

**DELAWARE RIVER BASIN COMMISSION**  
**Annual Report 1990**



*The Maurice River near Dorchester, N.J. (Photo courtesy of Cynthia Poten, Delaware Riverkeeper)*

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*Front cover: A waterfall in the Musconetcong River Gorge in Holland Township, Hunterdon County, N. J. The Musconetcong River empties into the Delaware below Phillipsburg. (Photo courtesy of Cynthia Poten, Delaware Riverkeeper)*

*This report was compiled by the staff of the Delaware River Basin Commission; edited by Christopher M. Roberts, the DRBC’s Public Information Officer; and designed by Odette P. Taft, DRBC graphic artist/ illustrator.*

# Introduction

## The Wet or Dry Look

In glancing at this year's Annual Report, one might ask: if there was enough water in the basin to ship some of it to Aruba, then why the need for additional reservoir storage and the push for water conservation?

The answer is driven by weather's whims.

1990 was wet. Reservoirs began spilling in March with billions of gallons of uncaptured fresh water being lost daily to the sea. Hydrologically, things were good. Water was plentiful and the sharing of it on a temporary basis with an island in trouble made sense.

But turn the calendar back but a year and the vagaries of nature become clear, as do the justification and need for capturing as much water as possible and conserving what's there.

March 1989: storage levels in the three major water supply reservoirs in the upper basin hover just above the drought emergency line. A precipitation deficit going back 15 months measures almost a foot. New York City imposes mandatory water cutbacks in order to keep the reservoirs as full as possible.

Hydrologically, things weren't good. But they would have been much worse if not for the captured water in storage and conservation efforts which saved some 50 billion gallons of water and averted a drought emergency. Soaking May rains did the rest, swelling Delaware River flows to record levels by the end of the month.

Turn the calendar back to 1984.

The first seven months of the year are so wet that there are three flood threats on the Delaware River. The major water supply reservoirs are spilling by April.

The next seven months are so dry that by the following April the Delaware River is flowing at record low levels and a drought emergency is triggered.

Then Hurricane Gloria spins up the East Coast and dumps up to nine inches of rain, swelling the Delaware River from drought levels to near flood stage. The emergency is soon over.

Yes, weather is fickle, as noted in this 1876 forecast by Mark Twain: "Probable nor'-east to sou'-west winds, varying to the southard and westard and eastard and points between; high and low barometer, sweeping round from place to place; probable areas of rain, snow, hail, and drought, succeeded or preceded by earthquakes with thunder and lightning."

In this business you have to be ready for anything.

But one thing *is* predicable: the impact of future droughts can be diminished through management programs which emphasize adequate storage capacity and long-term water conservation programs which discourage waste.

So turn the page and peruse. It all makes sense even if the weather doesn't.

— C. Roberts

# The Commission • 1990



Governor Florio



Mr. Catania

## New Jersey

Governor James J. Florio  
Chairman

Michael F. Catania  
Alternate

## 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

## Delaware

Governor Michael N. Castle  
Vice Chairman

Edwin H. Clark II  
Alternate

Alan J. Farling  
Gerard L. Esposito  
Second Alternates

## Engineering Division

David B. Everett  
Chief Engineer

Jeffrey P. Featherstone  
Policy Analyst



Governor Castle



Dr. Clark

## Pennsylvania

Governor Robert P. Casey  
Second Vice Chairman

James R. Grace  
Alternate

John E. McSparran  
Second Alternate

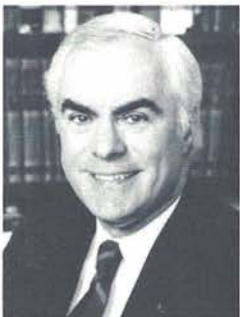
John Plonski  
Advisor

## Branch Heads

David P. Pollison  
Planning

George C. Elias  
Project Review

Richard C. Tortoriello  
Operations



Governor Casey



Dr. Grace

## United States

Secretary of the Interior  
Manuel J. Lujan Jr.  
Member

Irene B. Brooks  
Alternate

Lt. Col. Kenneth H. Clow  
Advisor



Secretary Lujan



Ms. Brooks

## New York

Governor Mario M. Cuomo  
Member

Thomas C. Jorling  
Alternate

Russell C. Mt. Pleasant  
Second Alternate

Albert F. Appleton  
Advisor



Governor Cuomo



Mr. Jorling

## Appleton Named Advisor to DRBC



Mr. Appleton

Albert F. Appleton, commissioner of New York City's Department of Environmental Protection (NYDEP), was designated the city's advisor to the Delaware River Basin Commission by Mayor David N. Dinkins on April 26, 1990.

Prior to his appointment as NYDEP Commissioner in January, Mr. Appleton served as special assistant attorney general in the New York State Office of the Deputy Attorney General for Medicaid Fraud Control. He also was legislative chairman of the National Association of Medicaid Fraud Control Units and, in 1987, received the association's special award for distinguished legislative accomplishment.

In 1974, Mr. Appleton served as special counsel to the Friends of the Earth in San Francisco, where he was responsible for legal and economic analysis of issues surrounding the construction of the Trans-Alaskan pipeline.

Mr. Appleton is a member of the New York State Department of Environmental Conservation's Title VII Advisory Committee on land acquisition and of the New York State Westside Waterfront Civic Advisory Panel. Since 1980 he has been conservation chair of the New

York City Audubon Society, serving as president from 1981 to 1983.

He also is a member of the board of directors of the New York State Environmental Planning Lobby and served on the administrative board of the Cornell Laboratory of Ornithology.

He received his bachelor's degree from Gonzaga University in Spokane, Wa. and his law degree from Yale University.

\* \* \*

New Jersey Governor James J. Florio was elected chairman of the Commission on June 27, 1990, succeeding Governor Mario M. Cuomo of New York.

Elected vice chairman was Delaware Governor Michael N. Castle; Pennsylvania Governor Robert P. Casey was elected second vice chairman.

Their terms run from July 1, 1990 through June 30, 1991.

The annual election of officers historically has been based on a rotation of signatory parties. The fifth Commission member is U.S. Interior Secretary Manuel J. Lujan Jr.

\* \* \*

Leroy Clark, a staff member of the Delaware River Basin Commission since its inception in 1961, died on March 13, 1990. He was 47.

Mr. Clark's official title was payroll, time and leave technician. He carried out the job with a playful gruffness that commanded staff compliance with his form-filling deadlines.

But his title never captured his other many talents: his ability to fill a room with laughter, a drab government office with freshly-cut flowers, or a frying pan with food for friends. Music and the arts were constant companions.

Mr. Clark graduated from Bartram High School in Philadelphia in 1960 and went directly to work for the Delaware River Basin Advisory Committee, which was instrumental in the Commission's formation. He joined the Commission the next year, serving the remainder of his life.

He's missed.



Leroy Clark  
(1942-1990)

# Environmental Protection or Economic Development?

By Gerald M. Hansler

The "Basic Act" for federal water pollution control was approved by President Eisenhower on July 9, 1956 (Public Law 84-660). That was a pleasant surprise to state public health officials, conservationists, and mayors of small towns, but much to the chagrin of the U.S. Chamber of Commerce and National Association of Manufacturers. The latter two groups were opposed to such innovative legislation which addressed local and regional water pollution problems that existed in every state of the union.

Their apparent reason was because federal grants would be given for the first time to municipalities to help them solve their local waste discharge problems. That was the *apparent* reason — objection to using federal tax revenues to solve local problems. But, was the real reason the fact that if municipalities cleaned up their acts, then industry would be forced to do the same?

Fortunately, that was the end result. And to their credit, industries and municipalities have come a long way in cleaning up their point sources of pollution.

The "Basic Act" was rather simple in nature. It dealt with the roll-back of existing gross pollution discharges. It addressed, in the first instance, removing the big lumps. In some cases, the arguments even centered around allowing continued dilution of raw sewage versus primary treatment.

The nation has progressed tremendously since those pioneering days when such an important approach as the establishment of water quality standards was never even mentioned in the "Basic Act," let alone the



Mr. Hansler

requirement of state water quality standards being approved by the federal water pollution control agency.

Today, our challenges are:

- clean up our lakes and streams to a "swimmable/fishable" level where achievable
- eliminate or reduce to tolerable levels toxics which heretofore entered our aquatic, brackish, and marine environments
- remove toxic deposits which accumulated over the years in the layers of our surface and ground waters
- address non-point source pollution problems
- eliminate or control combined sewer overflows from our more ancient cities, *and*
- prevent degradation of our waters once standards are attained, and protect those waters which historically have been of high quality.

The Commission is presently involved in some facet in each of the above pollution control efforts. High on the list (as explained later in this report) is the protection of our high quality waters which flow through the Delaware Water Gap National Recreation Area and the Upper

Delaware Scenic and Recreational Area. In those stretches, water quality is from thirty percent to seventy percent *better* than existing fishable/swimmable water quality standards.

But the bell has rung and the fight is on. Thousands of summer and year-round residents are flocking to those areas because of the wonderful outdoor amenities offered.

It has become a playground for the four states in the Basin. The question is, to what extent should the infrastructures of housing, roads, water supply and waste discharge systems, and the attendant non-point source pollution be controlled?

The Commission's present non-degradation policy is:

*“Nondegradation of Interstate Waters (Resolution No. 70-3). It is the policy of the Commission to maintain the quality of interstate waters, where existing quality is better than the established stream quality objectives, unless it can be affirmatively demonstrated to the Commission that such change is justifiable as a result of necessary economic or social development or to improve significantly another body of water. In implementing this policy, the Commission will require the highest degree of waste treatment determined to be practicable. No change will be considered which would be injurious to any designated present or future use.”*

Historically, economic development appears to have won the first several rounds, when considering that gray area above the line representing existing water quality standards and below the line representing actual high water quality. Should we prevent our streams from being degraded down to existing quality standards which protect all legitimate uses? Are we intelligent enough today, as a society, not to backslide? Can *both* economic development and maintenance of high water quality be achieved?

Yes, yes, yes.

The technology is available today to prevent *both* point and non-point sources from significantly, or measurably, or substantially impacting our higher quality streams. Both can be achieved, but the cost will be higher than when pursuing our past normal practices. Each new developer — whether residential, commercial, industrial, or agricultural — should be given advance notice as to the more rigid requirements necessary. Pollution prevention should be equally considered in decisions affecting a “go” or “no-go” decision, along with those other economic factors of planning, legal, design, construction, and the market.

We can have *both*; we must have *both*.



The Delaware looking downstream near Hawks Nest, a canyon-like gorge located along the Upper Delaware Scenic and Recreational River corridor. Route 97, shown to the left in New York State, is literally chiseled into the cliffs and offers a spectacular view of the valley. (Photo courtesy of the National Park Service)

# Water Quality

## Protecting Our Scenic Rivers

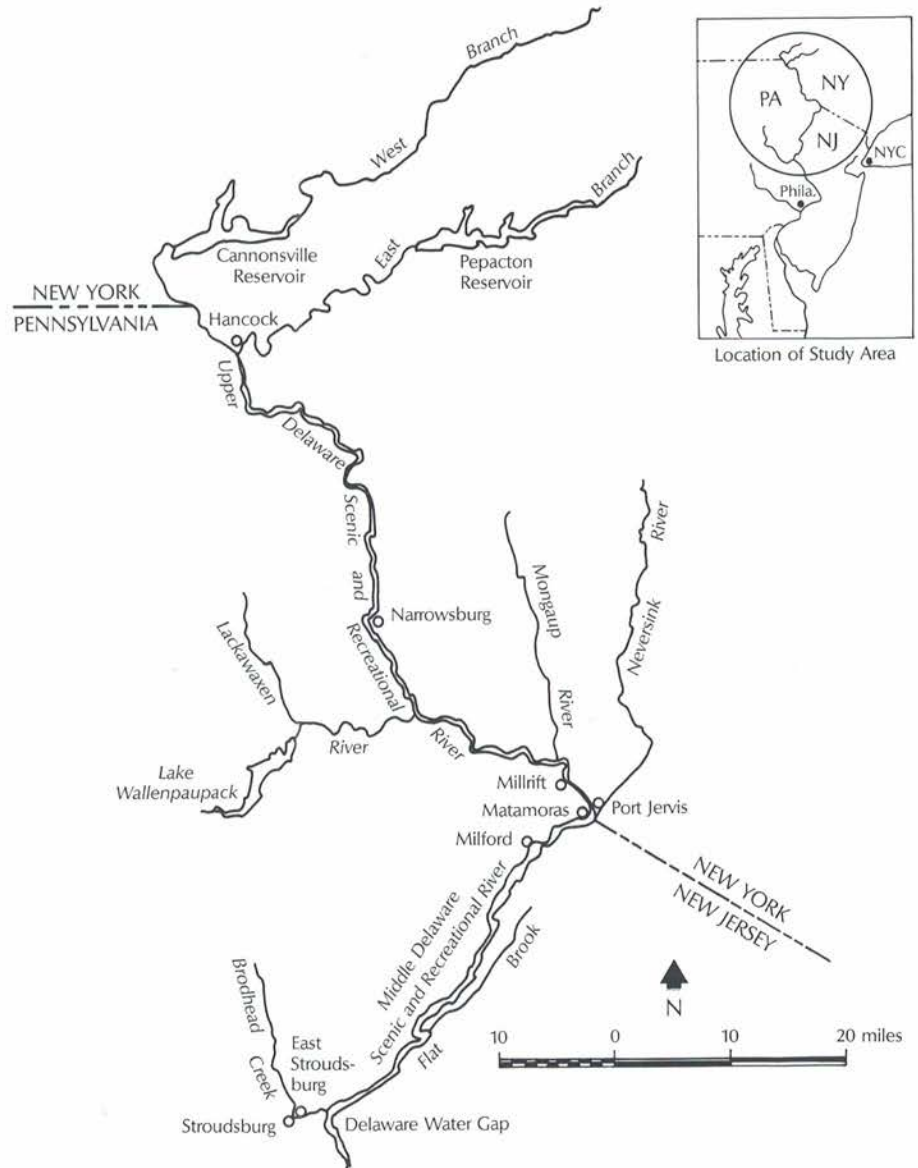
DRBC staff has released a set of proposed management strategies to protect water quality in the "scenic rivers" region of the basin from degradation due to encroaching development.

The proposed management alternatives are contained in a discussion document entitled "Staff Report on Scenic Rivers Water Quality Protection (Hancock, New York, to the Delaware Water Gap)," released to the public on October 30, 1990. Public briefings were held in November in Matamoras and Stroudsburg, Pa. and in Liberty, N.Y.

The Upper Delaware Scenic and Recreational River (UDSRR) and the Delaware Water Gap National Recreation Area (DWGNRA), which flanks the Middle Delaware Scenic and Recreational River (MDSRR), are noted for their beauty and recreational opportunities.

The two river reaches were added to the National Wild and Scenic Rivers System by Congress in 1978. By 1990, 120 river segments had been included in the system. Of these, only 19 are located in states east of the Mississippi River. The Upper and Middle Delaware are the only national scenic river segments in New Jersey, New York, and Pennsylvania and the only national scenic reaches located within several hours' drive of about 20 percent of the U.S. population. Most components of the system are located in western states, away from urban centers and/or developing areas.

In 1987, the Commission and the National Park Service (NPS) began working on a water resources management plan to protect the high



Upper Delaware and Middle Delaware National Scenic and Recreational Rivers.

water quality within the DWGNRA. The study was triggered by increasing land development in the area, especially the Poconos, and an attendant increase in the number of wastewater treatment plants.

In September of 1989, the Watershed Association of the Delaware River (WADR) petitioned the Commission

requesting that it designate waterways in the middle and upper basin as Outstanding National Resource Waters. The requested designation would apply to 121 miles of the Delaware main stem from just below Hancock, N.Y. to just below the Delaware Water Gap and those tributary reaches which flow within the Upper Delaware Scenic





*Runoff from farmland within the scenic rivers corridors can have a major impact on Delaware River water quality. Increased nutrient loadings, for example, can increase plant growth and chemical deoxygenation in the river, reducing dissolved oxygen levels essential to aquatic life. Proper farm management practices go a long way in solving the problem. (Photo courtesy of the National Park Service)*

and Recreational River corridor or the Delaware Water Gap National Recreation Area.

The Outstanding National Resource Waters (ONRW) designation would prohibit new direct discharges, or increases in wasteloads from existing discharges, to ONRW waters. The petition also called for strict non-point source pollution controls to deal with such problems as runoff from farmland and construction sites.

The "Staff Report on Scenic Rivers Water Quality Protection" addresses both the DRBC/NPS study and the WADR petition, concluding that existing water quality in both the UDSRR and the DWGNRA is higher than current water quality standards and should be protected from degradation. It notes, however, that while water quality preservation is in the interest of the region's long-term social and economic health, the right of local governments to control the extent of growth within their jurisdictions is recognized.

At year's end, Commission staff was

preparing a response document addressing concerns raised at the public briefings. Formal public hearings were expected to be held in 1991.

\* \* \*

The Commission and the National Park Service completed their draft report of the joint DWGNRA study in March of 1990. This draft was submitted to the Commission's Water Quality Advisory Committee for review and over 30 pages of comments were received from the U.S. Environmental Protection Agency, the Delaware Department of Natural Resources and Environmental Control, the New Jersey Department of Environmental Protection, the New York Department of Environmental Conservation, and the Pennsylvania Department of Environmental Resources.

The comments addressed a variety of technical and policy considerations and the need for additional information in several areas. Various meetings were held with New Jersey, New York, Pennsylvania, and E.P.A. personnel to discuss each organization's comments and concerns.

There was consensus during the review process that water quality management strategies should be developed for the Upper Delaware Scenic and Recreational River as well as the Delaware Water Gap National Recreation Area since upstream drainage impacts the DWGNRA. Further study was initiated, culminating in the "Staff Report on Scenic Rivers Water Quality Protection."

The 77-page report concludes that the need for scenic rivers water



*The Delaware River below Hancock, N. Y., the southern boundary of the fabled Catskill Mountains. Brown and rainbow trout, walleye and smallmouth bass inhabit this river section. (Photo courtesy of Cynthia Poten, Delaware Riverkeeper)*

quality protection in the basin is driven by two factors:

- Existing water quality is not adequately protected from degradation by currently-adopted water quality standards and associated pollution abatement policies as currently implemented; and,
- The region surrounding the UDSRR and the DWGNRA has experienced a high growth rate through the 1980s due to land development activities. While growth rates may vary from year to year, the long-term upward trend is expected to continue. This growth and development will increase the quantity of point and non-point source wasteloads delivered to the UDSRR and the DWGNRA.

The report concludes that existing water quality in the scenic river reaches can be preserved and protected by requiring higher wastewater treatment standards, non-point source controls for new service areas, and additional resources to expand management activities.

It further states that various elements of the WADR petition deserve consideration from either a policy or technical perspective, including the use of "natural systems" for wastewater discharge.

Natural systems include land treatment (soil-based systems), floating aquatic plant systems, and constructed wetland systems. They are considered viable wastewater treatment options by such organizations as the Water Pollution Control Federation and the U.S. Environmental Protection Agency.

\* \* \*



*Rock outcropping just north of the Narrowsburg (N. Y.) pool, the deepest body of water in the Delaware River with depths reaching 113 feet. The 17-mile river reach between Narrowsburg and Barryville, N. Y. is a prime spawning ground for shad. (Photo courtesy of Cynthia Poten, Delaware Riverkeeper)*

While protection of the scenic river reaches increases the cost of development and infrastructure improvement in the region, the increased cost should not impede local growth and development, the report notes. Considering the economic impact of the scenic rivers on the local tourist-based economies, the added cost should be considered an investment in the economic future of the region.

Commission staff recommends in the report that an interstate program be established in the scenic rivers region in order to protect these high quality waters. Recommended elements of such a program could include:

- Adoption of water quality standards reflecting existing high water quality and related non-degradation policies.

- Adoption of new point source effluent requirements, possibly on a seasonal basis.
- Adoption of a policy requiring project applicants to evaluate the use of natural systems technologies, including non-discharge systems for their projects.
- Adoption of a policy requiring the implementation of non-chlorination disinfection alternatives (i.e., ozonation and ultraviolet light) for applicable wastewater treatment facilities. Chlorination followed by dechlorination could be considered if complete destruction of viral pathogens could be assured.
- Adoption of a policy requiring the preparation and implementation of emergency management plans for all wastewater treatment facilities.



*Recreational craft ply the Delaware in the Hawks Nest region (above). A July traffic jam at Skinners Falls (left). Over the past decade, the Delaware's upper and middle scenic river segments attracted an estimated 25 million visitors, a figure that is expected to increase in coming years. Visits peak during the warmer months of the year when water pollution problems could be exacerbated due to low flows and high water temperatures. (Photos courtesy of Kittatinny Canoes and the National Park Service)*

ties in the scenic rivers region to prevent accidental discharges during power outages, etc.

- Adoption of non-point source requirements for all projects coming before the Commission for approval. It is envisioned that the Commission's requirements would be ultimately supplanted by state-mandated programs.
- Expansion of monitoring, enforcement, technical assistance, and other water quality management programs in a coordinated fashion among all applicable local, state,

federal, and regional public agencies.

- Adoption of a policy discouraging any new discharges within the boundaries of the Upper Delaware Scenic and Recreational River corridor and the Delaware Water Gap National Recreation Area.

Implementation of a river protection program for the basin's scenic rivers region would be unique in that it would mark the first time such a program had been applied nationally to a river system in such a rapidly urbanizing region: the Delaware Basin drains only four-tenths of one

percent of the total U.S. land area, yet it provides water for some ten percent of the nation's population.

### Upgrading Water Quality Standards

Public hearings were held during 1990 on recommendations to upgrade water quality standards for portions of the tidal Delaware River in order to meet goals set by the federal government.

The recommendations stem from a multi-agency study required under federal law for any waterways where current standards and designated uses do not conform to the goals of the federal Clean Water Act.

A section of the 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.

The hearings were held in October in Bordentown, N.J. and Philadelphia, where an earlier June briefing also was conducted. Seventeen witnesses, including representatives of major riverfront cities, testified. Some voiced full support for the proposed standard changes, while others had strong reservations about the technical feasibility and costs of implementing the plan.

At year's end, a response document was being prepared by DRBC staff with the intent of presenting it to the full Commission with recommendations based on the hearing record.

The three-year "Use Attainability"



*While not appearing to be exactly state-of-the-art, this monitoring equipment generated a lot of useful data during a 1990 water quality study of Zone 2 of the Delaware River, the reach from Trenton, N. J. to Northeast Philadelphia. The platforms, strobe lights and Hydrolab monitoring equipment were loaned to the Commission by Versar, Inc. of Columbia, Md.; the local police department (Ewing Township, N. J.) and the New Jersey Department of Transportation chipped in the traffic cones which were used as warning devices. Mini-monitors were rented from the U. S. Geological Survey (U.S.G.S.); the DRBC bought the trash cans, spray paint, and bungee cords and assembled four monitoring stations. The U.S.G.S. loaned the Commission a boat and motor and the DRBC's chief engineer, David Everett, brought his own boat to the river to help out. A report containing results of the study was expected to be released in the spring of 1991. (Photo by Chris Roberts)*

study was conducted by the DRBC with the support of Delaware, New Jersey and Pennsylvania and the U.S. Environmental Protection Agency.

Among its findings:

— Fishable water quality (as defined by a dissolved oxygen concentration of 4.0 milligrams per liter or higher) can be attained throughout the entire tidal portion of the river through sewage treatment plant upgrades. Currently, a 39-mile stretch of river, from the Delaware Memorial Bridge to just

north of the Tacony-Palmyra Bridge, does not meet the federal "fishable" goal.

— Thirty-one miles of the tidal river can be upgraded to primary contact recreation ("swimmable") from existing secondary recreation status without additional pollution abatement actions. The study confirmed what preliminary data had indicated: the higher water quality needed to meet the "swimmable" goal already exists as the result of recent pollution abatement programs.

The 31 miles recommended for upgrade encompass 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. Upgrading these two river sections to "swimmable" would leave only a 26-mile reach of the river in the Camden/Philadelphia area at a secondary contact use designation.

The primary contact ("swimmable") designation, as defined by the Clean Water Act, involves "recreation in and on the water." This includes not only swimming, but water skiing and other aquatic activities in which there is a high likelihood of ingesting water. Secondary recreational contact, on the other hand, involves such activities as fishing or boating.

It should be noted that the 200-mile, non-tidal reach of the Delaware River, from Trenton, N.J. north to Hancock, N.Y., is classified as both "swimmable" and "fishable" with the water quality in that reach

ranging from good to excellent. The Delaware Bay also is designated as "swimmable" and "fishable."

It also should be noted that the "fishable" and "swimmable" designations pertain strictly to water quality criteria.

Fish, for instance, are now distributed throughout the entire tidal portion of the river, stretching 85 miles from Trenton, N.J. south to Liston Point, Del. The "fishable" goal, however, is not being met in some portions of the tidal river because the water quality in those reaches is not high enough to support the full life cycle of a balanced aquatic community, including spawning, as stipulated in the Clean Water Act.

Similarly, while much of the tidal river is now designated "swimmable" from a water quality standpoint, dangerous currents, floating debris, ship traffic and other factors can make this activity unsafe.

### Controlling Toxic Pollutants

The Commission continued efforts during 1990 to identify and control toxic pollutants being discharged to the Delaware Estuary from wastewater outfall pipes.

Eighty-two industrial and municipal dischargers to the estuary were required to conduct monitoring for priority toxic pollutants and whole effluent toxicity, a measure of the toxicity to aquatic life from all toxic substances in the wastewater. Data collected during the monitoring program were entered into a toxic substance data base for use by state water quality agen-

cies in developing effluent limitations and wasteload allocations. The data base was expected to be completed by the spring of 1991.

The Commission also conducted studies of the presence of toxic pollutants in the tissues of resident fish and invertebrates and in ambient water samples (drawn directly from the river) between March and November.

Working with the U.S. Fish & Wildlife Service, the tissue of channel catfish, white perch and striped bass taken from the estuary were analyzed for pesticides, PCBs and heavy metals. Advisories limiting or banning the consumption of some Delaware Estuary fish species, especially bottom feeders, have been issued by Pennsylvania and New Jersey as the result of past fish tissue studies.

The three-year Estuary Toxics Management Program, initiated in 1989, is a combined effort of the Commission, the states of Delaware,



*DRBC Chief Engineer David Everett pilots his boat down the Delaware River off Florence, N. J., towing one of the monitoring platforms used in the Zone 2 study. The platforms were anchored at different locations in the river. Data retrieval by DRBC staff occurred around the clock over a one-week period. Also onboard is Robert Limbeck, DRBC's water resources analyst. (Photo by Warren Huff)*

New Jersey and Pennsylvania, and EPA Regions II and III. Its aim is to develop policies and procedures to control the discharge of substances toxic to humans and aquatic biota from point sources like outfall pipes.

Efforts were under way at year's end to develop numerical water quality criteria for toxic pollutants in the estuary, the tidal portion of the Delaware.

A plan of study for the second year of the program has been approved for the period October 1, 1990 to September 30, 1991. Emphasis is being placed on the calibration and verification of a far-field water quality model and the development of effluent limitations and wasteload allocations for the wastewater dischargers in the estuary.

### Chlorination Study

A study to determine whether the amount of toxic chlorine compounds being discharged into a segment of the Delaware River could be reduced without impacting on human health or on the shellfish beds in the upper Delaware Bay was concluded in early 1990. A report summarizing the findings was released in April.

The report concluded that the current practice of year-round wastewater disinfection should remain in effect, and that the issue should be re-visited once combined sewer overflows in the Philadelphia/Camden area have been corrected to essentially eliminate dry weather discharges and reduce wet weather discharges.



*Dick Albert, supervising engineer in the Commission's Water Quality and Planning Analysis Section, inspects a Minimonitor inside a trash can on one of the platforms. The trash barrels housed the delicate monitoring equipment which received and recorded signals from submerged sensors. Parameters measured included water temperature, dissolved oxygen, conductivity and pH. (Photo by Warren Huff)*

The toxic compounds in question are a by-product of wastewater disinfection, achieved through chlorination. This process virtually kills bacteria not removed by secondary wastewater treatment plants which eliminate 97 to 99 percent of these organisms. But there is a downside. While chlorine provides human health safeguards, some chlorine by-products can be harmful to fish and other aquatic life.

Data collection in the two-year study began in July of 1987 and ended in June of 1989. The data were fed into U.S. Environmental Protection Agency (EPA) computers and later transferred to the DRBC's computer network for retrieval and analysis.

During the first phase of the study, chlorination was suspended in the fall of 1987 at 25 wastewater treatment plants discharging to the Delaware River between Trenton, N.J. and Marcus Hook, Pa. All other treatment requirements remained

in force. Chlorination was resumed in the spring of 1988 with the return of recreational activity on the river. To provide comparison data, chlorination continued throughout the second year of the study.

Data generated by the study indicate that bacterial levels in the winter when the disinfection requirement was excused were significantly higher than in the winter with disinfection. The impact extended over the entire length of the river sampled, including the shellfishing area. The greatest impact was in the Philadelphia/Camden area. Bacteria levels during the entire study period were affected by untreated sewage from combined sewers during both dry and wet weather. Bacterial levels during the first winter were obviously affected by the suspension of disinfection.

Monitoring programs to detect bacterial levels were carried out over the length of the study with samples taken at 200 locations by the New Jersey Department of Environmental Protection (NJDEP) and Delaware's Department of Natural Resources and Environmental Control (DNREC).

The study was endorsed by the Pennsylvania Fish Commission and approved by the EPA, the U.S. Food and Drug Administration, the Pennsylvania Department of Environmental Resources, NJDEP, DNREC and by shellfish regulators in both New Jersey and Delaware.

The study was funded by a grant from the National Oceanic and Atmospheric Administration and contributions from the 25 dischargers.



*The Clyde A. Phillips, once a two-masted, gaff-rigged schooner, tied up on the Maurice River at Dorchester, N. J. Built by Stowman Brothers Shipyard in Dorchester in 1928, she harvested oysters until World War II when she was converted to a Delaware River fireboat. She resumed oystering, and later clamming, after the war but without her sails. Now plans are underway by the Delaware Bay Schooner Project to restore her to her original splendor. When finished, the ship will serve as a floating classroom where students of all ages will be taught about the Delaware Estuary and the efforts that are underway to protect this fragile ecosystem. (Photo courtesy of Cynthia Poter, Delaware Riverkeeper)*

# Water Conservation

## Some Plants Drink Less

The Commission's Water Conservation Advisory Committee was instrumental in putting together two technology transfer sessions in 1990 — one on ways to create attractive landscapes that are resistant to droughts, the other on ways to save water by modifying its retail price structure.

The session on plants, held March 6 in Cherry Hill, N.J., was attended by developers, nurserymen, turf-grass specialists, landscape architects, designers, planners, and government officials. Speakers addressed such topics as the varying types of low water-use plants and grasses, water-efficient landscape designs, and water-efficient irrigation systems and equipment.

Water-conserving landscaping products were on display.

Recent water shortages in the Delaware River Basin have demonstrated that there are limits to the supply of fresh water and that wise use of this water can stretch existing supplies.

Water-conserving landscapes can contribute significantly to this conservation effort since they require little or no watering, even during prolonged dry periods. And during serious droughts, when mandatory restrictions on such activities as the watering of lawns, plants and shrubs are in force, they stand a much greater chance of survival than conventional plantings.

The second seminar was held November 1 in Princeton.

Titled "Promoting Water Conservation Through Innovative Rate



*Drought-resistant shrubs need little or no watering and, when landscaped with decorative gravel as shown above, cut down on turf area. Working on this xeriscape garden in Cape May County are Dan Strombom (standing), agricultural/resource management agent with Rutgers Cooperative Extension, and Scott Mauger, an employee of the Cape May County Board of Agriculture. (Photo courtesy of Rutgers Cooperative Extension)*

Design," it was sponsored by the Commission and the New York City Water Board.

Speakers discussed various forms of rate structures designed to save water, such as imposing seasonal surcharges during summer months when demand peaks because of outdoor watering activities.

Also addressed were the adjustments in financial planning and budgeting that such rate changes may necessitate, the potential conflicts with regulatory agencies that approve such rates, and the lessons to be learned from electric utilities engaged in price-oriented, energy-saving campaigns.

Speakers included Gerald M. Hansler, DRBC executive director; Robert Tierney, chairman of the New York City Water Board; and Jim Tripp of the Environmental Defense Fund.

The seminar was a major component of a year-long conservation pricing study undertaken by the New York City Water Board as part of the city's wider efforts to meet the future demand for water.

The DRBC is considering adopting a policy to encourage water conservation through innovative rate designs since it appears this would be effective in reducing residential exterior water use.

This is important since such usage



is predominantly depletive and occurs over the summer during periods of low streamflows. Reducing depletive use through pricing appears to be a viable conservation strategy.

Conservation-oriented water rates have been adopted in other parts of the country in response to water emergencies such as droughts and in an attempt to slow the increase in water consumption that traditionally accompanies increases in population and per capita income. If this increase cannot be stemmed, new and costly water supply sources must be found.

The Commission's Water Conservation Advisory Committee has sponsored four technology transfer sessions in the past three years. The others were attended by representatives from the pulp and paper industries and from the chemical and pharmaceutical sector who exchanged information on successful water-saving programs at their own facilities.

Although the Delaware Basin drains only four-tenths of one percent of the total U.S. land area, almost ten percent of the nation's population rely on its waters for drinking and industrial use. Consequently, the Commission has invested heavily in water conservation initiatives in an effort to cut down on the demand side, convinced that it makes sense to save water during wet years as well as dry ones.

It has adopted regulations that:

- require leak detection and control programs for in-basin, public

water suppliers in an effort to locate unaccounted-for water projected at some 240 million gallons a day. Estimated treatment and delivery costs for that lost water: \$80 million a year.

- require the metering of major, in-basin, public water supply systems at the customer end of the pipe with all water bills based on metered usage instead of a flat periodic rate for an unlimited supply.
- establish water conservation performance standards for such plumbing fixtures and fittings as toilets, lavatory faucets and shower heads that are installed during new construction or major renovations. Basinwide savings of 110 million gallons per day are projected by the year 2020 as a result of switching to these water-saving devices.

The basin states of Delaware, New Jersey, New York and Pennsylvania have initiated their own water conservation programs. And New York City, the single biggest user of Delaware Basin surface water, is engaged in a ten-year program to install 630,000 water meters in residential buildings at an expected cost of \$290 million. Projected savings in water use once the program is completed and metered billing is in place: 300 million gallons a day. The city also has initiated a leak detection and repair program to locate breaks in its 6,300 miles of underground pipes.

The Commission adopted its leak detection regulation on April 22, 1987. It requires 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 states' environmental regulatory agencies. The regulation contains timetables for submission of leak detection and repair (LD&R) plans.

The 110 purveyors in the basin that distribute more than one million gallons a day were to have submitted their initial plan by April 22, 1989. As of March 21, 1990, 36 of the 110 had not completed this requirement.

The Commission and the states initiated steps to improve compliance. Letters were sent to the 36 purveyors requesting that they submit their plans by May 1, 1990. Seven did not comply.

Additional enforcement action was taken and by July 1 all were in compliance with the exception of Wilmington, Del., which was granted an extension in view of the fact the city had hired a consultant to conduct a hi-tech computer modeling study to pinpoint leaks. Data gleaned from the study will be used to prepare the city's LD&R plan.

The DRBC's Water Conservation Advisory Committee is chaired by Bruce Stewart, president of the Water Resources Association of the Delaware River Basin. The vice-chairman is Joseph Miri, chief of the Office of Water Policy Analysis, New Jersey Department of Environmental Protection.

# Hydrologic Report

## 1990: a Wet One

Annual average precipitation above the gaging station at Montague, N.J. was 48.10 inches or 4.94 inches above normal during 1990. For the drainage area above Trenton, average precipitation was 7.00 inches above the annual normal of 44.23 inches.

The Wilmington, Del. area received 44.13 inches of precipitation during the year, compared to an annual average of 41.38. However, the Philadelphia region ended up 1990 with a deficit: 35.79 inches compared to a normal 41.42 inches.

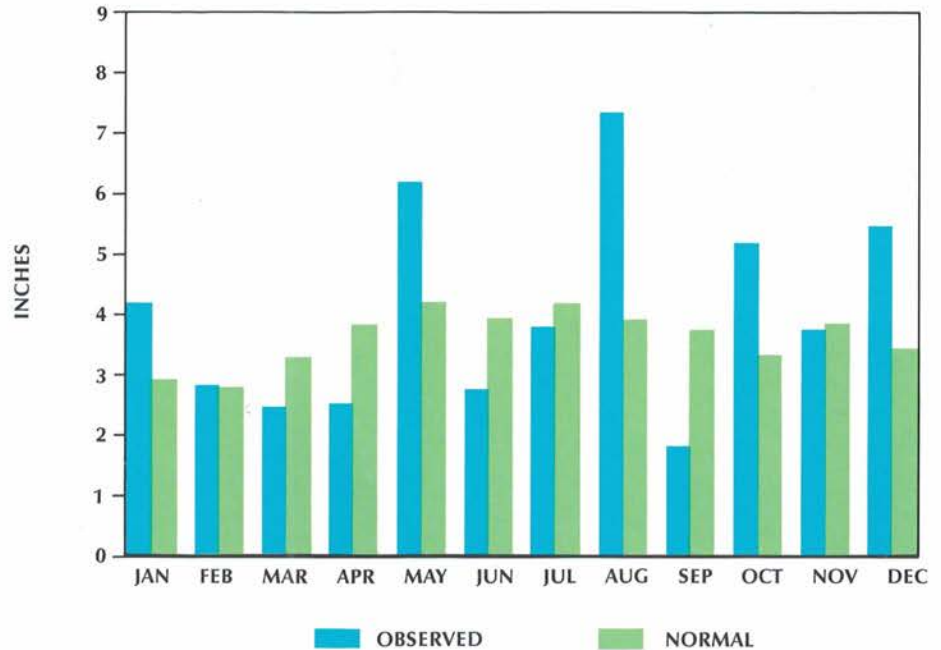
Flows of the Delaware River at Trenton averaged 13,900 cubic feet per second (cfs) or 33 percent above normal. A maximum average daily flow of 58,300 cfs occurred on November 12 and the minimum daily flow of 4,040 cfs on October 4. The annual average flow at Montague averaged 6,320 cfs or 22 percent above normal.

Storage in the three New York City upper basin reservoirs (Pepacton, Cannonsville and Neversink) ranged from normal to above normal throughout the year. The impoundments were full by mid-March and at year's end storage totalled 252 billion gallons, or about 20 percent above the normal of 197 billion gallons. The reservoirs hold 271 billion gallons when full.

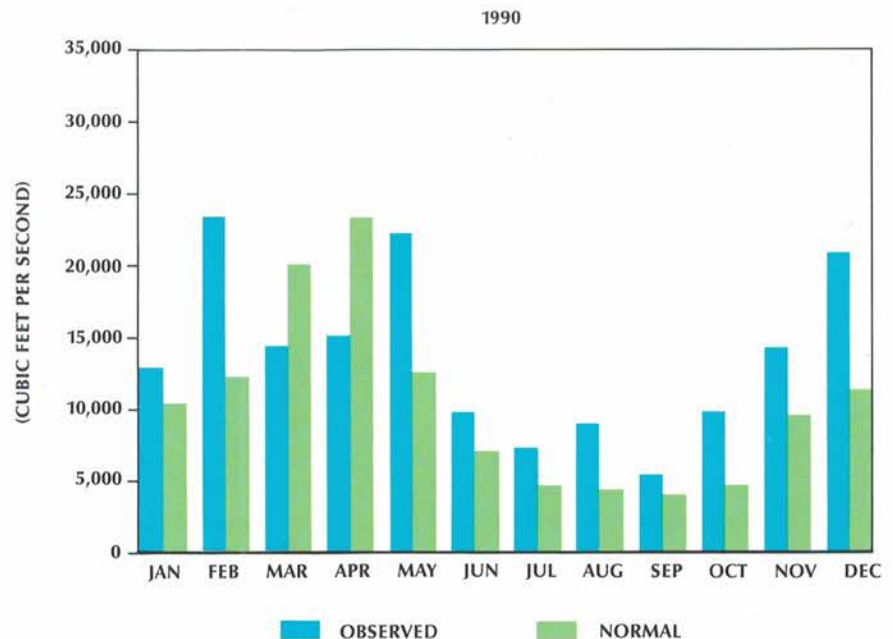
Releases totalling 4.9 billion gallons were made from the reservoirs' "thermal stress bank" from June through September to protect the cold water fishery in the upper basin. The water, drawn from the depths of the impoundments, cools

(continued on page 18)

**1990 PRECIPITATION**  
ABOVE MONTAGUE, N.J.



**AVERAGE MONTHLY DELAWARE RIVER FLOWS AT TRENTON**



## Trouble in Paradise

The letter was addressed to "The Distinguished Delaware Bay and River Commission."

The name had a noble ring about it, but the news wasn't good.

"The people of the island of Aruba are confronting a severe scarcity of drinking water. We are in a desperate need of imported water through December 1990," the letter stated.

"On behalf of the government and the people of Aruba I would appreciate your good offices in order to grant a permit for water delivery to Aruba from the Delaware River."

It was signed by N. O. Oduber, the island's prime minister.

Aruba?

Now in these parts, even the mention of diverting a little Delaware River water a few miles over a ridge line to another basin can cause a serious clamor.

But Aruba? The Dutch West Indies? The Caribbean Sea? Now that's out-of-basin.

Gerald Hansler, the Commission's executive director, conferred with the DRBC's five commissioners and staff. The basin's major water supply reservoirs were brimful when the letter arrived in the early spring of 1990. Billions of gallons of good quality fresh water were rushing down the Delaware River each day and being lost to the sea.

Hydrologically, there was logic in helping out a neighbor in need, a neighbor whose desalinization plants had broken down and who needed a temporary backup supply of water.

On March 27, Mr. Hansler granted emergency approval to Aruba to withdraw up to 33 million gallons a month from the Delaware River at the Mantua Anchorage near the Philadelphia Airport.

On May 23, the five commissioners backed that decision, voting unanimously to supply the water until January 1, 1991 with the condition that the withdrawals be curtailed or terminated should dry conditions develop in the basin.

The phones rang off the hook.

TV news crews helicoptered to the Commission's headquarters in West Trenton for interviews and scoured the Delaware River for shots of ships departing with "Aruban water."

Congressmen and citizens expressed concern. A New York City public relations firm, hired to represent Aruba's tourism industry, sent representatives to Commission meetings to allay any fears about the island's ability to quench a thirst.

Coastal Corporation, a Houston, Tex. based firm whose ships were hauling the Aruban water, dispatched staff to the Delaware Valley area to field questions.

One newspaper headline screamed: "Trouble in Paradise" and raised doubts about the river's ability to share its resources with its neighbors to the south.

It rained more than usual and the river swelled.

The Commission responded to the concerns.

"Since only a small fraction of runoff can now be captured as reservoir storage for future use, it seems only prudent to use a

small portion of our abundant supply to help out a neighboring country in need," stated one letter sent out June 10.

"Should there be a reversal in hydrologic conditions, with significant reservoir drawdowns, the DRBC has the power to make adjustments to its docket (decision), including immediate termination of all Aruba shipments.

"It should be noted that DRBC's regulations allow ships to take on estuary water for ballast (to enhance stability at sea) at no charge. This ballast water is then flushed from the ship at the port of destination.

"But because Aruba intended to use the ballast for emergency water supply, island officials and Coastal Corporation, the shipper, felt an obligation to notify the Commission of their intentions up front — before one drop of water left the basin. And they readily agreed to pay their fair share for what they planned to take — the same \$60 per million-gallon rate charged throughout the basin for consumptive water use."

It was a wet summer.

Attention turned to the World Series and the elections. The news crews got different assignments when the river level didn't drop. The PR people went back to New York and Houston.

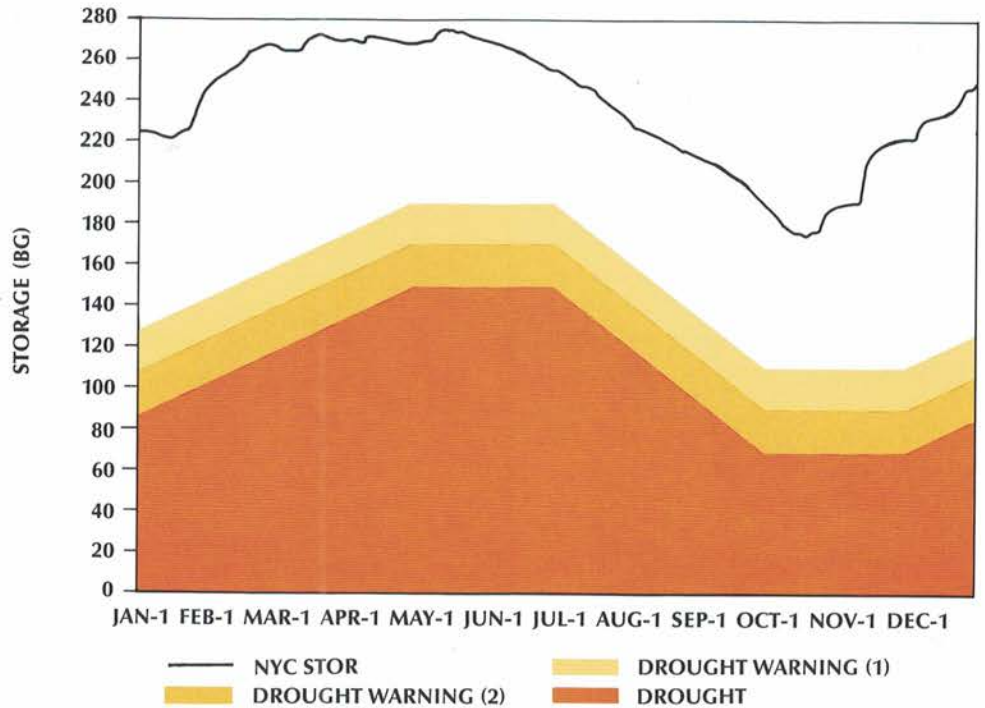
The desalinization plants were eventually repaired and the shipments stopped.

For the record, the tiny island received a total of 118 million gallons of Delaware River water over a five-month period.

That's about a third of what the city of Philadelphia uses in one day.

## TOTAL 1990 NYC DELAWARE BASIN STORAGE

IN BILLION GALLONS



(continued from page 16)

the trout-rich waters of the East and West branches of the Delaware River below Pepacton and Cannonsville reservoirs, the Neversink River below the Neversink Reservoir, and the upper reaches of the Delaware main stem.

At the request of DRBC's New York State representative, an additional 2,000 cfs-days were added to the 6,000 cfs-days set aside annually in the reservoir system for fishery protection. On August 15, DRBC Executive Director Gerald M. Hansler granted emergency approval of the additional set-aside after conferring with the other four Commissioners and the parties to the 1954 U.S. Supreme Court decree.

The Commissioners unanimously ratified the action at a public hearing on September 26. The decree parties gave their written consent.

Because of above average precipitation in most of the basin, salt water intrusion of the estuary was never a problem during 1990. Maximum intrusion of the so-called salt wedge (7-day average 250 ppm isochlor) occurred early in January when it reached River Mile 75, which is about four miles below the Pennsylvania Delaware boundary at Marcus Hook, Pa.

Ground water levels in observation wells in the basin fluctuated seasonally during the year, generally remaining near or above normal.

# Water Supply

## Meeting the Basin's Needs

Two bills that provided funding mechanisms for the expansion of the F. E. Walter Reservoir on the Lehigh River in Pennsylvania's Pocono Mountains expired in the 101st Congress and efforts were under way late in the year to have legislation re-introduced.

U.S. Senator Joseph Biden of Delaware declined to schedule one of the bills for hearing before the Senate Judiciary Committee which he chairs, pending a decision on whether Delaware farmers would help pay for the reservoir project through water use irrigation charges. Senator Biden has opposed such charges for agriculture.

The bill, SJR 234, was introduced in November of 1989 by Senator Bill Bradley of New Jersey. James Florio, New Jersey's governor, had written Bradley and the state's congressional delegation supporting the legislation and requesting support for immediate hearings.

The other bill, H. R. 793, was introduced nine months earlier by Congressman Paul Kanjorski of Pennsylvania. It was never acted on, largely because its formula for funding the F. E. Walter project differed significantly from financial commitments previously agreed to by the three down basin states and the federal government.

Attempts to amend the bill were unsuccessful, as were efforts to reach a compromise on the Kanjorski/Bradley legislation.

Expansion of the F. E. Walter Reservoir to create an additional 22.9 billion gallons of storage was part of the 1982 "Good Faith Agreement," signed by the governors of the four basin states (Delaware, New Jersey,

New York and Pennsylvania) and the mayor of New York City.

Under the Good Faith 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 project.

In the past, the non-federal sponsors of water resources projects could repay the federal government in annual payments over a period of 50 years. Current policy, however, requires payment over the period of actual construction for all project costs associated with water supply development.

The DRBC already is repaying the non-federal cost shares for Beltzville and Blue Marsh Reservoirs (covered by the 50-year repayment contracts) by charging a small number of surface water users in the basin for both consumptive and non-consumptive water use. Fees total about \$1.1 million a year — a small fraction of the estimated \$8 million a year price tag for the F. E. Walter expansion when combined with the repayment costs for Beltzville and Blue Marsh.

Why do only a small number of users pay?

In ratifying the Delaware River Basin Compact, Congress inserted certain Federal Reservations in Section 15.1(b) which prohibit the Commission from imposing any charges for water withdrawals or diversions from the basin if they lawfully could have been made without charge on the effective date of the Compact — October 27, 1961. In other words, the DRBC cannot charge pre-Compact water users — who make up the vast majority of water users in the basin — for new water storage projects or for

## Federal Reservation 15.1(b)

UNITED STATES: (from Public Law 87-328, 75 Stat. 688)

**15.1 Reservations.** In the exercise of the powers reserved to the Congress, pursuant to Section 1.4 of the Compact, the consent to and participation in the Compact by the United States is subject to the following conditions and reservations:

(a) . . .

(b) No provision of Section 3.7 of the Compact shall be deemed to authorize the commission to impose any charge for water withdrawals or diversions from the Basin if such withdrawals or diversions could lawfully have been made without charge on the effective date of the Compact; or to impose any charges with respect to commercial navigation within the Basin, jurisdiction over which is reserved to the Federal Government: *Provided*, That this paragraph shall be applicable to the extent not inconsistent with Section 1.4 of this Compact.

debt payments on existing water supply impoundments like Blue Marsh and Beltzville.

The Kanjorski and Bradley bills would have corrected that inequity by amending Section 15.1(b) of the Compact, thus allowing the Commission to charge all users to the extent they benefit from existing projects and stand to benefit from future projects like F. E. Walter.

\* \* \*

Other proposals were made during the year for meeting water needs in the basin.

The National Wildlife Federation (NWF) had several ideas.

One called for financing the Walter project on a “willing-buyer” basis. Another called for the establishment of a Conservation Investment Partnership Program under which the DRBC would fund selected conservation initiatives in New York City in return for credits for additional downstream flow releases from the city’s in-basin reservoirs.

The NWF also recommended that the Commission require public water supply utilities to revise their rate structures to encourage water conservation. And the NWF proposed that the Commission consider a program allowing pre-Compact users to sell their water entitlement rights.

The five DRBC Commissioners addressed these proposals at a January 12, 1990 Commission meeting.

They agreed that ongoing water conservation programs should be vigorously supported and expanded, but emphasized that a conjunctive approach was needed: additional water supply storage coupled to con-

tinued emphasis on reductions on the demand side.

As to the “willing-buyer” approach, Dr. James Grace, the DRBC’s Pennsylvania commissioner, expressed concern that a “pay if you want” system could not reliably provide the money to underwrite the necessary bonds to finance the Walter project. And Harold Budka, representing New York State, argued that the NWF proposal to auction Walter water missed the point: the additional supply was not needed simply to meet private needs but to meet public policy objectives — to provide sufficient water during low flow and drought periods.

Addressing the proposal to sell entitlements, New Jersey Commissioner Michael Catania pointed out that the Commission was established to manage the waters of the basin. To abdicate that responsibility, he said, and substitute a system whereby private parties would determine basin management policies by contract rights would be foolhardy.

The commissioners expressed general support for the proposal to revise water rate charges to encourage conservation, referring it to the DRBC’s Water Conservation Advisory Committee for further study.

That fall the Commission and the New York City Water Board sponsored a seminar in Princeton, N.J. on promoting water conservation through innovative rate designs, like imposing seasonal surcharges during summer months when demands peak because of outdoor watering activities.

By year’s end the Commission was considering adoption of a policy to encourage water savings through such rates structures. (See Page 14 for additional details.)

# Other Basin Highlights

## Flood Stage Mapping

Work has begun on a flood stage forecast mapping project for approximately 33 miles of the main stem of the Delaware River between River Mile 139.5 (near the Scudders Falls Bridge) and River Mile 172.5 (about two miles below Riegelsville, Pa.). 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 the Pennsylvania Emergency Management Agency.

The maps, at a scale of one inch equals 400 feet, make use of topographic mapping and aerial photography completed during the Corps' "Delaware River Basin Study" of 1984. Development which has occurred since the aerial photographs

were taken is being documented through field surveys.

Flood stage forecast maps tie forecasted flood stages at bridges and U.S. Geological Survey gaging stations to areas of inundation. The National Weather Service makes these stage forecasts during flood events and broadcasts them over NOAA Weather Radio. Flood Stage Forecast Maps are useful to emergency personnel responsible for evacuation prior to flooding.

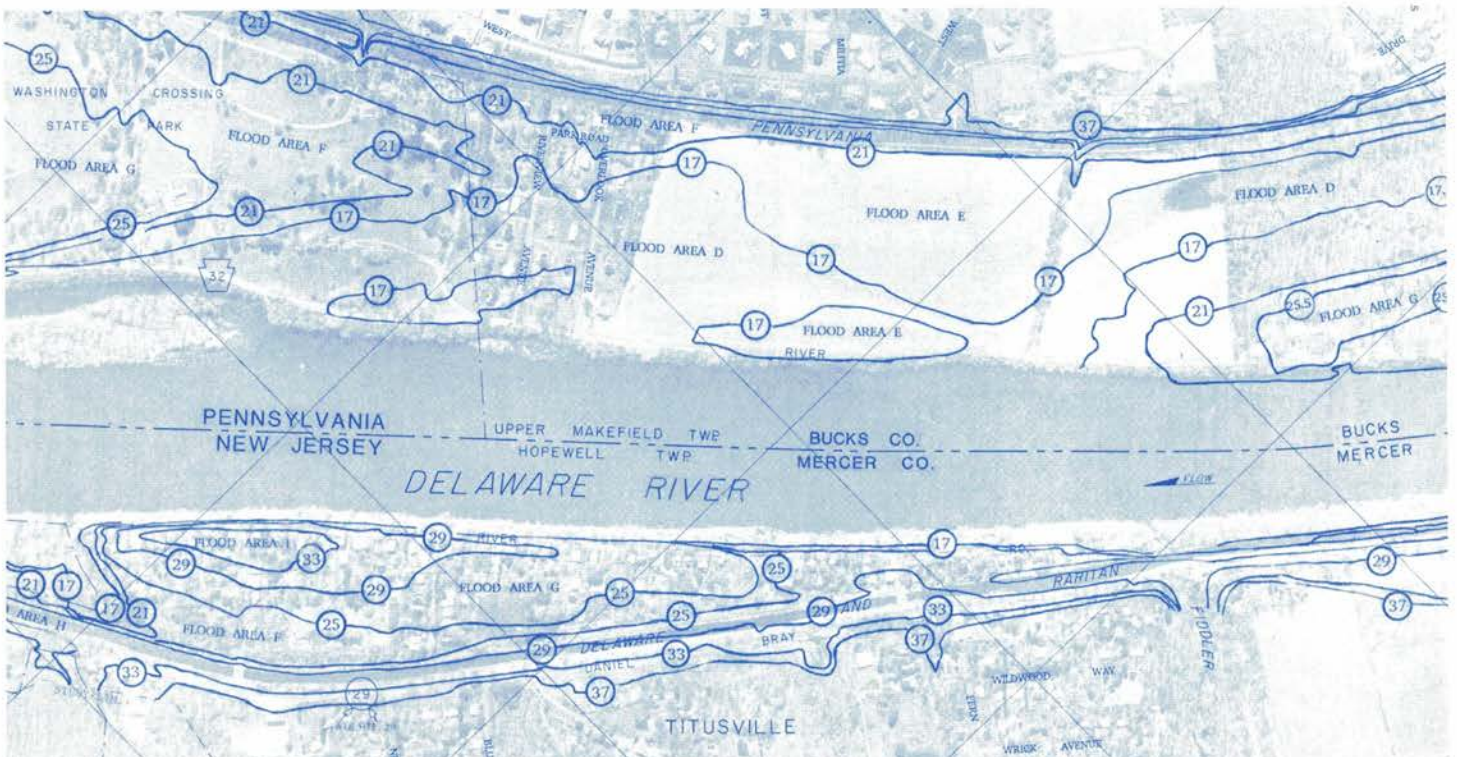
The maps can be digitized for use on the computer information systems maintained at the emergency operating centers in each of the four basin states.

The DRBC expects to participate in additional flood stage mapping

projects where high quality topographic mapping is available, and to provide assistance to other state and federal agencies to improve flood emergency operations.

During 1990, the Corps' Philadelphia District received authorization to proceed with the construction of automated flood warning systems in the Lehigh River and Assunpink Creek watersheds. These would be the first fully automated systems in the Delaware River Basin and would include the development of flood stage forecast maps. The DRBC hopes to assist where possible with the development of these warning systems.

The DRBC will continue to relay flood crest information from the National Weather Service to the public and other agencies when requested.



Flood stage forecast maps are crucial tools for emergency personnel responsible for evacuating low-lying areas.

## Ice Jam Project

As requested, the DRBC applied in the spring of 1990 for a New Jersey Freshwater Wetlands Permit which the state says is needed if the Commission is to proceed with a long-awaited project to reduce ice jam flooding on the Delaware River in the Port Jervis, N.Y. area.

The Commission hand-delivered the application to the New Jersey Department of Environmental Protection (NJDEP) on April 20. A public hearing was held November 8 in Montague Township, N.J. The NJDEP then directed the DRBC to explore three alternatives to the project's original design — the cutting of a 200-foot wide swath of trees on Mashipacong Island to create a passageway for river water when the main channel becomes ice-clogged.

The three alternatives to be considered: deepening the Delaware River channel in the vicinity of nearby Thirsty Deer Island; cutting of vegetation on Thirsty Deer Island; and managing releases from upper basin reservoirs in an attempt to minimize the occurrence of ice jams downriver.

In a December 11 response letter, the Commission stated that the first two alternatives had been explored by the U.S. Army Corps of Engineers and were found to be ineffective, as outlined in a 1986 Corps' report on design options. As to the third alternative, the Commission stated that a review of flood conditions on the Delaware preceding major ice jam flooding in the Port Jervis area in 1981 did not support the position that reservoir release management was a factor in the flooding, or that natural flows without reservoir releases would have created less severe ice conditions.

The NJDEP had not acted on the permit application at year's end.

The Commission also was awaiting word at the end of the year from the NJDEP on the status of an application filed in September requesting an extension of a two-year Stream Encroachment Permit issued by the state in 1988. The permit expired because of delays associated with the project, including the requirement the Commission secure the wetlands permit.

Negotiations continued with the Corps for updating the estimated cost of the project and for settlement of a revised local cooperative agreement between the Corps and the Commission. The original price tag for the project 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.

The 1981 flooding in the Port Jervis area claimed one life and caused an estimated \$14 million in property damage. The Delaware River rose 14.5 feet in one hour as a 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 DRBC agreed in the spring of 1986 to act as the project's non-federal sponsor after the Corps indicated that creation of the diversion channel on Mashipacong Island, which is located in New Jersey, was environmentally sound and economically feasible.

That fall the Corps received authorization from Congress to prepare project plans and specifications. The DRBC voted to add the proposed project to its Comprehensive Plan in 1988.



A road sign in Port Jervis, N. Y. is pounded by ice-clogged Delaware River water during the 1981 flood. The river rose 14.5 feet in one hour. (Photo courtesy of The Tri-State Gazette)



## Landfill Review Policy

The Commission has reaffirmed its policy on reviewing landfill projects, concluding that such review in most cases should be performed by the four basin states, which have the authority and resources to effectively regulate this growing industry.

On December 12, 1990, the commissioners, after public hearing, adopted Resolution 90-14 which re-confirmed the policies of an earlier resolution pertaining to landfill review (Resolution 69-7 adopted June 25, 1969).

Resolution 90-14 states that sanitary landfill projects will be referred to the Commission only in cases where no state-level review and permit system is in effect; where broad regional consequences are anticipated; or where the standards or criteria used in state level review are not adequate to protect the waters of the basin.

The Commission automatically reviews certain aspects of landfill projects under existing regulations: withdrawals exceeding 100,000 gallons per day (10,000 gpd in the Southeastern Pennsylvania Ground Water Protected Area), and discharges from landfill leachate treatment facilities exceeding 50,000 gpd.

Resolution 90-14 noted that the basin states have adopted comprehensive landfill/solid waste disposal regulations and conduct detailed review of such projects, including impacts on surface and ground water quality. It further states that "additional review by DRBC staff would generally be redundant."

The decision to revisit the landfill review policy was prompted by a petition filed in the fall of 1989 by a



*Federal Commissioner Irene B. Brooks studies "Earthweek 90" posters in the lobby of the Commission's headquarters in West Trenton, N. J. The posters were created by students at Roberts Elementary School in Wayne, Pa. to commemorate Earth Day's 20th anniversary. (Photo by Seymour P. Gross)*

group contending the Commission was required to review a landfill project in New Hanover Township, Pa.

The DRBC's executive director, Gerald M. Hansler, denied the petition and an appeal was filed with the five DRBC commissioners. Before they could act, however, the Commonwealth of Pennsylvania decided not to issue a permit for the project.

## Modeling Droughts

Data extension work completed during 1990 on the Delaware River Basin Daily Flow Model has enhanced the model's usefulness as a tool in drought frequency analysis.

Ten years were added to the model's simulation range so that it now covers

a 60-year period from 1927 to 1986. Accordingly, the dry periods of the 1980s can be modeled.

Tests comparing predicted and observed flows and storage levels for the 1980-81 drought were conducted after the extension work was completed. Flow routing tests for Delaware River gaging stations at Trenton and Montague, N.J. showed good agreement between predicted and observed flows.

However, recommendations were made for improving the model's performance based on analysis of flow comparisons for Delaware River tributaries, reservoir storage levels and the model's ability to meet flow targets.

Implementation of the recommended improvements began during mid-1990 by Columbia University, the consultant on the project which was funded by a grant from the U.S. Army Corps of Engineers, Philadelphia District.

Proposed enhancements include a modification of the model's flow routing algorithm, improvement of the model's convergence to flow targets at Montague and Trenton, introduction of flow trigger modeling for the Lehigh and Schuylkill Rivers, and introduction of a storage level balance procedure for making diversions from New York City's three upper basin reservoirs.

This work is scheduled for completion during 1991.

The Daily Flow Model was originally developed during the late 1970's. It simulates the hydrology of the Delaware River and major tributaries

based on streamflow records from U.S. Geological Survey gaging stations. It is used to study the effects of policy alternatives, such as measuring the impact of flow targets at Montague and Trenton on reservoir storage levels during severe drought conditions.

The model has been extensively used to compare alternative reservoir operating plans, which include the proposed expansion of the F. E. Walter Reservoir, located in Pennsylvania's Pocono Mountains.

The daily flow model is used conjunctively with the basin's salinity model to simulate chloride movement in the Delaware Estuary for alternative reservoir operating plans.

#### **UDC Award**

The Delaware River Basin Commission received a Certificate of Merit from the Upper Delaware Council (UDC) on February 24, 1990 "in recognition of its outstanding efforts and accomplishments as an agency participating in river management."

The Council praised the DRBC for its cooperation and assistance in putting together a UDC conference on Delaware River flow management which was held in the fall of 1989.

Three DRBC staff members participated in the conference — Gerald M. Hansler, the DRBC's executive director (keynote address), Richard C. Tortoriello, Operations Branch Head, and Robert V. Everest, the DRBC's regional planner who accepted the award at the UDC's second annual awards banquet held in Callicoon, N.Y.



*U. S. Fish and Wildlife Service personnel set a seine net as part of an adult shad population study in the Delaware River near Lambertville, N. J. Meanwhile, monthly sampling of juvenile shad continued during 1990 at five locations on the Delaware from Matamoras, Pa. to Trenton, N. J. from August until early October. A total of 21,028 juvenile shad were collected yielding a population index value of 363, well above the eleven year mean of 192. The study was carried out by the Delaware River Basin Fish and Wildlife Cooperative, comprised of fish and wildlife agencies in the four basin states and two federal fishery organizations.*

# Financial Summary

## Statement of Revenues and Expenditures — General Fund

Year ended June 30, 1990

REVENUES	<u>Budget</u>	<u>Actual</u>
Signatory parties:		
State of Delaware .....	\$ 226,900	\$ 226,900
State of New Jersey .....	613,000	613,000
State of New York .....	277,300	269,600
Commonwealth of Pennsylvania .....	704,200	704,200
United States .....	345,000	320,750
Water Quality Pollution Control Grant .....	240,000	240,000
Reimbursement of overhead — Agency Fund .....	30,000	30,000
Sale of publications and sundry .....	5,000	7,188
Project review fees and other income .....	94,400	58,945
Interest income .....	0	125,246
Fines and assessments .....	0	3,000
<b>TOTAL REVENUES .....</b>	<u><b>\$2,535,800</b></u>	<u><b>\$2,598,829</b></u>
 <b>EXPENDITURES</b>		
Personal services .....	\$1,545,500	\$1,492,565
Special and contractual services .....	188,100	164,437
Other services .....	60,800	55,260
Supplies and materials .....	61,090	61,080
Space .....	125,000	112,126
Communications .....	66,510	32,077
Travel .....	31,000	29,399
Maintenance, replacements, and acquisitions .....	77,000	56,642
Equipment rental .....	33,500	20,076
Fringe benefits and other .....	347,300	305,617
<b>TOTAL EXPENDITURES .....</b>	<u><b>\$2,535,800</b></u>	<u><b>\$2,329,279</b></u>
Excess (deficiency) of revenues over expenditures .....	0	269,550
Other financing sources:		
Operating transfers in .....	0	79,993
Operating transfers out .....	0	(22,000)
Total net other financing uses .....	<u>0</u>	<u>57,993</u>
<b>EXCESS OF REVENUE OVER EXPENDITURES (BUDGETARY BASIS) .....</b>	<b>0</b>	<b>327,543</b>
Reconciliation to GAAP basis of reporting — encumbrances .....	0	(802)
<b>EXCESS (DEFICIENCY) OF REVENUES OVER EXPENDITURES (GAAP BASIS) ...</b>	<u><u><b>\$ 0</b></u></u>	<u><u><b>\$ 326,741</b></u></u>

## Statement of Revenues and Expenditures — Capital Projects

Year ended June 30, 1990

REVENUES	<u>Budget</u>	<u>Actual</u>
Signatory parties:		
State of New Jersey .....	\$ 2,000	\$ 2,000
Commonwealth of Pennsylvania .....	25,000	25,000
Water Charges .....	1,009,500	1,136,020
Interest Income .....	145,000	265,466
Western Berks – Facilities Use.....	20,500	20,500
TOTAL REVENUES .....	<u>\$1,202,000</u>	<u>\$1,448,986</u>
<b>EXPENDITURES</b>		
Debt Service on Projects .....	\$ 862,000	\$1,170,260
Operation and Maintenance Cost on Projects .....	186,000	141,522
Administrative Cost .....	73,000	59,218
TOTAL EXPENDITURES .....	<u>\$1,121,000</u>	<u>\$1,371,000</u>
Excess of revenues over expenditures (Budgetary Basis).....	<u>\$ 81,000</u>	<u>\$ 77,986</u>

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.

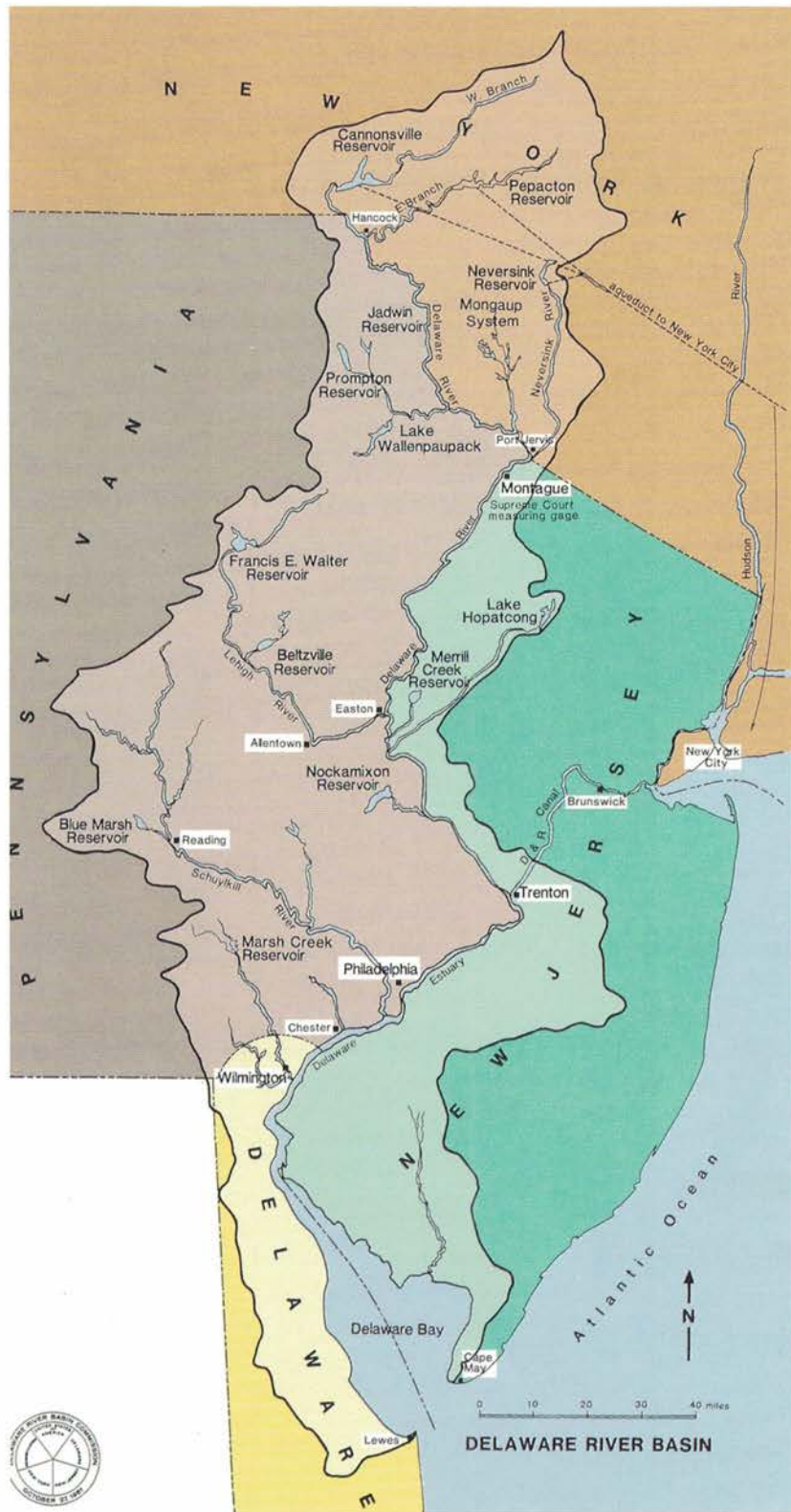
## Statement of Changes in Special Projects Fund Balances

Project	Fund Balances July 1, 1989	Revenues	Transfers	Expenditures	Fund Balances June 30, 1990
Zone II Dissolved Oxygen.....	\$ 0	\$ 0	\$ 9,000	\$ 335	\$ 8,665
Recreational rivers .....	14	0	(14)	0	0
Daily Flow Model .....	25,237	85,725	0	75,658	35,304
USGS monitors.....	33,091	178,981	0	189,811	22,261
Delaware Estuary — Philadelphia.....	0	10,000	0	10,000	0
Blue Marsh .....	41	0	(41)	0	0
Ground water — Pennsylvania Protected Area ...	46,207	150,000	(58,531)	131,647	6,029
Salinity — U.S. Army Corps of Engineers .....	17,028	0	0	12,212	4,816
Ground water — Withdrawal fees .....	1,135	0	0	0	1,135
Computer Project .....	4	0	(4)	0	0
Disinfection .....	106,477	0	0	6,703	99,774
Delaware Fish Study .....	0	107,000	0	107,000	0
Toxics Management Study .....	0	101,118	(21,642)	79,476	0
Delaware Estuary — EPA .....	0	68,176	0	64,149	4,027
National Park Service — Macro analysis.....	0	1,500	(60)	1,440	0
Dispersion Study .....	0	0	10,000	0	10,000
Nutrient Study .....	0	0	3,000	0	3,000
	<u>\$229,234</u>	<u>\$702,500</u> <sup>(A)</sup>	<u>\$(58,292)</u>	<u>\$678,431</u> <sup>(B)</sup>	<u>\$195,011</u>

(A) Revenues were derived from:

United States Government .....	\$155,401
Pennsylvania Department of Environmental Resources .....	281,668
Other States .....	76,450
Corporate and other grants and fees .....	188,981
	<u>\$702,500</u>

(B) Expenditures were primarily for payroll costs and contractual services.





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

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