



DELAWARE RIVER BASIN COMMISSION
Annual Report 1986

SILVER ANNIVERSARY EDITION



Commissioners attend the historic first meeting of the DRBC at Princeton, N.J. on Dec. 13, 1961. Shown left to right are New York Gov. Nelson Rockefeller, Pennsylvania Gov. David Lawrence, Interior Secretary Stewart Udall, New Jersey Gov. Robert Meyner and Norman Lack, alternate commissioner from Delaware.

Front cover: Three basin state governors join President Kennedy at the White House for a formal Delaware River Basin Compact signing ceremony on Nov. 2, 1961. Seated around the desk, left to right, are Govs. Robert Meyner of New Jersey; Elbert Carvel of Delaware and David Lawrence of Pennsylvania. Looking on, left to right, H. Mat Adams of New Jersey; William Miller, counsel to the Delaware River Basin Advisory Committee (DRBAC); Frank Barry, U. S. Interior Department; W. Brinton Whitall, a DRBAC staff member; Gen. Norman Lack, Delaware alternate; Philadelphia Mayor Richardson Dilworth; Harold Wilm, representing the state of New York; Maurice Goddard, Pennsylvania Secretary of Forests and Waters; Vincent Terenzio, a member of the New York City Water Board; and Arthur Ford, the water board's chairman.

Report designed by Odette P. Taft, DRBC graphic artist/illustrator



The late James F. Wright, former Chief Deputy Director of the California Water Resources Department, is sworn in as DRBC Executive Director on May 23, 1962 by Judge Joseph Sloane at Philadelphia City Hall. Observing the ceremonies, at right, is Maurice Goddard, then Pennsylvania Secretary of Forests and Waters.

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Introduction

DRBC Honored on its Silver Anniversary

On Oct. 27, 1986, the Delaware River Basin Commission turned 25.

There was a birthday party a few weeks earlier at the Union League in Philadelphia, sponsored by the League of Women Voters.

That night, Sept. 18, the Water Resources Association of the Delaware River Basin saluted the DRBC at its annual awards dinner with Sherman W. Tribbitt, former governor of Delaware, highlighting 25 years of Commission accomplishments.

Stewart L. Udall was Secretary of the Interior when the Delaware River Basin Compact was signed and was appointed by President John F. Kennedy as the Commission's first federal member. In a luncheon address, Mr. Udall touted conservation as the linchpin in any successful water resources management program, noting that "the best things in

life are free — friendship, love, natural beauty, clean air, clear water. You have to earn them in a way, but they are free, and they must be preserved."

Merilyn Reeves, a director of the League of Women Voters of the United States, said it was a political miracle that the interstate-federal compact that became law on Oct. 27, 1961, had operated successfully for 25 years. And she said it was a biological miracle that water quality had been significantly improved during that time span. "There is no doubt that this river is worth all the time, attention and money that it has received over the past twenty-five years," she told several hundred well-wishers at a morning seminar commemorating the Commission's Silver Anniversary.

R. Timothy Weston, longtime alternate commissioner from Pennsylvania, remarked at the Commission's business meeting that afternoon:

"Probably no area of the country faced, or continues to face, greater challenges in allocating and conserving limited resources to serve such a large population or such a diverse industrial and agricultural complex. The 20 million residents of this basin and its service area each day withdraw and use more water than the flows of the Rio Grande and Colorado River combined.

"Yet, today — even confronted with such divergent and conflicting interests, and in the face of 70



Former Interior Secretary Stewart Udall, left, greets Maurice Goddard, Pennsylvania's representative to the DRBC from 1961 to 1979.

DRBC Commissioners R. Timothy Weston, Pennsylvania; Irwin H. King, New York; R. Wayne Ashbee, Delaware; and Michael F. Catania, New Jersey; assemble in front of poster boards commemorating the DRBC's silver anniversary.



years of litigation and negotiation – the Delaware River Basin stands as the prime example of interstate cooperation and commitment to dynamic, regional water resources management.

“Long before there was an EPA, or a Federal Clean Water Act, or even an environmental movement, this Commission tackled the challenge of bringing back a dead river – fouled by decades of neglect and pollution. In adopting and enforcing the nation’s first binding regional water quality standards, this Commission did not – as one critic suggested – engage in an ‘uncertain search for environmen-



Former DRBC employees exchange memories, from left, Dawes Thompson (public information officer), Marie Combs (secretary to the executive director) and C. H. J. “Jack” Hull (staff engineer)

tal quality.’ In the face of those who said it couldn’t be done – that economic welfare and environmental well-being were incompatible – the Commission acted on a different vision and belief: that we could do better.

“Today, Joe Gage and his North Philadelphia neighbors can again fish for shad and

perch from the Delaware – a prospect their fathers knew was impossible. Youth are swimming again in Penn Treaty Park – a concept that was unthinkable 20 years ago.”

In July of 1955 the vision of a regional water resources agency was born. It was during that month, only weeks before the valley’s worst recorded flood, that the governors of Pennsylvania, New York, Delaware and New Jersey, and the mayors of Philadelphia and New York, agreed to seek basin-wide solutions to basinwide problems.

This pact resulted in the formation of the Delaware River Basin Advisory Committee, with one member each appointed by the two mayors and the four basin state governors.

The valley’s worst flood struck the weekend of Aug. 19, 1955, claiming 99 lives and inflicting \$100 million in property damage. In its wake came a public clamor reflected by Congress’ quick action in directing the U.S. Army Corps of Engineers, in cooperation with 18 other federal agencies, to fashion a comprehensive physical plan to develop and control the Delaware Valley’s water resources.

Jeanette Ross, chairman of the Interleague Council of the Delaware River Basin (League of Women Voters), at left, talks with Maurice Goddard, one of the Commission's founders. Others at the table, left to right, Peggy Haskin, New Jersey Water Supply Authority; former Interior Secretary Stewart Udall; David Goldberg, DRBC general counsel; and D. W. Bennett, executive director of the American Littoral Society.



On July 10, 1958, the two mayors and the four governors met at Washington Crossing, Pa., in the first of a series of "summit" meetings to hear a progress report on the activities of the advisory committee and the Corps.

By this time, another study into the type of governmental organization that should be created as a permanent basinwide water resources management, planning and regulatory agency was underway at the Maxwell Graduate School of Syracuse University.

A second summit meeting was held in Philadelphia on Sept. 30, 1959, at which time the chief executives received the Syracuse report, "River Basin Administration and the Dela-

ware," and accepted a recommendation for a joint federal-state commission to be created by compact between the states and the federal government. The governors and mayors then directed the advisory committee to draft the necessary legislation.

In December of 1960 the Corps completed its report. This massive document, 11 volumes in length, advocated a 50-year development program of 58 water control projects at a cost of \$591 million to reduce flood damage, to augment stream flows and increase water supplies, to provide 41,000 acres of additional recreational waters, and to produce millions of kilowatt hours annually in conventional hydroelectric power.

At League of Women Voters' luncheon, from left, Frances Cook, fiscal section head; Leroy Clark, payroll technician; W. Brinton "Buzz" Whitall, former commission secretary; C. H. J. Hull, former staff engineer; Robert Goodell, chief engineer; and John Rattie, water resources engineer.



Within three months after the Corps completed its report, the advisory committee unveiled its compact draft at a third summit meeting, held on Feb. 1, 1961. This document was officially received and endorsed by the governors and mayors, and by nightfall had already been introduced into the legislature of one state, New York.

Before the summer months had passed, the compact had won the approval of both houses of the legislative branches of all four states and Congress and had been signed by the four governors.

On Sept. 27, 1961, President Kennedy

added his signature to the congressional action. Thirty days later, on Oct. 27, 1961, the Delaware Basin Compact became law, marking the first time in the nation's history that the federal government and a group of states had joined together as equal operating partners in a river basin planning, development and regulatory agency.

In her address at the Silver Anniversary celebration on Sept. 18, 1986, Ms. Reeves echoed the sentiments of Commission Chairman Pro Tem R. Wayne Ashbee of Delaware when she said that public participation is a key ingredient in the Com-

mission's decision-making process.

"Public participation is a blueprint for problem solving," she said. "It establishes the framework, the rules of the game, so that diverse interests can share information, learn, evaluate, compromise, develop trust, agree and then act.

"In the next 75 years the problems of water will be defined and solved through the same imperfect process — a mix of science, uncertainty, value judgments, public perception and political compromises. Public participation is the only way to ensure that all the elements of that mix are fairly considered."

Veteran DRBC employees, flanking Executive Director Gerald Hansler, displaying 20-year certificates at the 25th anniversary celebration.

Left to right: Robert Everest, senior planning coordinator; Seymour Gross, supervising engineer; Catherine Dougherty, secretary

to the executive director; Robert Goodell, chief engineer; and David Pollison, head of the Planning Branch.



The Commission • 1986



Governor Castle



Mr. Ashbee

Delaware

Governor Michael N. Castle
Chairman

R. Wayne Ashbee
Alternate



Governor Thornburgh



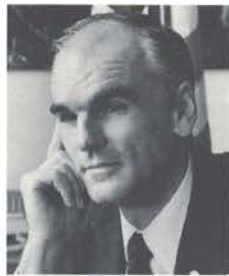
Mr. Weston

Pennsylvania

Governor Dick Thornburgh
Vice Chairman

R. Timothy Weston
Alternate

William J. Marrasso
Advisor



Secretary Hodel



Mr. Kanuck

United States

Secretary of the Interior
Donald P. Hodel
Member

George J. Kanuck, Jr.
Alternate

Lt. Colonel Ralph V. Locurcio
Advisor



Governor Cuomo



Mr. Williams

New York

Governor Mario M. Cuomo
Member

Henry G. Williams*
Alternate

Harvey W. Schultz
Advisor



Governor Kean



Dr. Dewling

New Jersey

Governor Thomas H. Kean
Member

Richard T. Dewling
Alternate (through 7/30/86)

Michael F. Catania**
Alternate (effective 7/30/86)

Staff

Gerald M. Hansler
Executive Director

David J. Goldberg
General Counsel

Susan M. Weisman
Secretary

Christopher M. Roberts
Public Information Officer

John F. Glowacki
Chief Administrative Officer

Engineering Division

Robert L. Goodell
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C. H. J. Hull
Staff Engineer

Jeffrey P. Featherstone
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Branch Heads

David P. Pollison
Planning

David B. Everett
Project Review

Richard C. Tortoriello
Operations

* Irwin H. King serves as Alternate
in Mr. Williams' absence.

** Dirk C. Hofman serves as Alternate
in Mr. Catania's absence.



Mr. Catania

DRBC Gets New Alternate from New Jersey

Michael F. Catania, deputy commissioner of the New Jersey Department of Environmental Protection (NJDEP), was appointed New Jersey's alternate member to the Delaware River Basin Commission on July 30, 1986, by Gov. Thomas H. Kean. He succeeds NJDEP Commissioner Richard T. Dewling.

Dirk C. Hofman, deputy director of NJDEP's Division of Water Resources, will serve in Mr. Catania's absence.

An attorney, Mr. Catania brings a dozen years of legal and legislative experience in the field of environmental protection to his new post with the Commission. He was director of NJDEP's Office of Regulatory Services from its inception in 1982 until taking up his duties as the department's deputy commissioner on Feb. 4, 1986.

From 1974 to 1982, he served with the Office of Legislative Services, New Jersey Legislature, as supervising research associate for the Energy, Agriculture and Environment Team.

Mr. Catania received a law degree from Rutgers School of Law in 1980, a master's degree from Rutgers Graduate School of Political Science in 1975, and a bachelor's degree in liberal arts from Livingston College, Rutgers, in 1973.



GAO Revisits the DRBC

By Gerald M. Hansler

The General Accounting Office (GAO) is the Congress' watchdog over the effectiveness of federal legislation – from both the standpoint of the written law and its implementation.

In February of 1981, the GAO completed its first review of the DRBC and reported to Congress. That review was initiated at the request of Elmer B. Staats, highly respected by both sides of the aisle in Congress, and while he served as Comptroller General of the GAO. His report was a comprehensive analysis of the effectiveness of the DRBC (and also the Susquehanna River Basin Commission). Since the Comptroller General, himself, called for the review, GAO's findings were submitted to the President of the Senate and the Speaker of the House; appropriate House and Senate committees; Director, Office of Management and Budget; the Secretary of the Interior; and the Governors of the Basin States – Delaware, New Jersey, New York, and Pennsylvania.

GAO believed that while progress had been slow over the first 20 years, the Commission had been a positive force for water resource planning and management. Also, the initial reason for forming the Delaware Compact – to settle existing water disputes – was still valid.

A second GAO review of the DRBC was prompted by a request from a single Basin Congressman, Peter H. Kostmayer, in August of 1985. Congressman Kostmayer had five questions concerning specific DRBC activities:

1. To what extent has the DRBC encouraged and implemented residential, commercial, and industrial water conservation

techniques and strategies in order to maintain adequate streamflow in the Delaware River? Does the Commission emphasize non-structural alternatives to river management?

2. How accurate have DRBC forecasts been for population growth and anticipated water use in the River Basin?
3. How effectively has the DRBC used its permitting process and its authority to limit water withdrawals to ensure adequate streamflow in the Delaware River? What effect will DRBC permits for depletive water use have on future river streamflow?
4. To what extent have public input and comments been incorporated into DRBC policy-making?
5. What are the "federal interests" that the Secretary of Interior's appointee to the DRBC represents and how well are those interests represented?

The GAO report was presented to Congressman Kostmayer in October of 1986.

GAO officials spent many months delving into and reporting on DRBC activities related to those five issues. My first reaction to this latest audit was "another witch-hunt prompted by some disgruntled constituent and an effort which will consume much valuable DRBC staff time." However, my views changed because of the conduct of the GAO investigators, who were thorough and even-handed; and the questions themselves which, though limited in scope, were important relative to the manner in which DRBC conducts its business.



Mr. Hansler

Water Conservation and Non-Structural Solutions to Enhance Minimum Streamflows

The GAO observed that:

"To address the basin's water supply problems, DRBC has shifted its emphasis from structural solutions toward water conservation approaches, especially during droughts. It has instituted special drought emergency actions to reduce (1) out-of-basin diversions to New York City and New Jersey, (2) releases from the three New York State reservoirs, and (3) streamflow objectives at two New Jersey gauging stations. Also, the basin states have developed plans for reducing water use during droughts, including restricting nonessential water use and reducing the water use of large water users. DRBC claimed that during the 1985 drought, which lasted about a year, 84 billion gallons were conserved through reductions in out-of-basin diversions and in reservoir releases."

GAO also recognized that a limited construction program to provide additional storage is under way. Actually, water conservation continues to be emphasized by the DRBC, but is not the *only* answer to meeting existing and future water needs during periods

of drought. The additional storage to be provided by completing all or some of the four planned storage projects is necessary. Those reservoir projects are Merrill Creek, F. E. Walter, Prompton, and Cannonsville.

The Commission's Water Conservation Advisory Committee, chaired by Bruce Stewart, has done an excellent job in recommending water conservation strategies for the basin. First, the committee recommended a list of seven nonessential water uses that should be curtailed during drought periods. Its recommendation was adopted by the Commission for application in each of the four States during the drought of 1985.

Although the Commission had regulations requiring *new or expanded water users* to apply water conservation techniques in such areas as information programs, leak detection and control, contingency plans, metering, and conjunctive use (where practicable), this represented only the tip of the iceberg insofar as total water use in the basin. What about the many *existing* major water users? How could their water habits be improved?

The Commission has recently adopted basinwide regulations relative to *all* users in certain categories. Four specific regulations will aid communities and state agencies in conserving water:

- The registration of all wells in the basin which yield greater than 10,000 gallons per day will now give each Basin State and the DRBC valuable information on the extent to which aquifers are stressed and any attendant impact on perennial streams (DRBC Resolution No. 85-19, 1985).
- The reporting of all bulk water withdrawals of 100,000 gallons

per day or more (both surface and ground) will assist the States and DRBC in not over-allocating the resource, and will assist water users in their leak detection and control programs (DRBC Resolution No. 86-12, 1986).

- The requirement that all public water systems that distribute over 100,000 gallons per day must undertake a leak detection and control program should also reduce water supply demand (DRBC Resolution No. 87-6, 1987).
- Owners of all water supply systems serving the public that distribute in excess of 100,000 gallons per day must install, or require to be installed, water meters incident to the provision or maintenance of service . . . within ten years (DRBC Resolution No. 87-7, 1987).

The Commission's Water Conservation Advisory Committee is now considering a program dealing with basinwide water conservation performance standards for plumbing fixtures and fittings.

Forecasting Population and Water Use Trends

The GAO observations on this matter were:

"DRBC's 1980 population growth forecast was generally accurate, but DRBC's data on the water availability, withdrawal, and depletion categories are not always reliable enough to allow DRBC to most effectively manage the basin's water resources. Such data are important in providing DRBC with a better basis on which to decide whether additional (1) water use permits should be approved, (2) storage capacity should be con-

structed, and/or (3) water conservation measures need to be adopted. DRBC has recognized the limitations of its data and has taken steps to obtain more accurate data of both supply and usage."

Measuring existing water withdrawals and estimating depletive water use by *all* users in the basin had been fragmented historically. However, the Commission and its signatory party water management agencies are fast closing those gaps. Implementation of the well registration and water withdrawal reporting regulations will give us solid information as to the impact of depletive water use on the basin's hydrology, especially when considering both streamflow and aquifer levels.

The art of projecting new depletive water uses is less exacting. Major industry shifts to the "Sun Belt" or foreign shores are not that predictable. Energy and water conservation tends to reduce depletive water use. However, the continued shift in population from inner cities to suburban residences with acreage and attendant lawns, shrubs, gardens and swimming pools increases depletive water use because of excessive evaporation. Also, agricultural irrigation is on the rise, and new technologies such as cogeneration to handle refuse disposal problems will account for significant depletive water use increases. Consequently, it probably makes more sense to extrapolate *recent* trends, rather than long term trends, when estimating needs for the next 15 to 20 years.

Depletive Water Use Budgeting

The GAO observations were:

"Approving new water withdrawal permits is a key decision that DRBC makes in its overall mission of managing the basin's water

resources. Its policy has been more restrictive in recent years and has served to help protect groundwater supplies in the basin and in the southeastern Pennsylvania protected area in particular.

“DRBC approves individual permit applications on the basis of local water conditions. Because of the absence of reliable water availability and usage data basinwide, however, we could not determine the relationship between permit approval and streamflow adequacy. Also, DRBC is not in a position to determine the cumulative effects of the individual permit approvals on water resources in the entire basin. DRBC is in the process of obtaining more reliable water availability and usage data.”

The DRBC has now completed its depletive water use inventory (December 1986). After several iterations of state water agency review and revision of draft inventories, estimated depletive water use is much better refined than data used in previous water supply planning. Also, with a single basinwide water use reporting system through each state water management agency, the profiles of water withdrawals and depletive use will become even more precise and can be updated annually.

The major purposes of developing a depletive water use budget – which will be regulatory in nature – are to assure that the States and DRBC do not over-allocate the resource, and also to assure that one state doesn't over-allocate its share of the resource based upon its percentage contribution to, or underwriting of, DRBC-sponsored water storage projects.

With an updated estimate of depletive water use and modern mathematical

models for estuary salinity behavior and Delaware Basin daily flows, we can now predict the impact of both existing and future depletive water use.

A major policy issue which will confront the Commission in its ultimate development of a depletive water use program is the rationale for establishing the baseline for depletive water use. Will that baseline be the actual maximum estimated depletive use experienced over the past ten years, or will it be paper allocations or entitlements issued by DRBC and the state agencies? Usually, the latter are much higher than actual use.

Public Input Into DRBC Decision-Making

Observations by the GAO on this question were:

“DRBC’s public input process allows the public and other interested parties an opportunity to provide their views on DRBC policy and project decisions. During the October 1984-October 1985 period, DRBC received public input on only 15 percent of the issues being considered. These issues, however, were generally controversial and significant in terms of impact on the basin’s water resources. On 4 of the 22 issues receiving public comment, DRBC changed the docket or resolution to reflect suggestions the public made.”

For the most part, proposed project approvals under Section 3.8 of the Delaware River Basin Compact do not elicit public comment. Most people and organized groups favor new or upgraded waste treatment projects. An exception to those classes of projects occurs where the receiving

streams are high quality waters and any degradation is questioned. Water supply withdrawal projects which are large in nature, or where nearby existing water withdrawals or perennial streams might be impacted, usually excite public comment. Finally, major policy issues dealing with standards, rules, and regulations invariably bring forth public comment, usually wide-ranging.

In 1986, 105 project applications were processed by DRBC and several proposed policy changes were considered. The public was made aware of these activities. Over 30,000 notices detailing Commission meetings and public hearings on proposed projects were mailed. An additional 5,000 press releases covering these matters were sent to the news media. For certain, the public, interest groups and affected parties know when the DRBC is going to “walk its dog.”

Commission decisions on all policy matters and project approvals are made in open public meetings. This does not imply that everyone is satisfied with a final decision. When final approval is given on controversial projects or policies, it usually constitutes a compromise, but always based upon the existing DRBC Comprehensive Plan and Rules and Regulations.

The question dealing with “federal interests” will not receive a response here, though GAO did comment with observations on that matter. It was a question directed more to federal participation on the Commission rather than DRBC activities.

Overall, the GAO’s final report was a fair assessment of past and current activities. Moreover, much additional and constructive effort has occurred since the GAO review. We expect it will continue.

Water Quality

Should Standards Be Raised?

A two-year study to determine the feasibility of restoring “fishable/swimmable” water quality in the degraded portions of the Delaware estuary was begun in 1986. Known as the “Delaware Estuary Use Attainability Project (DEL USA),” its purpose is to determine whether water quality standards can practically be raised in the estuary and what pollution abatement measures would be required to attain new standards.

Special field studies which addressed key water quality questions and involved many of the agencies that are cooperating with the DRBC in the project were initiated during the year.

In May, staff from the DRBC, the Pennsylvania Department of Environmental Resources (PaDER), the U.S. Environmental Protection Agency (EPA) and the Academy of Natural Sciences (under contract with DRBC), collected water column and sediment samples at 14 sites in the estuary for measurement of Sediment Oxygen Demand (SOD) rates and concentrations of toxic substances. SOD rates were measured by the Academy and analyses of toxic substances were conducted at PaDER’s laboratory in Harrisburg. The samples were collected by Academy divers who worked off a 35-foot boat supplied and manned by EPA personnel.

In June, DRBC and EPA personnel, on board another EPA vessel (the 165-foot OSV Peter W. Anderson) collected water column and sediment samples at 30 sites. SOD samples were analyzed by EPA scientists and analyses of toxic substances were conducted at the New Jersey Health Department lab in Trenton through a cooperative agreement with the New Jersey Department of Environmental Protection. As part of a special study conducted by EPA, vertical sections of undisturbed sediment were photographed at each site to provide insight into the complex chemical and biological processes that result in SOD.

Between July and October, DRBC personnel, using a boat, motor and incubators loaned by the U.S. Geological Survey, conducted over a dozen bacteriological surveys of Zones 2 and 3 of the river – beginning at the head of tide at Trenton, N.J., and extending south to River Mile 100 at Philadelphia’s Ben Franklin Bridge. Analyses were made at a special DRBC laboratory for fecal coliform and *E. coli*, recently recommended for use as a recreational parameter by EPA.

The Pennsylvania Fish Commission (PFC) conducted a fish population survey in August in Zones 3 and 4 of the river (between northeast Philadel-

Left: Submersible camera apparatus is lowered into the Delaware River from the deck of the OSV Peter W. Anderson as part of the sediment oxygen demand study.



Right: Workers recover sediment core from a dredge used for SOD measurements.



phia and the Delaware-Pennsylvania-New Jersey state line at Marcus Hook, Pa.), continuing work that was begun in 1985.

In the 1985 study, PFC personnel observed a variety of fish in Zone 3, the river's most polluted stretch. The finding was important because it appeared to reflect a recovery due to water pollution abatement efforts.

However, because drought conditions existed in the basin during 1985, the DRBC asked the Fish Commission to re-examine its findings. Results of the latest sampling indicate the fish population recovery is continuing, and that 1985's atypical hydrological conditions were not a significant factor in the earlier sampling results.

Also in 1986, the EPA conducted screening toxicity bioassays on water samples from Zones 3 and 4.

In addition to the field activities, efforts continued on other elements of the project. These included:

Staff from the Delaware Department of Natural Resources and Environmental Control (DNREC) used toxics' data supplied by discharge monitoring reports and other sources to initiate an assessment of the extent and origin of toxics in the estuary and the effects of those toxics on the attainment of fishable and swimmable water quality goals.

EPA began an investigation of potential cost-effective measures for de-

creasing pollution loadings from point and non-point sources through innovative allocation techniques.

As 1986 was ending, reports were being completed on the sediment oxygen demand results, the bacteriological and fish population surveys and the chronic bioassay tests. It is anticipated that the draft DEL USA Project report, containing recommendations for new water quality standards and pollution abatement measures, will be completed in 1987.

305(b) Report

Section 305(b) of the Federal Clean Water Act requires biennial assessments of water quality to be prepared by state agencies and by various interstate commissions. From these reports, the U.S. Environmental Protection Agency prepares a national report which it submits to Congress for use in gauging the act's effectiveness and in determining whether new legislation or additional resources are needed.

Unlike the state reports, the DRBC prepares a report dealing with only one river – the Delaware. The DRBC report is drawn from the 305(b) reports prepared by the four basin states (New York, New Jersey, Pennsylvania and Delaware) and is published under separate cover because of a fervent public interest in the river.

In its latest report, issued in March of 1986, the water quality of the river and bay during 1984-85 was assessed. Results indicated that 49% of the river-bay water was of excellent quality, 32% good quality, 7% good to fair, 3% fair, 5% poor to fair, and 4% poor. About 9% of the river water was severely impaired by point and non-point source pollution.



A pumpkinseed sunfish is measured after being netted during the Pennsylvania Fish Commission's fish population survey.

The following table presents a general reach-by-reach assessment of overall water quality. The terms "excellent," "good," "fair," and "poor" are used

to describe the degree to which water quality standards were violated or designated stream uses impaired. The "swimmable" and "fishable"

goals are those contained in the federal Clean Water Act. A "?" indicates that some doubt exists about the attainment of the indicated goal.

River Reach	No. of Miles	General Water Quality	Meets Swimmable Goal	Meets Fishable Goal
West Branch Delaware.....	9	Good	Yes	Yes
Zone 1:				
Hancock to Port Jervis.....	74	Excellent	Yes	Yes
Zone 1:				
Port Jervis to Delaware Water Gap.....	46	Excellent	Yes	Yes
Zone 1:				
Delaware Water Gap to Trenton.....	77	Good	Yes	Yes
Zone 2:		Good to Fair	Yes?*	Yes
Trenton to Northeast Philadelphia.....	25			
Zone 3:		Poor	No	No
Philadelphia-Camden Area.....	13			
Zone 4:		Poor to Fair	No	No
Schuylkill River to Marcus Hook, Pa.	16			
Upper Zone 5:		Fair	Yes?*	No
Marcus Hook to New Castle, DE.....	11			
Lower Zone 5:		Good	Yes	Yes
New Castle to Delaware Bay.....	20			
Zone 6:		Good	Yes	Yes
Delaware Bay.....	48			

*A subsequent DRBC bacterial study of Zone 2/Upper Zone 3 showed that Zone 2 met the federal swimmable goal. Updated data also indicated that Upper Zone 5 met the swimmable goal in the summer of 1986.

The DRBC also developed information on Delaware River water quality for inclusion in a nationwide study on non-point source pollution conducted by the Association of State and Interstate Water Pollution Control Administrators.

In other water quality projects the Commission:

- contracted with the state of Delaware to sample 18 locations in the Delaware estuary and bay for 30 different parameters (microbiological, sanitary, chemical, heavy

metals, etc.). The locations are sampled 18 times a year on either a high or low slack tide. This program has been operating since 1967 and it is envisioned that the data will be particularly useful in contrasting expected improved water quality when the last of the large estuary pollution control facilities comes on-line.

- provided financial support to the U.S. Geological Survey for the operation of three automatic water quality monitors in the estuary and bay. These devices measure dis-

solved oxygen, temperature, pH, and conductivity on an hourly basis.

- contracted with Delaware, New Jersey and Pennsylvania to collect and analyze data from eleven estuarine tributaries and 55 dischargers each month.

Limnological Program

In January of 1986, the Delaware River Basin Commission, in cooperation with the National Park Service, released the findings of the 1985 Upper Delaware Summer Limnological Program.

This program is a cooperative water quality monitoring venture conducted by the Commission and the Park Service in the Upper Delaware Scenic and Recreational River (UDSRR), the Delaware Water Gap National Recreation Area (DWGNRA), and the eight miles of river in between. Over 70 tributaries and 120 miles of the Delaware encompass the study area.

Eighty-eight locations were sampled between May and September of 1985 to collect data on one or more of the following parameters: fecal coliform bacteria, fecal streptococcus bacteria, dissolved oxygen, pH, conductivity, water temperature and biological organisms.

Highlights of the findings:

- Overall water quality in both the UDSRR and the DWGNRA generally ranged from good to excellent based on the results of the sampling.
- Anthropogenic (man-made) influences on water quality were noted, particularly in Little Equinunk Creek, Callicoon Creek and possibly the Lackawaxen River. Follow-up investigations indicated that animal pollution from barnyards and stables in the Little Equinunk watershed was a likely cause of high coliform levels in that stream. Callicoon Creek, which is known to contain raw sewage discharges, appeared to be the recipient of some degree of human wastes on some sampling dates. The data indicate that the pollutants enter the creek below the confluence of the North and East branches and impact on UDSRR water quality.
- The most polluted tributaries in the DWGNRA were Cherry and Brodhead Creeks, a finding that mirrored the results of previous sampling efforts. The lower reach

of Cherry Creek was found to be a public health threat as reflected by high fecal coliform values from raw sewage discharges.

Data from the 1985 monitoring program were used to prioritize sampling locations for the 1986 program, which obtained data from 93 locations in the Upper Delaware region and which also ran from May to September.

As in past years, good to excellent water quality was found in much of the study area during 1986, although localized problem areas exist. There also was a new problem area discovered. Data indicated a source of bacterial pollution upstream from Port Jervis, N.Y., which was having an impact on water quality along the New York side of the river, including the Port Jervis municipal beach.

In addition to the joint sampling by the Commission and the Park Service, the Monroe County (Pa.) Planning Commission joined the two agencies in 1986 in a water quality survey of Cherry Creek and the lower reach of Brodhead Creek. The intent of the survey was to pinpoint the location and extent of the problems affecting the two Monroe County streams and the Delaware main stem in the Delaware Water Gap area.

The New York Department of Environmental Conservation conducted a pollution survey during 1986 of the lower portion of Callicoon Creek, verifying problems associated with a lack of sewage treatment plants in the Callicoon, N.Y., area.

A report detailing the 1986 Summer Limnological sampling program was being prepared at year's end.

Disinfection Study

The Delaware River Basin Commission on May 28, 1986, adopted Resolution

No. 86-8, amending its regulations so as to no longer require year-round disinfection of treated sewage discharged to intrastate streams and rivers in the basin as long as water quality standards are still met.

Such disinfection, usually achieved by chlorinating the wastewater, kills harmful bacteria, which is important during the hot summer months when water-contact recreational activity is high. However, chlorination and its byproducts also can be harmful to fish and other aquatic life in the sensitive ecosystems in the receiving streams.

The need for chlorination is reduced sharply during the winter months when there is little or no water-contact recreation. The amended regulations will give the basin states more flexibility in the management of their master plans to protect both public health and fish and wildlife in the aquatic environment.

Resolution No. 86-8 specifically amends the DRBC's water quality regulations by striking the year-round disinfection requirement in favor of a requirement that the wastewater be effectively disinfected "as needed to meet applicable DRBC or state water quality standards." The resolution also stipulates that "the capability to resume disinfection, upon reasonable notice (not to exceed 15 days), shall be maintained."

The intrastate streams and rivers in question, like the Schuylkill and the Lehigh in Pennsylvania and the Neversink and Mongaup in New York, neither form nor cross interstate boundaries.

Year-round disinfection remains in effect for the basin's interstate waters, including the entire 330 miles of the Delaware River and Bay.

A public hearing on the proposed amendments to the water quality regulations regarding disinfection was held in Philadelphia on Feb. 26, 1986.

In 1983, the DRBC conducted a hearing on a broader plan to require disinfection only when necessary to meet water quality standards. Specifically, it was proposed that:

- current fecal coliform criteria in stream standards for Zones 5 and 6 of the Delaware River (stretching from the Pennsylvania/Delaware state line south to the mouth of the Delaware Bay) would continue to be in effect year-round, requiring year-round disinfection of waste discharges to these zones to maintain the bacterial quality of water near shellfishing areas;
- current fecal coliform criteria in stream standards for all other zones of the Delaware River and for interstate tributaries would remain in effect from May through September, when disinfection of waste discharges to these zones would generally be required. (During the remainder of the year, fecal coliform criteria in stream standards would be at levels generally not requiring wastewater disinfection.)
- for all other streams (intrastate), disinfection would be required as necessary to meet applicable (state) water quality standards.

The DRBC concluded that more information was needed before acting on the 1983 plan, and called for a two-year study which is slated to begin in 1987. Meanwhile, the DRBC determined there was no need to await the study's outcome before acting on the intrastate disinfection proposal since disinfection practices by dischargers to these streams would

not impact shellfishing water quality many miles downstream.

The 1987 study will consist of sampling of the Delaware River from the Torresdale water treatment plant in Philadelphia to Ship John Light in the upper bay, as well as sampling in surrounding shellfish areas.

The program's cost is estimated at \$400,000. A \$200,000 grant has been obtained from the National Oceanic and Atmospheric Administration with the remainder of the funding to come from municipalities in the study area.

Striped Bass Study

Striped bass were once abundant in the Delaware River system. In 1880, according to one historical document, over 100,000 pounds of striped bass were sold in Philadelphia markets. Other early accounts indicate that the species was widely distributed from the Delaware Bay to the non-tidal waters above Trenton, N.J.

Industrial and domestic pollution took its toll. Spawning areas were lost and brood stocks collapsed. Now, with the return of cleaner water in the river, a striped bass restoration program has been developed in an effort to revive a fishery which could have significant economic benefits for the region.

On July 30, 1986, the Delaware River Basin Commission passed a resolution authorizing its executive director to contract for the pass-through of state and federal funds for consulting services on behalf of the Delaware Basin Fish and Wildlife Management Cooperative (DFWMC) which will sponsor the program. Members of the cooperative are the Delaware Division of Fish and Game, the New York Division of Fish and Wildlife, the New

Jersey Division of Fish, Game and Wildlife, the Pennsylvania Fish Commission, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service.

The current regulatory climate in the basin is conducive for the protection and buildup of striped bass stock with the three down basin states either prohibiting harvest or imposing legal size limits for "keeper" fish.

Beginning in the spring of 1987, a series of studies will be conducted in an effort to determine whether striped bass spawning now occurs in the freshwater tidal portion of the Delaware, whether Delaware River striped bass are distinguishable from Chesapeake Bay or other striped bass stocks, and whether it's feasible to use Delaware striped bass as brood stock.

An ichthyoplankton survey will be conducted in the spring in the reach of the river between the mouth of Pennypack Creek and Trenton to determine the relative abundance of striped bass eggs and larvae. It currently is not known whether juveniles taken in the Delaware system are the result of local spawning or whether they are range extensions of juveniles spawned elsewhere, for instance in the well documented spawning grounds in the Chesapeake and Delaware Canal.

Should the results of the studies indicate that the striped bass population in the Delaware system is increasing, the population would be allowed to rebuild through natural reproduction with its progress being closely monitored. Should the findings indicate that there is not an adequate striped bass population in the river, then consideration would be given to a basin-wide moratorium on harvest and enhancement of existing stocks through a stocking program.

Conservation

Water-Saving Proposals Unveiled

Water conservation not only makes sense, it is the keystone in any successful water resources management program.

It must be practiced in wet years, as well as in dry ones. For fresh water is indeed a finite commodity. To waste it anytime is foolish and expensive.

Increased water demand, for instance, can damage the environment by lowering streamflows and lake levels and depleting ground-water aquifers. The more water we use the more wastewater we generate, putting a strain on existing treatment and pumping plants and storage facilities, and creating a need for costly new ones.

Household water conservation not only saves water, it saves energy, energy needed to heat water and run appliances. The result: lower utility bills.

In 1986, the Delaware River Basin Commission's Water Conservation Advisory Committee presented two water-saving proposals to the Commission. Public hearings on the recommendations were scheduled for 1987.



A Philadelphia Water Department repairman uses a Detect-A-Leak unit to listen to water main valves, fire hydrants and service lines to detect leak noise. Plugging the unit into a van-mounted computer allows the leak to be pinpointed with accuracy.

The first is a leak detection and repair program to identify and, hopefully, capture lost or unaccounted-for water used in public water supply systems within the basin. DRBC staff estimates that such unaccounted-for water — water withdrawn by a purveyor from a source but not accounted for as being delivered to customers — amounted to some 240 million gallons a day in 1985. Estimated annual treatment and delivery costs for that water were estimated at between \$75 million and \$80 million.

Where does this water go? It can escape through defective hydrants, or leaky meters, mains, storage facilities, or treatment plants. It can go unaccounted when not metered (as in the use of hydrants for fire fighting) or when metered inaccurately. The pirating of water by means of illegal hook-ups is yet another piece in the missing-water puzzle.

The four basin states and the DRBC currently either encourage or require leak detection and repair programs. But these programs lack uniformity, thus discouraging basinwide application.

The recommendation presented by the Water Conservation Advisory Committee stipulates that owners of basin water supply systems serving the public that distribute in excess of 100,000 gallons per day (gpd) during any 30-day period shall devise a systematic program to monitor and control leakage. The program is to include recommendations and a timetable for rehabilitation required to maintain the system in good physical condition.

Each purveyor's program would be subject to review and approval by the respective basin state regulatory agencies: The Delaware Department of Natural Resources and Environmental Control, the New Jersey Department of Environmental Protection, the New York Department of Environmental Conservation, and the Pennsylvania Department of Environmental Resources.

The second proposal by the Water Conservation Advisory Committee is to expand basinwide service metering — the metering of water at the retail end of the pipe. The DRBC's current service metering regulations apply only to new water supply systems and extensions of existing systems. Under the committee's proposal, the service metering regulations would apply to all existing public water supply systems in the basin, old and new, with a ten-year grace period for retroactive installations at the existing connections.

The Commission also requires (as of Jan. 1, 1987) source metering, or measuring and recording of large amounts of water that are withdrawn from surface or ground-water sources throughout the basin. Requiring both types of metering (universal service and source) is integral to prudent water supply management as it provides a handle for monitoring and measuring the total resource.

Specifically, the service metering proposal calls for owners of water supply systems serving the public in the basin that distribute in excess of an average of 100,000 gpd during any 30-day period to install, or require to be installed, water meters

for maintenance of service at the retail level. The meters would be installed so as to record water use at all connections, including commercial, industrial, municipal, institutional, and residential structures. Except for costs associated with the provision of service, purveyors' water charges would be based on metered usage.

The committee also recommended that each purveyor provide metered residential customers with information on how water can be saved through conservation measures, detailing the availability of such devices as low-flow shower heads and water-saving toilets.

Service metering also is being instituted in New York City, which lies 100 miles outside the basin but is the biggest single depletive user of Delaware River water. Starting in the fall of 1987, the city will begin a 10-year program to install water meters in all residences at an expected cost of \$290 million. Once in place, New York City residents will pay for water they actually use, instead of the flat rate they are subject to now, a move that should encourage conservation as the change impacts directly on the citizenry's pocketbooks.

In addition, the city has initiated a leak detection program, a proactive venture begun in 1980 to locate faults in the 6,300 miles of pipe that tunnel spaghetti-fashion beneath the nation's largest metropolis. Cost for the detection program (repair work not included) in fiscal 1985 was \$1.3 million.

"We're surveying foot-by-foot down the mains using state-of-the-art

computer equipment and it's working," reports Thomas D. O'Connell of New York City's Department of Environmental Protection.

The Water Conservation Advisory Committee was concentrating on two other proposals at year's end: basinwide use of water-saving plumbing fixtures and the initiation of a public information program on water conservation efforts.

There is ample evidence that the installation of water-saving plumbing fixtures is cost effective and saves a lot of water. About 75 percent of interior residential water use is for toilet flushing and bathing. In many cases, the use of water saving plumbing fixtures can cut this use in half. Such fixtures include shallow-trap toilets, toilet tank inserts, shower flow restrictors, low-flow shower heads and automatic shutoff valves on public lavatories.

The Water Conservation Advisory Committee was exploring the possibility of recommending that the DRBC endorse certain standards adopted by the American National Standards Institute (ANSI) in implementing a basinwide plumbing fixture program. Members of the committee, which is chaired by Bruce E. Stewart, executive director of the Water Resources Association of the Delaware River Basin, also planned to meet with industry representatives to seek advice on setting standards. On Sept. 10, 1986, committee members toured the Stevens Institute in Hoboken, N.J., to learn more about water conservation capabilities and design specifications of various plumbing fixtures and fittings.

Ground Water

Getting a Handle on a Vital Resource

The DRBC, on June 25, 1986, adopted resolutions requiring the source metering of water withdrawals, both ground and surface, exceeding 100,000 gallons per day (gpd) during any 30-day period.

An exception is the heavily-stressed Ground Water Protected Area of southeastern Pennsylvania where the metering trigger for subsurface water is 10,000 gpd.

The new regulations took effect Jan. 1, 1987.

The information generated by the source metering will enable the DRBC to maintain a permanent and accurate running measurement of the volume of water being withdrawn. The lack of accurate, quantitative water-withdrawal data has been a long-standing problem, as evidenced by the large discrepancies that often exist between estimated and actual withdrawals in various parts of the basin.

Under the new regulations, which amend the DRBC's Comprehensive Plan, Water Code and Ground Water Protected Area Regulations, affected water users must report withdrawals to regulatory agencies in their respective basin states – Delaware, New Jersey, New York and Pennsylvania. The withdrawals must be measured to within five percent of actual flow by means of automatic continuous recording devices, flow meters or other methods.

Exception to the five percent performance standard may be granted on a case-by-case basis for surface water withdrawals if that standard is not technically feasible or economi-

cally practicable. In no case shall the standard exceed ten percent.

Withdrawals must be recorded at least on a daily basis for public water supply use and on a biweekly basis for all other water uses, and reported annually (as monthly totals) to these agencies: the Delaware Department of Natural Resources and Environmental Control, the New Jersey Department of Environmental Protection, the New York State Department of Environmental Conservation and the Pennsylvania Department of Environmental Resources.

The information is being stored in the U.S. Geological Survey's computerized data bank and will be accessible to other governmental agencies.

Households and most small businesses should not be affected by the new regulations. Typical households, for instance, use only a few hundred gallons of water a day.

The following water uses, which are mostly seasonal or temporary, are exempt from the metering requirement: agricultural irrigation, snow-making, dewatering incidental to mining and quarrying, and dewatering incidental to construction. However, persons engaged in such withdrawals in excess of 100,000 gpd (10,000 gpd in the Ground Water Protected Area) during any 30-day period must record the pumping rates, the dates, and the elapsed hours of operation of wells and pumps used to withdraw water and report that information to the respective state agency.

The heavily-populated Ground Water Protected Area of southeastern Penn-

sylvania was so designated in 1980 because of its severely stressed ground-water resources. It includes all of Montgomery County, most of Bucks, a large portion of Chester and some communities in Berks and Lehigh counties. The 10,000 gpd trigger for ground-water metering conforms to the DRBC's policy for the area on well permits, which must be obtained if withdrawals likewise reach the 10,000 gpd mark.

The new source metering regulations effectively complement current DRBC service metering regulations which require the metering of water that enters individual dwelling units served by new or expanded water supply systems of more than 250 connections and using a total of 100,000-plus gpd.

The combination of source and service metering enhances water conservation programs since both types of metering are essential for the administration of efficient leak detection and repair programs.

Public hearings on the source metering proposal were held in Hancock, N.Y. on March 6, 1986, and on March 26, 1986, in Philadelphia.

New York's representative on the DRBC abstained from voting on the source metering proposal.

Source metering was one of eight major recommendations that grew out of a special three-year, ground-water study by the DRBC. A second recommendation, basinwide well-registration, was adopted by the DRBC in the spring of 1985.

Late in 1984, the Ground Water

Advisory Committee presented the recommendations to the Commission in the form of proposed amendments to the DRBC's Comprehensive Plan and Rules of Practice and Procedure.

Two of the six remaining proposals are expected to be addressed by the Commission in 1987. They are:

A recommendation to streamline well-permitting by creating a single-tier permitting process through the establishment of a uniform set of basinwide standards and criteria.

Under such a system, New Jersey and Delaware, which possess permitting authority, would administer their own programs using the newly-adopted standards on behalf of themselves and the DRBC. Permitting in Pennsylvania and New York, states without such authority, would be handled by the DRBC, again using the new basinwide yardsticks. Currently, permitting of large ground-water withdrawals is a function of both the basin states and the DRBC.

The Ground Water Advisory Committee also proposed that all major pre-Compact ground-water users in the basin (those "grandfathered" by a federal reservation in the 1961 Delaware River Basin Compact) be identified and regulated by the states in accordance with a common DRBC format, or by the DRBC if a state does not possess the authority.

Also expected to be addressed by the Commission in 1987 is a recommendation to create rules setting forth minimum standards and criteria for issues of well interference, water quality degradation, ground-water recharge, streamflow maintenance

and water-budget analyses. These rules would further refine the concepts contained in the Commission's withdrawal-limits policy adopted in 1980. Implementation would be by both the DRBC and the basin states.

The other four recommendations:

- Encourage ground-water users to consider joint use of both ground and surface water sources in their planning for water supply, long-term cost effectiveness and environmental protection.
- Require that New York and Pennsylvania conduct an advance-notice procedure for evaluating potential well applications and adopt standards for well construction and abandonment. (Delaware and New Jersey already have such programs.)
- Reconsider the DRBC policy for favoring large regional sewage collection and treatment facilities to avoid instances where such facilities contribute to the drying up of perennial streams because of water transfers between local watersheds.
- Moderate a 1980 DRBC withdrawal-limits policy that is considered difficult to administer and could unnecessarily limit ground-water development.

The Ground Water Advisory Committee consists of eleven members — one each from the DRBC's five signatory parties and six public members representing a cross-section of interests. The chairman is David C. Yaeck, executive director of the Chester County (Pa.) Water Resources Authority.

Good Faith

An Equitable Solution

Efforts to establish a funding base for two crucial water supply storage projects were stepped up during 1986.

An independent consultant was hired to examine the relationship between water-use fees and user benefits, and an advisory committee was created to make recommendations on a fee structure.

Both activities are in lock step with a DRBC effort to amend a federal reservation in the Delaware River Basin Compact that prohibits the Commission from imposing any charges for water withdrawals or out-of-basin diversions if they lawfully could have been made without charge when the compact took effect on Oct. 27, 1961.

These exempted pre-compact water users greatly outnumber post-compact users. And they benefit from existing post-compact projects and stand to benefit from the two proposed water supply storage projects – the enlargement of the Prompton

and F. E. Walter reservoirs in Pennsylvania's Pocono Mountains. It is this inequity that the DRBC seeks to remedy.

The Water Project Financing and Water Charges Advisory Committee met for the first time on May 14. Its members were drawn from throughout the basin and represent a balance of water users – local government agencies, water purveyors, electric utilities, industrial and commercial users, public interest groups, farmers and conservationists. It met four more times during 1986 and by year's end had made a number of suggestions regarding the allocation of project costs and the design of potential charging schedules.

The consultant, Black & Veatch, was studying these proposals, as well as updating statistics used in earlier water charge models to reflect new data compiled by the Commission on depletive water use. A final consultant's report was to be issued in early 1987.



The Francis E. Walter Reservoir is shown at top, Prompton at bottom. (Photos courtesy of the U.S. Army Corps of Engineers)

Legislation to strike the "grandfather" clause from the compact was introduced, but was not voted on in the 99th Congress. The DRBC commissioners stated at year's end that they did not intend to seek reintroduction of the legislation until all interested parties, including the advisory committee, had had a chance to digest the results of the consultant's final report.

"At this time, (we) wish to reiterate (our) commitment to implementing *all* of the essential elements of the 'Good Faith' agreement," the DRBC commissioners said in a statement released Dec. 23, 1986. "In particular, we reiterate our commitment to implement the projects called for in the agreement and to seek workable,

fair and equitable financing arrangements to develop those projects in a timely manner.”

The “Good Faith” agreement, finalized in 1983, made mid-course corrections to a 1954 U.S. Supreme Court decree apportioning the waters of the Delaware in an effort to assure, among other things, adequate streamflows downriver. The agreement was signed by the parties to the decree – the governors of the four basin states and the mayor of New York City.

The high court’s water-sharing formula had been based on the then drought of record, which had occurred during the 1930s. The “Good Faith” pact was based on the drought of the 1960s, which was 40 percent more severe than the 1930s drought and which was followed by another drought in 1980-81, and another in 1985.

What the framers of “Good Faith” did in designing a basin-wide master plan for future water supply management, was to take into account not only the recent droughts but the decisions to put the Tocks Island Dam project on hold and the scrubbing of other reservoir projects – Trexler, Aquashicola, Maiden Creek, etc.

Instead, their master plan contained a commitment to enlarge, for water storage purposes, the F. E. Walter Reservoir on the Lehigh River near White Haven, Pa., and the Prompton Reservoir in the Lackawaxen River Valley near Honesdale, Pa.

As part of the “Good Faith” agreement, Delaware, Pennsylvania and New Jersey agreed to negotiate arrangements to underwrite and finance the non-federal cost of these projects – cost-sharing obligations estimated at \$140 million. (New York did not participate because it did not stand to benefit.)

In the past, the non-federal sponsors of such projects could reimburse the federal government in annual, low interest payments over a 50-year period. Current policy, however, requires payment up front, or over

the period of actual construction for all costs associated with water supply development.

The DRBC already is repaying the U.S. Army Corps of Engineers for the non-federal cost shares of two other reservoirs, Beltzville and Blue Marsh (which are covered by the 50-year repayment contracts) by charging major, in-basin, surface water users for withdrawals begun, or increased, after the Delaware River Basin Compact became law. Water charges total about \$900,000 annually – a minuscule amount when stacked up against the Walter-Prompton price tag.

It is the Commission’s intent to return to Congress with a realistic range of charging alternatives which the public has had a chance to examine. Once the compact is modified, the Commission, in accordance with its own rules and regulations and after full public hearings and extensive review, will be in a position to adopt a fair and equitable charging system.

The cost to modify the F. E. Walter and Prompton reservoirs, if everyone contributes, would be relatively small. Under several charging schedules worked up by the DRBC, an average family connected to a public water supply system would pay 70 to 90 additional *cents* a year – a cheap insurance policy for a reliable and safe water supply.

It boils down to this: All Delaware Basin users, old and new, benefit from DRBC-sponsored projects through improvement in water quality, recreation, flood control and especially reliable flows and supplies. Modification of the compact to assure user equality is a fair solution to a real and growing problem and a firm commitment to a brighter economic and environmental future.

Merrill Creek

Substantial progress was made on several important components of the Merrill Creek Reservoir project during 1986, despite a “stop-construction” order which was issued because of soil erosion problems at the Warren County, New Jersey, site.

Preliminary work on the pipeline, which will link the reservoir and the Delaware River, was completed by year's end, including excavation of a pipeline tunnel. The pipeline will be connected to an inlet/outlet tower within the 650-acre reservoir bowl. This structure will help control the quality of water, especially as relates to water temperature, when releases are made to the river during low-flow periods.

The 57-inch diameter pipe will stretch for over 3½ miles, up and down hills and through Scotts Mountain.

A pumphouse on the Delaware will skim off river water during times of high flow, pumping water through the pipeline to supply the reservoir. The pumphouse is expected to be finished by the middle of 1987, with the entire reservoir project slated for completion in the late summer of 1988.

The "stop-construction" order was issued on June 11, 1986, by the Warren County Soil Conservation Service. It cited several violations of permits that were issued relating to soil erosion and sedimentation. The order took effect immediately and, as a consequence, work was not fully resumed at the site until July 21, after corrective measures were taken.

Two organizations, the Merrill Creek Citizens Advisory Council (MCCAC) and the Merrill Creek Conservation and Sportsmen's Association (MCCSA), remained active during the 1986 construction period. Both represent interests of the local community and have been involved in the creation of a nature center and an environmental preserve at the reservoir site.

The Merrill Creek Reservoir, once completed, will be used during low flow periods on the Delaware to compensate for depletive water use at the generating plants of seven electric utilities that are sharing in the project's benefits and costs. They are: Atlantic City Electric Co., Delmarva Power & Light Co., Jersey Central Power & Light Co., Metropolitan Edison Co., Pennsylvania Power & Light Co., Philadelphia Electric Co., and Public Service Electric & Gas Co.

It was by resolution in 1976 that the Delaware River Basin Commission directed the utilities to provide supplemental water supply storage. The DRBC unanimously approved construction of the reservoir on Oct. 24, 1984, and was the principal regulatory agency involved in the technical and environmental reviews. Construction began Sept. 23, 1985.

The Merrill Creek Owners Group, consisting of the seven utilities, acquired the necessary local, state and federal permits.

Camden Metro Study

The "Good Faith" agreement called for the state of New Jersey to examine potential solutions to water supply problems in the Camden metropolitan area, focusing on the overpumping of the Potomac-Raritan-Magothy (PRM) aquifer.

Consequently, the New Jersey Department of Environmental Protection (NJDEP) selected the engineering firm of Camp Dresser & McKee, Inc. to conduct a study of the region which is bounded on the north by Edgewater Park, the Rancocas Creek and Mount Holly, on the south by Paulsboro, Glassboro and Clayton, to the

west by the Delaware River, and to the east by the Pinelands National Reserve.

In a report issued in the fall of 1986, NJDEP, along with the engineering firm, stated that the best water supply alternatives included:

1. Piping 54.5 million gallons per day (mgd) across the Delaware River from Philadelphia's existing Baxter Water Treatment Plant;
2. Developing 54.5 mgd from new wells in the PRM outcrop in Burlington County;
3. Developing 54.5 mgd from the Delaware River at a new surface water intake and treatment facility near Delanco, N.J.;
4. Developing 45.0 mgd from any one of the above (northern) sources and providing the balance (9.5 mgd) with new wells in the Cohansey Sand aquifer, the so-called "North/South" alternatives.

The PRM aquifer not only is experiencing severe water level declines due to the overpumping, but also water quality degradation caused by such factors as salt-water intrusion and the introduction of hazardous wastes from surface sources. Over the years, pumping of the aquifer has lowered water levels in wells as much as 100 feet.

The report stated that recent data collected by the U.S. Geological Survey show that the portion of the PRM aquifer adjacent to the Delaware River may not be as thick as once thought, meaning that the amount of ground water that could be withdrawn at proposed sites may be less than originally estimated. Consequently, more wells would be needed

(at a higher cost) to obtain the necessary amounts of water.

Cost estimates were worked up for the water supply alternatives with the Baxter Water Treatment Plant pipeline being the least costly. The report notes that non-cost criteria also must be considered, however, in the final selection, including reliability (i.e. how susceptible to contamination is each of the alternatives?) and adaptability (which alternatives can be expanded, which alternatives are more capable of handling a contamination incident if it occurs?).

The report concludes that all the alternatives can supply the 54.5 mgd needed by the year 2020. The surface water alternatives (Baxter and Delanco) could theoretically be expanded to provide even more water at these locations. The ground-water alternatives could be expanded only marginally if future water needs were to increase significantly.

If all areas of the PRM which are known to contain, or are suspected of containing, contaminants are excluded from consideration, then only up to 62 mgd could be developed from the aquifer. Additional water supplies could be developed at the Cohansey sites, but the increase in ground-water production would be realized at the expense of reduced baseflow of surface streams in the study area, the report states.

It continues: "There is a history of ground-water contamination in the Camden metropolitan area, especially in the heavily industrialized and urbanized outcrop of the PRM aquifer adjacent to the Delaware River. Twenty wells representing some 10 mgd of production are presently subject to some form of contamination.

The contaminants include volatile organics, chromium, mercury and nitrates. In the course of this study, three new incidents of ground-water contamination have been detected in Burlington County in areas that up to now had been assumed to be 'free' of organic contamination."

The study's project team also has released a report on potential savings from water conservation in the Camden metropolitan area. In it, the team concludes that the implementation of conservation measures (leak detection, water pressure management, etc.) could reduce water demands in the study area by 5 to 10 mgd by the year 2000, and 10 to 15 mgd by the year 2020.

Depletive Water Use Budget

Recommendation 1 of the "Good Faith" agreement called for amending the DRBC's Comprehensive Plan to include revised interim and long-range salinity objectives in the Delaware River estuary. It also recognized the need to use new reservoir facilities for additional water storage and for salinity protection.

The "Good Faith" authors proposed that as each new unit came on line, the operating salinity objective should be revised until an objective for the year 2000 was reached — a maximum 30-day average chloride concentration of 150 mg/l and a maximum 30-day average sodium concentration of 83 mg/l at River Mile 98 (one mile upstream of the Walt Whitman Bridge).

Simultaneously, a series of depletive water use allocation budgets should be adopted at each stage and a regulatory program instituted to assure that

future depletive use is balanced with existing storage capacity necessary for effective salinity control.

In March of 1985, the DRBC staff, in cooperation with state regulatory agencies, began assembling and analyzing updated data on depletive water use in the basin.

These data were drawn from DRBC docket decisions pertaining to permitted water use, from other in-house water use information such as Level B Study files and surface water use inventories, and from abundant information provided by the signatory states.

During December of 1985, a report on water use in five categories — industry, water purveyors, golf courses, agriculture and institutions — was distributed to a Depletive Water Use Budget Task Force made up of representatives from the four basin states. Estimates of water use for power generation were provided by the Delaware River Basin Electric Utilities Group (DRBEUG). After review by the states, revisions were incorporated into the water-use data base.

By November of 1986, three additional categories of water use had been incorporated in the data base — rural self-supplied, ski areas and livestock. Again draft reports were sent to the basin states for review.

Final revision of the draft depletive water-use inventory came in December of 1986. These latest estimates of basinwide water use will become the basis for determining a depletive water-use budget, and for establishing salinity model simulations with which to predict chloride intrusion of the estuary.

Hydrologic Report

Weather's Whims

A rain-swollen Delaware River crested at 20.21 feet (144,000 cfs) at Trenton, N.J., on March 16, 1986, flooding low-lying roads and basements and damaging some sections of the Delaware Canal. Heavy rains in northern New Jersey and New York and snow melt in the basin's upper reaches caused the already topeavy river to leave its banks.



The Delaware River spills onto Route 32 near Point Pleasant, PA. (Intelligencer/Record, Doylestown, PA)



A youth uses a canoe to check a cottage on River Road in Harmony Township, just north of Phillipsburg, NJ. (Sue Beyer/The Express)



An unidentified man tries to rescue an air compressor from a shed that was swept away by the Delaware River's high waters near Minisink Ford, upriver of Port Jervis, NY. (Richard Tarbell/The Tri-State Gazette)

The March 16 floodwaters marked the second highest crest at Trenton since the record flood of August 1955 which notched a crest of 28.80 feet (328,000 cfs) and claimed 99 lives.

On May 30, 1984, the river at Trenton crested at 20.66 feet (152,000 cfs), or about a half foot above the 20-foot (140,000 cfs) flood stage.

Five flood-control reservoirs (F. E. Walter, Prompton, Jadwin, Beltzville and Blue Marsh) minimized the flooding, holding back more than 12 billion gallons of runoff in 1984 and more than 8 billion gallons in 1986. All five projects were completed after the 1955 flood.

In addition, New York City's three upper Delaware water supply reservoirs (Pepacton, Cannonsville and Neversink) captured 45 billion gallons of runoff during the March 1986 flooding. Some 12 billion gallons of runoff were captured in Neversink during the high waters of May 1984.

Hydrologic conditions in the basin varied markedly in 1986. Average precipitation above Trenton, N.J., for the year was 49.91 inches, or 5.68 inches above normal. Streamflows at Trenton averaged 12,520 cfs, or about 20 percent above the normal 10,490 cfs, with the mean daily flow never dropping below 3,000 cfs.

Below Trenton, however, there was a shortage of rain, causing water supply problems. For instance, from February through September, 22.09 inches of precipitation were measured at Wilmington, Del., compared to a normal for the period of 28.51 inches. The 6.42-inch deficit is equivalent to about two months' normal rainfall. Fortunately, precipitation was above normal for the remainder

of the year in the lower basin.

Ground-water levels were adversely impacted by the lack of rain in the lower basin. By the end of July, more than 16 communities in Pennsylvania and at least four in New Jersey had imposed either voluntary or mandatory water restrictions. In Delaware, Gov. Michael N. Castle declared a drought warning requesting voluntary water conservation.

It wasn't until November, with the end of the growing season accompanied by above-normal precipitation, that ground-water levels in the lower

basin improved. By late December, the levels were near normal.

To improve water quality and quantity in the lower reaches of the Schuylkill River, the U.S. Army Corps of Engineers, at the request of the DRBC, released 904 million gallons of water from Blue Marsh Reservoir during the latter part of September.

Storage in the major upstream water supply reservoirs was above normal for most of 1986. At year's end, New York City's three Delaware system reservoirs (Pepacton, Cannonsville and Neversink) were filled to 88 per-

cent of capacity with 238 billion gallons of water – the most since 1977. Normal year-end storage is 182 billion gallons, or 67 percent of capacity.

The salt front in the Delaware River estuary was in the normal to below normal range during 1986, remaining in the vicinity of River Mile 69 (just below the Delaware Memorial Bridge) during the first six months. Maximum intrusion (7-day average 250 ppm isochlor) occurred in late September when the front reached River Mile 84, about nine miles below the mouth of the Schuylkill River.

Sea Level: A Rising Threat

A predicted rise in sea level could substantially increase the salt content of the Delaware River estuary in the next century, contaminating drinking water, damaging plumbing and machinery, and upsetting the river's delicate ecology.

These findings are contained in a joint report released in May of 1986 by the Environmental Protection Agency (EPA) and the Delaware River Basin Commission (DRBC) titled "Greenhouse Effect, Sea Level Rise, and Salinity in the Delaware Estuary."

The report also states that higher sea levels could threaten the Delaware Bay's oyster industry and destroy much of the approximately 320 square miles of wetlands which provide critical habitats for many species of

birds and fish and which serve as one of nature's cleansing mechanisms.

Recent reports by the National Academy of Sciences and EPA project a worldwide rise in sea level of two to five feet in the next century, compared to the one-foot rise that has taken place along the Atlantic Coast over the past 100 years.

The principal authors of the joint DRBC/EPA report, C. H. J. Hull, recently retired Staff Engineer for the DRBC, and the EPA's James G. Titus, conclude that a rise in sea level of just 12 inches would have major impacts on coastal erosion, flooding and saltwater intrusion of the estuary, which flows through the fifth largest urban area in America.

A sea level rise of several feet would result in water in the upper estuary (above the Schuylkill River in Philadelphia) becoming too salty for most uses, necessitating a switch to alternate supplies at great expense, the report states.

"Philadelphia's water supply intake at Torresdale, now in the freshwater reach of the estuary, would be subject to occasional invasions of sea salts, which would sometimes leave the water unacceptable for the city's many water customers," the report continues.

"Industries now using fresh water from the upper estuary would, after a sea level rise, find brackish water at their intakes during dry periods.

Those industries now using brackish water from the middle and lower reaches of the estuary would experience much higher salinities than those for which their systems were designed, which would damage pipes, tanks, and machinery and increase water treatment costs. In some cases these industries would have to shift permanently to alternative water supplies."

The report recommends that other environmental impacts be investigated, noting that accelerated rises in sea level would be expected to produce major changes in the ecology of the estuary.

It continues:

"Some species now thriving in the relatively clean waters of the lower estuary would migrate into the more polluted areas of the upper estuary, close to wastewater outfalls and other hazards. Water craft using the now-freshwater reaches of the upper estuary would be subject to problems caused by marine-fouling organisms. These marine organisms also would infest water systems that take water from the tidal river in reaches now free of this problem.

"If the relatively small rise in sea

level — less than 30 centimeters (one foot) — during the period for which observations are available could damage oyster beds significantly, the much greater rise considered herein could severely threaten the bay's oyster industry. The natural seed oyster beds near the head of Delaware Bay would tend to shift up the estuary. Such a shift would reduce yields both because the estuary is much narrower above the bay and because shifting upstream would bring the oyster beds closer to upstream sources of pollution.

"Higher water levels could drown much of the approximately 830 square kilometers (320 square miles) of wetlands along the estuary. Although these ecosystems could migrate landward with rising sea level, such migration would be inhibited if development just inland of the marsh is protected by bulkheads, levees, and other structures . . . By removing one of nature's cleansing mechanisms, a loss of wetlands could increase pollution loadings in the estuary."

Perhaps the most serious potential implication of increased river salinity, according to the report, would be saltwater contamination of adjacent aquifers. Many water users in the

lower Delaware River Basin adjacent to the estuary depend on groundwater supplies, which are recharged in part by the river.

"The increasing salinities in the Delaware estuary that would accompany a large rise in sea level would severely aggravate the existing saltwater intrusion problems of aquifers in the Delaware Basin, primarily in New Jersey and Delaware," the report states. "Some aquifers now heavily used would probably become too salty for drinking water and would have to be abandoned or limited to agricultural and industrial uses."

Sea level rises are linked to a mechanism known as the "greenhouse effect," a warming of the earth due to increasing atmospheric concentrations of carbon dioxide, methane, chlorofluorocarbons and other gases. This warming causes polar glaciers in Greenland and Antarctica to melt and ocean waters to expand, thus raising sea levels.

The report notes that although most of the glaciers have melted since the last ice age, they still contain enough water to raise sea level more than 200 feet. Throughout geologic history, sea level has risen and fallen by over 1,000 feet.



The Delaware River as it flows towards the bay, just upstream of the Ben Franklin Bridge linking Camden and Philadelphia.

Other Basin Highlights

Consumptive Use at Limerick

On April 29, 1986, the DRBC approved an application from Philadelphia Electric Co. to temporarily use water from two upstream reservoirs to replenish the water supply at its Schuylkill River nuclear power plant at Limerick. A public hearing on P. E.'s proposal had been held in nearby Pottstown on April 15.

The DRBC, however, did not approve a request from the utility to blend the reservoir water with water from an abandoned strip mine.

Under the plan approved April 29, P. E. would purchase the water from the borough of Tamaqua which operates the reservoirs, Still Creek and Owl Creek.

In a joint application filed by P. E., Reading Anthracite Co. (which owns the water-filled strip mine known as Beechwood Pool) and Tamaqua officials, it was proposed that releases from the three upstream water pools be used during 1986 to offset such conditions as low stream flow or low dissolved oxygen levels which, under DRBC regulations, could prevent the utility from withdrawing water for consumptive use at Limerick.

Much of the river water, which is used for cooling, is evaporated, or consumed, in the large cooling tower and thus not returned to the river.

Because the Beechwood Pool water is of poor quality (containing 1700 milligrams per liter of total dissolved solids), P. E. proposed to mix it with releases from the reservoirs (containing total dissolved solids of 32 milligrams per liter) so that specific quality objectives could be met downstream.

In reaching its decision, however, the DRBC concluded that the applicant's proposed plan of operation would conflict with the Commission's Comprehensive Plan as it relates to water quality standards and that the Beechwood Pool amounts would not be needed because of an upcoming six-week maintenance shutdown at the Limerick plant.

P. E. had sought DRBC permission on two previous occasions to use the Beechwood Pool water for Limerick cooling. On Sept. 12, 1985, the utility's request to use up to 32½ cfs from the abandoned mine pit was turned down. Eight days later (Sept. 20, 1985) P. E. submitted a scaled-down request, asking for emergency approval to draw up to 10 cfs from the pit. This, too, was denied.

The utility, on an intermittent basis, used Tamaqua reservoir water during the spring, summer and early fall of 1986 to replenish the water supply at Limerick. As of the end of October, some 750 million gallons of replacement water had been released into the Schuylkill.

On Nov. 5, 1986, however, P. E. informed the DRBC that the borough of Tamaqua was experiencing pump problems in its water distribution system and that releases would be curtailed until the problem was corrected. The utility stated that a shutdown of the plant due to inadequate cooling water would result in increased costs to customers of \$420,000 a day.

Consequently, the utility requested that a DRBC docket prohibiting the consumptive use of Schuylkill River water whenever the flow at the Pottstown gauge is less than 530 cfs (with one Limerick generating unit

operating) be revised to allow consumptive withdrawals using a 415 cfs cutoff. In its application, P. E. agreed to withdraw water under the 415 cfs trigger only when the dissolved oxygen levels exceeded those specified in the April 29, 1986 docket.

Dissolved oxygen (DO), a crucial ingredient in any healthy aquatic environment, usually increases as temperatures cool in the fall, the result of decreased bacteriological action in the water.

At a public hearing on Nov. 25, 1986, the DRBC tabled P. E.'s request for temporarily substituting the 415 cfs trigger, noting that flows in the river had increased significantly since the date of the request. (The Commission did issue a temporary permit in October of 1985 reducing the consumptive withdrawal trigger at Pottstown from 530 cfs to 415 cfs. That permit expired at the end of 1985.)

The April 29, 1986, docket approving the use of replacement water from the Tamaqua reservoirs also granted P. E. permission to substitute specific dissolved oxygen limits for water temperature restrictions in determining the availability of Schuylkill River water. And it gave the utility the option to substitute consumptive water use at Limerick for reduced consumptive use at two other generating stations – Titus and Cromby.

The temperature restriction, which called for P. E. to suspend water withdrawal from the Schuylkill for consumption at Limerick when the river temperature reaches 59 degrees (F), was established back in 1973 when the nuclear power plant was still in the planning stages. On May 29, 1985, the DRBC, in response to a request from P. E., granted a new docket condition permitting the utility to temporarily use the dissolved oxygen limit as the water use trigger. That docket expired Dec. 31, 1985.

Under the docket approved April 29, 1986, no withdrawals for consumptive use could be made from the Schuylkill River between March 1, 1986

and June 15, 1986 (a period when fish spawn), whenever dissolved oxygen levels averaged less than 7.0 milligrams per liter (or 7 parts per million). No single reading was permitted to fall below 6.0 milligrams per liter. After June 15, the limits dropped to an average level of 5.1 milligrams per liter with no single reading being permitted to fall below 4.2 mg/l.

The dissolved oxygen levels are monitored at various points along the river.

Upper Delaware Management Plan

A proposed final Management Plan for the Upper Delaware Scenic and Recreational River was completed by the Conference of Upper Delaware Townships (COUP) in November of 1986. At year's end, the National Park Service (NPS) was completing work on a final Environmental Impact Statement (EIS) and planned to submit both that document and the COUP plan to its Washington office for review and expected approval by the Secretary of Interior.

A public review draft of the Management Plan was unveiled in January, 1986, and a draft EIS was released in April. Public hearings were held in June. From July through October, a Plan Revision Committee responded to over 2,500 comments received over the course of the public hearing and review process.

The final COUP Management Plan was developed with the assistance of the NPS, the Delaware River Basin Commission (DRBC), New York state's Department of Environmental Conservation (NYDEC), the Pennsylvania Department of Environmental Resources (PaDER), five Upper Delaware planning offices in the two states, and the Upper Delaware Citizens Advisory Council, created by the 1978 federal legislation designating the 73-mile stretch of the Upper Delaware as part of the National Wild and Scenic Rivers System.

The river corridor boundary in the proposed final plan will encompass some 55,000 acres. Within that area,

the plan calls for NPS purchase of no more than 124 acres from willing sellers, primarily for river access and visitor facilities.

COUP, an ad hoc association of representatives from the 15 towns and townships along the river between Hancock, N.Y., and Matamoras, Pa., was formed in 1981 in response to local concerns over the impact the scenic river designation would have on river bank communities. COUP offered to develop a revised management plan after plans drawn up by the NPS and the states met strong opposition from local interests.

The Park Service provided funding to COUP to develop a plan that responded to local concerns. It was formulated with the assistance of three consulting firms and a 35-member Plan Oversight Committee.

The National Wild and Scenic Rivers System legislation states that the designated stretch of the river must be protected in its free-flowing condition and that it must be managed for the benefit and enjoyment of present and future generations.

The DRBC has assisted in the implementation of the legislation since the act's inception, providing technical information and support in response to interstate concerns relating to water quality, environmental protection and flow management.

Once the final Management Plan is approved by the Secretary of Interior, the creation of an Upper Delaware Council is proposed to assure continued involvement in Upper Delaware Scenic and Recreational River matters by the plan's chief architects. Council members are expected to include the NPS, PaDER, NYDEC and representatives from the towns and townships which flank the designated reach of the river. The Upper Delaware Citizens Advisory Council is proposed to be a non-voting member of the new council and the DRBC will serve in an advisory capacity.

Project Review

One of the Commission's most visible and important functions is the review of a large variety of water-related projects in the basin. Through this process, the Commission seeks to protect the region's water resources from such conditions as contamination and over-depletion.

The DRBC has acted on 2,523 applications since its inception. In fiscal 1986, 105 applications were processed as follows:

Projects exempt: 13

Projects approved under Section 3.8 of the Compact: 91

(Of these, 54 were concurrently added to the Comprehensive Plan. Twelve were ground-water renewal projects.)

Project applications withdrawn: 0

Project applications denied: 1

The above numbers, however, can be deceptive because they do not reflect the large number of cases where an applicant drops a project after being advised by DRBC staff that it is flatly unacceptable or needs significant, and perhaps costly, alterations. On the other hand, cases that reach Commission meetings for a public hearing and vote usually carry a recommendation for approval by the Project Review staff.

Participation by the public is an integral and vital part of the Project Review process. Numerous public notices are mailed out outlining upcoming hearings on projects which are under Commission consideration. In calendar year 1986, 30,260 notices detailing upcoming Commission meetings and public hearings on proposed projects were mailed to interested parties. In addition, 5,000 press releases covering the same topics were dispatched to the news media.

The Project Review staff is in daily contact with applicants and with local, state and federal agencies which share concerns over the effects proposed projects could have on the

basin. Many sponsors must be notified that plans should be amended to qualify for approval, and many requests arrive with insufficient information that must be developed.

Included in applications that come before the Commission are well projects, pipelines, flood control structures, watershed protection programs, wharfs and docks, wildlife preserves, and water diversion plans. Public and private water-supply projects and waste-treatment facilities generate the most applications.

During fiscal year 1987, 25 ground-water withdrawal permits of five years duration will expire. These must be reviewed by the Commission for renewal.

Trenton Complex

On July 30, 1986, the DRBC gave its approval to the "Trenton Complex," a project to close gaps in the freeway and interstate highway system around New Jersey's capital city through the construction of a major interchange connecting U.S. interstate highways 195 and 295 and a segment of New Jersey Route 29. The project was subject to review under the DRBC's wetlands regulations.

A new highway, N.J. 129, will be built, connecting the proposed Route 29 segment to U.S. Route 1. Also to be constructed are extensions of I-195 and I-295 leading to the proposed interchange.

The applicant, the New Jersey Department of Transportation (NJDOT), adopted various measures to mitigate adverse impacts on the environment, including the elimination of all dredging from the project, the creation (construction, planting and maintenance) of 82 acres of wetland habitat to compensate for 49.2 acres of wetland to be filled, and the use of sound barriers at key locations to reduce highway noise.

Also added to the plan, at the recommendation of the DRBC's federal commissioner, were terrestrial wild-

life crossings which permit deer and other animals to travel beneath the raised roadways.

Objectors to the project brought suit in U.S. District Court to restrain NJDOT from proceeding under an interim approval that had been issued by the DRBC's executive director. The court refused to issue a restraining order. Thereafter, the objectors withdrew their suit against the DRBC. A similar action was continued in state court against NJDEP.

A public hearing on the project, which had been under consideration for over 20 years, was held by the DRBC on June 23, 1986, and the hearing record was left open until July 14.

In reviewing the project, the DRBC determined that excavation of wetlands had begun prior to any approval by the Commission, a violation of the DRBC's Rules of Practice and Procedure. As a result, NJDOT paid to the Commission, by way of a settlement in lieu of penalty, the amount of \$47,800.

New Castle Water Plan

The Delaware River Basin Commission on Oct. 28, 1986, approved a plan for the development of water supplies to meet future needs in New Castle County, Delaware, while deleting from its Comprehensive Plan a controversial 24-year-old project that would have dammed the main stem of White Clay Creek.

The projects that were approved are located in New Castle County north of the Chesapeake and Delaware Canal and in southern Chester County, Pennsylvania, along the Delaware/Pennsylvania state line. They involve the development of additional surface water supplies with new reservoirs at Churchman's Marsh, adjacent to the Christina River, and Thompson Station, on a tributary to White Clay Creek, as well as additional wells at four locations.

Action on a proposal to transfer water from the Chester Water Authority in

Pennsylvania to New Castle County via the Artesian Water Co. and the Wilmington Suburban Water Corp. systems was deferred by the DRBC pending completion of regulatory review by Pennsylvania's Department of Environmental Resources and the Susquehanna River Basin Commission.

Deleted from the DRBC's Comprehensive Plan was the "Newark Project," which had been adopted by the Commission on March 28, 1962. To be located on White Clay Creek, it would have impounded water in both New Castle and Delaware counties. However, in 1984, land that was necessary for the project's development was designated a "unique natural area" by the Delaware Department of Natural Resources and Environmental Control because of rare species of flora and fauna in the stream valley. Subsequently, the land was donated to Delaware and Pennsylvania as a park for low-density recreational use.

Ice Jam Project

On April 29, 1986, the Delaware River Basin Commission adopted Resolution No. 86-7, agreeing to act as the local non-federal sponsor of a project to reduce ice jam flooding in the tri-state area of the Delaware River.

By the following October, the U.S. Army Corps of Engineers had received authorization from Congress to prepare project plans and specifications.

In 1982, the DRBC, through Congress, requested that the Corps conduct a study of the ice jam flooding problem which a year earlier had caused an estimated \$14 million in property damage in the Port Jervis, N.Y.,

Matamoras, Pa., and Westfall Township, Pa., area.

The Corps issued a draft report in December of 1985 stating that it would be economically feasible to construct a diversion channel, 200 feet wide and 13,000 feet long, on nearby Mashipacong Island. The channel would provide a passage way for ice-clogged river water.

The states of New York and Pennsylvania and the three municipalities have indicated to the Commission their intent to participate and fund the local cost share of the project which could amount to as much as 25 percent of the total projected cost of approximately \$1 million. Federal construction funds must still be approved by Congress.

Flood Loss Reduction Program

Drafts of four flood insurance studies prepared by the DRBC during 1986 have been submitted to the Federal Emergency Management Agency (FEMA) for review. The studies, to evaluate flood frequency and severity, were conducted in Hatfield Township in Montgomery County, Chalfont Borough and New Britain Township in Bucks County, and Smithfield Township in Monroe County. The results of these studies will be used by FEMA as the basis for preparing flood insurance rate maps and reports for each municipality. Preliminary reports and maps will be presented by FEMA to each community for possible comments. Once finalized they will be used as the basis to qualify area properties for maximum coverage under the National Flood Insurance Program.

The DRBC will continue to assist when requested in the preparation of

technical evaluations used for specific community flood insurance studies. However, the future focus of the DRBC in its Flood Loss Reduction Program will be to evaluate potential flood damage from a basinwide perspective, instead of concentrating on individual communities.

Master Siting Study

The Delaware River Basin Electric Utilities Group issued a Master Siting Study in April of 1986, providing updated data which the DRBC had requested to help develop a series of depletive water use allocation budgets.

The study included data on all major electric generating projects currently using the basin's water resources, as well as data for projects that are proposed during the next 15 years. Included was a graph showing estimated monthly consumptive use for all major water-related generating facilities for the years 1986 and 1994, and a summary of the type and capacity of generating facilities which are expected to be in operation within each sub-basin by the year 2000.

The study, drawing data from ten utility companies, noted that "despite vigorous conservation efforts, the utilities' loads continue to grow and new generating facilities will continue to be required although their location may not necessarily be in the basin. Likewise, non-consumptive and consumptive water use will continue to increase as capacity grows and generating units are added. If this growth is more rapid than that shown in this study, the need for new facilities may be advanced into the time frame of this MSS (Master Siting Study) and the consumptive water use could be greater than that shown herein."

Financial Summary*

Budgetary

Revenues			Expenditures		
	Budgeted	Received		Budgeted	Expended
Delaware	\$ 175,300	\$ 175,300	Personal services	\$1,225,000	\$1,188,360
New Jersey	473,000	473,000	Special and contractual services	212,100	209,636
New York	263,000	263,000	Other services	36,900	36,887
Pennsylvania	543,500	543,500	Supplies and materials	47,400	47,264
United States	275,000	268,000	Space (including \$51,047 of principal payments on Plant Fund mortgage)	191,300	191,279
Water Quality Pollution Control Grant	240,000	229,683	Communications	53,700	53,605
Reimbursement of overhead	27,000	27,000	Travel	35,000	34,494
Sale of publications and sundry items	5,000	8,629	Maintenance, replacements, and acquisitions	47,000	46,961
Project review fees and other income	45,900	46,718	Equipment rental or lease	21,600	21,097
Interest income	0	111,700	Fringe benefits and other	242,000	241,401
Fines and assessments	0	16,000		\$2,112,000	\$2,070,984
Contingent funding	0	0	Excess of revenues over expenditures (budgetary basis)	0	91,546
Fund balance	64,000	0	Reconciliation to GAAP basis of reporting — encumbrances		(4,153)
	\$2,112,000	\$2,162,530	Excess of revenues over expenditures	\$ 0	\$ 87,393

Non-Budgetary**

Special Programs and Projects	Fund Balances July 1, 1985	Revenues	Transfers	Expenditures	Fund Balances June 30, 1986
Well Registration — EPA	\$ 0	\$ 18,248	\$ 0	\$ 18,258	\$ (10)
2 D Model	14,660	0	0	14,500	160
USGS Monitors	41,118	206,800	25,000	257,183	15,735
Delaware Estuary	0	13,000	0	13,000	0
Blue Marsh — Prompton Dam	(28,000)	0	0	0	(28,000)
Study of Exotic Wastes — Phase II	46,047	0	0	0	46,047
Ground Water	86,464	0	0	10,023	76,441
Merrill Creek	12,590	0	0	0	12,590
Recreational — Scenic Rivers	0	8,750	0	8,750	0
Blue Marsh	40,000	129,000	95,000	209,770	54,230
Ground Water — Pennsylvania Protected Area	244,532	139,000	0	113,215	270,317
Merrill Creek Environmental	21,030	0	0	21,030	0
Ground Water — Withdrawal Fees	1,075	60	0	0	1,135
Computer	43,255	1,308	0	0	44,563
Tybouts Corner — Delaware	0	12,310	0	12,310	0
Flood Plain Contract — Pennsylvania State	0	95,640	0	87,597	8,043
Disinfection	0	4,850	0	0	4,850
Daily Flow Model	229	2,059	0	2,288	0
	\$523,000	\$631,025	\$120,000	\$767,924	\$506,101

*For Fiscal Year ended June 30, 1986.

**Revenues from sources outside current expense budget.

The records of the Commission are independently audited each year as required by the Compact.



Work boats tied up on the Smyrna River at Flemings Landing, Delaware. (Photograph by Seymour P. Gross)

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