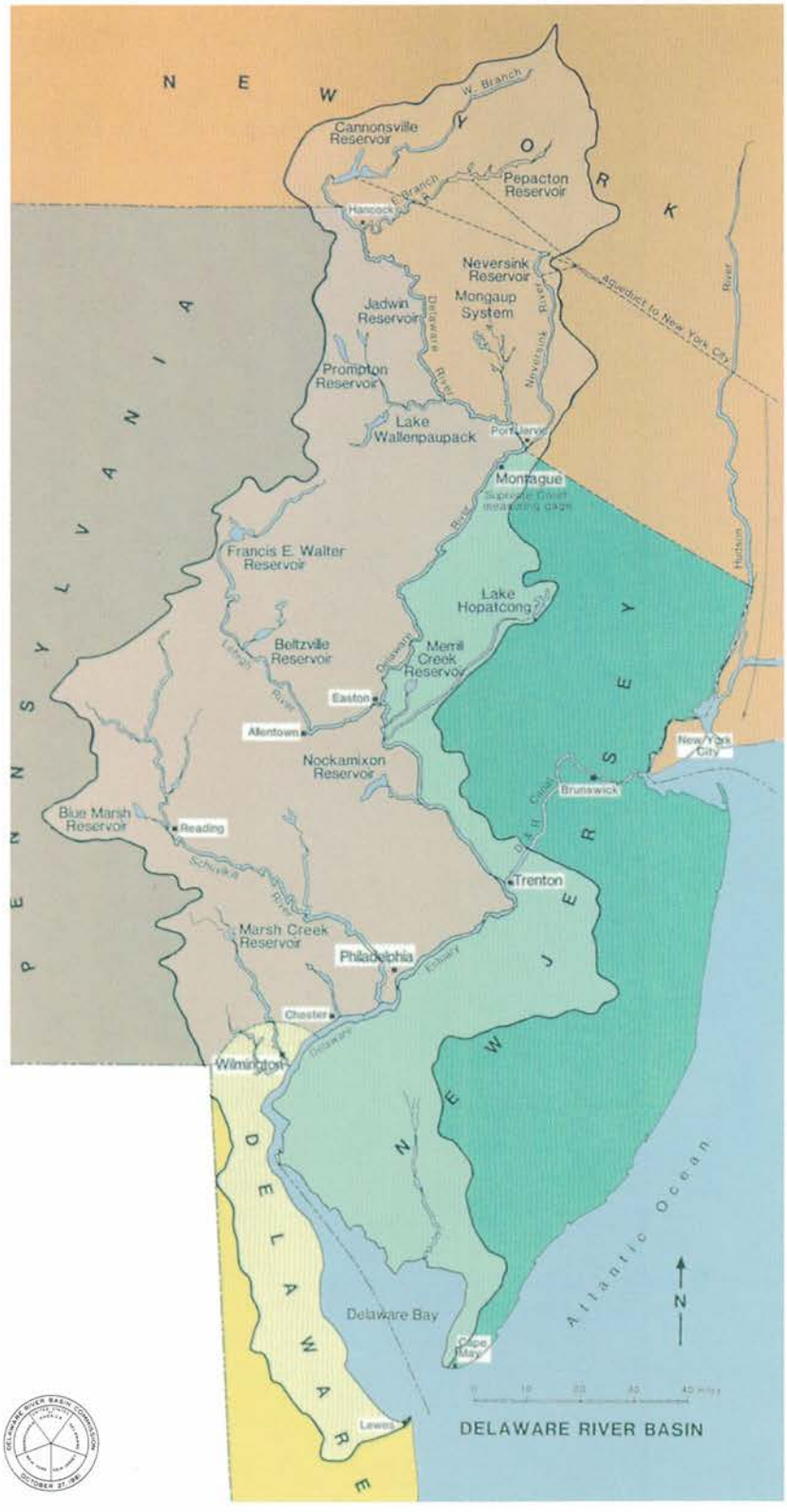
DELAWARE RIVER BASIN COMMISSION
Annual Report 1991


N E W Y O R K
P E N N S Y L V A N I A
N E W J E R S E Y
D E L A W A R E
W. Branch
Cannonsville Reservoir
E. Branch
Pepacton Reservoir
Hancock
Neversink Reservoir
Aqueduct to New York City
Mongaup System
Jadwin Reservoir
Delaware River
Neversink River
Prompton Reservoir
Lake Wallenpaupack
Port Jervis
Montague
Separate Drift measuring gage
Hudson River
Francis E. Walter Reservoir
Lake Hopatcong
Beltzville Reservoir
Lehigh River
Merrill Creek Reservoir
Easton
Allentown
New York City
Nockamixon Reservoir
Brunswick
D & R Canal
Blue Marsh Reservoir
Reading
Schuylkill River
Trenton
Marsh Creek Reservoir
Philadelphia
Estuary
Chester
Delaware River
Wilmington
Atlantic Ocean
Delaware Bay
Cape May
Lewes
N
0 10 20 30 40 Miles
DELAWARE RIVER BASIN

Contents

Material for this report was generated by the staff of the Delaware River Basin Commission. The report was designed by Odette P. Taft, DRBC graphic artist/illustrator, and compiled and edited by Christopher M. Roberts, the Commission's public information officer.

Front cover: An employee of the (Fred) Lewis Fishery of Lambertville, N.J. prepares to tie up a boat after an evening on the Delaware River netting shad. The catch is sold to customers who have phoned in orders, then wait on shore for their fish. The Lewis family started the business in 1898. It is the only commercial shad fishery left on the river.

This report was printed with soy ink on recycled paper.

The Commission · 1991

Governor Castle

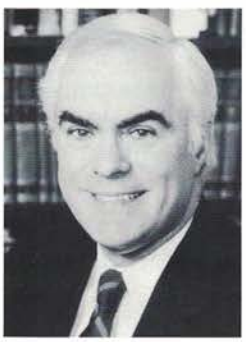
Dr. Clark

Delaware

Governor Michael N. Castle
Chairman

Edwin H. Clark II
Alternate

Alan J. Farling
Gerard L. Esposito
Second Alternates



Governor Casey

Ms. Glotfelty

Pennsylvania

Governor Robert P. Casey
Vice Chairman

Caren E. Glotfelty
Alternate

John E. McSparran
Second Alternate

John Plonski
Advisor

Secretary Lujan

Ms. Brooks

United States

Secretary of the Interior
Manuel J. Lujan, Jr.
Second Vice Chairman

Irene B. Brooks
Alternate

Lt. Col. Kenneth H. Clow
Advisor

Staff

Gerald M. Hansler
Executive Director

David J. Goldberg
General Counsel

Susan M. Weisman
Secretary

Christopher M. Roberts
Public Information Officer

Richard C. Gore
Chief Administrative Officer

Engineering Division

David B. Everett
Chief Engineer

Jeffrey P. Featherstone
Policy Analyst

Branch Heads

David P. Pollison
Planning

George C. Elias
Project Review

Richard C. Tortoriello
Operations

Planning Branch:

Richard C. Albert
AnneMarie Dearson
Pauline A. Ditmars
Robert V. Everest
Thomas J. Fikslin*
Seymour P. Gross
Warren R. Huff
Todd W. Kratzer
Robert L. Limbeck
Ronald B. Rulon
Paul J. Scally
Odette P. Taft

**On loan from E.P.A. to conduct a Delaware River toxics study*

Governor Cuomo

Mr. Jorling

Governor Florio

Ms. Fox

New York

Governor Mario M. Cuomo
Member

Thomas C. Jorling
Alternate

Russell C. Mt. Pleasant
Second Alternate

Albert F. Appleton
Advisor

New Jersey

Governor Jim Florio
Member

Jeanne M. Fox
Alternate

Steven P. Nieswand
Second Alternate

Staff *(continued)*

Project Review:

Thomas L. Brand
David C. Brown
H. Page Fielding
Karl S. Heinicke
Robert C. Kausch
Susan C. Owens

Operations:

Richard K. Fromuth
Timothy R. Lazaro
John J. Rattie
Judy G. Scouten

Administrative:

Anna Mae Auch
Frances B. Cook
Gregg Dusecina
Dorothy L. Golinski
Carolyn M. Hartman
B. Ahnde Lin
Anne S. Van Aken

Directorate/Engineering:

Catherine F. Dougherty
Carolyn B. Everett
Anne M. Zamonski
Mary Zaroff

New Commissioners Named

Jeanne M. Fox, deputy commissioner of the New Jersey Department of Environmental Protection and Energy (NJDEPE), Caren E. Glotfelty, a deputy secretary in the Pennsylvania Department of Environmental Resources (DER), and Steven P. Nieswand, an administrator within NJDEPE, have been appointed to serve on the Delaware River Basin Commission.

New Jersey Governor Jim Florio named Ms. Fox to represent him in Commission business effective July 19, 1991. She succeeded Michael F. Catania, who served as New Jersey's alternate commissioner for five years before becoming executive director of the New Jersey Chapter of The Nature Conservancy.

Mr. Nieswand, administrator of NJDEPE's Water Supply Element, was appointed by Gov. Florio to serve as second alternate.

Ms. Fox joined the NJDEPE in February of 1991 after serving nine years with the New Jersey Board of Public Utilities where she directed the divisions of solid waste and water/sewer before becoming chief of staff. Prior to that, she was the Election Division attorney in the Office of the Secretary of State.

She is vice president of the National Women's Political Caucus and a member of the New Jersey Commission on Sex Discrimination in the Statutes. She also serves on the steering committee of the New Jersey Bipartisan Coalition for Women's Appointments and is a charter member of the Women's Agenda of New Jersey.

Ms. Fox is a Rutgers University graduate, receiving a bachelor of arts degree from Douglass College in 1975 and a law degree in 1979.

As administrator of NJDEPE's Water Supply Element, Mr. Nieswand is involved in administering programs dealing with safe drinking water, water allocations and water supply.

He joined NJDEPE in 1969 and has worked in water quality modeling and management planning and in the construction grants program.

Mr. Nieswand also represents New Jersey on the Delaware River Master

Mr. Nieswand

Advisory Committee which oversees provisions of the 1954 amended U.S. Supreme Court decree apportioning the waters of the Delaware.

He holds a bachelor's degree in agriculture engineering from Rutgers University and a master's in sanitary engineering from Cornell University.

* * *

Ms. Glotfelty, deputy secretary for water management in DER, was appointed by Gov. Robert P. Casey to serve as Pennsylvania's alternate on the Commission, effective October 1, 1991. She succeeded James R. Grace, who as part of an administrative reorganization within the DER was named Deputy Secretary for Parks and Forestry. Dr. Grace was appointed to the Commission in 1987.

Pennsylvania's second alternate on the Commission is John E. McSparran, director of the DER's Bureau of Water Resources Management.

Ms. Glotfelty was named a DER deputy secretary in April of 1991 after serving as special assistant to DER Secretary Arthur Davis. She also was staff to the Governor's Select Committee on Nonpoint Source Nutrient Management.

Ms. Glotfelty began her career at the DER in 1974, remaining until 1981 when she was named Special Assistant for Chesapeake Bay Affairs in the Maryland Office of Environmental Programs. She also worked for several private consulting firms and as a township sewage enforcement officer.

She holds a bachelor's degree from Raymond College, University of the Pacific, and a master's degree in environmental planning from the University of Pennsylvania.

Castle Elected Chairman

Delaware Governor Michael N. Castle was elected the Commission's chairman on June 19, 1991, succeeding Governor Florio.

Elected vice chairman was Governor Casey; U.S. Secretary of the Interior Manuel J. Lujan, Jr. was elected second vice chairman.

Their terms run from July 1, 1991, through June 30, 1992.

The annual election of officers historically has been based on a rotation of the five signatory parties to the Commission.

Executive Director's Report

The Decision-Making Process: Considering the Public Viewpoint – Up Front

By Gerald M. Hansler

The Delaware River Basin Commission is constantly confronted with decisions on policy, standards, rules, regulations, and individual projects. Ultimately, the governors of the four basin states and the U.S. Secretary of the Interior are responsible for the decisions made.

As everyone who has dealt with the Commission knows, votes on DRBC issues are usually cast by the designated alternates to the five Commission members. Nonetheless, Commission decisions are controlled by elected officials or their representatives since even the Secretary of the Interior is appointed by an elected official — The President.

The Commission has been very diligent in factoring "public" interests, as well as signatory party agency viewpoints, into its decision-making process. A first and important step in the process is the formation *and* utilization of broad-spectrum advisory committees.

Advisory committees were key in the development of the Commission's water quality standards initially promulgated to clean up the Delaware Estuary. That cleanup has been a real success story.

The advisory committees utilized in completing the Level B Study Report, which served as a framework for the "Good Faith" Agreement among the parties to the U.S. Supreme Court Decree of 1954, truly represented all interests in the basin.

The Commission became keenly

Mr. Hansler

aware of ground water problems in various sectors of the basin in the late 1970s. Streams that historically were perennial in flow became intermittent, excessive drawdown of the important Potomac-Raritan-Magothy Aquifer in southern New Jersey and northern Delaware increased ground water salinity problems. And, more and more disputes were arising between neighboring ground water users because of over-pumping and/or over-allocation of the local resource.

In 1979, Commission staff was developing a grant application to present to the Federal Water Resources Council for a basinwide ground water resources management study. The usual personnel of signatory party agencies and DRBC staffers formulated the draft plan of study and application. But, something was missing.

Devoid of input into this important effort were diverse interests who might be affected by the implementation of any study recommendations adopted. Commission staff corrected this deficiency by establishing a steering committee to assist in preparation of the final

plan of study and application. Placed on that steering committee were not only the usual talented agency personnel, but key representatives from the public sector: water utilities, agriculture, environmental groups, industry, and the ever-watchful League of Women Voters. That broadened steering committee did result in a more meaningful plan of study, which was given high marks by the Water Resources Council and which resulted in funding for the Commission's project.

Recognizing the value of the broad-based steering committee approach, the five commissioners to the DRBC resolved, on December 15, 1982, to elevate the staff's steering committee on ground water management to a full fledged DRBC advisory committee. Such committee could and did react to draft and final reports of the various consultants participating in the basinwide ground water management study. It then functioned as the official body that recommended to the Commission those policies, rules, and regulations to better manage our ground water resources.
A significant product of the Ground Water Management Advisory Committee was the recommendation for a uniform basinwide well registration program. After several official public hearings and some revisions to the proposal, it was adopted by a vote of the commissioners.

Another DRBC advisory committee that has done yeoman work for the Commission's water resources programs is the Water Conservation Advisory Committee. At the conclusion of the Commission's deliberations on water supply management through the Level B Study and the "Good Faith" processes, it was determined that water conservation was key to balancing the supply/demand equation in the basin.

On April 20, 1983, the commissioners resolved to form the committee — again, with members representing the "public" viewpoints, not just those of signatory party agencies. As with the Ground Water Advisory Committee, the committee chairman, Bruce E. Stewart, was elected by the committee members from the public sector. David C. Yaeck, a water resources management expert with a non-signatory party agency, had been elected to chair the ground water committee.

Since water conservation policies and regulations could impact a broad spectrum of water users in the basin, the committee membership was established to include such representation:

- investor owned water utilities
- publicly owned water utilities
- industry
- electric power companies
- agriculture
- environmentalists
- commerce, consulting and construction.

No less than seven major DRBC water conservation initiatives have been adopted because of the efforts of that advisory committee, but not without internal struggles and differences of opinion within the committee. Such is the nature of deliberations when individuals with completely opposite viewpoints are asked to recommend a specific course of action to the Commission.

An initial step in advisory committee deliberations is to agree or stipulate as to the facts applicable to a specific problem to be resolved. In other words, everyone should be playing their hands from one unstacked deck of cards.
The second and more difficult step in the process is agreeing to the best course of action to resolve the problem. Many alternatives are considered and the recommendation adopted by the committee as a whole

- is by consensus or majority,
- generally represents a compromise of competing interests,

  and
- does provide another effective tool in water management.

By far, the most salient feature of using broad-spectrum advisory committees is that the proposed rule-making by the Commission has many of its rough knobs and edges removed by persons affected — *before* a final proposal is subjected to official public notice/public hearing and final adoption.
Though it is still the governors and the U.S. Interior Secretary who are ultimately responsible, factoring in the public viewpoints at the beginning of the decision-making process is much more acceptable than bureaucrats saying, "Here it is, take it or else!"

Drought Warning Triggered

Conservation Pays Off

The Delaware River Basin dropped into drought warning on September 13, 1991 as storage in major water supply reservoirs dipped to unseasonably low levels due to prolonged dry weather.

It was the sixth time in the past eleven years that a drought warning had been triggered in the basin. Two times, in 1981 and 1985, conditions worsened and drought emergencies were declared with mandatory water use restrictions imposed.

Had conservation steps not been taken in 1991, another emergency would have kicked in by early November. In all, 44.7 billion gallons of water were saved in storage as the result of drought management actions.

When the basin entered drought warning on September 13, the maximum withdrawal limits on out-of-basin diversions to New York City and to central and northern New Jersey were cut back by 15 percent. Streamflow objectives, which during dry times are met by releasing water from reservoirs, also were reduced.

New York City, which lies outside the Delaware Basin, draws roughly half its water via aqueducts from three in-basin reservoirs it owns and operates in the Catskill Mountains — Neversink, Pepacton and Cannonsville. The impoundments account for about 75 percent of the basin's total surface water storage.

New Jersey diverts water out-of-basin via the Delaware and Raritan Canal, which links the Delaware River just north of Trenton and the Raritan River in New Brunswick.

New York's allowable withdrawal from the three reservoirs was cut from 800 million gallons a day (mgd) to 680 mgd; New Jersey from 100 mgd to 85 mgd. The minimum flow target of the Delaware River at Montague, N.J. was reduced from 1,750 cubic feet per second (cfs) to 1,655 cfs — a reduction of about five percent.

Further cuts were agreed to on October 10 — New York City's allowable take dropping to 560 mgd, New Jersey to 70 mgd, and the Montague flow target to 1,100 cfs, reverting back to 1,655 cfs the following two weekends to meet

Life Before Reservoirs

The dry weather of 1991 resulted in reduced streamflows throughout much of the basin. Had it not been for reservoir releases, river levels would have been much lower. Because under drought conditions, basin reservoirs can contribute 50 percent or more of a river's flow.

There were days during the summer and early fall of 1991, for instance, when up to 90% of the flow of the Delaware River at the Montague, N.J. gage was made up of reservoir water. Without benefit of that harnessed resource, the Delaware would have shrunk to a trickle.

The benefits from the man-made storage move downstream.

Take September 16, 1991. Sixty-three percent of the Delaware's flow at Trenton came from upstream reservoirs: 53% from New York City's three in-basin impoundments in the Catskill Mountains, 8% from releases from power company reservoirs, and the remaining 2% from Beltzville Reservoir on the Lehigh River, which feeds the Delaware at Easton, Pa.

What was it like before reservoirs?

According to newspaper accounts, there was a serious drought in the upper basin in 1874. The Honesdale Herald (a predecessor to The News Eagle) described the arid conditions in an article which appeared September 10, 1874:

"For nearly two months there has been but one fall of rain throughout the Lake Region. There was a storm of short duration on the night of the 21st of August.

"Since then, a drought without a parallel has prevailed. The Delaware River has not been so low within the recollection of anyone in the valley. At Port Jervis where the stream is ordinarily nearly 500 feet wide, it may be crossed dryshod on the stones that are exposed in its bed.

"The Lackawaxen River, the largest tributary of the Delaware above the Lehigh River, is in some places almost entirely dry."

late season recreational demands. The flow objective for the Delaware River at Trenton fell from 2,700 cfs to 2,500 cfs.

After October 10, adjustments were made to the flow targets based on the movement of salty water upriver from the Delaware Bay.

The Commission also called for voluntary water use reductions throughout the basin with the exception of Cape May and Cumberland counties in New Jersey and the basin area in Delaware below the Chesapeake and Delaware Canal. These two areas were exempted because their depletive water use does not impact on salt water intrusion.

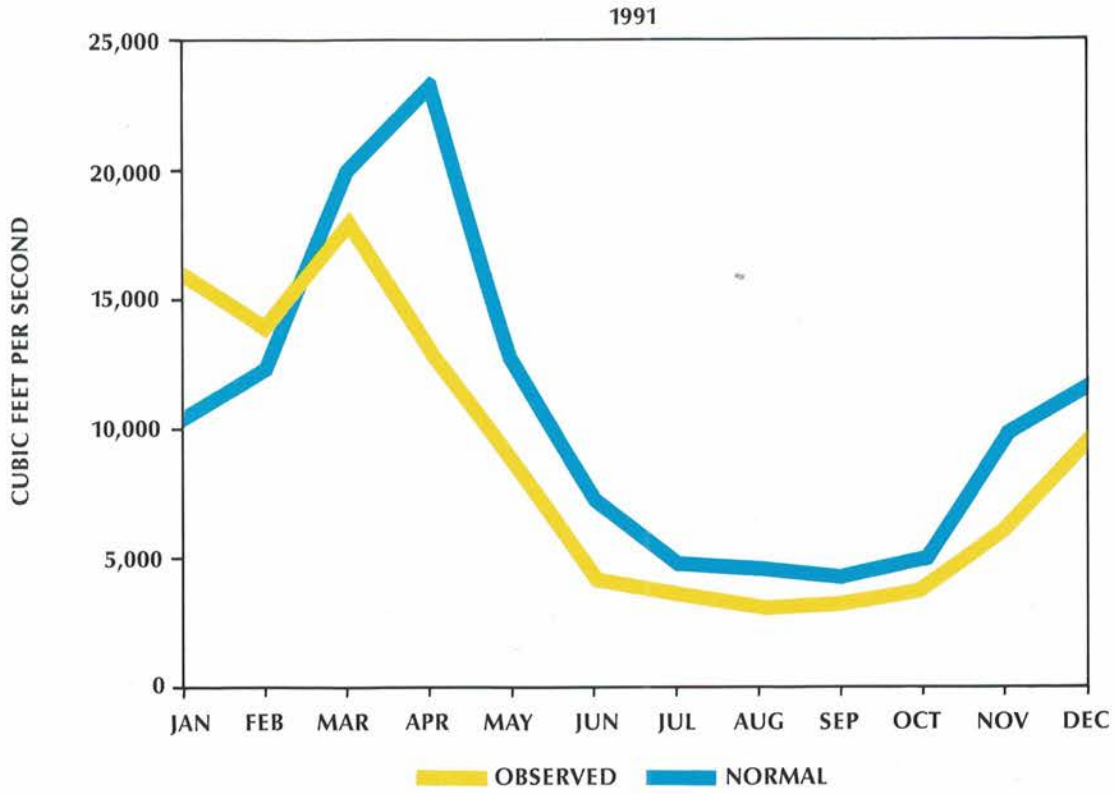
In the rest of the basin, residents were encouraged to curtail such outdoor activities as lawn watering, non-commercial car washing, or hosing down driveways, patios or sidewalks — all non-essential uses which can be highly evaporative.

To help improve water quality and protect fisheries during the late summer and fall, 3.8 billion gallons of water were released from Beltzville and Blue Marsh Reservoirs into the Lehigh and Schuylkill Rivers, the Delaware's two largest tributaries.

And for the first time since it was completed in 1987, releases totaling 2.2 billion gallons were made from Merrill Creek Reservoir, the basin's newest impoundment located just off the Delaware near Phillipsburg, N.J. The 16 billion-gallon pump storage facility was built by a consortium of seven electric utilities at the direction of the DRBC. Once the basin enters drought warning and flows fall below the normal Trenton objective of 3,000 cfs, the utilities must release water from the impoundment to make up for evaporative losses at their riverbank generating stations.

The Commission's drought management plan, adopted in 1983, is geared to the combined storage in the three New York City reservoirs. When storage drops below a designated level depicted on a "drought warning" rule curve and remains there for five consecutive days, the basin automatically enters the drought warning mode, as it did on September 13. Further significant

AVERAGE MONTHLY DELAWARE RIVER FLOWS AT TRENTON



declines into a "drought zone" trigger drought emergency actions.

The rule curve reflects seasonal hydrology, descending in the summer when storage is expected to drop off due to increased water demand, and ascending over the winter and early spring when the reservoirs normally are refilled from snowmelt and spring rains.

Drought managers also may design reservoir releases and streamflow objectives based on the location of the so-called "salt front," as they did after October 10. (The salt front is the location in the Delaware Estuary where the concentration of chlorides in water is 250 parts per million.)

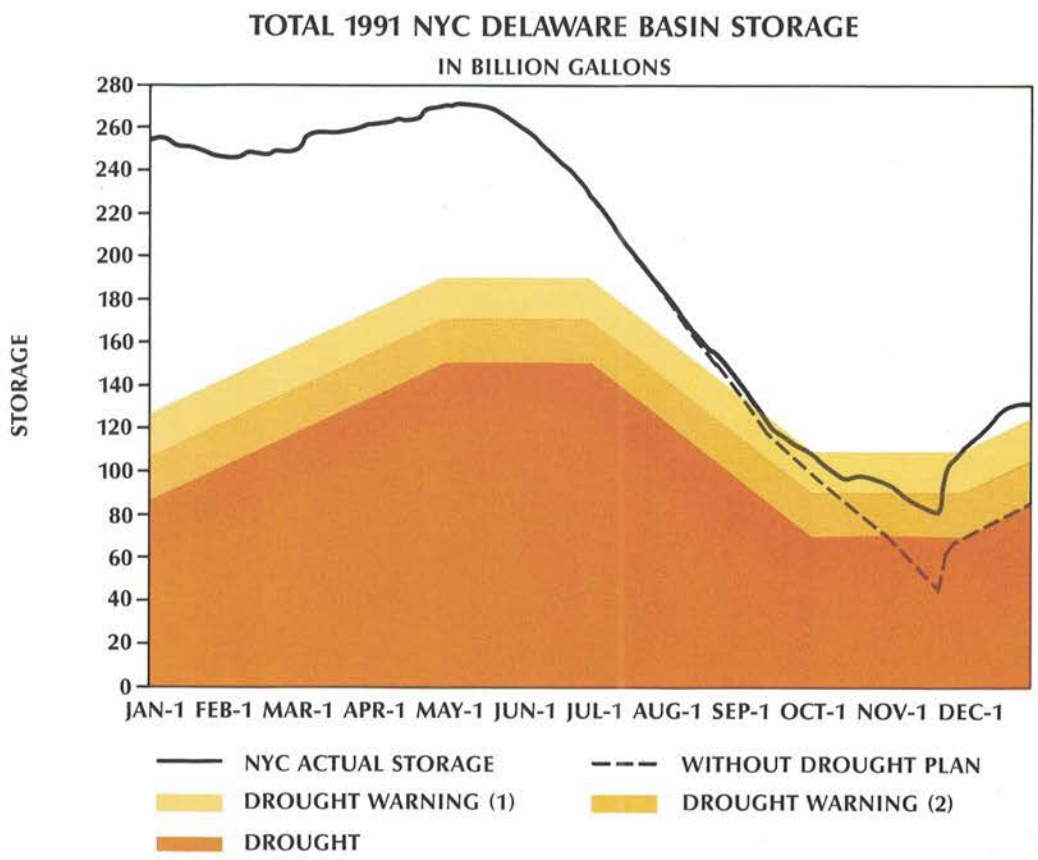
Reservoir releases and sporadic but heavy thunderstorms in the lower basin during the summer and fall of 1991 helped repel the salty water which never posed a threat to municipal surface water intakes or to aquifers, which are recharged in part by the Delaware. Maximum intrusion was in mid-November when the front migrated upstream to River Mile 86, about four miles north of Chester, Pa. Normal location for that time of year is River Mile 80.

* * *

The spring of 1991 in the basin will be remembered for scorching heat that began in May, ushering in summer ahead of the calendar. Water supplies were drawn down early, and there was little rain to help replenish storage, or cool things off. The dry weather continued into the fall and winter.

The upper basin (above Montague, N.J.) notched a precipitation shortfall of 8.67 inches for the year. It was wetter in the lower basin with annual precipitation deficits of 6.10 inches at Reading, 5.20 inches at Philadelphia and 1.56 inches at Wilmington.

By summer's end, New York City's in-basin reservoirs were less than half full — 156 billion gallons shy of their 271 billion gallon capacity. Storage increased by only 18 billion gallons during the remainder of the year and when 1991 ended the impoundments still hadn't recovered past the halfway mark. Storage on December 31 stood at 133 billion



gallons or 49.1 percent of capacity. Normally, the reservoirs are 72 percent full on this date, holding 195 billion gallons of water.

Streamflows also were off, and would have been much lower if not for reservoir releases which at times more than doubled the volume of water in the Delaware and improved levels in other basin waterways.

Ground water levels were slower to respond to the drought-like conditions, but by mid-summer had begun to decline. In Pennsylvania, Wayne County reported record low levels for August. By late November, 13 of 19 wells with drought indices in Chester County were below drought warning levels and ten were below drought emergency levels.

Officials in Pennsylvania declared a drought emergency in July for 55 of the commonwealth's 67 counties where mandatory water use bans or restrictions were imposed.

In New York State, a drought alert was issued on August 30 for New York City and eleven of the state's southeastern counties.

And on November 8, New York City officials announced a drought warning, after declaring a drought watch on September 25. The officials voiced concern about the ability of the city's reservoirs to refill by spring.

With conditions worsening in the basin, the Commission scheduled a special public hearing on November 25 to consider the possible declaration of a water supply emergency. Three days before the meeting was to convene it rained. Really hard.

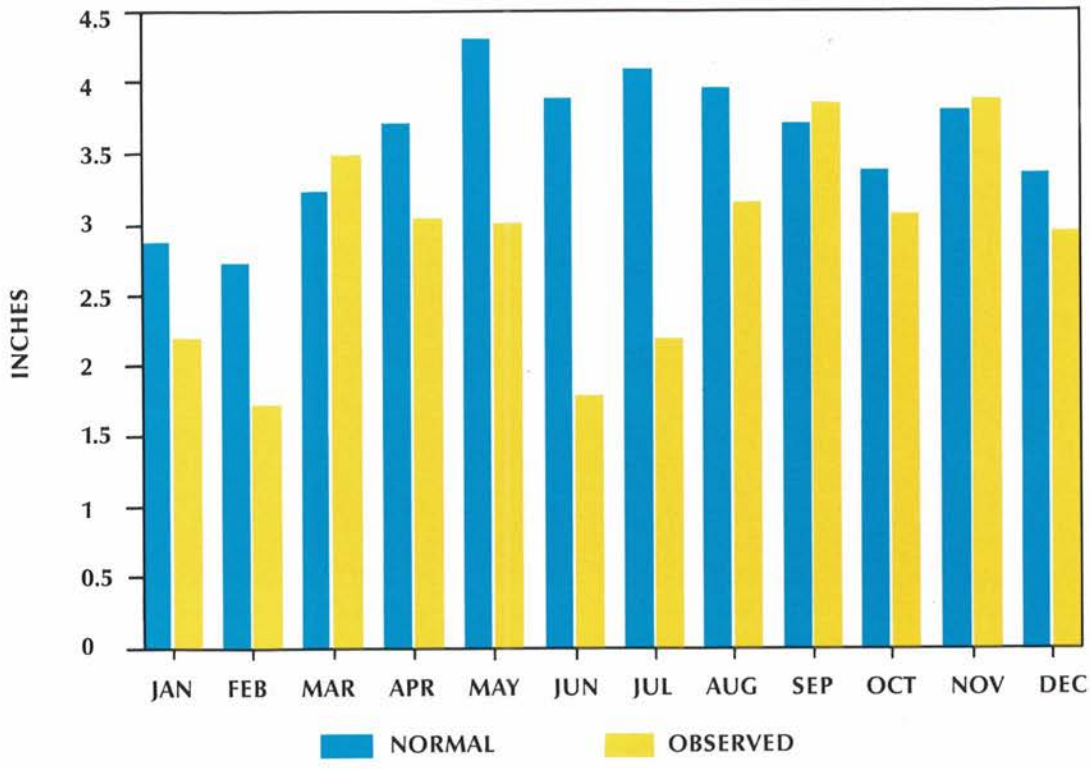
Up to three inches fell in the upper basin. Streamflows climbed to above normal levels for the first time in a month. Storage in the New York City reservoirs shot up by 22 billion gallons.

The Commission withheld action, but noted that while the rain had brought temporary relief, the months ahead would be critical in determining the outcome of the water shortage.

It didn't rain hard again the rest of the year.

1991 PRECIPITATION

ABOVE MONTAGUE, N.J.



Water Quality:
Scientists Dye for the Sake of Knowledge

The Delaware River at times resembled grape punch during the summer of 1991 as a team of scientists used dye to simulate the movement of potential waterborne pollutants under varying streamflow conditions.

The study, one of the largest ever conducted on the river, generated data which are being used to develop water quality and toxic spill models for the 125-mile reach between Hancock, N.Y. and the Delaware Water Gap.

The harmless dye, Rhodamine WT, was poured into the river during parts of May and August and samples were collected downstream. On-site fluorometers were then used to measure dye concentrations at the various sampling sites, providing preliminary data on the dye's travel time and dispersion pattern throughout the water column.

The ongoing study is a joint effort of the Delaware River Basin Commission, the National Park Service, the U.S. Geological Survey and the Upper Delaware Council. In all, 124 people spent 14 days collecting and analyzing some 5,000 river samples. At year's end, samples were still being re-analyzed under temperature-controlled laboratory conditions and were to be entered into U.S.G.S. computers for final interpretation. A U.S.G.S. report containing the study's findings is expected to be released in the fall of 1993.

The long-awaited study began May 1, 1991 after months of preparation and planning. At 6:26 a.m. Park Service rangers Rhonda Moore and Chris Frazier canoed into the fog above Skinners Falls and dumped almost three gallons of dye into the river. Their canoe paddles turned a reddish purple in the early morning mist as they returned to shore.

The May 1 study, the first of four phases, was conducted to determine how the dye would react when it reached the 114-foot Narrowsburg Pool, the deepest spot in the river.

The dye cloud reached Narrowsburg in about 2½ hours. Samples taken from boats and ferried to shore by jet ski indicated that the leading edge of the cloud was indeed entering the pool just upstream of the Narrowsburg Bridge. About 30 minutes later, the dye plume was downstream of the bridge and had been drawn to the floor of the 114-foot hole. The dye was suspended within the pool and slowly released to the downstream flow over the next 24 hours.

The second phase, a medium flow study, was conducted from May 6 through May 9 when flows at the Montague, N.J. gaging station ranged from 4,600 cubic feet per second (cfs) to 6,700 cfs. The study area included the river reach from just downstream of Hancock, N.Y. to the Delaware Water Gap.

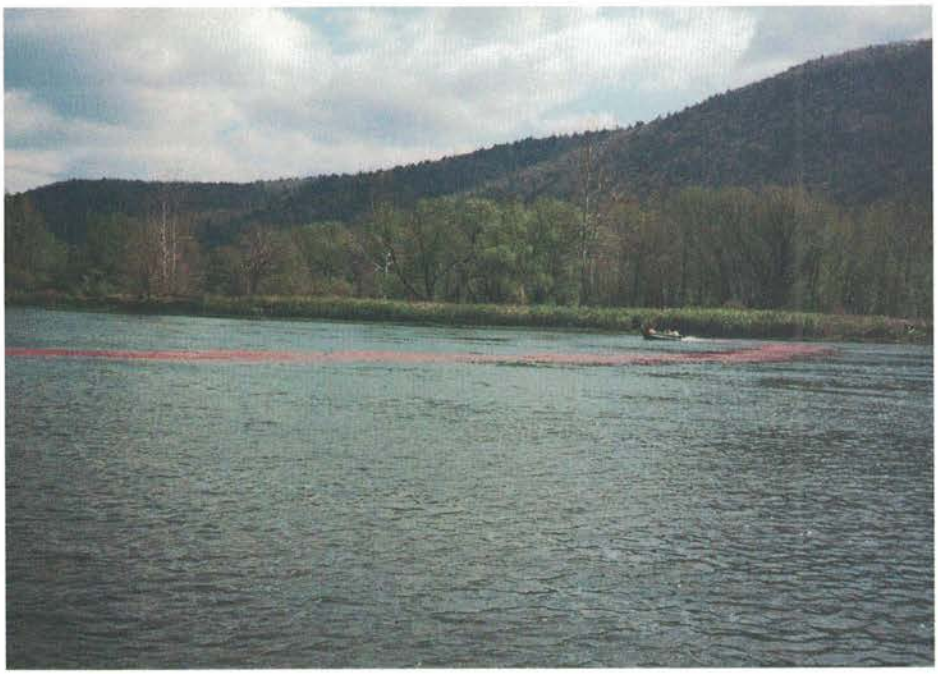
The river was divided into five subreaches. Dye was injected into the river at the upstream end of each subreach. Dye travel times that were calculated using documented methods from prior dye-tracer studies predicted dye-cloud arrival and departure times at downstream sites that were as much as eight hours faster than observed. This deviation was probably caused by the numerous large, slow-moving, pooled areas of the river in the lower reaches.

The third and fourth parts of the study, the low flow and surge wave phases, were conducted from August 5 through August 8 and from August 12 through August 14.

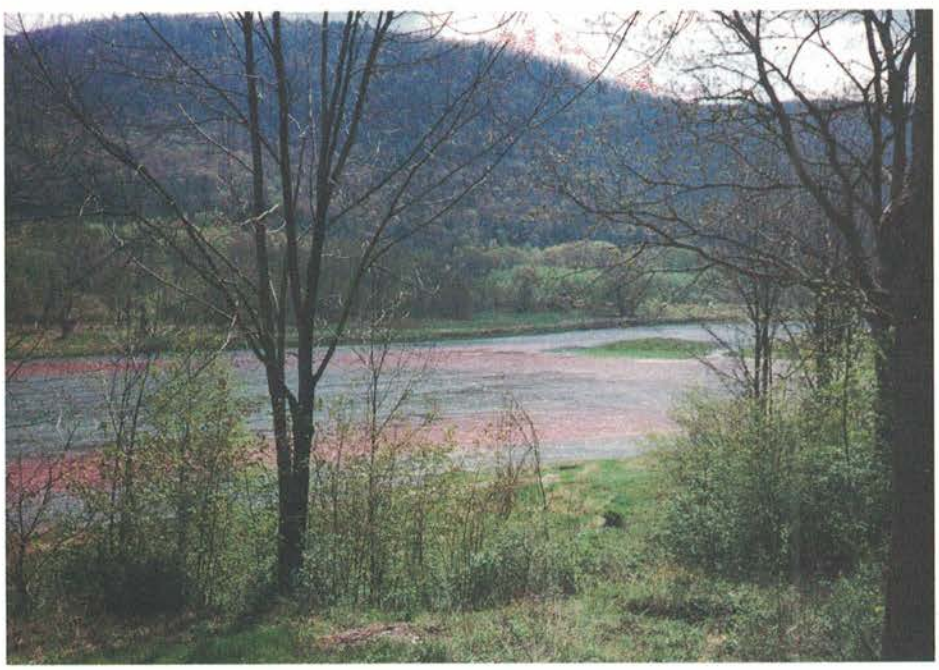
The upper Delaware was divided into two study segments. The first covered the river reach from the Lackawaxen River's confluence with the Delaware downstream to the Delaware Water Gap.

Once the low flow work was completed on this portion of the river, two separate surge wave studies were performed to measure the impact of reservoir releases on the movement of the dye cloud. Water was released from the Mongaup

Park Service Ranger Rhonda Moore prepares for early morning dye injection duty on the Delaware River at Skinners Falls. (Photo by Chris Roberts)



Dye being poured into the Delaware River at Hancock, N.Y., above. Below, dye cloud moves downstream one-half mile below the injection site. (Photos by Robert Limbeck)



Reservoir System in New York State and from Pennsylvania's Lake Wallenpaupack, which feeds the Lackawaxen. The second study segment covered the river reach from Hancock to the Lackawaxen's confluence. Following the low-flow dye sampling, water was released from New York City's Cannonsville Reservoir, again to observe the impact on the river's hydraulics.

As in the medium-flow study, dye travel times were much slower than anticipated, again probably due to large pooled areas and dense aquatic plant growth.

The surge wave studies were designed to determine the effect on pollutant transport and dispersion should a toxic spill occur or a wastewater treatment plant malfunction when reservoir releases are being made.

The computer toxic spill model which is to be developed from the study data will be made available to emergency response agencies and river managers. The model will predict concentrations and travel times of a pollutant so that downstream communities and recreational areas can be alerted to its impending arrival.

The water-quality model will be used to refine "Scenic Rivers" water quality protection efforts described further on in this chapter. In addition, the Commission and the National Park Service have been collecting water quality data during annual summer monitoring programs which will be used in the model's development.

The time-of-travel study, costing over $100,000, is being funded by the U.S.G.S., the Commission, the Park

Sampling crews rendez-vous below the Narrowsburg Bridge as the dye cloud moves downstream. (Photo by Chris Roberts)

Service and the Upper Delaware Council. In addition to these agencies, many other organizations participated in the project, including the Pennsylvania Department of Environmental Resources, the U.S. Environmental Protection Agency, the New York City Department of Environmental Protection, the Pennsylvania Fish and Boat Commission, Pennsylvania Power and Light Co., Orange and Rockland Utilities, Inc., the Monroe County Planning Commission, the Pike County Conservation District, Rutgers University, and the Watershed Association of the Delaware River. Citizen volunteers also helped out.

Scenic Rivers Protection

Commission staff spent much of 1991 developing a final strategy in its four-year effort to develop a water quality protection plan for the Upper Delaware Scenic and Recreational River (UDSRR) and the Delaware Water Gap National Recreation Area (DWGNRA). Staff worked closely with the Commission's Water Quality Advisory Committe and National Park Service personnel.

Numerous draft proposals were developed and debated and numerous meetings of the committee and special sub-committees were held in an effort to craft a final proposal. By year's end, all parties were in general agreement as to the approach to be taken and were hopeful that public hearings could be held in the spring of 1992.

Triggering concern for the future of the scenic rivers was the rapid growth and development that occurred in the Pocono Mountains region surrounding the DWGNRA during the past decade.

In 1987, the Commission and the National Park Service began working on a water resources management plan to protect the high water quality within the DWGNRA. A year later, the Watershed Association of the Delaware River petitioned the Commission to classify the entire stretch of the Delaware from Hancock, N.Y. to the Delaware Water Gap as Outstanding National Resource Waters, a term embodied in U.S. EPA's national non-degradation regulations. The Commission subsequently expanded its planning effort to include the Upper Delaware Scenic and Recreational River.

The water quality protection strategy that has evolved out of the planning process takes a multi-agency partnership approach with responsibilities for protecting existing water quality divided between the Commission and the state environmental regulatory agencies in New York, New Jersey and Pennsylvania.

Todd Kratzer, DRBC water resources engineer, at work at a riverbank fluorometer, used to measure dye concentrations. (Photo by Chris Roberts)

The proposed plan is unique in that, once implemented, it will mark the first time in the nation that such a program has been applied to a river system in such a rapidly urbanizing region. The plan recognizes that

water quality preservation is in the best interest of the area's long-term social and economic health, while taking into account the right of local governments to control the extent of growth within their jurisdictions.

Scenic Rivers Monitoring Program

Since 1984, the DRBC and the National Park Service have conducted an annual summer water quality monitoring program taking samples in the Delaware River and tributaries between Hancock, N.Y. and the Delaware Water Gap.

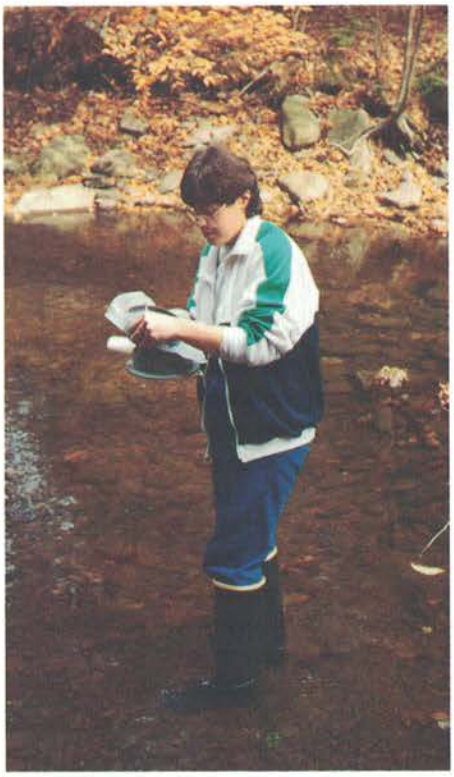
The program augments similar efforts of state and local agencies. Annual reports are prepared on each year's effort and distributed to governmental departments, the news media and other interested parties.

During the summer of 1991, program personnel made approximately 500 station visits to over 78 sites in the Upper Delaware Scenic and Recreational River, the Delaware Water Gap National Recreation Area and the intervening reach of river. Fecal bacteria, dissolved oxygen, water temperature, pH, conductivity and benthic (river bed) organisms were routinely monitored. In addition, biochemical oxygen demand (BOD) and nutrient analyses were done for selected locations and flow measurements were made for tributaries which had never been gaged. The BOD, nutrient and flow data will be used in the development of a water-quality model as part of the Scenic Rivers Protection Program.

In addition, a sediment toxics survey was conducted on Beaver Brook, a New York tributary to the Upper Delaware Scenic and Recreational River.

Most of the analyses of samples were done in a National Park Service laboratory located near Milford, Pa. Nutrient and BOD analyses were performed by a private laboratory.

A report on the 1991 findings will be published in the spring of 1992.



National Park Service ranger Debbie Drelich conducts a sediment toxics survey on Beaver Brook, a New York tributary to the Upper Delaware Scenic and Recreational River. (Photo by Richard C. Albert)

A Creek's Comeback

In 1984, Commission data showed that Cherry Creek was the most polluted tributary to the Delaware Water Gap National Recreation Area.

Average fecal coliform values in the stream were 1679/100 milliliters (ml.) with a geometric mean of 922/100 ml. This far exceeded the adopted fecal coliform stream standard of 200/100 ml.

Data in 1985 and 1986 showed geometric means greater than 6000/100 ml. with individual values as high as 66,000/100 ml. Cherry Creek's status as the most polluted stream in the scenic rivers area continued into subsequent years.

Due to the efforts of the Pennsylvania Department of Environmental Resources, the Borough of Delaware Water Gap, and others, a sewage treatment plant and connecting sewer lines were constructed for the borough. The plant began receiving wastewater in late 1989.

The completion of the sewage treatment plant and the hookup of its entire service area has resulted in major water quality improvements to the stream.

In 1991, fecal coliform values met water quality standards for the second consecutive year with a geometric average of 120/100 milliliters. Today's fecal coliform levels in Cherry Creek are probably the lowest levels experienced in the last 100 years.

Data for 1991 indicate that non-point sources are now the major influence on fecal coliform levels since the stream's bacterial levels are generally low until it rains.

Improvement in the water quality of Brodhead Creek also was noted in 1991, although it will take several years of data collection to confirm that this is an on-going trend. Arithmetic average fecal coliform values observed in the 1984 to 1990 period generally ranged between 400 to greater than 500/100 ml. In 1991, however, the mean observed value was 110/100 ml. This reduction of bacterial levels is likely the result of upgrades at the Stroudsburg and East Stroudsburg wastewater treatment plants.

Data from 1992 hopefully should verify the 1991 results for Brodhead Creek and show the first indications of improvements to Callicoon Creek in New York State, the latter resulting from the completion of a Town of Delaware sewage treatment plant now under construction.

The Delaware Estuary:

Toxics Management

The Commission initiated the Estuary Toxics Management Program in 1989 in an effort to develop policies and procedures to control the discharge of toxic substances from municipal and industrial wastewater treatment plants located along the tidal portion of the Delaware River.

The program is a combined effort of the Commission, the states of Delaware, New Jersey, and Pennsylvania, and EPA Regions II and III.

Thomas Fikslin, on loan from the EPA Region II, directs the project working out of the Commission's offices in West Trenton, N.J.

During 1991, the program focused on the completion of several field studies investigating the toxicity of ambient water on aquatic life and the extent of toxic contamination of river bed sediments. A report containing recommendations for water quality criteria for toxic pollutants in the estuary also was completed.

Water samples were collected at 12 sites between Trenton and Artificial Island during 1991 and tested to assess their toxicity to fish and invertebrates. These tests involve exposing certain species to the water samples and observing whether their growth or reproduction is affected.

The species used in these tests were standard freshwater test species, the fathead minnow *(Pimephales promelas)* and the cladoceran *(Ceriodaphnia dubia)*; and in samples from the lower river, the marine test species, the sheepshead minnow *(Cyprinodon variegatus)* and the mysid *(Mysidopsis bahia)*.

This study indicated two areas of the estuary where the ambient water samples were toxic to the fathead minnow. The areas encompassed River Miles 97 to 111 (Walt Whitman Bridge to the Torresdale section of Philadelphia) and the vicinity of the Delaware Memorial Bridge (River Mile 69). The water sample collected at River Mile 69 also produced significant reductions in the reproduction of Ceriodaphnia.

The Commission plans to perform modeling studies and conduct additional field studies in 1992 to further investigate these observations.

A study of the concentrations of toxic pollutants in the sediments of the estuary was also conducted in the summer of 1991. Sediment samples were again collected at 12 sites between Trenton and Artificial Island with the assistance of the Delaware Department of Natural Resources and Environmental Control. The samples were analyzed for metals, chlorinated pesticides, polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs).

The results of this study indicated elevated concentrations of several metals including copper, lead, zinc, cadmium and chromium. The highest concentrations of metals generally occurred in the upper portion of the estuary above Chester, Pa. PAHs also

Personnel from the Delaware Department of Natural Resources and Environmental Control decontaminate equipment used in the collection of Delaware River sediment as part of the Estuary Toxics Management Program. (Photo by Thomas Fikslin)

were detected at elevated concentrations with the highest concentrations occurring between River Mile 114.5 and 88.5 (Beverly, N.J. to Paulsboro, N.J.). The chlorinated pesticide DDT and its metabolic products DDE and DDD were detected in most of the samples. PCB Arochlors (commercial mixtures) were not detected; however, the presence of individual PCBs at very low levels was suggested.

The results of these studies will be used in modeling work which will investigate the transport and fate of metals in the estuary.

A major product of the program during 1991 was the completion of the report on the recommended water quality criteria for toxic pollutants for the estuary. Currently, there are three different sets of water quality criteria for toxic pollutants which apply to the estuary. The application of uniform water quality criteria and implementation procedures for establishing effluent limitations in NPDES permits for industrial and municipal discharges is essential if the limitations and subsequent treatment requirements are to be equitable.

The report, which has received the concurrence of the Commission's Water Quality Advisory Committee, recommends the adoption of criteria for 26 toxic pollutants and whole effluent toxicity to protect the estuary's aquatic life. It also recommends the adoption of criteria for 47 toxic pollutants which are classified as carcinogens, and criteria for 65 toxic pollutants to protect against non-carcinogenic effects on human health from the ingestion of water or the consumption of fish from the estuary.

The Commission currently is planning to solicit comment and discuss the recommendations contained in the report during public briefings planned for the spring of 1992.

Efforts also will be made during 1992 to develop and validate wasteload allocations for those toxic pollutants which are expected to exceed the recommended water quality criteria.

Water Quality Standards Raised

Water quality standards for a 31-mile stretch of the Delaware River were upgraded by the Commission in 1991 and now meet the "swimmable" goal contained in the federal Clean Water Act.

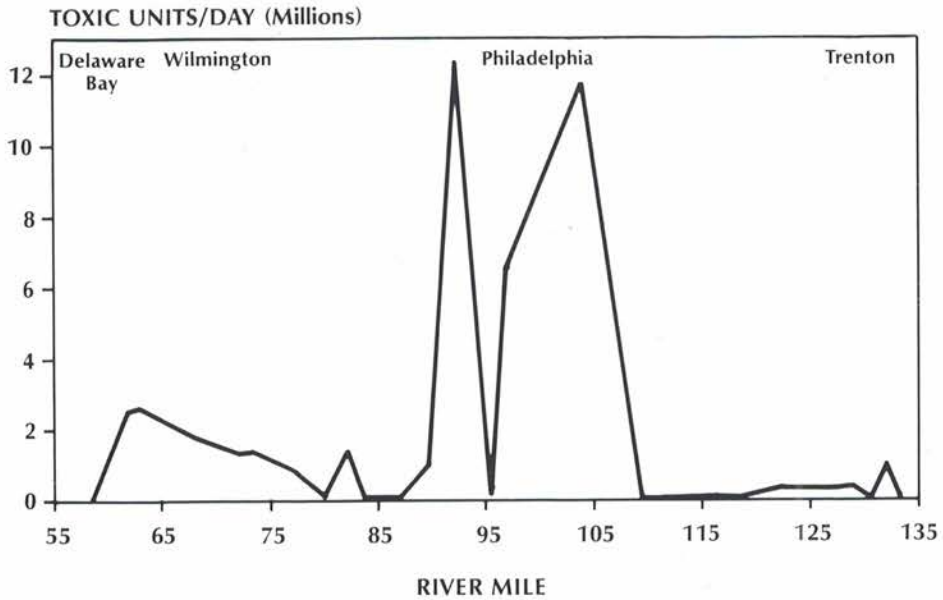
This leaves only a 26-mile reach of the river in the Camden/ Philadelphia area with a non-swimmable or secondary contact use designation.

Upgraded were two river reaches: a 22-mile stretch from the Chesapeake and Delaware Canal upstream to the Commodore Barry Bridge, and a nine-mile stretch from the Burlington-Bristol Bridge downstream to just north of the Tacony-Palmyra Bridge.

The Clean Water Act calls for "water quality which provides for the protection and propagation of (fin)fish, shellfish and wildlife, and provides for recreation in and on the water" where attainable. These are commonly referred to as the national "fishable" and "swimmable" goals.

Additional pollution abatement actions were not needed to upgrade

MASS LOADING OF TOXICITY TO THE TIDAL DELAWARE RIVER



Bioassay tests showed growth reductions in the fathead minnow in the river reach between Philadelphia and Wilmington and a decline in the reproduction of cladoceran in the Wilmington area.

the 31-mile reach to "swimmable" (primary recreation use). A study conducted by the Commission confirmed what preliminary data had indicated: the quality of water needed to meet the "swimmable" goal already existed as the result of improved treatment at wastewater treatment plants discharging to the Delaware.

The study also found that through further upgrades at sewage treatment plants in Philadelphia and Camden, "fishable" water quality (as defined by a dissolved oxygen concentration of 4.0 milligrams per liter or higher) can be attained on a 39-mile stretch of the river from the Delaware Memorial Bridge to just north of the Tacony-Palmyra Bridge. The Commission has deferred action on this segment of the study because of questions raised concerning the cost of additional pollution abatement actions.

Combined Sewer Overflows

The Commission has received a $525,000 grant from the U.S. Environmental Protection Agency to study and develop control strategies for combined sewer overflows in the Delaware Estuary.

Since receiving the grant in the fall of 1991, DRBC staff has been working with state and EPA personnel to define data needs and to design a scope of work to carry out water quality modeling. Results of the study are anticipated in late 1994 or early 1995.

In large portions of most cities in the United States, the sewer system which collects sanitary sewage and industrial wastewater for delivery to wastewater treatment plants is combined with the sewer system which collects rainfall running off the city's streets and rooftops. This is true for Philadelphia, Camden, Chester, and Wilmington, all located along the Delaware River.

Relatively modest rainfall produces volumes of combined sanitary sewage and stormwater runoff too great for the treatment plants to handle. When this occurs, it is necessary to discharge these volumes, including a portion of the untreated sanitary sewage and industrial wastewater, directly to the Delaware River or its tributaries. The nearly 300 combined sewer overflows discharging to the Delaware Estuary represent one of the most significant sources of pollution remaining after nearly three decades of pollution abatement work.

The recent adoption by the Commission of the upgraded water quality standards for the estuary recognized the impact of combined sewer overflows on river bacterial levels. As noted earlier, a 26-mile reach of the Delaware in the Philadelphia/Camden area was not upgraded to primary contact recreational status because of the high bacterial levels.

At public hearings held by the Commission in 1990 on the proposed upgrading, there was testimony that combined sewer overflows be addressed before requiring further upgrading of wastewater treatment plants to meet additional goals of the federal Clean Water Act.

However, more information is needed on the exact effects on water quality from potential improvements in combined sewer overflows, including the interaction of the numerous overflow locations with the Delaware's complex tidal flows.

Water Supply:
Water Transfer Policy Adopted

The Commission adopted regulations during 1991 that govern the transfer of water and wastewater to and from the Delaware River Basin after approving a controversial request to export treated Lehigh River water to the Susquehanna River Basin.

The regulations, along with policy statements, were adopted June 19 as Resolution 91-9.

The resolution states that it shall be the policy of the Commission to discourage the exportation of water from the Delaware Basin or the importation of wastewater to the basin that would significantly reduce the assimilative capacity of the receiving stream. The ability of streams within the basin to accept wastewater discharges should be reserved for in-basin users, the resolution states.

All projects involving a significant transfer of water into or out of the Delaware Basin must be submitted to the Commission. If approved, the water leaving the basin is subject to depletive water use charges — $60 per million gallons versus the 60 cents per million-gallon rate charged for water that is withdrawn, then returned to the basin.

As part of the new policy, applicants seeking to import water from the Delaware Basin must first make an effort to develop, use, or conserve the water resources in the basin to receive the water and must detail any conservation steps that have been taken that could forestall the transfer.

Also to be assessed are the social and economic impacts of the importation or exportation.

The Commission will consider applications for inter-basin transfers on a case-by-case basis. The application filing fee for any project that results in an out-of-basin diversion will be increased by 50%.

* * *

The new policy and regulations were driven in large part by an application from the Hazleton (Pa.) City Authority to draw up to 2.5 million gallons of water daily from the Lehigh River, which drains to the Delaware River, then return the treated water to the Susquehanna Basin.

Hazleton straddles the ridge line dividing the two watersheds.

The Commission gave the city approval to proceed with the project at a special meeting on January 30, 1991 after holding two public hearings on the application, one in Jim Thorpe, Pa., at which 44 people testified. When the hearing record closed on January 14, 1991, 97 written comments had been received. Most commenters, many from downstream communities, had concerns about the project, designed to give Hazleton a more reliable public water supply and eliminate a giardia cyst contamination problem.

It was during the hearings that the Commission was urged to adopt a policy on inter-basin transfers so that a set of written guidelines could be followed in considering future cases.

Requests came from Mary Ellen Noble, director of the Watershed Association of the Delaware River, and Gretchen Leahy, environmental coordinator for the Borough of Morrisville, Pa. Two DRBC commissioners, Michael F. Catania, representing New Jersey, and Irene B. Brooks, the federal government's representative, also urged that such a policy be crafted.

In addition to the hearings, Commission staff and personnel from the Pennsylvania Department of Environmental Resources (DER) attended a number of briefings in the Lehigh Valley where some community leaders and lawmakers considered the proposed withdrawal a "water grab" by an upstream user which could cause environmental harm to the Lehigh.

The final docket approved by the Commission January 30 contained conditions not only to protect the river's fisheries and recreational uses, but to use water conservation programs as a way to cut down on Hazleton's water needs. Some of the docket conditions were prompted by the hearing process. The conditions included:

- Hazleton Authority may not withdraw Lehigh River water during low-flow periods.
- The city cannot increase the withdrawal unless additional reservoir storage is built upriver.
- The city must monitor withdrawals, make monthly reports to DER and implement water conservation steps, including leakage reduction and the metering of all water customer connections.

The Commission approved the Hazleton withdrawal at a public meeting January 30, 1991 in West Trenton, N.J. after a public hearing process that generated volumes of verbal and written testimony and lengthy and tedious deliberations. The seriousness of the moment, just before the vote was taken, is written on the faces of (clockwise) New Jersey Alternate Commissioner Michael F. Catania, Pennsylvania Alternate Commissioner James R. Grace, Hazleton City Authority solicitor Lawrence Klemow, and Eugene Rafalli, chairman of the Authority's board of directors. (Photos courtesy of the Hazleton Standard-Speaker)

- The city must develop a contingency plan to save water during emergencies.
- The seven-mile pipeline which will carry the water from the river intake to Hazleton's distribution system once the project is completed was downsized from 24-inch diameter to 16-inch. (When in operation, a daily withdrawal of 2.5 million gallons a day will amount to only one-half of one percent of the river's average flow and less than 1/8 of an inch of the river's depth at the intake point.)

"The DER and the DRBC took the public's concerns seriously. We put in the necessary restrictions to protect the Lehigh River while, at the same time, giving Hazleton the water it needs," noted James Grace, the DRBC's Pennsylvania commissioner and a DER deputy secretary.

George Elias, head of the Commission's Project Review Branch, explains the proposed Hazleton City Authority diversion project at a special public hearing held by the Commission January 10, 1991 in Jim Thorpe, Pa. (Photo courtesy of the Hazleton Standard-Speaker)

F. E. Walter: No Free Ride for Major Users

"The Francis E. Walter expansion is needed. It will help to avoid water shortages, help to eliminate the need for emergency measures, and will ensure adequate water supplies for the future," New Jersey Governor Jim Florio told a packed Delaware River Basin Commission meeting in West Trenton, N.J. on March 27, 1991.

Gov. Florio, who served as the Commission's chairman from July 1, 1990 through June 30, 1991, was making a pitch for a project which has been delayed for years due to lack of funding.

He stressed at the meeting the importance of moving ahead with the expansion, saying, "We can't afford to wait until the inevitable dry period comes and watch the salt line come up the Delaware to contaminate water supplies..."

The governor said he recently communicated with Governors Robert P. Casey of Pennsylvania and Michael N. Castle of Delaware, as well as Senator Bill Bradley of New Jersey, and was encouraged that consensus was near in the support for legislation which would open the way for funding.

"This project needs broad-based financing which should be contributed by all the users," Gov. Florio said. "States and the federal government should not bear the full cost and we can't let major water users get a free ride."

The governor's "free ride" remark was in reference to a federal reser-

vation inserted by Congress 30 years ago into the Delaware River Basin Compact prohibiting the Commission from imposing any charges for water withdrawals in the basin if they lawfully could have been made without charge on the date the Compact was ratified — October 27, 1961.

In other words, the Commission cannot charge pre-Compact water users — who make up the vast majority of water users in the basin — for new water storage projects like the F. E. Walter modification even though those users would benefit.

Plans to enlarge the reservoir were contained in a 1983 document known as the "Good Faith Agreement," which recommended ways to manage the basin's future water needs. The agreement was signed by the governors of Delaware, New Jersey, New York and Pennsylvania and the mayor of New York City.

Under the pact, the three down-basin states agreed to negotiate on the underwriting and financing of the non-federal, cost-sharing obligation necessary to complete the expansion, which would add 22.9 billion gallons of water supply storage in the impoundment.

The F. E. Walter Reservoir was completed in 1961 as a flood control project. The dam is located on a tributary of the Lehigh River near White Haven, Pa., some 77 miles above the Lehigh's confluence with the Delaware River.

The estimated price tag for enlarging the reservoir for water supply has risen sharply over the years, jumping from $127 million in 1986 to $160 million in 1991 — an increase of 26%. Further delays could push the price higher.

Of the $160 million, $130 million would be used to cover the creation of the additional water supply storage, with the rest going for enhanced recreational uses and improved flood control benefits.

New Jersey and Pennsylvania have committed $10 million each up front and Delaware has agreed to a pro-rata share amounting to $800,000 to help finance the added water supply storage.

New Jersey Governor Jim Florio voices his support for expanding storage capacity in the Francis E. Walter Reservoir at a Commission meeting he chaired March 27, 1991. Flanking the governor, left to right: Alan J. Farling, Delaware's alternate commissioner; Commission Executive Director Gerald M. Hansler; Michael F. Catania, New Jersey's alternate commissioner; and James R. Grace, the alternate commissioner from Pennsylvania. Commission Secretary Susan M. Weisman records the proceedings. (Photo by Seymour P. Gross)

The Commission collects about $1.3 million a year from the 70 surface water users in the basin that are not "grandfathered." The money is used to finance and cover maintenance and operating costs for two other water supply reservoirs — Beltzville on the Lehigh River and Blue Marsh on the Schuylkill River.

While the cost to enlarge the F. E. Walter impoundment is in the millions, residential water users would need only pocket change to help pay their share. It is estimated that the quarterly water bill for an average homeowner in the three down-basin states would increase by less than 25 cents as a result of the Walter expansion, compared to the $25 per quarter hike associated with meeting requirements of the federal Safe Drinking Water Act.

Legislation has been introduced in Congress to strike the "grandfather" clause from the Compact so that all users would pay their fair share, but it has not been successful.

Two bills were introduced during the 101st Congress but never voted on.

Commission staff spent much of 1991 crafting a revised drought management plan for the basin which assumes the availability of additional Walter storage.

With an enlarged F. E. Walter Reservoir and the 15 billion gallons of additional storage in the recently completed Merrill Creek Reservoir near Phillipsburg, N.J., storage in the lower basin would more than double. This would result in significantly greater drought protection with considerably fewer drought emergencies, as well as improved salinity conditions in the Delaware Estuary.

Computer modeling shows that for a repeat of the 1927-1986 hydrology, implementation of the revised drought management plan with an enlarged F. E. Walter Reservoir would reduce by 70 percent the time during which mandatory water use restrictions are imposed in the basin.

The draft management plan was expected to be unveiled in 1992.

It is hoped that once the benefits from an enlarged F. E. Walter are made public, there will be a new push for federal legislation to amend the Compact, giving the Commission the expanded funding base it needs to move forward with this important project.

Water Charges Expanded

The Commission took the game of golf seriously during 1991, adding 83 courses to its water-charging program.

The charging program took effect in 1974. Water-use inventories at the time indicated that most golf courses in the basin were in operation before 1961 and thus "grandfathered" from paying for their surface water withdrawals.

Since then, however, many new courses have been built and some have changed ownership, making them subject to the water-use fees.

So the Commission took a new inventory in 1991 of 162 golf courses thought to be operating in the basin. Only one had not responded by year's end.

The Commission found that 129 courses were using surface water for irrigation. Of the 83 courses found to be subject to charges, 12 had changed ownership since 1961.

Forty-six courses were exempt because they were in operation prior to 1961. Of the remaining 32 courses that were inventoried, many were found to be using ground water, some purchased water from off-site sources, and a few no longer were in business.

Bills (based on a consumptive use factor of 90%) were sent out to the 83 golf courses subject to charges. By year's end, 41 had reimbursed the Commission for their 1990 surface water use. The average payment was $325. Payment for 1991 water use was expected early in 1992.

It is estimated, based on the current figures, that $24,000 will be generated annually in golf course, water-use fees once everyone gets in the swing of things.

Water Conservation

At What Price?

In this country, water often is taken for granted. It's relatively inexpensive. Compare your annual water bill with your annual cable TV bill and you'll likely find that H_2O is cheaper than HBO when you include the cost of the accompanying channels.

Television provides entertainment. Water sustains life. Yet for years we've wasted it in vast quantities.

It was more than a decade ago that the Delaware River Basin Commission came to realize that to effectively manage the basin's waters it not only would have to increase reservoir storage but conserve existing supplies.

Conservation became a linchpin in the management game plan. Since then, the DRBC has passed regulations requiring water distribution systems to be metered in order to monitor actual usage. Leak detection and repair programs have been placed on the books, and standards for water-saving plumbing fixtures and fittings such as low-flow toilets and shower heads have been adopted.

It was in 1990 that the Commission began looking at another way to save water. In the fall of that year, it joined the New York City Water Board in sponsoring a seminar entitled "Promoting Water Conservation Through Innovative Rate Design." Speakers from throughout the country discussed various forms of rate structures aimed at reducing water usage, such as imposing seasonal surcharges during summer months when demand peaks. A second workshop on water-conserving rate structures, which already are in place in some parts of the basin, was conducted in 1991 by the Water Resources Association of the Delaware River Basin.

Meanwhile, the Commission's Water Conservation Advisory Committee was busy drafting a regulation that encouraged the adoption of such water-conserving rates by major water purveyors in the basin. In shaping its proposal, the committee worked closely with the public utility commissions in the four basin states.

A public hearing was held on the draft regulation on August 14, 1991 and as the result of public input the regulation was re-drafted to address some of the concerns raised in testimony and submitted written comments.

The revised regulation was the subject of a second hearing on December 11, 1991 with the hearing record being extended to the end of the year to allow for the submission of additional written comment. Commission action was expected in early 1992.

Under the draft proposal, water companies would be required to submit conservation plans with any applications to the Commission for new or expanded water withdrawals.

The conservation plans would describe how the water purveyor has implemented DRBC water-saving regulations already on the books, including the requirements for metering programs to track water usage and the programs to identify and fix leaky distribution systems.

Applications submitted to the Commission after June 30, 1992 for new or expanded withdrawals of one million gallons per day or more also would have to be accompanied by an evaluation report on the feasibility of implementing a water-conserving retail pricing structure.

The proposed regulation encourages water companies in the basin to consider adoption of water conservation pricing. It does not give the Commission the power to set rates.

The conservation plans would be subject to review and approval by

Members of the Commission's Water Conservation Advisory Committee deliberate policy issues at a meeting held at the Commission's offices in West Trenton, N.J. (Photo by David C. Brown)

the basin state environmental agencies in which the water delivery system is located: the Delaware Department of Natural Resources and Environmental Control, the New Jersey Department of Environmental Protection and Energy, the New York Department of Environmental Conservation, and the Pennsylvania Department of Environmental Resources.

Water-conserving rate structures can provide incentives to customers to reduce average or peak water use, especially during the high-use summer period. And they reflect the fact that water is a limited resource that should be used in an economically efficient manner.

Such pricing is characterized by rates based primarily on metered usage with one or more of the following components:

- Rates in which the unit price of water is constant regardless of the quantity of water used (uniform rates) or increases as the quantity of water used increases (increasing block rates);
- Seasonal rates or excess-use surcharges to reduce water usage during summer months when demands peak.

A non-conserving pricing structure provides no incentives to consumers to reduce water use. Such pricing may be characterized by one or more of the following components:

- Rates in which the unit price of water decreases as the quantity of water used increases (decreasing block rates);
- Rates that involve charging customers a set fee per unit of time (i.e., $20 per month) regardless of the quantity of water used (flat rates).

Compliance Deadlines Set

Decreasing block rates and flat rates encourage waste.

So do outdated plumbing fixtures and fittings which use excessive amounts of water.

Consider that indoor water use can be reduced by about 20 percent in households where conventional 5.5 gallon-per-flush (gpf) toilets are replaced with 1.6 gpf models. Assuming five flushes per person per day and three people per household, a savings of some 60 gallons per day can be realized.

It was back on January 13, 1988 that the Commission adopted water conservation performance standards for plumbing fixtures and fittings, requiring 3.5 gpf toilets as well as low-flow urinals, shower heads and faucets for sinks and lavatories. It amended the regulations on May 24, 1989, calling for 1.6 gpf toilets instead of the 3.5 gpf models.

As of January 1, 1992, three of the four basin states, Delaware, New York and New Jersey, had requirements in place complying with the Commission's standards. Pennsylvania, the fourth basin state, did not.

In the spring of 1991, the Commission notified 505 municipalities in the basin portion of Pennsylvania that they had until May 15, 1992 to comply. The Commission noted that because Pennsylvania did not have a statewide plumbing code, it fell on local governments in the basin portion of the state to enact their own regulations.

By the end of 1991, 43 municipalities had submitted updated plumbing ordinances which meet the Commission's standards.

In its May 15, 1991 letter to the municipalities, the Commission noted that legislation to establish a statewide plumbing code in Pennsylvania was expected to be introduced shortly. On June 10 a bill was introduced, and it contained conservation plumbing standards identical to those established by the Commission. But it died in committee. New legislation is expected to be introduced in 1992.

The DRBC regulations for water-conserving plumbing fixtures and fittings apply only to new construction and renovations. They do not call for retrofitting.

The regulations state that all water conservation performance standards for plumbing fixtures and fittings adopted by the four basin states or political subdivisions shall comply with the following minimum standards:

- Maximum flow for sink and lavatory faucets and shower heads shall not exceed three gallons of water per minute.
- Maximum flow for water closets (toilets) and associated flushing mechanisms shall not exceed an average of one and six-tenths gallons of water per flush; maximum flow for urinals and associated flushing devices shall not exceed one and one-half gallons of water per flush.

* * *

The Commission adopted its leak detection and control regulation on April 22, 1987. It requires water purveyors that distribute in excess of 100,000 gallons per day (gpd) during any 30-day period to develop a systematic program to monitor and control leakage. Each purveyor's program is subject to review and approval by the basin state in which it is located.

The 110 purveyors in the basin that distribute more than one million gallons a day (mgd) were to have submitted program plans by April 22, 1989. All are now in compliance. The deadline for purveyors that distribute between 100,000 gpd and one mgd was April 22, 1992.

Revised and updated program plans are required from the purveyors every three years following the initial deadlines. However, the states may require more frequent program submissions from purveyors whose distribution systems experience unaccounted-for water losses in excess of 15 percent.

Operation Low Flush

If you want to get a head with water conservation, check out the North Wales Water Authority in Montgomery County, Pennsylvania.

Since May 1, 1990, the Authority has been offering rebates to customers who install water saving, 1.6 gallon-per-flush toilets. It's $75 per toilet, with a maximum pay out of $150 per customer.

As of December 31, 1991, the Authority had rebated $14,985 for 204 installations and was running at a rate of about ten rebates a month.

"We believe that conserving water is one of the best ways to make sure that there's enough water for everyone, both now and in the future," states the Authority in a brochure featuring its water-saving mascot, 'Johnny Low Flush.'

"If all of our customers were to make the switch to low flush toilets, the water saved over the course of a year would amount to 237 million gallons. That's more than a drop in the bucket."

The program runs through May 1, 1993 with a pay out limit of $500,000. In order for a customer to qualify, the toilet to be installed must be certified by the manufacturer as having a volume flush of 1.6 gallons or less and Authority personnel must be authorized to inspect the installation.

To get feedback on the program, the Authority surveyed the first 50 people who took advantage of the rebates. In general, the responses were quite favorable.

"We would not have switched if it had not been for your offer. It was a great impetus to save

much water for now and future generations," wrote one customer.

Wrote another: "In all honesty I think the rebate was a great idea. It should prompt some folks to get off their toilet compatible part and do just a little bit for the community."

Those surveyed were asked questions about their experiences following installation of the water saver models:

"How does the unit function (compared to the old unit) in terms of waste load ejection?"

Of 29 respondents, 15 said "better," ten "the same" and four "not as good."

"Does the unit require more or less cleaning?"

The replies: "more" (8), "less" (7), "the same" (14).

The Authority realizes that not everyone will want to make the switch, noting that the cost of replacing a toilet is not fully covered by the rebate. But it also recognizes that those who do participate will eventually save money through lower water bills.

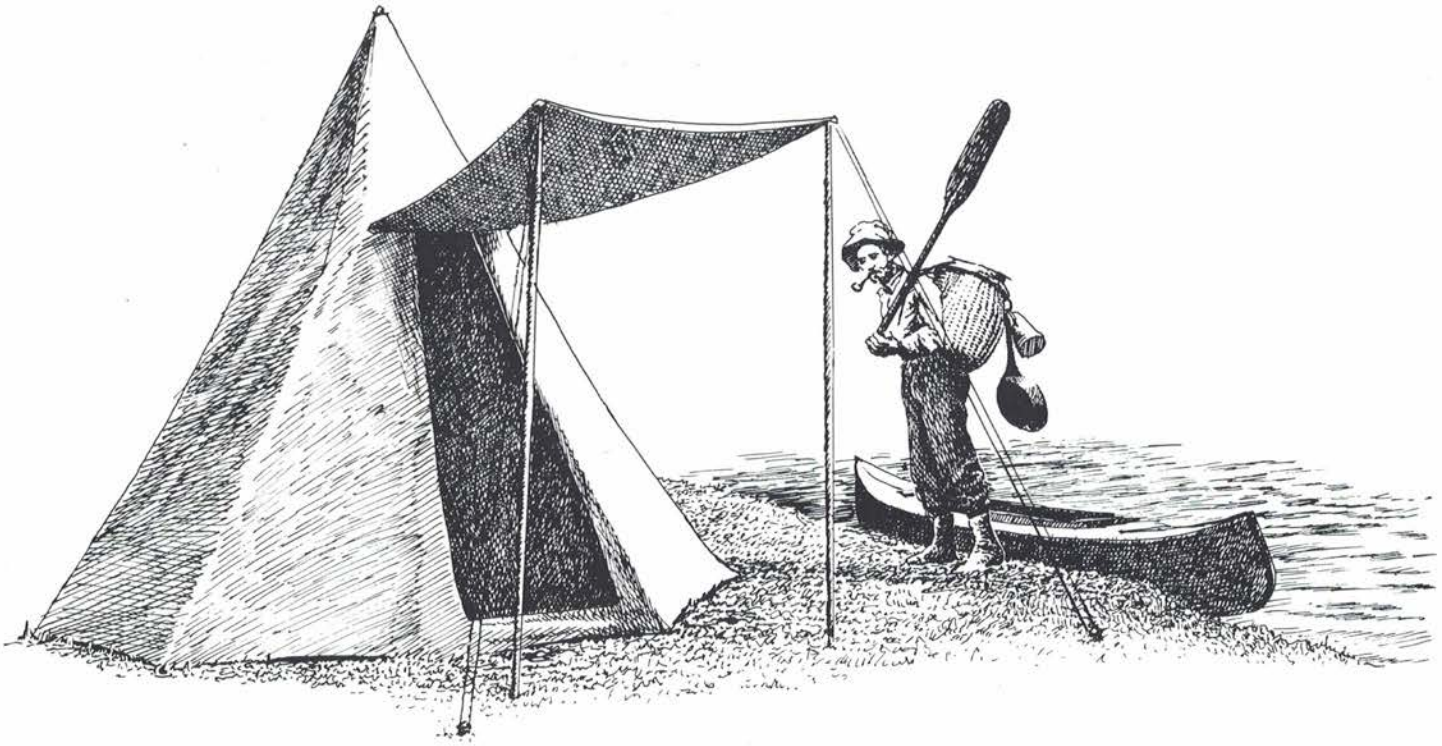
"Plus, you will have the satisfaction of knowing that, by doing more to conserve water, you will be helping to assure future generations of a safe and secure water supply," says Peter Lukens, the Authority's executive director.

With North Wales' program in high gear, there is talk that some other communities in the Delaware Basin may launch their own toilet rebate campaigns.

Think of the possibilities. Johnny Low Flush could be joined by Wally Water Watcher or Charlie Conservation, or maybe their sidekicks — Hopper Long Cassidy and Billy the Lid.

Paddling into the Past

By Richard Albert



Today, we take Delaware River canoeing for granted. Easy access to the river from modern highways allows automobiles with colored canoes to find launching areas with ease.

River-based canoe liveries (there are dozens of them) advertise on television and radio, and their brochures are widely distributed. Billboards point to their headquarters. Some offer canoes and equipment for sale, campgrounds for the weary, specialized trips, and other services. Books and river maps (like the Commission's map set) can be purchased for the canoe-it-yourselfers and free information is readily available from National Park Service information centers and other sources. Government and private enterprise have made canoeing the Delaware River extremely easy.

In 1891, one hundred years ago, recreational canoeing was seen in a different light. The sport in the United States was only about 15 years old and participants were generally urban middle-class males. Along with bicycling, canoeing was one of the few sports that promised adventure and freedom of movement in the pre-automobile 19th Century.

Interest in canoeing for sport was sparked by John MacGregor, a wealthy London attorney. In 1859, MacGregor traveled to northern Canada where he observed Eskimos and their kayaks. Upon returning home, he designed a wooden, kayak-like canoe dubbed the "Rob Roy." He then set out on a long canoe trip through Europe. The trip culminated in the 1866 publication of a book, "A thousand Miles in the Rob Roy Canoe on Twenty Rivers and Lakes of Europe." This and subsequent books by MacGregor and other English canoeists were best-sellers on both sides of the Atlantic.

The first recreational canoe trips down the Delaware River appear to have occurred in 1876. In that year, Philadelphia hosted the

Centennial Exposition to celebrate the United States' 100th anniversary. The exposition attracted visitors from all over the world including several parties of canoeists that traveled to Philadelphia via the Delaware River. At the exposition, the public could find the products of several canoe-builders on display.

The early trips down the Delaware marked the beginning of what can be considered the "Golden Age of Canoe Tripping on the Delaware River"— the period from roughly 1875 to 1900. What attracted the canoeists to the Delaware then are the same things that attract canoeists today: its semi-wild setting; its rapids and rifts; its clear, clean water; and its accessibility (via railroads and canals in the 19th Century) from major U.S. population centers.

* * *

In September 1891 five canoeists left Trenton, N.J. by train bound, via Jersey City, for Hancock, N.Y. In the week preceding their departure, their canoes had been carefully shipped by freight train to the Erie Railroad's Hancock depot. The canoeists were heading for a vacation adventure — a 200-mile trip down the Delaware to their Trenton homes.

They set out from the shores of the Delaware's East Branch at Hancock. The party consisted of J. Wallace Hoff, a Trenton fire official; William M. Carter, a commercial printer; Harry Allen, a bank official; Frederick Donnelly, a clothing store owner; and Clark Cooper, who had just returned from bicycling through Europe.

Three canoes used were typical of the canoes of the day. These were beautifully-built wooden solo models with enclosed wooden decks. Propelled with long double-bladed paddles, they reflected their kayak and Rob Roy ancestry. The other two appear to have been Canadian, open style craft. This type of canoe, the direct ancestor of the aluminum and plastic canoes of today, would rapidly supplant the Rob Roy style canoe in the U.S. during the 1890s.

Hoff eventually published a book detailing the highlights of the 1891 trip. "Two Hundred Miles on the Delaware River" describes a river that had sights and sounds vastly different from those experienced by canoeists one hundred years later.

Let's flip through the pages as we travel downstream:

"At the conjunction of the streams, we found a large raft stranded." Most 19th Century canoeists

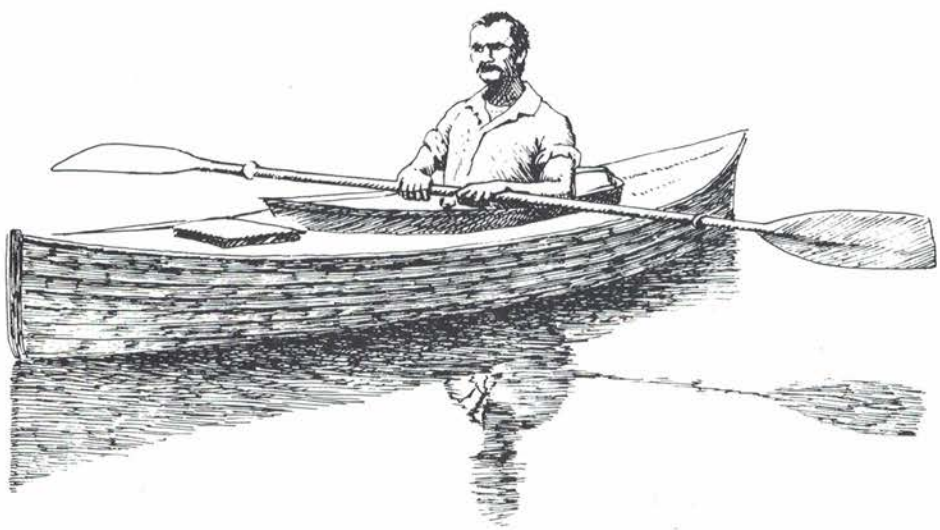
remarked about seeing lumber rafts on the Delaware even though the heyday of log rafting was about over. The raft was stranded because of the low flows between Hancock and Port Jervis, N.Y. that often prevented canoeing in this reach of the river. The construction of reservoirs in the 20th Century has largely eliminated this problem.

"Some distance above Long Eddy (N.Y.) we came to a lumber slide built down the mountain side from the plateau above." The slide was built to get hardwoods to the Long Eddy wood chemical plant. Wood chemicals, lumbering, farming, and bluestone quarrying were the largest industries in the upper Delaware region during the 19th Century.

"We . . . held a council close by a ferry boat . . . used to connect the shore ends of the main highways in New York and Pennsylvania. These ferry boats we met all along the river." Cable ferry boats of several designs were once commonplace on the Delaware, used for river-crossings before bridges replaced them.

At Long Eddy, the canoeists were given a tour of the wood chemical plant. *"The stench that pervaded the place was awful."* Today, Long Eddy is a sleepy village that smells great.

"Visitors in the shape of cattle invaded camp and sniffed half timidly, half resentfully, at our usurping their domain." Most 19th Century canoeists remarked on the many farms along the Delaware. They often bought milk, eggs, and other perishables at the local farm houses.



After having portaged around a log-boom constructed illegally in the river, the canoeists *could hear Cochecton Falls, the first really bad spot on the river."* Today Cochecton Falls is known as Skinners Falls, a major recreation spot during the summer.

In Narrowsburg, N.Y., the canoeists ate a meal that *admitted of no disparaging comments"* at the Arlington Hotel. The hotel building now contains the National Park Service visitor center for the Upper Delaware Scenic and Recreational River and the Delaware Valley Arts Alliance. After eating at the hotel, the canoeists camped at a site near today's Pennsylvania Fish and Boat Commission Access Area. The bridge from Pennsylvania to Narrowsburg was a wooden covered bridge in 1891.

"Lackawaxen (Pa.) is a great summer resort and the country round-about contains many points of interest." At Lackawaxen, the canoeists shot the dam that once stood upstream of the Roebling Aqueduct and successfully avoided crashing into the structure. In the 1880s, the leader of a party of Jersey City canoeists drowned while shooting the 16-foot dam. Today, the recently-restored Roebling Aqueduct is the most famous point of interest in Lackawaxen.

"Opposite, on a heavy grade, ran the tracks of the Erie Railroad. We could hear the engines puff

and the wheels slip, and see the reflected glow from the fires as the furnace doors were thrown back." Hoff describes the locomotive firemen shoveling coal into the steam locomotives that are working hard upgrade toward Hancock. Steam locomotives on the Erie (now Conrail) Railroad line disappeared in the early 1950s, but freight trains powered by diesel-electric engines still rumble along the rails.

"From Lackawaxen to Port Jervis we were accompanied by the Delaware and Hudson canal, with ever-attendant noise of horns and shoutings, together with the choice vocabulary of captains and mule drivers." The D & H Canal would be abandoned in seven years. Canallers in the 19th Century enjoyed the same reputation for rowdyism as some canoeists do today. Today's canoeists can easily find remnants of the canal. Nineteenth Century canoeists passed six active canals between Lackawaxen and Trenton.

"The place at which we stopped was the upper landing where a side wheel steamer lay." The canoeists observed one of two steamboats that were then serving visitors to the long-gone Delaware Water Gap resort hotels. This particular boat landing was in the general vicinity of the Interstate 80 bridge between New Jersey and Pennsylvania.

"The water from now on we noticed was not as clear as above Easton, being foul with coal and sewage." Although water quality in the river below Easton has improved, today's canoeists will still observe some degradation due to the influence of the lower Lehigh watershed.

"Saturday night at a country hotel is not without its interesting features. The week's work over, the farmers from the country-side gather to discuss crops, horses, and politics." Many of these country hotels are now fine eating establishments catering to a more affluent class of people than their former clients.

"A noticeable fact concerning the section through which we were traveling was that the river villages of any importance center about some milling industry." Most of the small milling villages are today bedroom communities with little, if any, manufacturing activity.

"Scudders Falls have a narrow chute through the dam, and is only a drop and a rough race." The chute, just upstream from the Scudders Falls Bridge (Interstate 95) near Trenton, still exists. It is currently used by kayakers practicing white water maneuvers. The dam, however, is in great disrepair. New Jersey Route 29 from I-95 to downtown Trenton is built over the canal that received its water from the Scudders Falls dam.

"As we journeyed on, our old friend the moon came up full and grand from the peaceful hillside, making for us a bright pathway as we drifted down to Park Island, the home of the Trenton Canoeists." Early Trenton canoeing clubs declined with the change in canoeing that occurred around 1900 and eventually disappeared. Park Island later became a Rotary Club summer camp and was renamed Rotary Island. Today, the island consists largely of woods.

The five men who canoed the Delaware in 1891 are no longer with us. If they returned today would they be surprised to find horseless carriages (canoe livery vans) pulling trailers filled with canoes made of metal and plastic to a river shared by tens of thousands of people each year? What would they think about all the other changes?

(Mr. Albert, a supervising engineer with the Commission, has written several books. This article is derived from information obtained for a book-in-progress, "Paddling into the Past." The pen and ink sketches were drawn by Tom Brand, a Commission water resources engineer.)

Other Basin Highlights

Ice Jam Permit Approved

The State of New Jersey issued a Freshwater Wetlands Permit to the Commission during 1991 for a long awaited project to reduce ice jam flooding on the Delaware River in the Port Jervis, N.Y. area.

A wetlands mitigation plan that originally had been proposed by the U.S. Army Corps of Engineers was found acceptable to meet the mitigation requirements of the state permit.

The wetlands would be impacted by the cutting of a 200-feet wide swath of trees on Mashipacong Island to create a passageway for river water and ice when the main channel becomes ice-clogged.

The State of New Jersey also approved an extension of a two-year Stream Encroachment Permit which had been issued in 1988. The new expiration date is October 1992. The permit had expired because of project delays, including the requirement the Commission secure the wetlands permit.

The cost of creating the ice diversion channel has risen sharply over the years. The original price tag was $1 million, to be paid on a cost-sharing basis: 75 percent by the Corps and 25 percent by the states of Pennsylvania and New York, the City of Port Jervis, the Borough of Matamoras, Pa., and Westfall Township, Pa.

During 1991, the Corps adjusted the project's escalating cost from $1.3 million to $1.46 million and moved back a projected starting date of July 1992 to May 1993. An agreement between the Corps and the Commission also was modified to reinstate a section which permits the parties to withdraw from the project should the eventual construction cost be more than projected.

Flooding in the Port Jervis area in 1981 caused severe damage and claimed one life. The Delaware River rose 14.5 feet in one hour as the result of ice which jammed against Mashipacong and Thirsty Deer Islands, acting as a makeshift dam.

The next year the DRBC, through Congress, requested that the Corps conduct a study of the flooding problem. The Commission agreed in the spring of 1986 to act as the project's sponsor after the Corps indicated that creation of the diversion channel on Mashipacong Island, located in New Jersey, was environmentally sound and economically feasible.

There has been some erosion of support since then. During 1991, Westfall Township held a non-binding referendum to determine if the citizenry still favored funding the project. There were only 237 votes cast with a slim majority voting against funding. In July, the township supervisors voted to withdraw their support, resulting in a funding gap of $50,000.

Later in the year, Commission and Army Corps staff held a public briefing for the benefit of elected officials of Westfall Township, Matamoras and Port Jervis. Because many of the officials had recently taken office, historical aspects of the project were outlined, as were updated costs and benefits. Westfall Township officials later renewed their support, but by year's end local cooperation agreements were still not signed.

Until the agreements are signed with the Corps, the states and the municipalities, funds are not available for the Commission to undertake the acquisition of real estate easements which the Corps needs prior to awarding construction contracts for the diversion channel and wetlands mitigation area.

Recreation Maps Updated

The popular Delaware River Recreation Maps first released by the Delaware River Basin Commission in 1966 were updated and revised during 1991.

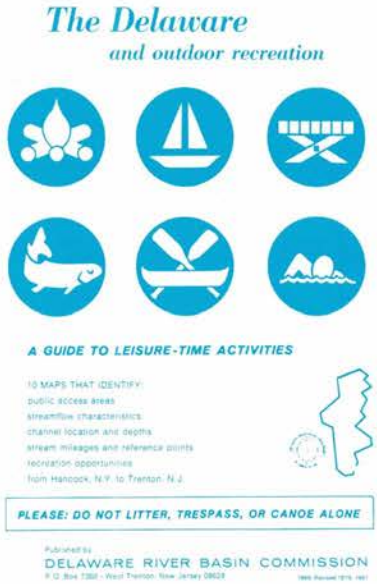
The maps, which are available to the public, cover the 200-mile, non-tidal reach of the river from Hancock, N.Y. to Trenton, N.J.

The ten-map set depicts river channel locations and depths, stream miles and reference points, and provides a detailed classification of streamflow characteristics in accordance with the International Canoe Federation's Scale of River Difficulty — a valuable tool for canoeists and other boaters navigating the river.

Included with the maps is a list of private liveries which rent canoes, rafts and other watercraft and provide boaters information about the river's many recreational opportunities. An updated and detailed list of river access areas in New Jersey, New York and Pennsylvania also is provided, offering information on the availability of parking areas, boat ramps, sanitary facilities and trash receptacles. A pamphlet on canoe safety rounds out the package.

A synthetic paper stock and special inks were used in reprinting the new map series, which was last updated by the Commission in 1979. The coated paper has impressive tear strength and is highly resistant to moisture.

The maps and accompanying informational material come in a durable



zipper lock, waterproof bag which can be used to view folded map sections of specific river reaches.

The cost is $10 per map set. They may be obtained at the DRBC's headquarters, 25 State Police Drive, West Trenton, N.J., or by sending a $10 check or money order (made out to the Delaware River Basin Commission) to the Commission at P.O. Box 7360, West Trenton, N.J. 08628.

The Commission also offers recreational maps for the Schuylkill River. Comprised of eight sections, the Schuylkill map set has many of the features of the Delaware maps and covers the area from the Tamaqua Dam at Tamaqua, Pa. to the Fairmount Dam in Philadelphia. The cost is $8 per set.

Flood Stage Mapping

Flood stage forecast mapping for the reach of the Delaware River between River Mile 139.5 (near the Scudders Falls Bridge above Trenton) and River Mile 148 (the New Hope-Lambertville wing dams) was completed during 1991.

Mapping is being done on the Delaware's main stem between Trenton and Belvidere, N.J. The project is under contract with the U.S. Army Corps of Engineers and is being completed at the request of the New Jersey Department of Environmental Protection and Energy and the Pennsylvania Emergency Management Agency.

Mapping for the reach between Trenton and the Scudders Falls Bridge was completed by the Corps' Philadelphia District during 1990. During 1992, the Commission will map the reach of the Delaware between the New Hope-Lambertville wing dams and Belvidere.

The flood stage maps, at a scale of one inch equals 400 feet, make use of topographic mapping and aerial photography completed during the Corps' "Delaware Basin Study" of 1984. Field checks have been made to inventory flood plain development which has occurred since the aerial photographs were taken.

Flood stage forecast maps are designed to identify areas of potential inundation based on flood stage forecasts generated from rising river gage readings and anticipated precipitation. The National Weather

Service broadcasts the forecasts over NOAA weather radio and communications networks maintained at county and state emergency operations centers.

Flood stage forecast maps, when used in conjunction with river stage forecasts, can provide emergency personnel with an overview of potential flooding and evacuation needs prior to a flood event.

The maps can be digitized for inclusion with computerized information systems at the emergency operations centers in the basin states. This allows for large screen displays of maps showing the potential flood areas for a forecast storm. The availability of this information in a centralized location improves coordination of emergency responses.

The DRBC will continue to work with the Corps on the Delaware River flood stage mapping and expects to participate in similar projects where high quality topographic mapping is available.

Application Fees Increased

A new filing fee schedule has been adopted to help cover the cost of reviewing applications submitted to the Commission's Project Review Branch.

Effective May 1, 1991, the filing fee for review of water resources projects is the greater of (a) or (b) as follows, and (c), if and as applicable:

(a) minimum fee: $250 for any project that requires Commission action;

(b) alternative fee:
  (1) 1/10th of 1% of the project cost to $10 million;
  (2) 1/25th of 1% of the remaining cost above $10 million but not to exceed a maximum fee of $50,000 for any one project.

(c) for any project that results in an out-of-basin diversion, the fee as described above is increased by 50%.

Government agencies are exempt from these filing fees.

Project costs include estimated expenses for design, supervision of construction and actual construction, legal services, contract administration, land, materials, and equipment.

Filing fee revenues go into the Commission's general fund.

The Commission adopted the new fee schedule on April 24, 1991 following two public hearings at which staff pointed out that past revenues obtained from project review filing fees have amounted to substantially less than the cost of administering the Commission's Project Review program.

The last increase was 1975, a year after the fees were established.

Fish Ladders Approved

The number of shad within the Delaware River Basin should increase substantially in the next few years as the result of fish passageways which are scheduled for construction on two dams on the Lehigh River.

The Commission approved the projects, submitted by the Pennsylvania Department of Environmental Resources, on March 27, 1991.

The passageways, or "fish ladders," will enable adult American shad to move upstream past the existing 13.5-foot-high Easton Dam and the 17-foot-high Chain Dam which currently block springtime spawning runs. The late summer downriver migration of juvenile shad will be aided by low-flow notches that will allow more water to flow over the dams' faces, reducing abrasion of the young fish.

More than 23.5 miles of the Lehigh River will open up for shad spawning once the passageways are completed, hopefully by 1993.

The Pennsylvania Fish and Boat Commission has projected an annual recreational benefit of $1.2 million from the sport fishery that is expected to develop in the Lehigh Valley once the "ladders" are in place. The Fish Commission anticipates spawning runs up the Lehigh of more than 250,000 shad annually. About one million adult shad now migrate each spring into the Delaware River to spawn.

The Easton Dam is located at the Lehigh River's confluence with the Delaware. It has prevented American shad from reaching their native spawning sites for more than 100 years. The Chain Dam, located upstream, was built in 1970 to replace an 1800s impoundment.

Two observation windows are to be installed at the Easton Dam so the public can witness the passage of shad and other migratory species.

Overall cost for the two fish passageways is estimated at $2.7 million.

Water Resources Program Adopted

An updated Water Resources Program was approved by the Commis-

sion on April 24, 1991, a document shaped by public hearing input and lengthy deliberation.

The Delaware River Basin Compact requires the Commission to adopt a Water Resources Program each year based upon its Comprehensive Plan for the immediate and long-range development and use of the water resources of the basin.

The Water Resources Program details management strategies for reservoir operations and modifications, water storage, regulated stream flows, drought operation plans and flooding. Ground water is examined with regard to potential availability and its relation to surface water supplies.

The quality of both surface and ground water is reviewed and water quality problems are identified. Current and projected water demands for domestic, municipal, industrial, agricultural, recreational and electric power uses also are presented.

The Commission held its first public hearing on the proposed Water Resources Program on December 12, 1990, extending the hearing record until February 10, 1991 to allow for additional comment. A second hearing was held on that date, but the Commissioners deferred action to allow for further review.

Copies of the 1990-1991 Water Resources Program can be obtained from the Commission at no charge.

Award Winners

DRBC Executive Director Gerald M. Hansler and Robert V. Everest, the Commission's regional planner, have been recognized for their accomplishments in water resources management.

Mr. Hansler, who has served as Commission executive director since 1977, received the 1991 Special Recognition Award from the Water Resources Association of the Delaware River Basin for his leadership skills in shaping management policy within the basin.

Mr. Hansler was honored at the association's recognition dinner on March 27 in Cherry Hill, N.J.

Mr. Everest, who joined the Commission when it was formed in 1961, received the 1991 Distinguished

David P. Pollison, left, head of the Commission's Planning Branch, presents Robert V. Everest, the Commission's regional planner, the Upper Delaware Council's 1991 Distinguished Service Award during ceremonies in West Trenton, N.J. (Photo by Seymour P. Gross)

Service Award from the Upper Delaware Council.

The Council's highest honor, the reward is given "to that individual who acted with distinction in support of the goals and objectives of the River Management Plan" for the Upper Delaware Scenic and Recreational River.

Mr. Everest was honored at the council's awards banquet on March 9 at Woodlock Pines in Pike County.

DRBC Executive Director Gerald M. Hansler displays the 1991 Special Recognition Award which he received from the Water Resources Association of the Delaware River Basin. Flanking him are, left, Nicholas DeBenedictis, Philadelphia Electric Co.'s senior vice president, corporate and public affairs; and Arthur A. Davis, secretary of the Pennsylvania Department of Environmental Resources. (Photo by Edward Savaria, Jr.)

The council also awarded the Commission a Certificate of Merit for "instituting new programs or policies to protect the natural resources of the river corridor."

Computer System Upgraded

The Commission purchased eight personal computers (PCs) in August of 1991 along with WordPerfect software as part of a plan to phase out dedicated word processors that had been assigned to Commission secretaries and which no longer were compatible with PCs being used by technical staff.

The secretaries were retrained on the WordPerfect software at Mercer County Community College and the New Jersey Department of Personnel's Human Resource Development Institute.

WordPerfect was chosen because of its widespread use by many other governmental agencies, including the U.S. Environmental Protection Agency.

Financial Summary

Statement of Revenues and Expenditures — General Fund

Year ended June 30, 1991

REVENUES	Budget	Actual
Signatory parties:		
State of Delaware	$ 253,500	$ 253,500
State of New Jersey	597,200	554,000
State of New York	350,300	269,600
Commonwealth of Pennsylvania	633,800	633,800
United States	457,000	427,750
Water Quality Pollution Control Grant	240,000	240,000
Reimbursement of overhead — Agency Fund	32,000	32,000
Sale of publications and sundry	10,000	6,590
Project review fees and other income	49,100	114,430
Interest income	75,000	115,558
Fines and assessments	0	27,500
TOTAL REVENUES	$2,697,900	$2,674,728
EXPENDITURES		
Personal services	$1,629,400	$1,571,710
Special and contractual services	171,000	153,581
Other services	64,900	51,715
Supplies and materials	71,600	71,277
Space	130,000	117,240
Communications	71,500	54,349
Travel	24,500	23,117
Maintenance, replacements, and acquisitions	97,500	88,827
Equipment rental	24,000	15,632
Fringe benefits and other	413,500	410,404
TOTAL EXPENDITURES	$2,697,900	$2,557,852
Excess (deficiency) of revenues over expenditures	0	116,876
Other financing sources:		
Operating transfers in	0	97,556
Operating transfers out	0	0
Total net other financing uses	0	97,556
EXCESS OF REVENUE OVER EXPENDITURES (BUDGETARY BASIS)	0	214,432
Reconciliation to GAAP basis of reporting — encumbrances	0	(1,193)
EXCESS OF REVENUES OVER EXPENDITURES (GAAP BASIS)	$ 0	$ 213,239

Statement of Revenues and Expenditures — Capital Projects

Year ended June 30, 1991

REVENUES	Budget	Actual
Signatory parties:		
State of New Jersey	$ 2,000	$ 0
Commonwealth of Pennsylvania	25,000	25,000
Water Charges	1,300,000	1,189,581
Interest Income	150,000	253,083
Western Berks - Facilities Use	20,500	20,500
TOTAL REVENUES	$1,497,500	$1,488,164
EXPENDITURES		
Debt Service on Projects	$ 862,000	$ 861,142
Operation and Maintenance Cost on Projects	220,000	188,649
Administrative Cost	99,200	75,007
TOTAL EXPENDITURES	$1,181,200	$1,124,798
Excess of revenues over expenditures (Budgetary Basis)	$ 316,300	$ 363,366

NOTE: Debt service and operating and maintenance cost are for the Beltzville Reservoir Project and the Blue Marsh Reservoir Project and payments are made to the United States Army Corps of Engineers.

Statement of Changes in Special Projects Fund Balances

Project	Fund Balances July 1, 1990	Revenues	Transfers	Return to Grantor	Expenditures	Fund Balances June 30, 1991
Zone II Dissolved Oxygen	$ 8,665	$ 0	$ 0	$ 0	$ 7,427	$ 1,238
Daily Flow Model	35,304	81,325	0	0	37,223	79,406
USGS monitors	22,261	89,840	0	0	111,222	879
Ground water - Pennsylvania Protected Area	6,029	220,000	(57,713)	0	131,057	37,259
Salinity - U.S. Army Corps of Engineers	4,816	18,500	0	0	10,090	13,226
Ground water - Withdrawal fees	1,135	0	0	0	0	1,135
Computer Project	0	0	0	0	0	0
Disinfection	99,774	0	0	(99,774)	0	0
Delaware Fish Study	0	110,000	(1,500)	0	107,649	851
Toxics Management Study	0	147,238	(38,343)	0	108,895	0
Delaware Estuary - EPA	4,027	353,256	0	0	353,870	3,413
Delaware Estuary/PA	0	56,055	0	0	56,055	0
Dispersion Study	10,000	0	0	0	4,590	5,410
Nutrient Study	3,000	0	0	0	641	2,359
	$195,011	$1,076,214 [A]	$(97,556)	$(99,774)	$928,719 [B]	$145,176

[A] Cash receipts/revenues were derived from:

United States Government	$ 451,305
Pennsylvania Department of Environmental Resources	457,092
Other States	77,977
Corporate and other grants and fees	89,840
	$1,076,214

[B] Expenditures were primarily for payroll costs and contractual services.

The records of the Commission are audited annually as required by the Compact.

Delaware River Basin Commission
P.O. Box 7360
West Trenton, NJ 08628

BULK RATE
U.S. POSTAGE
PAID
TRENTON, N.J.
Permit No. 1522