby-throated Hummingbird | NE428 |    |    |   | Vesper Sparrow       | 540   |    |    |   |
| Ruddy Duck              | 167   |    |    |   | Willet                     | 258   |    |    |   | American Kestrel       | P360   |    |    |   | Eastern Kingbird          | NE444 |    |    |   | Savannah Sparrow     | 542   |    |    |   |
| Canada Goose            | NY72  |    |    |   | Upland Sandpiper           | 261   |    |    |   | Osprey                 | 364    |    |    |   | Great Crested Flycatcher  | 452   |    |    |   | Hermit's Sparrow     | 547   |    |    |   |
| Mute Swan               | 178.2 |    |    |   | Spotted Sandpiper          | P263  |    |    |   | Barn Owl               | 365    |    |    |   | Eastern Phoebe            | 456   |    |    |   | Sharp-tailed Sparrow | 549   |    |    |   |
| Glossy Ibis             | 186   |    |    |   | Killdeer                   | DD273 |    |    |   | Long-eared Owl         | 366    |    |    |   | Eastern Wood Pewee        | S461  |    |    |   | Seaside Sparrow      | 550   |    |    |   |

# CRITERIA FOR BREEDING EVIDENCE

## POSSIBLE BREEDING (PO)

- x Species observed in breeding season in possible breeding habitat.
- x Singing male(s) present or heard in breeding season.

## PROBABLE BREEDING (PR)

- P Pair observed in suitable habitat in breeding season.
- S Singing male present on more than one date in one place.
- T Bird (or pair) apparently holding territory.
- D Courtship and display, agitated behavior, well developed brood patch or cloacal protuberance.
- 1/3 N Visiting probable nesting site.
- 1/3 S Nest building by wrens, woodpeckers, and Monk Parakeet.

## CONFIRMED BREEDING (CO)

- DD Distraction display or injury feigning.
- NO Nest building by any species except wrens, woodpeckers, and Monk Parakeet.
- UN Used nest found.
- FE Female with egg in oviduct.
- FL Recently fledged young.
- FS Adult carrying fecal sac.
- FY Adult(s) with food for young.
- ON Adult(s) entering or leaving nest site, indicating occupied nest. Not generally used for open nesting birds.
- NE Identifiable nest and eggs, bird sitting on nest or eggs, identifiable eggshells found beneath nest, or identifiable dead nestling(s).
- NY Nest with young.

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| Species                 | PU    | PK | LU | A    | Species                    | PU    | PK | LU | A    | Species                | PU    | PK | LU | A  | Species                   | PU    | PK | LU | A | Species            | PU                    | PK  | LU | A |    |       |
|-------------------------|-------|----|----|------|----------------------------|-------|----|----|------|------------------------|-------|----|----|----|---------------------------|-------|----|----|---|--------------------|-----------------------|-----|----|---|----|-------|
| Pied-billed Grebe       | 006   |    |    |      | American Bittern           | 190   |    |    |      | Piping Plover          | 277   |    |    |    | Short-eared Owl           | 367   |    |    |   | Acadian Flycatcher | 463                   |     |    |   | S  |       |
| Great Black-backed Gull | 047   |    |    |      | Eastern Least Bittern      | 191   |    |    |      | Wilson's Plover        | 280   |    |    |    | Barn Owl                  | 368   |    |    |   | Willow Flycatcher  | 466.4                 |     |    |   | NE |       |
| Herring Gull            | 051   |    |    |      | Great Blue Heron           | 194   |    |    | ✓    | American Oystercatcher | 286   |    |    |    | Saw-whet Owl              | 372   |    |    |   | Least flycatcher   | 467                   |     |    |   |    |       |
| Laughing Gull           | 058   |    |    |      | Common Egret               | 196   |    |    |      | Chukar                 | 288.2 |    |    |    | Screech Owl               | 373   |    |    |   | Horned Lark        | 474                   |     |    |   |    |       |
| Gull-billed Tern        | 063   |    |    |      | Snowy Egret                | 197   |    |    |      | Bobwhite               | 289   |    |    |    | Great Horned Owl          | 375   |    |    | ✓ | FL                 | Blue Jay              | 477 |    |   |    | FY    |
| Forster's Tern          | 069   |    |    |      | Louisiana Heron            | 199   |    |    |      | Ruffed Grouse          | 300   |    |    |    | Monk Parakeet             | 382.6 |    |    |   | Common Crow        | 485                   |     |    |   |    | FL    |
| Common Tern             | 070   |    |    |      | Little Blue Heron          | 200   |    |    |      | Ring-necked Pheasant   | 309.1 |    |    | BT | Yellow-billed Cuckoo      | 397   |    |    |   | FY                 | Fish Crow             | 490 |    |   |    |       |
| Roseate Tern            | 072   |    |    |      | Cattle Egret               | 200.1 |    |    |      | Turkey                 | 310   |    |    |    | Black-billed Cuckoo       | 388   |    |    |   | D                  | Starling              | 493 |    |   |    |       |
| Least Tern              | 074   |    |    |      | Green Heron                | 201   |    |    | P UN | Rock Dove              | 313.1 |    |    | N  | Belted Kingfisher         | 390   |    |    | ✓ |                    | Bobolink              | 494 |    |   |    |       |
| Black Skimmer           | 080   |    |    |      | Black-crowned Night Heron  | 202   |    |    | P    | Mourning Dove          | 316   |    |    | NE | Hairy Woodpecker          | 393   |    |    |   | FY                 | Brown-headed Cowbird  | 495 |    |   |    | FY    |
| Common Merganser        | 129   |    |    |      | Yellow-crowned Night Heron | 203   |    |    |      | Turkey Vulture         | 325   |    |    |    | Downy Woodpecker          | 394   |    |    |   | PN                 | Red-winged Blackbird  | 496 |    |   |    | UN    |
| Red-breasted Merganser  | 130   |    |    |      | King Rail                  | 208   |    |    |      | Northern Harrier       | 331   |    |    |    | Pileated Woodpecker       | 405   |    |    |   |                    | Eastern Phoebe        | 502 |    |   |    |       |
| Hooded Merganser        | 131   |    |    |      | Clapper Rail               | 211   |    |    |      | Sharp-shinned Hawk     | 332   |    |    |    | Red Headed Woodpecker     | 406   |    |    |   |                    | Orchard Oriole        | 506 |    |   |    |       |
| Mallard                 | 132   |    |    | R FL | Virginia Rail              | 212   |    |    |      | Cooper's Hawk          | 333   |    |    |    | Red-bellied Woodpecker    | 409   |    |    |   | S                  | Northern Oriole       | 507 |    |   |    | FY    |
| Black Duck              | 133   |    |    |      | Sora                       | 214   |    |    |      | Goshawk                | 334   |    |    |    | Common Flicker            | 412   |    |    |   | NY                 | Common Grackle        | 511 |    |   |    | WB FL |
| Gadwall                 | 135   |    |    |      | Black Rail                 | 216   |    |    |      | Red-tailed Hawk        | 337   |    |    | FL | Chuck-will's Widow        | 416   |    |    |   |                    | Boat-tailed Grackle   | 513 |    |   |    |       |
| Green-winged Teal       | 139   |    |    |      | Common Gallinule           | 219   |    |    |      | Red-shouldered Hawk    | 339   |    |    |    | Whip-poor-Will            | 417   |    |    |   |                    | Purple Finch          | 517 |    |   |    |       |
| Blue-winged Teal        | 140   |    |    |      | American Coot              | 221   |    |    |      | Broad-winged Hawk      | 343   |    |    |    | Common Nighthawk          | 420   |    |    |   |                    | House Finch           | 519 |    |   |    | FL    |
| Shoveler                | 142   |    |    |      | American Woodcock          | 221   |    |    |      | Bald Eagle             | 352   |    |    |    | Chimney Swift             | 423   |    |    | ✓ |                    | American Goldfinch    | 524 |    |   |    | D     |
| Wood Duck               | 144   |    |    | P ON | Common Snipe               | 230   |    |    |      | Peregrine falcon       | 356   |    |    |    | Ruby-throated Hummingbird | 428   |    |    | ✓ | NE                 | Tree Sparrow          | 541 |    |   |    |       |
| Ruddy Duck              | 167   |    |    |      | Willet                     | 258   |    |    |      | American Kestrel       | 360   |    |    | P  | Eastern Kingbird          | 444   |    |    |   | NE                 | Savannah Sparrow      | 545 |    |   |    |       |
| Canada Goose            | 172   |    |    | NY   | Upland Sandpiper           | 261   |    |    |      | Osprey                 | 364   |    |    |    | Great Crested Flycatcher  | 452   |    |    |   | T                  | Henslow's Sparrow     | 547 |    |   |    |       |
| White Swan              | 178.2 |    |    |      | Spotted Sandpiper          | 262   |    |    | D    | Barn Owl               | 365   |    |    |    | Eastern Phoebe            | 456   |    |    |   |                    | Sharp-shinned Sparrow | 548 |    |   |    |       |





## *Bergen County Audubon Society*

Statement submitted to the Senate Land Use Management and Regional Affairs Committee on the proposed "Watershed Protection Act" (S.2339) and related issues.

May 23, 1990

--For Immediate Release--

I am David Hall, Director of Legislation for the Bergen County Audubon Society. John Traynor has already spoken about our concerns regarding wildlife populations and their dependence on the Hackensack watershed for suitable habitat. I would like to speak further on the importance of maintaining the watershed lands as a buffer for protecting water quality. There is a frightening change in the attitude of the Hackensack Water Company towards the importance of maintaining high water quality within the reservoir system itself. The buffer lands around the system were established many years ago by far-sighted people who realized that water quality was best ensured by restricting public access to the immediate surface water feeding into the reservoir system which they created. The new "best information" seems to be that a modern filtration plant can take all pollutants <sup>of</sup> <sub>^</sub> the reservoir water just before its use by the public. Thus the buffer lands become dispensable and the Hackensack Water Company is eager to sell them for development.

We have several disagreements with this policy. First of all, the loss of buffer zones and the degradation of water quality within the reservoir has the potential to harm the wildlife populations which currently depend upon these waters. The filtration plant downstream will surely not protect the reservoir's function as wildlife habitat if pollutants are allowed to enter from upstream of the reservoir.

Secondly, the confidence of the engineering community in this filtration plant for protecting our drinking water seems overblown. Need we remind you of the recent fiasco in France with the filtration of Perrier water? A little overconfidence can lead to harming ourselves. Who wants to sponsor the Chernobyl of drinking water disasters? Who can predict what sorts of pollutants will next enter the watershed? The general rule is that water quality testing lags several decades behind the chemical industry's inventiveness in creating new classes of toxic compounds. In addition, there are growing industries trying to encourage the public to spray our yards with toxic herbicides and pesticides, all of which flow down the street and into surface waters.

It took decades of using DDT indiscriminately before we came to realize that DDT could cause general detrimental effects to wildlife and perhaps to ourselves. Today we know of surface waters in the Eastern industrial states that are irreversibly contaminated with PCBs, Kepone, gasoline, trichloroethylene, and mercury, most stemming from industrial processes or commercial establishments founded in the 1940s, 50s and 60s. Regular testing for these compounds didn't begin until many years after their entry into surface waters. "Modern" commerce and industry may have moved beyond some of these procedures, but now we are just learning about new problems with dioxins and other unintended chemical byproducts. Again the same rule applies; dioxins were contaminating our environment for many years before anyone thought to test for them, years when the hazard was unrealized and the chemical product undetectable by then "state of the art" methods. We frankly don't know what new toxic compounds to test for today, we don't know which compounds will be invented next, and we don't know which new compounds will enter commercial use next. Furthermore, we don't know which compounds might be used by new tenants who would move into developments surrounding New Jersey's reservoir systems when and if their buffer zones are dismantled. Since New Jersey remains a key center for the chemical industry, this is a serious concern.

We Audubon members are frequent visitors of all the remaining open spaces in Bergen

County and around the state - we are "connoisseurs" of open space, as are the birds we like to study. We can tell you that any open space in the state, any field, meadow or forest that is not under lock and key is constantly subject to midnight dumping of refuse, chemical drums, construction debris, and anything which costs a lot of money to dispose of properly. The main reason we can rely on drinking any surface water is that our watershed buffer zones remain protected behind chain link fences. If you allow new development within the buffer zones, no matter what regulations you write in Trenton, you can be assured that more dumping will immediately follow along the back property lines of each new development. Moreover, the new residents in these former buffer zones will demand the right to spray their properties with pesticides, herbicides, etc. just as they have learned to do elsewhere. Filtration plants may have their uses, but we would rather trust in chain link fences. There will always be new compounds coming into use that have no place in our water supply. Human nature being what it is, your regulations will rarely achieve the good results of a sturdy fence.

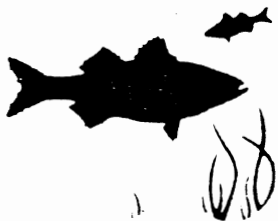
What we can surmise is that the highest level of water quality is going to be ensured by retaining adequate buffer zones around our water systems statewide. The buffers surrounding the Hackensack watershed seem only barely adequate right now. There is no excuse for overconfidence about the future of our water quality. The highest public interest will be served by maintaining and protecting each water reservoir with substantial buffer lands as has been done in the past.

Submitted by

Dr. David H. Hall  
Director for Legislation  
Bergen County Audubon Society

4 Cavell Place  
West Caldwell, NJ 07006

(201) 226-7825



# PASSAIC RIVER COALITION

246 MADISONVILLE ROAD, BASKING RIDGE, NJ 07920 (201) 766-7550

Statement before the Senate Land Use Management and Regional Affairs Committee, Paramus Borough Hall, Paramus, New Jersey, May 23, 1990

Presented by: Ella F. Filippone, Executive Administrator

The Passaic River Coalition is a watershed association which has been involved with water resources management issues since 1969. We have participated in numerous activities during this more than twenty year period related to water supply and water quality. As a member of the agenda committee for the State Water Supply Master Plan, we joined with the other watershed associations in requesting that a study be undertaken on watershed and aquifer protection. The Rutgers Study, published last year, is the outcome of that request. Traditionally the Division of Water Resources has undertaken structural projects as opposed to nonstructural. Thus today's hearing is most welcome and long overdue.

Before commenting on watershed protection needs in the State of New Jersey, I'd like to point out that under the Water Supply Master Plan preliminary studies, one was completed regarding the conflicts presented to the state because of the differing kinds of water purveyors --- the private and public. While the state may and does subsidize public purveyors, it cannot provide similar funds to the private, stockholder-owned company. The need to protect the watershed within a franchise area remains the same; however, the private company, as part of the free enterprise system, cannot obtain similar government subsidies. Thus in discussing state programs, the equity of using public funds to benefit private companies is a difficult issue to resolve.

## Anti-Degradation Policy

Under the federal Clean Water Act, every state must adopt an anti-degradation policy. New Jersey integrated such a policy in the late 1970's into its surface water classification system, emphasizing that discharges into streams shall not demonstrate any "measurable change in quality." Thus, any alteration of the land should not cause pollution to occur. While this concept, which focuses on preventing pollution from getting worse, is part of the DEP regulations, follow-through has been poor. The reason for this is that in order to enforce an antidegradation policy, new techniques would have to be used, which, of course, would add to the cost of a project. In addition, all too often, in order not to degrade a river or stream, maximum development of a site might not occur, thus effecting the profit of the developer.

We recommend that an antidegradation policy, such as the one attached as Exhibit 1 be adopted as law in New Jersey.

## Watershed Protection

We anticipate that discussion on reservoir protection will be ongoing for some time. However, at this point, we would like to emphasize that in our opinion buffer zones should not be considered the only method needed to protect water quality in our reservoir systems. The best approach would be to evaluate each system on its own under a set of guidelines, developed with certain goals in mind. The establishment of buffer zones at the present time should be considered as a first step or an interim step in beginning to manage our watershed lands.

While two reports have now been published, one by Rutgers and the other by the BPU, neither has provided the guidance necessary to properly manage watershed lands. We suggest that the legislature undertake its own evaluation of the need to alter the manner in which land use takes place in those portions of New Jersey which provide water supplies to the public. The State should also determine which lands should be preserved in perpetuity to protect the potable waters of the state. Working with watershed associations might be a place to start, as these organizations have a direct relationship to the natural resource protection ethic.

## Buffers around Reservoirs

A distinction should be made between developed, developing and un-developed areas in the State as they relate to buffer zone strategies. Clearly, buffers are but one method of protecting our water supply reservoirs. Wherever possible, we would prefer to see all lands to the ridge line of the catchment area in public ownership. Where this is not possible, some accommodation must be made based on good science, dealing with slope, drainage, soils, vegetative cover, and surrounding land uses with proper identification of any high risk facilities within the watershed. Currently, some similar issues are being raised and evaluated under the wellhead protection program. Similar techniques should be employed for watershed protection.

## Buffer Strips

Buffer strips should be maintained to prevent the formation of gullies and excessive erosion. Guidelines should be written for use of specific vegetation within buffer strips. Consideration must also be given to the effectiveness of the buffers during the winter months. Dense planting of pine trees has been an effective strategy for control of runoff in the winter months because of the thick layer of pine needles that collect stormwater contaminants.

Streams which feed into reservoirs are an important component of the water supply system. If these streams are not protected, then buffer strips around reservoirs will only be minimally effective. It is recommended that the reservoir buffers be extended to include the feeder streams.

The water purveyor is responsible for the quality of their public

water supply. As such, they should be given greater authority to review developments along tributary streams to the reservoir. Water purveyors should be granted such authority and their recommendations should have the force of law. This suggestion can work well for public purveyors; however, where a private purveyor is involved, authority should be vested in a public entity close to the region via a written directive from the State. Certain financial arrangements could then be made with the private purveyor for services rendered.

The legislature did establish the North and South Jersey Water Supply Districts. While the North Jersey District has been functioning effectively for some time, South Jersey never got under way. Consideration might be given to have this water supply commission have a more meaningful voice with regard to activities feeding into reservoirs. Currently, their strongest voice is after-the-fact when it should be just the other way around.

#### Soil Conservation Practices

As development continues to encroach on our water supply resources, the problem of soil erosion and sedimentation also grows. County Soil Conservation Districts are limited in the enforcement of their regulations by staff and funding restrictions, especially now with the major budget cut on the Department of Agriculture. As such, it is recommended that greater oversight and enforcement of soil conservation regulations be given to municipalities (building inspectors). This includes review of certified soil conservation plans and enforcement of violations. Monetary penalties for violations should be more stringent, and all fines should go to the municipality involved with this program.

#### Category One Streams

Category One streams, or Trout Production waters, are our highest quality water supply sources, and they must be protected accordingly. These streams are protected by the State's Anti-Degradation policy. This policy needs stringent enforcement if it is to be effective. These streams must be given first priority in any decisions made regarding buffer zones, and discharges from development.

Stormwater discharges into Category One streams must provide safeguards so that degradation of the stream does not occur. When the Soil Conservation Service is involved in a project, the State's antidegradation policy must be honored. Thus, an accepted Soil Conservation Service policy of using retention basins which contain 70 percent of the sediments from a development is no longer acceptable. The 30 percent which currently ends up in a Category One stream degrades the stream and thus high water quality and habitat are lost.

### Interstate Waters

Greater attention must be given to streams which cross state boundaries. These high quality streams must be protected from interstate pollution. For years the Passaic River Coalition has sought to have the stream classifications in New York upgraded to a comparable standing as water flowing into Connecticut from New York. The Connecticut classification is a AA-Special. Currently, New York is reviewing an upgrade from "D" to "C," which is totally unacceptable. Just last week, we requested a hearing on a sewage treatment plant being planned for a housing development in New York which would discharge directly into the Ringwood River, which flows into the Wanaque Reservoir, the drinking water supply for over 2 million people in northern New Jersey. If the classification remains at "D" or "C," degradation should occur.

While one meeting has been held between the two states, considerable information needs to be gathered so that we may protect our water supplies. For example, Superfund sites exist across the border, which could effect our surface and ground waters. The Passaic River Coalition has been getting 'phone calls about a wide variety of pollutants which will sooner or later reach our drinking water supplies. Because of the lack of an interstate agreement, such problems do not get resolved. The legislature should require that a similar agreement should be entered into with New York as exists between New York and New Jersey.

### Best Management Practices

The use of Best Management Practices or BMP's is an important part of water supply management. Non-structural approaches, such as zoning, street sweeping, vegetative BMP's, grass swales and filter strips should be widely used. Maintenance should be a separate management element, functioning under a well defined plan. A wide variety of BMP's needs to be established for watershed protection.

### Road Salts

The Departments of Transportation and Environmental Protection must develop an agreement regarding the application of road salts on roads adjacent to water supply reservoirs. The DOT should be required to use the least environmentally damaging substance available in these areas. The DEP should provide recommendations on this subject if necessary.

### Point Sources of Pollution

The statement in the Rutgers Report: "...point source discharges of wastewater are sufficiently regulated under the NJPDES rules..." is not accurate. This program has not worked as well as it should have over the years, and all point source are not adequately regulated; they only oversee what is being disposed of

Into receiving waters. The control of point sources of pollution must not be overlooked. To address this, highest priority must be given to bringing Wastewater Treatment Plants to their highest level of treatment as outlined in the State's 208 Plan, and eliminating pollution from point sources, especially those which discharge into waters used for potable water supplies as a first priority. The highest priority must be given to upgrading plants which discharge into drinking water supplies, and every effort must be made to eliminate the NJPDES permit program altogether so that what goes into our rivers and streams meets the "no measurable change" policy.

#### Stormwater Discharges

Stormwater discharges into feeder streams above reservoirs and into reservoirs should not be permitted. At the planning board level and under the N.J. stream encroachment system, greater attention must be given to control of sediment and other pollutants coming through the drainage systems.

#### Creation of a Blue Acres Fund

The State must recognize that an adequate and high quality water supply is of major economic importance and is critical to the maintenance of public health. As such, watershed protection cannot go forward without a dedicated fund to acquire watershed lands, prime recharge lands, wellhead protection areas, or pay in-lieu-of-taxes.

While the Assembly has begun deliberations on a water tax or surcharge, consideration should be given to applying a charge or tax onto the water user. The following chart is based on an annual average daily use of 990 mgd, which is the amount used by the 25 major water purveyors in the state, which supply 75 per cent of all potable water, to which was added an additional 25 per cent.

| <u>Add per</u><br><u>1,000 gal.</u> | <u>Annual Return</u> | <u>Annual Cost to</u><br><u>Family of Three</u> |
|-------------------------------------|----------------------|---|
| \$ .01                              | \$ 3,613,500         | \$ .66  |
| .02                                 | 7,227,000            | 1.31  |
| .03                                 | 10,840,500           | 1.97  |
| .04                                 | 14,454,000           | 2.64  |
| .05                                 | 18,067,500           | 3.30  |

Under this program, we suggest that lands be treated in a similar manner as Green Acres lands, so that the proposed sale of such lands would first be offered to the state, county, or municipality in which it is located. Relief from the property tax would clearly benefit certain large watershed land owners.

We have been working on a more detailed funding program; however, at this time, we would like to conclude by emphasizing that the watershed protection program should be based on good science, defensible in court, and not on arbitrary figures. Thank you.



## EPA ANTIDegradation Policy

The antidegradation policy adopted by EPA which acts as minimum guidance to the states is as follows:

(1) Existing instream water uses shall be maintained and protected. No further water quality degradation which would interfere with or become injurious to existing instream water uses is allowable.

(2) Existing high quality waters which exceed those levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water shall be maintained and protected unless the State chooses, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, to allow lower water quality as a result of necessary and justifiable economic or social development. In no event, however, may degradation of water quality interfere with or become injurious to existing instream water uses. Additionally, no degradation shall be allowed in high quality waters which constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and feasible management or regulatory programs pursuant to section 208 of the Act for nonpoint sources, both existing and proposed.

Reference: EPA Rules and Regulations, 40 CFR Part 130 (130.17 (e) (1) and (2).

SYLVIA SPAETH

River Edge Environmental Protection  
Commission

wants to go on record in support

of as strong a bill possible to

preserve water quality and

open spaces.

Rec'd by  
S. Spaeth

MAY 11 1990

May 10, 1990

Senator Paul Contillo  
90 Main Street  
Hackensack, NJ 07601

RE: PUBLIC HEARING ON SENATE BILL NO. 2339, THE PROPOSED  
"WATERSHED PROTECTION ACT" AND RELATED ISSUES

Dear Senator Contillo:

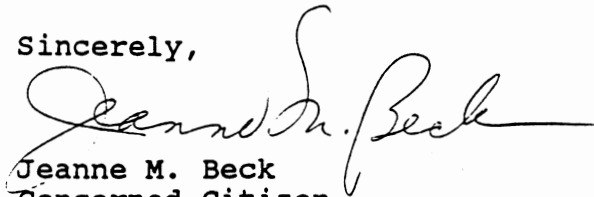
Due to the fact that the above referenced public hearing will take place during business hours on Monday, May 23, 1990 at 2:00 PM, I am unable to attend. However, I would like my voice to be heard in support of the proposed "Watershed Protection Act".

I hereby submit one of many letters I have written on the subject of watershed protection which I request that you in turn submit to the Committee on my behalf.

To preserve Nature ensures our own preservation.

Please pass the proposed "Watershed Protection Act" into law.

Sincerely,



Jeanne M. Beck  
Concerned Citizen  
34 Charles Street, #1-C  
Westwood, NJ 07675

Enclosure

May 10, 1990

Senator Paul Contillo  
90 Main Street  
Hackensack, NJ 07601

Dear Senator Contillo:

I submit this letter with great trepidation about the future of our watershed lands, specifically addressing the transactions made by Hackensack Water Company/Rivervale Realty, which, being one in the same, are aiming to destroy our precious and necessary watershed properties in order to achieve monetary gain, at the cost of placing the general public in a precariously dangerous position.

May I also point out that Hackensack Water Company/Rivervale Realty received its watershed properties for free, as a necessity in order that the said company could uphold its promise to the public, which it serves, to supply us with pure, clean water. These watershed lands protect not only our water supply, but our air, and support a rich diversity of flora and fauna, without which we would either perish from contaminated drinking water and/or deprivation of seeing the beauty of Nature -- what little is left here in New Jersey. (It's quite ironic that New Jersey is called the Garden State.)

I hereby express my personal outrage at the underhanded and biased decision made by the Board of Public Utilities to approve the transfer of watershed lands from Hackensack Water Company to its sister company, Rivervale Realty. Further, I urge you to investigate the legality of this transfer of lands to Hackensack Water Company's sister company, Rivervale Realty.

I also urge you to consider the true motive behind the decision of the Board of Public Utilities to vote for this transfer/destruction of our public lands at 4:00 PM, via telephone, on the last day of their duration in office. May I please remind you that the Board of Public Utilities had been granted the public trust and I am confident when I say that I speak for the majority of residents effected, that our trust has been betrayed.

This action toward the potential destruction of our necessary watershed properties deserves your urgent attention and consideration of the practical and ethical issues involved. Once our lands are destroyed there is only danger on our horizon in the form of:

## Water &amp; Air Pollution

Increased population brings increased chemical pollution (insecticides/pesticides) into our water supply and no amount of sophisticated machinery can purify our water as effectively as Nature's herself -- and machines break down. Trees clean the air; land cleans the water.

## Demands/Drought

Increased population brings increased demands on our water supply which has a history of becoming too low in drought times, which are more frequent (almost every summer) as the planet warms. This warming is further increased (even noticeable on Old Hook Road once you leave the watershed area and travel the roads) as more pollutants are introduced such as automobiles, trucks and buses.

## Environmental Destruction

Extinction is forever. It took several hundred years for the watershed properties to develop their resident flora and fauna. It can take one minute for one person of influence to make a negligent decision to destroy it -- don't let that person be you.

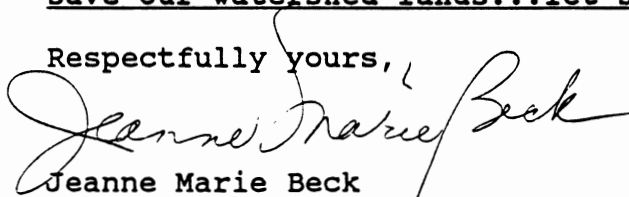
## Ethics

Only mankind is guilty of greed. The public has witnessed this grossly irresponsible action on the part of Hackensack Water Company/Rivervale Realty and the Board of Public Utilities.

Unfortunately, no matter how we, the people, plea for safety of our drinking water, reserved quantity of our drinking water, and the assurance that future generations are safe, the decisions remain in the hands of only a relative few. Please, help us fight for our rights and to preserve our environment.

In a time when ecology and the environment are fast becoming issues superseding the greed for monetary gain, it is hard to believe that anyone could even consider or willingly choose destroying Nature in its purity and serenity for bulldozers, blacktop, cement, unoccupied office buildings (of which we are inundated), lawn chemicals, increased traffic in the form of polluting trucks, buses and automobiles, and a denser population which always leads to more crime for an already understaffed police force. What ever happened to the old fashioned, but never out of style, saying: "The best things in life are free." Look around...let's save Nature...let's save our watershed lands...let's save our future.

Respectfully yours,



Jeanne Marie Beck  
Concerned Citizen  
34 Charles Street, #1-C  
Westwood, NJ 07675

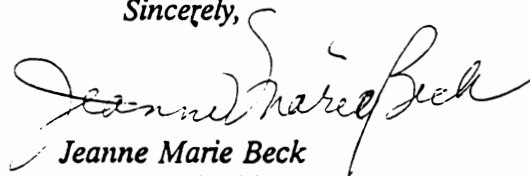
May 10, 1990

To Whom It May Concern:

To preserve Nature  
ensures our own preservation.

Please pass the proposed  
"Watershed Protection Act" into law.

Sincerely,

A handwritten signature in cursive script, reading "Jeanne Marie Beck". The signature is written in dark ink and is positioned above the printed name.

Jeanne Marie Beck  
Concerned Citizen  
34 Charles Street, #1-C  
Westwood, NJ 07675

# Assembly Republican News

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CONTACT:

- 1 -

## WATERSHED TESTIMONY

By Assemblyman Patrick J. Roma

May 23, 1990

Mr. Chairman, members of the committee.

Thank you for allowing me this opportunity to address Senate Bill 2339, which I consider one of the most important pieces of environmental legislation we have dealt with in quite some time.

I am a sponsor of A-3102 in the Assembly which would extend the present moratorium on the conveyance of watershed protection property which we established by law in 1988. As you may know, that bill is on second reading in the Assembly, having been approved by committee, and I expect we will be voting in the full Assembly shortly.

The legislation before us today -- requiring that the Department of Environmental Protection adopt rules and regulations establishing 500-foot buffer zones for all watershed lands which are associated with public water supply reservoirs -- is one more important piece of the puzzle as we work to protect New Jersey's drinking water.

Fewer efforts with which we have engaged are important than the task before this committee today. For if we do not act to protect watershed lands and therefore protect our supplies of safe drinking water, we jeopardize not just our generation but future generations as well.



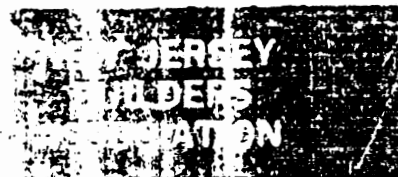
Watersheds act as a natural filter, cleaning our water of pollutants the good old fashioned way -- with Mother Nature's help. But we simply cannot allow this property to be destroyed by development and thereby destroy its cleansing capability.

The development pressures on watershed properties are overwhelming because those lands are among the few remaining open spaces in places like Bergen County. That's another reason why we in the legislature should stand strong to protect these lands.

Mr. Chairman, I want to congratulate you for scheduling this bill and I am hopeful that the legislation will be passed by this committee and posted for a vote as soon as possible.

Thank you.

101 MORGAN LANE, PLAINSBORO, NEW JERSEY 08536 • (609) 275-8888 • FAX (609) 275-4411



The Honorable Paul J. Contillo  
90 Main Street  
Hackensack, NJ 07601

RE: Senate Bill 2339, Watershed Protection Act

Dear Senator Contillo:

Our purpose in writing you is to state our concerns regarding Senate Bill 2339, The Watershed Protection Act. As you may recall, Mr. Carl Goldberg testified on behalf of the New Jersey Builders Association at the May 23 public hearing in Paramus.

While we share your goal of protecting our surface drinking water supplies from non point source pollution and degradation, we have serious concerns with the extent of land within which buffer areas are to be required (38% of the State according to a Department of Environmental Protection, December 1989, report) and with giving the Department virtually unlimited authority to devise a multi-zone buffer system around waterways in this area.

We recommend that the bill be revised to limit its scope to protection of water supply reservoirs, and not all waterways within the watershed. Without this change, the DEP could theoretically require buffers around all waterways in the State without any scientific justification simply because the waterway (even if it is an intermittent one) eventually drained into a river along which there is a water supply intake. We also suggest that the legislation state that the width of the buffer areas will generally decrease as one gets farther away from the water supply source, which is consistent with scientific principles.

WAYNE L. KARNELL

GEORGE H. KAREN  
is Vice President  
JOSEPH RIGGS  
is President-Elect  
BERT BITTENBENDER  
is President-Associate Affairs  
and Referee  
of the Council.  
The Club de Compagnie

GREGORY C. FALLON  
Second Vice President  
JOHN FALLONE  
Vice President-elect  
PATRICK J. O'KEEFE  
Executive Vice President  
Michael Gross, Esq.  
Lawyer/President Counsel  
PETER J. S. PETERSON  
Finance Consultants



• National Association of Home Builders • Atlantic Builders Association of New Jersey • Home Builders Association of Cape May County • Central Jersey Builders Association • Builders Association of Metropolitan New Jersey • Builders Association of Northern New Jersey • Home Builders Association of Northwest New Jersey • New Jersey Shore Builders Association • Builders Association of Somerset & Morris • Builders League of South Jersey • Builders Political Action Committee of New Jersey • Home Owners Warranty Corporation of New Jersey • Insurance Trust of the New Jersey Builders Assoc. • Institute of Multi-Family Housing

"No man has the moral right to withhold his support from an organization that is striving to improve conditions within his trade sphere." — Theodore Roosevelt

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Senator Contillo

June 8, 1990

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Regarding the unlimited authority to DEP, we believe that the Department's discretion should be limited. Our concern is based on the fact that nowhere in the legislation are the size of the buffer areas, or the activities that are to be regulated, identified. The Legislature should place limitations on the size of these buffers. We should not readily forget the years of debate that centered around the Freshwater Wetlands Act in which a delicate compromise was reached on buffers. Even with this care, this program has run into numerous problems, not the least of which are three law suits in which the courts have struck down DEP's Regulation. Unlike recent environmental legislation, this bill gives too much discretion to DEP.

With the enactment of New Jersey's Freshwater Wetland Protection Act in 1987, all state open waters that are surrounded by wetlands (including reservoirs and their tributaries) automatically have a buffer ranging from fifty to one-hundred and fifty feet.

We also urge you to include a provision to provide for legislative oversight so that the Legislature is aware of the regulations that result from this effort and to this end, we recommend that:

- \* The DEP be required to hold two legislative hearings as was done with the State Highway Access Management Code in addition to the usual public hearings on the proposed buffer regulations. These hearings should provide for at least 30 days notice after publication in the N.J. Register; and
- \* A DEP Watershed Advisory Committee be created on which representatives of various interests will be represented, including builders and developers, to assure that balanced rules are adopted.

We believe that the legislative oversight is critical to assure that the regulated community has ample opportunity for input and that the DEP is responsive to public comments.

The NJBA recommends that further changes be incorporated as follows:

- \* Extend the timeframe within which the DEP is to adopt rules to two years to allow for sufficient public notice, legislative hearings and resolution by the Advisory Committee;

Senator Contillo  
June 8, 1990  
Page three

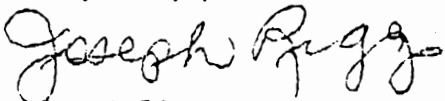
- \* Add a provision that states that DEP is not to establish a new permit program but is to simply require compliance with certain best management practices that are to be developed;
- \* Require DEP to identify the amount of land that will be removed from development potential due to the imposition of the multi-buffer zones;
- \* Require DEP to review its current regulatory programs to determine ways in which they can be revised to accomplish the objectives of this bill, for example, encourage the use of centralized wastewater treatment systems as opposed to individual septic;
- \* Require DEP to explore the use of voluntary incentive programs to minimize non point source pollution by promoting clustered housing, etc.; and
- \* Revise Section Two to clarify that there are presently several regulatory programs that presently exist in New Jersey for regulating non point source pollution considered to be a major cause of water quality degradation in the state including, but not limited to standards related to septic systems, underground storage tanks, soil erosion and sediment control, freshwater wetlands and their transition areas and others.

In closing, there is no question that an adequate and safe water supply is essential to the home building industry and the public. We also do not dispute the fact that buffer zones around water supply reservoirs serve a useful function and are a necessary component to a sound watershed management strategy. For this reason, the NJEA has helped to found a private corporation named "RESPONSE" whose goal is to minimize and control non point source pollution through public education and other means.

Senator Contillo  
June 8, 1990  
Page four -

We will be calling your office to set up a meeting to discuss with you personally this issue of vital concern.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Joseph Riggs".

Joseph Riggs  
Vice President and Chairman  
Environmental Committee

cc: Robert Karen; Vice President and Chairman  
Legislative Committee  
Patrick O'Keefe  
Marianne Rhodes  
Michael McGuinness

LTRCON



**association of new jersey  
environmental commissions**

Testimony for the Senate Land Use Management and Regional  
Affairs Committee Public Hearing on Senate Bill No. 2339  
May 23, 1990

Marcianna Caplis, Project Director  
Association of New Jersey Environmental Commissions

The Association of New Jersey Environmental Commissions is a non-profit educational organization for the state's 300 municipal and county environmental commissions. For nearly 20 years our members have been working with local planning and zoning boards, county, state and federal agencies to protect valuable natural resources through a variety of open space preservation techniques. The protection of watersheds is imperative.

I need not emphasize to the Committee how essential water is to living things. We are all based, quite literally at the cellular level, on water. Our fresh water supply source is precipitation which collects on the surface of the land and percolates to ground water. In the northern region of New Jersey, where the state's human population is most densely concentrated, we depend on surface water sources to meet our water needs.

While our watersheds have long been mapped and named, their workings have not been understood. Like so many mechanisms in natural systems, the complex functioning of watersheds has gone unnoticed. There are two exceptions: when the workings of the watershed interfere with us (flooding is an example), and when the watershed cannot function well (an example is the silting in of a reservoir). Good planning and vigilant watershed protection can reduce the likelihood of both.

Construction and development, or urbanization, on watershed lands has very serious impacts on the quality and even the quantity of the watershed's water. Essentially, the replacement of soil and vegetative ground cover with impervious "built" surfaces prevents precipitation from entering the ground and directs it into gutters and storm sewers. Stream changes of increased volumes and peak discharges result, along with increased frequency and severity of flooding, increased runoff velocity, stream widening, streambank erosion and undercutting. These hydrologic modifications are categorized by the EPA as a major source of non-point pollution.

Another EPA category of non-point pollution is urban runoff, which rivals agriculture as the worst non-point polluter, and which is a far more serious polluter in northeastern New Jersey. In discussion of construction on watershed lands and the resulting urban cover, sediment is the major polluter impacting water quality. Sediment destroys wildlife habitat by covering feeding, spawning and nesting areas. It decreases light transmission through water, decreasing food supply and the viability of aquatic life. This increased turbidity lowers the water's oxygen concentration, while urban runoff contains large quantities of oxygen-demanding materials, further reducing the oxygen levels. If dissolved oxygen levels drop too far, the result is a septic body of water. A lake or reservoir can be lost through eutrophication speeded up by sediment fill. Further, sediments transport other pollutants such as pesticides, herbicides, phosphorus and nitrogen nutrients from fertilizers, bacteria, salts, metals, oil and grease.

While there still is no national standard for reservoir protection, it is in general assumed that the greater the amount of undeveloped land around a reservoir, the greater the protection afforded. Such buffers of open space function to protect the reservoir from degradation, to control sediment, to control erosion, to remove nutrients and pollutants, to control stream temperature and to provide aquatic and wildlife habitats.

In the case of protecting watersheds, an ounce of prevention may well be worth a ton of cure. A review of the literature reveals what we already know: to assure a safe potable water supply, protect the water quality at its source. The April 1989 Watershed Management Strategies for New Jersey prepared by Rutgers' Cook College Department of Environmental Resources stresses that "Proper forest management...and the control of urban growth are also essential 'if long-term economic burdens are to be minimized in managing water supply sources' (1982:28)."

Certainly it is less costly to prevent water degradation than to clean it up afterward. Once sedimentation, soil erosion, flooding and water pollution occur, there are no low-cost solutions. Better to bear the costs to preserve open space now than to pay for flood tunnels or tertiary treatment plants in the inflated dollars of the future. Although it is difficult to assign dollar figures to the function of a watershed system, or any other natural system, some attempts

are being made. The New Jersey Green Acres Program has published a study of the socioenvironmental economics of open space preservation. In summary, the arguments for the economic benefits of open space preservation are:

1. Open space increases the value of adjacent property;
2. Outdoor recreation is big business in New Jersey;
3. The preservation of open space results in more cost-efficient development patterns;
4. Open space preservation saves public funds by preventing development of hazardous areas;
5. Open space preservation allows nature to continue its valuable work in the form of air and water purification, flood control, creation of topsoil and agricultural land, water storage and climate control;
6. Open space preservation may be a less expensive alternative to development, considering the costs of schools, public facilities, services and government.

Humans rely, for our existence, on certain given constants - invisible air which is healthy to breathe, abundant supplies of clean running water, rainfall which nurtures our crops, a layer of upper atmosphere which screens out damaging radiation, stable climate patterns and ranges of temperature. We are living in an era when we see and feel changes in these constants; changes which we have caused by our actions, actions deemed safe by technical experts. Our understanding of natural systems is very limited. We are only beginning to perceive the intricate, synergistic workings and delicate balances of our natural world; the operations of these systems create and maintain the conditions for life. No amount of engineering expertise can develop a system which works as efficiently, or is as free of dangerous extremes.

Nevertheless, we rely on technical and engineering practices to modify natural situations which we do not completely understand and to change natural systems which have a range of functions beyond our perception. The uncompromising, two-dimensional techniques of engineering, which so often result in either/or scenarios, are not well suited to the inclusive, multi-tiered performances of natural systems. Yet we persist in optimistically calling our intrusion, and destruction, of a natural system its "management".



Watershed protection is pollution prevention at its best, and is preferable to watershed management. Watershed protection is far-sighted; it appropriately values the functioning of the watershed and the essentiality of clean water. It is less expensive, both in today's development and services costs and in tomorrow's repair and reclamation costs. The flooding in Wayne and the proposed Passaic Flood Tunnel were avoidable, but the best technical procedures applied in the flood basin have inexorably led us to both. Watershed protection is efficient; it takes advantage of how open space and wetlands work to ensure a clean water supply.

Watershed protection is more than tracts of open space, but it begins there. Regulations need to be in clear and unambiguous language, and should have no loopholes. It is not possible to serve the goals of short-term economic growth and natural resource protection, not when the former occurs at the expense of the latter. It is appropriate and just for government, as the agent of its citizens, to pursue the protection of our natural world; it is in itself a defensible and necessary task. Moreover, it is the duty of government to protect those resources essential to life, such as potable water.

Protecting the land surrounding reservoirs is important, but not enough. We must go beyond only protecting the adjacent reservoir lands; protection of streams that feed the reservoirs is essential. These streams may originate in areas far removed from the reservoir. The following controls are critical to protecting New Jersey's reservoirs and water supply:

1. Establishing and enforcing land use controls on development in the headwaters areas of streams that feed reservoirs;
2. Establishing stream corridors so that adjacent wetlands and other vegetated areas can filter out impurities from runoff that enters the streams;
3. Protecting steep slopes near streams to prevent erosion and subsequent sedimentation of streams;
4. Strictly controlling development on the streams' recharge zones;

5. Strictly controlling the volume and quality of storm water. (NJDEP has been working on a model ordinance which should be mandatory for all areas draining to reservoirs.)

Open space is at a premium in New Jersey, and the need protect our water is imperative. Since much of our open space is also buffering streams and water supply reservoirs, there is twice as much reason to enact strong regulations to preserve our water quality and our open space. For protection of potable water supply, for recreational needs, for the very real psychological benefits which open space brings to people, for an efficient expenditure of dollars and energy, for wise stewardship and foresight -- for all these reasons, it is vital to adopt strong watershed protection rules now.



# New Jersey Environmental Federation

## TESTIMONY IN SUPPORT OF THE WATERSHED PROTECTION ACT MAY 23, 1990

**State Office**  
46 Bayard Street  
New Brunswick, NJ 08901  
(201) 846-4224  
FAX: (201) 846-4320

**North Jersey Office**  
305 Bloomfield Avenue, 2nd Fl.  
Bloomfield, NJ 07003  
(201) 680-6446

**Jersey Shore Office**  
808 Belmar Plaza  
Belmar, NJ 07719  
(201) 290-8986

**South Jersey Office**  
37 South 13th Street, 5th Fl.  
Philadelphia, PA 19107  
(215) 557-6044

**Northwest Jersey Office**  
304 North 7th St  
Allentown, PA 18102  
(215) 434-3223

**Legislative Office**  
321 West State Street  
Trenton, NJ 08616  
(609) 392-4871  
FAX: (609) 392-4893

**National Office**  
317 Pennsylvania Avenue, S.E.  
Washington, D.C. 20003  
(202) 547-1196

JEANNE CTERSEN, PROGRAM DIRECTOR, NJ ENVIRONMENTAL FEDERATION

I am testifying on behalf of the New Jersey Environmental Federation, an organization comprised of 60,000 individuals and 45 grass roots citizen groups working together on environmental issues. It is a chapter of the national organization, Clean Water Action. Its founding members were instrumental in the writing and passage of the federal Clean Water Act.

We are adamantly in support of the Watershed Protection Act, an overdue piece of legislation. For millions of years, watersheds have protected the quality of our drinking water; through strict policies of the last few years, construction and development have compromise these waters forever.

The date of this hearing seems more than coincidental - I cannot testify directly from a ceremony marking the signing of the NJ Water Enforcement Act by Governor Florio. During a two-and-a-half year citizens' campaign to pass this Act, the NJ Environmental Federation and its members realized the need for legislation that addressed both point and non-point source pollution of our waters. A 1988 study, for example, showed that only 31% of our waterways were fishable and swimmable by the standards set by the federal Clean Water Act - more than five years after the 100% goals set by legislation were to have been achieved.

Our polluters are not only industrial; they are municipal sewer facilities and delegated authorities. An April, 1989 GAO report documented that approximately 37% of all toxics dumped into our waterways passed through sewage facilities.

The Watershed Protection Act is a necessary and integral part of solving our water pollution puzzle, dealing with issues unresolved by other legislation. This Act addresses the issue of non-point source pollution, which accounts for more than 50% of our water pollution.

We want to acknowledge the work of our member organizations in Hudson County who have worked hard to bring this issue to the light of public scrutiny, both locally in challenging the policies of United Resources, and in helping to solve a crisis that is state-wide as well.

We would also like to thank Senator Contillo, for the time to sit on this committee, and for his leadership on this issue.







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