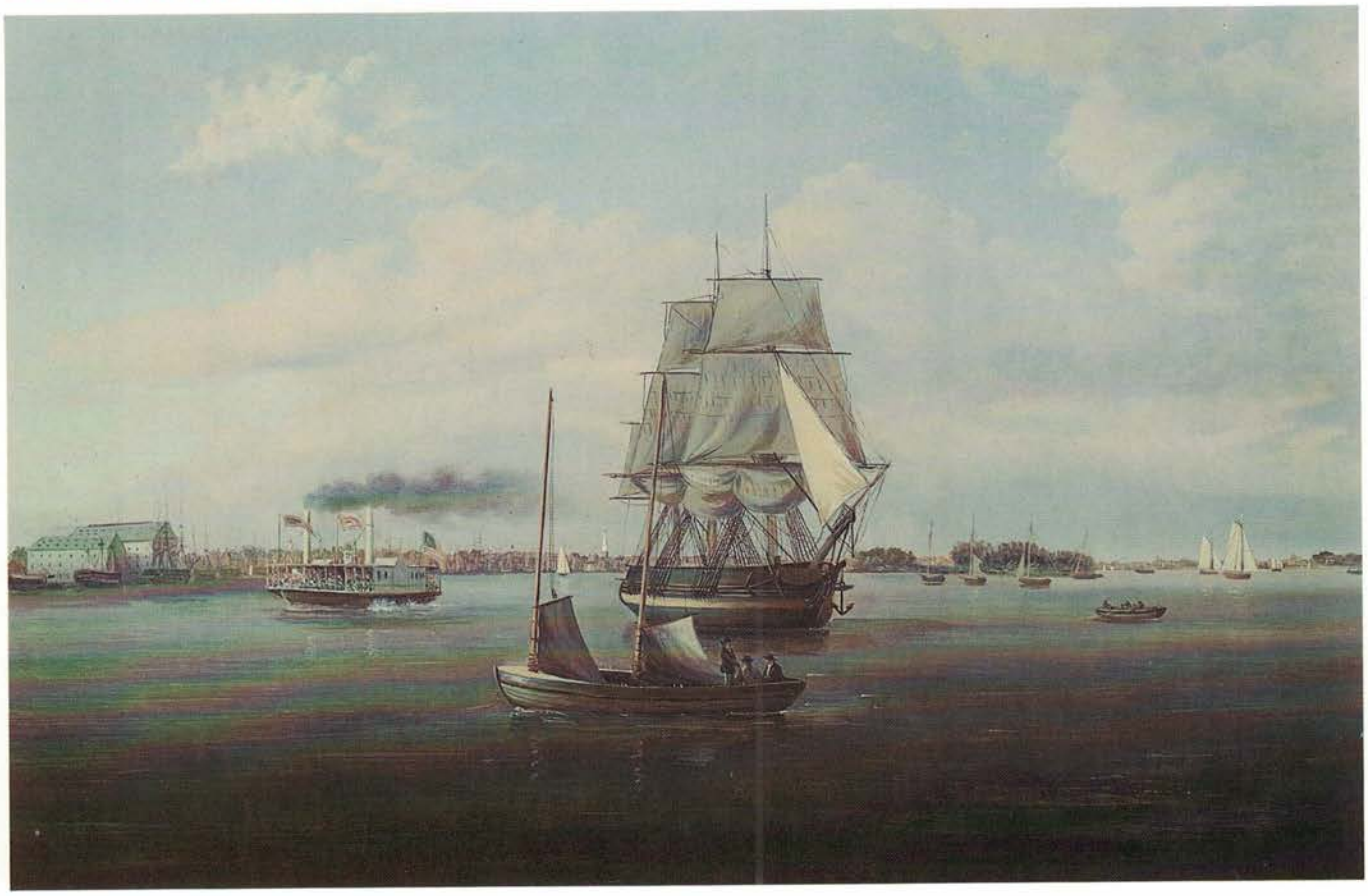
DELAWARE RIVER BASIN COMMISSION



ANNUAL REPORT • 1983

"Point Breeze,"
oil by Charles B. Lawrence
(active 1813-1837).

New Jersey State Museum Collection

Contents

The paintings reproduced on the cover and elsewhere in this report were part of a 1983 exhibition entitled "19th Century Painters of the Delaware Valley." On the cover is "View of the Harbor of Philadelphia from the Delaware River," an oil by Thomas Birch (1779-1851), from the Collection of the Newark Museum.

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

"Point Breeze,"
another view,
oil by Charles B. Lawrence
(active 1813-1837).

New Jersey State Museum Collection

Introduction

As with 1961, when the Delaware River Basin Compact was enacted with great speed by the four basin states and the United States Government, 1983 proved to be a very big year indeed for the cause of interstate water comity on the Delaware.

Much of this report relates how the 22-year-old compact successfully brought together again the parties that rely on the river's resources — but this time the gathering was to update many of the region's water-management policies and programs. These respond primarily to the basin's increasingly frequent water shortages and to the corresponding deficit in storage capacity.

The compact has not been changed in its more than two decades as the enabling law for the Delaware River Basin Commission, nor has any serious need for major changes in it been identified. Meanwhile, however, patterns in hydrology, government policies, public attitudes, funding availability and other relevant conditions have undergone severe shifts.

Working within the established framework of the compact, the parties in 1983 formally agreed on the needed new blueprints and guidelines in a historic document called Interstate Water Management. And, working within the same framework, the Commission also began its necessary actions to carry out the pact's recommendations.

This report, describing that story and others, is presented respectfully to the basin's 7 million citizens and their elected representatives in Albany, Dover, Trenton, Harrisburg and Washington.

Year of Recommitment

It was in 1961 that the long-pursued goal of interstate water peace in the litigation-embattled Delaware River Basin was realized through enactment of a novel commitment among the four river-dependent states, joined by the United States Government.

Twenty-two years later, the region has made a firm recommitment to the same principle of equitably sharing both the river's resources and the responsibility for managing them.

It was the speedy five-party adoption of the 1961 Delaware River Basin Compact, the nation's first between any state and the federal establishment, that produced the multi-state comity and created the Delaware River Basin Commission to carry it on.

The 1983 reaffirmation grew not from any need to alter DRBC's compact authority, but rather out of the necessity for different management concepts to respond to permutation of water resource circumstances. The many changed circumstances were wrought principally by nature and new outlooks toward environmental management, and they began emerging only a few years after DRBC went into operation.

The first big change developed when the Delaware's record water-supply drought of 1964-67 proved far worse than any envisioned in earlier decision-making by government and the courts. Then, the mammoth projections of population, energy and industrial growth that underpinned DRBC's first-phase comprehensive plan of 1962 failed to materialize as economic woes gripped the Northeast. Also, the once-heralded multipurpose Tocks Island reservoir plan for the mainstem, seen as a virtual cure-all for floods, droughts and recreation needs alike, became an anathema to many, as with dams in general, and was relegated to long-term uncertainty as elected officials responded to environmentalists' protests.

The changes and trends had to be recognized and dealt with. In December 1978 DRBC invited the four basin states and New York City as the parties to the U.S. Supreme Court decree on interstate sharing of Delaware waters to enter "good faith" negotiations to forge agreements on updated management policies. At the time, new signs of interstate discord had begun developing, primarily over Tocks Island.

The five chief executives accepted the invitation and their personally delegated representatives spent the next four years grappling with a conglomeration of issues related to water-supply sufficiency. Their accord was expressed in a report entitled Interstate Water Management that was presented formally to DRBC in February 1983.

The five signatures executing the document — those of Governors duPont of Delaware, Kean of New Jersey, Cuomo of New York and Thornburgh of Pennsylvania and Mayor Koch of New York City — signified that the concord had been reached at the highest authority.

The chief executives' "good faith" comitment represented difficult, compromised agreements that added up to a blueprint to better prepare all areas using the Delaware to cope with inevitable water shortages. Grouped under 14 categories, the specific recommendations were organized around a long-term salinity-control standard for the estuary to be achieved through

development of limited new reservoir storage and flow-augmentation capacity, water conservation actions, a drought-management plan, and regulation of new or expanded depletive water uses.

Most of the specific recommendations called for altering policies, standards and construction plans in DRBC's comprehensive plan. Thus, primary implementation responsibility fell on the Commission, and by the end of 1983 more than half of the proposals already had been fully carried out.

While natural and social conditions change widely, and sometimes wildly, necessitating such modifications as the governors suggested, the original Delaware River Basin Compact is viewed as being as up to date as when it was drafted — except for the 6 percent ceiling DRBC may pay in bond interest.

DRBC has its critics, but the signatories that it represents feel that the Compact has served them effectively, and water resources experts from throughout the nation and in many foreign countries frequently look to its legal authority and experiences for guidance in handling their water-management problems.

The one thing requiring no change in order to achieve the objectives of the governors is the compact, which four of their predecessors, Governors Lawrence of Pennsylvania, Meyner of New Jersey, Boggs of Delaware and Rockefeller of New York, had joined President Kennedy in signing 22 years earlier — and which still stands as a viable authority for the region's water-management actions.

Changing the Guard

The annually rotating chairmanship of the Commission was passed in mid-1983 from the Commonwealth of Pennsylvania to the United States. The then-U.S. member of DRBC was James G. Watt, who was succeeded early in 1984 by William P. Clark as both Secretary of Interior and member of DRBC. Governor Thornburgh of Pennsylvania had been 1982-83 chairman. Governor Cuomo of New York succeeded the U.S. member as vice chairman.

Governor duPont's alternate member of DRBC for four years, Thomas P. Eichler, left state government to become the new regional administrator of the U.S. Environmental Protection Agency in Philadelphia. Taking over his post as director of Delaware's division of environmental control in the Natural Resources and Environmental Control department and also as the governor's alternate on DRBC was Robert J. Touhey. Before returning to his native Delaware's state government to work on environmental problems in 1975, Mr. Touhey was a sanitary engineer with EPA in Cincinnati.

Late in 1983, Governor Cuomo designated Irwin H. King, regional director for the New York Environmental Conservation Department in Schenectady, as an alternate DRBC member from the Empire State to act in the absence of Environmental Conservation Commissioner Henry G. Williams. Earlier in the year, Mr. Williams had replaced Russell C. Mt. Pleasant, associate director for water in the department, as regular alternate from New York. Mr. King's 25 years with the state include five years as a regional director for the department in 11 western New York counties and later as an assistant commissioner in Albany for regional affairs.

Secretary Clark

Mr. Eichler

Mr. King

Fruits of Good Faith

Ending four years of intensive "good faith" deliberations, the final drought-readiness recommendations from the four river-state governors and Mayor Koch of New York City were formally presented in their Interstate Water Management report to the Delaware River Basin Commission on February 23, 1983.

The long-awaited document laid before the region a wide variety of operational, regulatory, standard-setting, policy-making, planning and structural proposals — all aimed at better equipping the basin to cope with its unpredictable but inevitable water-supply shortages.

By the end of the year, less than 11 months later, eight of the recommendations had been fully implemented. On four others, formal action had been taken to initiate the necessary follow-through. And four of the remaining five would be ready for implementation to commence in 1984.

One package of decisions permanently adopted criteria for declaring shortages and directed how available supplies are to be shared equitably among regions using Delaware waters. In fact, those measures were on the books by mid-year, in plenty of time to relieve the effects of the short-lived drought warning of November-December, the basin's third shortage in three years.

Established by those measures were:

- The drought of the 1960's as the region's worst for water planning and management purposes.
- Specific seasonal water storage levels in the upper Delaware reservoirs of New York City to trigger declaration and termination of drought warnings and emergencies.
- The formula that was used to cut back on water-supply diversion allowances to New York City and reduce downstream flow targets, thus conserving dry-spell supplies.
- A revised salinity-control standard and new sodium-control standard that specify tolerable limits for the protection of drinking and industrial water supplies and public health in the Camden-Philadelphia section of the tidal Delaware.

Adoption of a second package of proposals in November formally committed DRBC and its five signatory parties to support and effect the expansion of the basin's long-deficient system of reservoirs.

When fully carried out, these projects will sharply increase the volume of storage available in the basin. The supplies will be used to augment the streamflows of major tributaries and the Delaware mainstem, thus assuring enough fresh water to hold the so-called salt front a safe distance downstream from the Philadelphia-Camden area during droughts, and also assuring minimum protection of all instream uses such as recreation and fisheries.

The salt front is that point where the concentration of ocean chlorides to water is 250 parts per million. The salt concentration must be kept low especially along the tri-county New Jersey area where river water recharges the sprawling underground reservoir that supplies drinking water to tens of thousands of residents of Camden, Gloucester and Burlington counties.

Storage facilities

The governors made five specific proposals relating to enlargement of the basin's limited system of reservoirs, and four of them won unanimous approval by DRBC's five members.

They voted to schedule enlargement by the federal government of two existing flood control facilities in Pennsylvania, Francis E. Walter reservoir in the Lehigh valley by the end of 1990 and Prompton reservoir in the Lackawaxen valley by 1995.

Also, they voted that New York State is to increase the capacity of Cannonsville in Delaware County by 1990. This is one of three large lakes in the western Catskill Mountains that provide half of New York City's water supply.

In addition, the commission revised DRBC's authorization of the controversial and long-delayed plan for the multi-purpose Tocks Island lake on the Delaware mainstem near the Water Gap. The new description conforms to the governors' suggestion that Tocks Island should "be held in reserve status for development after the year 2000 if needed for water supply."

The governors also endorsed construction by 1986 of a proposed power company impoundment on the site of a smaller one on Merrill Creek in Warren County, New Jersey, if found environmentally and technically feasible. But action by DRBC must await completion of its final environmental impact statement by DRBC in 1984 on this facility, which would replenish streamflows to the extent that power plants evaporate cooling water during droughts.

Scorecard on Status of the Drought-Relief Proposals

Implementation was completed in 1983 on:

- Adopting new control standards for salinity and sodium in Philadelphia area of the Delaware.
- Designating seasonal reservoir levels as triggering criteria for drought-control actions.
- Establishing cutback formula for water exports, streamflow objectives and downstream releases to conserve storage.
- Specifying 1960's shortage as "drought of record" for water supply planning.
- Preparing state contingency plans for conserving water.
- Adopting DRBC policy that drought-period depletive losses should be reduced by 15 percent.
- Making permanent the trial program of augmented conservation releases that has improved upper basin cold-water fisheries and recreation.
- Holding the Tocks Island reservoir plan in reserve in event more water supply is needed after year 2000.

Approval of the Walter, Prompton, Cannonsville and Tocks Island measures actually was delayed a month to provide time for revision of the proposed project descriptions. The commissioners directed that they be rewritten to reflect concerns expressed in 171 statements and letters received by DRBC in the public hearing process.

Apprehensions that the enlarged water pool at Walter might threaten upstream properties, that excessive recreational use would burden local services and facilities, and that an insecurely built dam could imperil downstream communities all were addressed in the revision. Changes in the Prompton measure responded to worries about reduced Lackawaxen River flood protection for Honesdale and Hawley and safety of the enlarged dam. The Cannonsville revisions directed that preconstruction studies encompass a multi-level release system to protect downstream water quality in terms of temperature, oxygen content and rate of flows. As for Tocks Island, assurances were added that numerous feared negative effects must be studied, including unsightly conditions from algae growth and water-level fluctuation, and harm to fisheries.

Followup action was formally initiated in 1983 on:

- Enlarging Prompton reservoir to include water supply.
- Raising the Francis E. Walter dam to add water supply.
- Increasing the water supply capacity of Cannonsville reservoir.
- New Jersey solving Camden area's water supply problems.

Pre-implementation work progressed on:

- Adopting a plan for coordinated drought-period operation of seven reservoirs to assure good streamflows and hold off the "salt front."
- Starting construction of Merrill Creek reservoir.
- Establishing a regulatory program to limit future depletive losses to balance storage deficits.

Action was deferred for lack of funds on:

- Testing upriver ground-water pumping to augment streamflows.

Conservation actions

Two other governors' proposals, both relating to the crucial need to conserve water during shortages, also were carried out in 1983. One was adoption of a DRBC policy commitment that conservation measures for drought periods will be designed to reduce depletive, or evaporative, fresh-water losses by 15 percent. The other was the preparation by each of the four basin states of water-saving contingency plans for phased implementation during shortages. The states met the governors' deadline of December 31 for submitting their plans to DRBC. (A separate section on conservation discusses the status of these and related matters and appears on page 8.)

In another recommendation, New Jersey was asked to undertake a study to examine potential solutions by 1990 to the water supply problems in the greater Camden area, including the overpumping of the underground system that supplies it. The state was preparing to engage a consultant to investigate alternatives, including conjunctive use of ground and surface water, pumping of ground water from the Cohansey Sands aquifer that underlies most of South Jersey, and tying into the Philadelphia water system.

One suggestion was deferred indefinitely by the commissioners due to lack of funds. It is that the Commission conduct a field demonstration of the effectiveness of pumping from ground waters in upper-basin mountainous areas for additional streamflow augmentation during shortages. This idea encountered stiff resistance in the area affected.

Extensive public hearing process

On both rounds of its 1983 actions to carry out the governors' broad drought-control plan, DRBC conducted an extensive public information and public hearings program to promote the broadest possible discussion and analysis of each matter up for consideration.

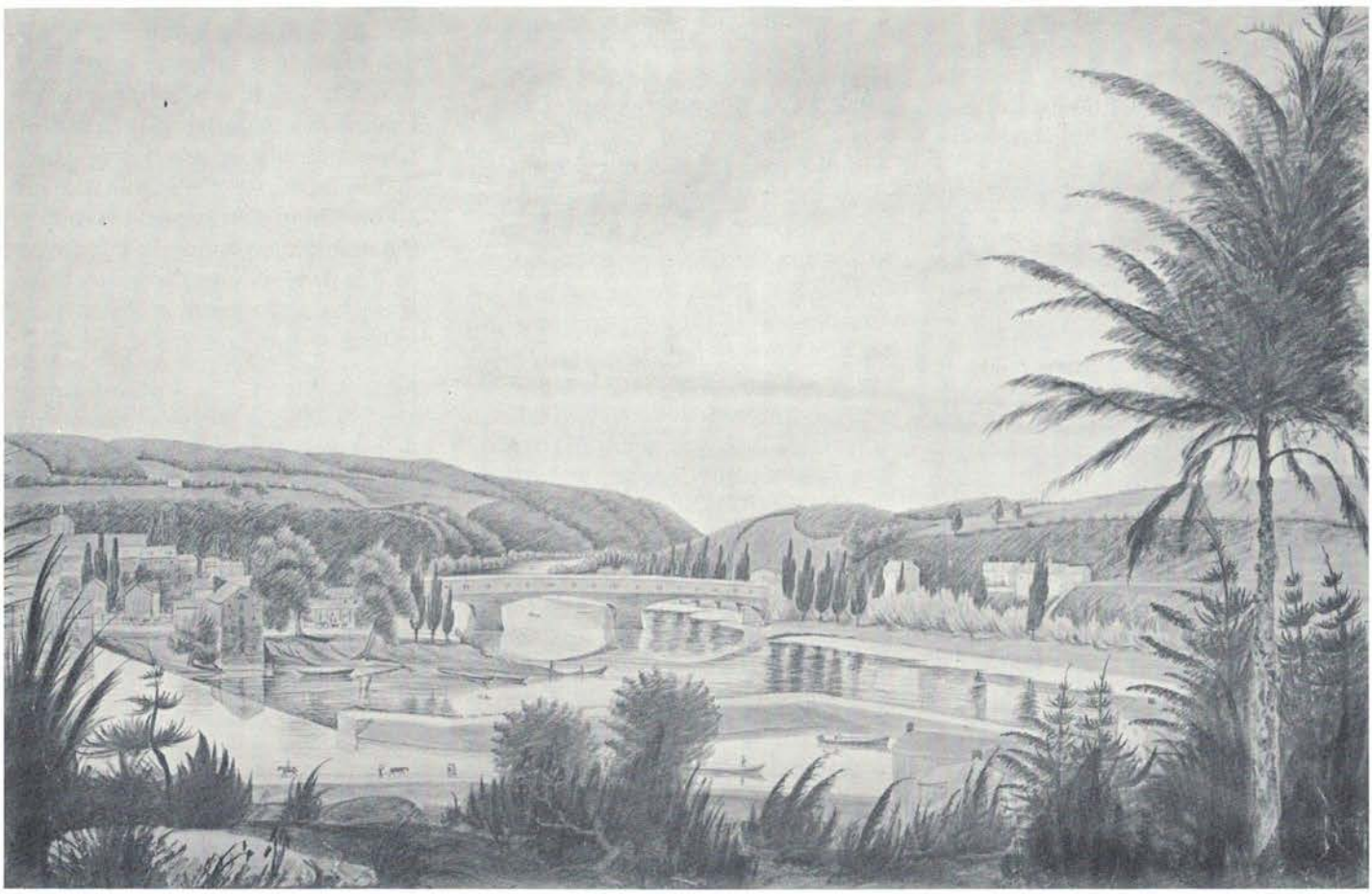
Hearings on both groups of proposals, widely publicized in each instance more than a month in advance, were held in eight locations up and down the basin, from Philadelphia in the estuary region to Walton, N.Y., in the far upper reaches. Descriptive material was circulated in large quantity on each proposal, including the full texts of all measures and detailed staff papers on each of the regulatory proposals. Effectiveness of this process was shown by the many revisions made in the proposals following hearings.

Actually, this 1983 DRBC information activity was the seventh separate public information effort since the late 1970's dealing with these important new guidelines, programs and projects for getting the river region through droughts by updating the Commission's voluminous comprehensive plan for the basin.

In 1982, while the governors' report was in preparation, two series of information meetings on both the draft and final versions were taken to the public in day-night sessions held in all four states.

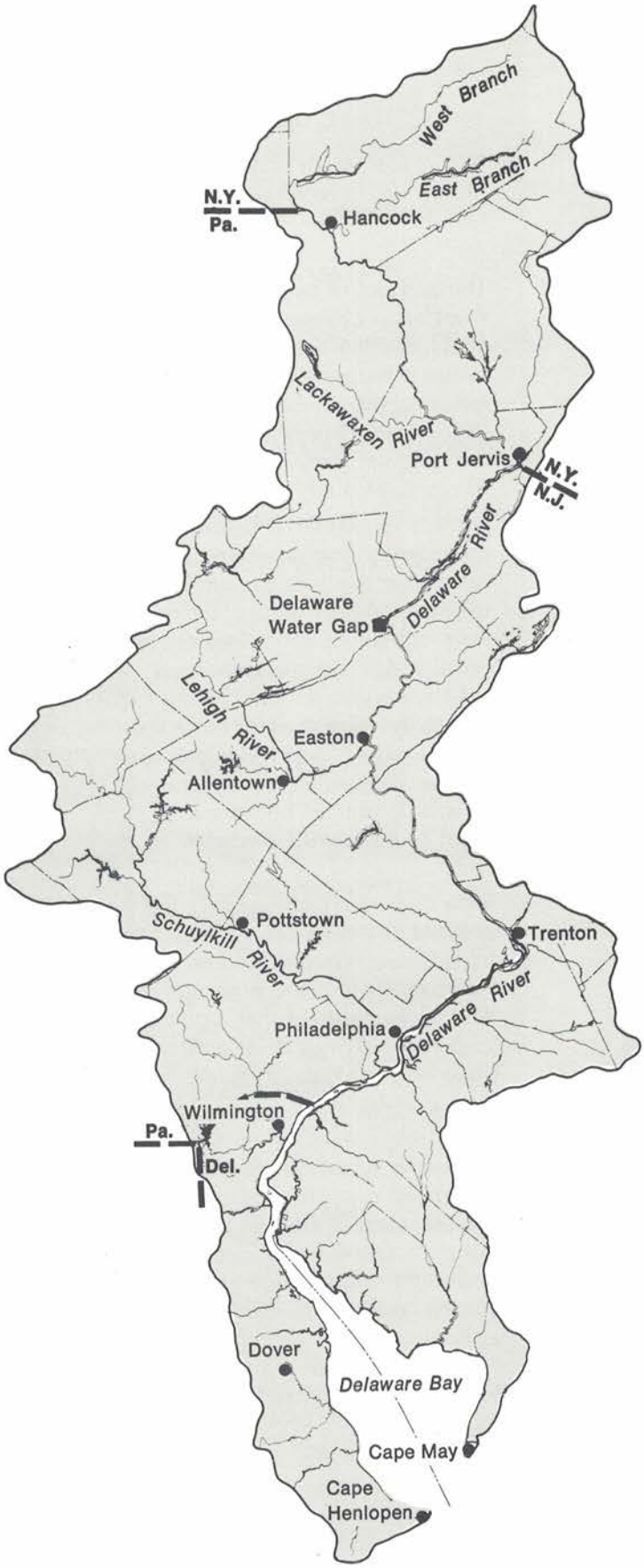
All but one of the governors' recommendations were identical or similar to suggestions contained in the 1981 final report of DRBC's equally far-reaching Delaware River Basin Comprehensive Study, commonly called Level B. The special DRBC staff that conducted that investigation had taken its proposals on the road four times in the late-1970's for public workshops, information meetings and hearings. These were held in 17 separate communities, some several times on both the preliminary and final report phases.

In addition, there was continuous public participation throughout the Level B process, beginning with the study-scope phase, in the form of representation on the steering and advisory committees.



Northampton County Historical and Geneological Society

"Covered Bridge Across Delaware River in Easton, Pennsylvania,"
watercolor by Mary Elizabeth Maxwell McCartney
(1814-1893).



The Delaware River Basin

Conservation

The authors of both the Delaware River Basin Comprehensive (Level B) Study of 1981 and the Interstate Water Management report of 1983 exhorted the region to blend conservation into its new initiatives, and the follow-through is well under way.

DRBC's special Level B study staff consistently emphasized that conservation was the "cornerstone" of its sweeping reassessment of the region's water resources needs into the next century. And conservation is an equally pervasive theme of the 1983 report, in which the four basin state governors and New York City's mayor borrowed heavily from Level B in their blueprint to better equip the basin to cope with droughts.

Both reports concurred that the greatest emphasis on and benefits from conservation should be during water shortages. And both particularly recommended that a goal of 15 percent savings be established in depletive, or evaporative, losses during droughts.

A specific recommendation in the governors' drought-readiness report was that each of the four river states submit to DRBC by the end of 1983 a drought contingency plan for phased implementation during shortages, also with 15 percent depletive savings. Each state did submit its plan by the appointed date.

In accordance with the governors' wishes, each state plan specifies prospective non-essential uses to be restricted; provides for phased-reduction contingency plans by large water users; lists legal authority for establishing water-saving programs, including fines and penalties; and outlines public information services.

Also as the governors urged, DRBC adopted in 1983 a new salinity-control objective for the Camden-Philadelphia section of the estuary to protect its public and industrial water supplies. If that objective is to be met, they agreed, depletive water use in the basin cannot be allowed to outdistance storage capacity needed to produce the controlling flows. Hence, the governors called on DRBC to promulgate a regulatory program with a water-use budget to limit depletive losses and balance them with actual storage capacity available.

Major Elements of States' Drought-Contingency Plans

- Public information program.
- Indicators of shortages, identification of drought stages by severity, and criteria.
- Non-essential water uses that would be restricted.
- Specific actions to achieve a 15 percent reduction in depletive water uses at drought-emergency stage.
- Requirement that each large water user prepare its own contingency plans.
- Legal authority and enforcement capability.

To assist it in evaluating the adequacy of the states' new drought-contingency plans and also to help prepare the depletive-use regulatory program, DRBC created a new water conservation advisory committee that was ready to go to work by the time the state plans were received.

Represented on the committee are DRBC's five signatory parties and Philadelphia and New York City, the two biggest users of Delaware water, and also a cross-section of the water-concerned public. Six public delegates representing the interests of recreation and civic groups, water purveyors, power companies and other water-using industries bring the full membership to 13.

Besides fulfilling its specific assignments, the advisory group is to counsel the Commission on other ongoing conservation policies and programs.

Earlier conservation actions

Many conservation actions by the Commission predate the Level B and "good faith" reports and also relate to water saving on a day-by-day basis as well as during water-shortage emergencies.

A 1973-approved Commission requirement is that all sizeable new public and private water-supply systems, as well as enlarged existing systems, include metering of each individual household, business, industry and apartment building.

And enlarging on a 1976 DRBC policy that called for maximized water-use efficiency by industrial, municipal and agricultural users, all DRBC water-supply project approvals since 1980 have required metering all withdrawals, monitoring for and repairing leaks, consumer conservation programs and linkups with adjacent water systems.

In addition, measurable water savings adding up to hundreds of billions of gallons of water have been achieved under conservation actions taken by DRBC during all four water shortages since its creation 22 years ago, including two drought emergencies. These savings have stemmed directly both from reductions made in out-of-basin exports of water supply to New York City and Northeast Jersey and from concurrent reductions in downstream releases from the city's reservoir system. These cutbacks preserved maximum possible storage in the event the shortages worsened.

Many other Commission actions over the years also have served the cause of conservation. In one example, a special program that DRBC enacted in 1980 has reversed the trend of overuse of ground waters in a 1,500-square-mile region of southeastern Pennsylvania. That action designated the problem region as a ground water "protected area" and imposed regulations and restrictions that have insulated existing well users from new large withdrawals and forestalled further excessive use.

Water Quality: Continued gains

The quality of the 330-mile long Delaware continues to press closer toward attaining the goals set in the early days of the pioneering reclamation program for the river, particularly the estuary region from below Wilmington to Trenton.

The volume of organic pollutants going into the river's worst sections has been reduced by half. Dissolved oxygen content of the water has been increased correspondingly, and over a greater distance and for longer periods. Acidity and phosphates have been lowered. And both pH and alkalinity values have been raised.

These steady improvements and marked benefits from the cleanup are evident through comparison of current information with data collected on those parameters in the 1950's and early 1960's.

(A report entitled "Water Quality Inventory Report for the Delaware River," detailing the current status of the stream's quality and progress of the control program, is available from DRBC.)

Fifty percent of the length of the interstate mainstem, or 166 miles, was found in 1983 to be in "excellent" condition, the top water quality designation, denoting no significant pollution problems. Most of these river miles have been incorporated into the National Wild and Scenic Rivers System. Thirty percent, or 99 miles, had attained "good" status, meaning problems are minor or local only. Eighty-nine percent of the entire river is now "fishable" and 85 percent "swimmable."

Though it too is improving, there remains in "poor" condition a persistently depressed 29-mile stretch of the estuary – less than a tenth of the river's total length. This problem reflects the heavy and still-inadequately treated sewage discharges from Philadelphia and Camden. Waters ranked "poor" are those suffering regular violations of stream standards. The other 36 miles, just upstream and downstream of the poor section, are rated "good" to "fair," indicating some violations of the standards. Prior to the correction of chronic problems, these miles generally had been rated "poor" too.

Even in the worst-ranked Philadelphia-Camden area of the river, its improved quality is evident, and a factor in the increased popularity of water- and waterfront-related activities as well. The water's better quality is now "luring more people to the river,"

Water Quality Status of

	Miles	
Hancock, N.Y., to the Delaware Water Gap	118	E
Delaware Water Gap to Trenton	79	
Trenton to Philadelphia	25	G
Philadelphia to Marcus Hook, Pa.	29	
Marcus Hook to Wilmington	11	G
Wilmington to Atlantic Ocean	68	E t

according to an official of a Philadelphia-based tourboat operation. "You can see the river is cleaning up in the wash of the boats," the official stated.

A 1983 report by 36 university researchers from Delaware, Rutgers, Princeton, Lehigh and Stevens, in a project sponsored by the Delaware River and Bay Authority, gave the estuary and bay good marks for quality. The specialists found the bay able to sustain major fisheries, and forecast that the improving river will support increased recreational and industrial development.

As for the nontidal 200 miles of the river above Trenton, including 110 in the Scenic River System, the "excellent" quality is reflected in its constantly escalating popularity for recreation. An estimated half-million recreation seekers in 1983 enjoyed what may be the nation's most heavily used river, mile-for-mile, for pleasure.

The once near-moribund annual migrations of the popular American shad have almost quadrupled over the past five years. Fishery experts and the River and Bay Authority report say this is attributable directly to improved dissolved oxygen levels in the river near Philadelphia. A good-sized shad is seven pounds, but occasional catches now are in the 10-pound range. Springtime events along the river to celebrate the revived shad runs have become major attractions.

The massive program of the past two decades that has produced this dramatic — but still uncompleted — upgrading of one of the nation's worse-polluted rivers has had lots of partners. It is a program that has needed — and received — cooperation and assistance from many sources.

Acting through their DRBC, the four river states and the United States Government have cooperated from the effort's inception. And the progress to date could not have been recorded without the willingness of the river's enormous industrial community to commit itself to the cleanup through expenditures of vast sums of money.

In the case of public sewage collection and treatment agencies, there often has been more willingness than wherewithal, and a consequent lagging behind industrial progress and the original schedule. Slow funding has been the main obstacle to upgrading some of the biggest public sewerage facilities.

The old Interstate Commission on the Delaware (Incodel), which DRBC absorbed in 1963, actually started the job in the 1930's. Incodel pushed successfully for the basin states to adopt the standards that resulted in construction and operation of municipal and industrial wastewater facilities. These brought widespread primary and secondary treatment to the region for the first time — and far ahead of many other areas in the United States with serious pollution problems.

But the post-war population and industrial boom along with public clamoring for purer water necessitated far more advanced pollution control.

A major federal cause-effect study of the estuary's problems, completed in 1965, provided the detailed diagnosis that the region needed to tackle the bigger job and offered alternative solutions. It was an investigation that employed a pioneering mathematical model of the tidal river. Acting through their then-young DRBC, the four basin states and the federal government initiated the advanced cure immediately.

DRBC's standards for cleaning the waters of the interstate Delaware — requirements that generally are more stringent still than those since imposed by the federal government — were adopted in 1967. The new standards were followed up by the issuance of a wasteload allocation to each discharger of organic pollutants to the estuary. Each discharger's allotment represented its share of the river's ability to assimilate organic

he Delaware Mainstem

Quality	Water quality issues
xcellent	Localized point and non-point source problems; recreational use increasing
Good	Point or non-point source effects; recreational use increasing
Good to fair	Amount of wastes discharged is increasing
Fair to poor	Completion pending on upgrading of major municipal plants; potential for upgrading standards under study
Good to fair	Potential for upgrading standards under study
xcellent o good	Potential for spills from barges and ocean-going shipping

wastes. And under a decade-old national program to restrict discharges, the states issue permits to the estuary dischargers limiting their loadings to DRBC-assigned allocations.

The federal government not only has a vote along with the four states on each DRBC decision, but plays a preeminent role in the cleanup through issuance of grants by the Environmental Protection Agency (EPA) for construction of new or expanded sewage treatment plants.

The City of Philadelphia's sewerage system, serving 2,330,000 persons in the city and suburbs, or about one-third of the seven million population of the 13,000-square-mile river basin, naturally is by far the largest volume discharger to the river. It is the cleansing of these discharges, now progressing, that will be primarily responsible for raising oxygen content to acceptable levels in that part of the estuary.

The Philadelphia picture changed dramatically beginning in 1979 when the city agreed to a big cleanup effort and schedule in a federal court consent decree in which the other parties included EPA, DRBC and the Sierra Club. A massive upgrading program has been underway by the city ever since, thanks largely to the city's cooperation and about $510 million in federal grants already awarded toward the estimated $800 million total cost.

The city has three big plants, and the goal for each is "advanced" secondary treatment, or up to 90 percent removal of pollutants prior to discharge to the river. Upgrading of the Southwest plant, near Philadelphia International Airport, was virtually completed in 1980 and it is meeting standards. Nearby waters are reflecting the improvement through their higher oxygen content.

The second, Northeast, is 95 percent finished and expected to be meeting effluent limitations by the end of 1984. The Southeast plant, near the Walt Whitman Bridge, is slated to be complying by 1987, now being about 75 percent ready.

The next biggest still-uncorrected pollution source is Camden County, where the new Municipal Utilities Authority is soon to start constructing the first phase of a system that, it is hoped, will go into operation in 1988. The first of two plants is scheduled for compliance in 1986. Sixteen existing inadequate local facilities across the county will be phased out.

As for the estuary region's two other largest cities, both have fully improved facilities on line and are discharging acceptable-quality wastewaters. They are Wilmington, the first big municipal operation along the estuary to meet limitations after being modernized in the 1970's, and Trenton, where full-compliance operation began in mid-1983 and whose beneficial effects on the river are expected to show up in 1984.

In addition, several modern regional plants that replaced scattered and outdated local facilities are now in operation serving densely populated suburban areas along the estuary.

The Commission • 1983


Secretary Watt


Mr. Kanuck

United States

Secretary of the Interior
James G. Watt
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Project Review

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Operations

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

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

Water Shortage Pattern Persists

The recent pattern of increasingly frequent water supply shortages persisted disturbingly in 1983.

The normally water-rich Delaware River Basin dropped into DRBC-declared drought warning conditions on November 9 for the third time in a little over three years and not nine months after the region emerged from another on March 28.

Fortunately, both warnings were brief, and neither deepened into a full-fledged water-supply emergency, although this did appear likely in each case. The criterion for determining the basin's drought-warning or emergency status is the seasonal volume of storage in New York City's three big Delaware Basin reservoirs — Cannonsville, Pepacton and Neversink.

The earlier of the year's two warnings had taken effect on November 13, 1982 and continued three months into 1983 before storage increased sharply in the city's three impoundments due to heavy mid-March precipitation in the basin's headwater areas.

Conditions deteriorated so sharply in the weeks following the November 1982 warning declaration by DRBC that it conducted the public hearing that is required prior to a more serious emergency declaration. But the need did not materialize, primarily because of water-saving actions voted by DRBC that conserved 55 billion gallons (bg) in storage.

The year's second shortage luckily lasted only six weeks – perhaps the shortest ever. In mid-June the impoundments were overflowing, but the ensuing dry spell and storage decline triggered the warning on November 9 as the level dipped to 40 percent of their 271 bg capacity and continued to drop to only one-third full on November 21. Then started a month-long upswing after heavy rainfalls in the western Catskill Mountains that lifted supplies by 50 bg to nearly 55 percent, enough at that time of year to cancel the warning. The lakes are normally 72 percent full then, however.

Termination of both drought warnings meant full restoration of allowances for regions using Delaware River water. New York City, whose entitlement to exported Delaware water was cut by 15 percent during both warnings, got back its normal allowance of 800 million gallons a day (mgd), or about half of the city's total usage.

Also, the normal minimum flow target for the Delaware, as measured at Montague in Sussex County, N.J., reverted to 1750 cubic feet per second (cfs) from the reduced warning goal of 1655 cfs. The cutbacks are intended to conserve as much storage as possible, and in this instance they saved 6 bg.

The downstream flows are regulated by releases made from the three New York City lakes and are designed to meet the needs of lower basin areas in New Jersey, Pennsylvania and Delaware. Primarily, the purpose of the minimum fresh water flows is to hold back the intrusion of salt water from the ocean which could contaminate drinking and industrial water supplies in the Camden and Philadelphia area.

Technically, Northeast Jersey's right

to import up to 100 mgd in Delaware water also was reduced by 15 percent. But the Delaware and Raritan Canal is not capable of delivering that much water pending improvements now being made in its carrying capacity by the state's new Water Supply Authority.

No user restrictions were imposed during either warning period, although DRBC did appeal to all users of Delaware water, both surface and ground, to consume no more than needed. However, bans did go into effect on a local-option basis in some Pennsylvania communities with specialized problems.

Had storage continued to diminish into a drought emergency, the New York City and New Jersey export allowances and the minimum downstream flow target would have been reduced further to effect even greater savings than those actually realized. In addition, user restrictions could have been ordered.

The water export allowances to New York City and North Jersey and the target flow were decreed in 1954 by the U.S. Supreme Court when it resolved an old water rights dispute between the states. However, the court's formula of diversions and downstream releases to meet the flow target is changeable during shortages under provisions in the Delaware River Basin Compact, which is DRBC's operating authority.

Tens of thousands of residents of the tri-county Camden-Gloucester-Burlington area along the Delaware in New Jersey get their drinking water from a sprawling natural underground source called the Potomac-Raritan-Magothy aquifer that is recharged by water from the river. Water experts warn that severe salt contamination of an aquifer can render it useless as a potable source due to problems of taste and sodium affecting public health.

Also, industries in the Philadelphia area that draw supplies from this normally salt-free reach of the river encounter costly problems including corrosion of machinery and equipment when it becomes salty.

The so-called "salt front" of 250 parts per million of chlorides to water was kept a safe distance – not less than 8 miles – downstream of Camden and Philadelphia during both shortages, and ground water tables returned to acceptable levels practically everywhere throughout the four-state basin by the end of 1983.

Normally, the salt front moves between the vicinity of the Delaware Memorial Bridge, below Wilmington, to the Chester area, a range of some 15 miles. The salt location directly reflects the volume of fresh water inflows to the estuary, which ends at Trenton, 135 miles upriver from the ocean. The deepest penetration of the salt front ever recorded was in October 1965, during the region's worst water-supply drought.

Not until the fall of 1980, nearly 15 years after the record drought, did another serious shortage develop, worsening early in 1981 from a warning into an emergency that was not formally terminated until April 1982. In addition to the regional cutbacks in supplies, widespread bans were imposed on non-essential uses in that drought.

The recurrence of two additional near-drought situations by the end of 1983 amounted to a persistent and alarming new trend of three shortages in three years. This pattern was a big factor in prompting DRBC to act without delay in commencing the implementation of the drought-preparedness recommendations it received from the basin state governors and New York City's mayor in February 1983.

Drought Warning Ends With a Splash!

It is ironic but not unusual that the November-December drought warning was punctuated by a flood scare. Regionwide rains that were both heavy and sustained for more than two days and that fell on already saturated land swelled the river to near bankful.

Only 48 hours after DRBC announced the warning had ended, the Delaware rose on December 22 to just 21 inches short of its 20-foot flood stage for Trenton.

Riverfront residents had an even closer call on April 17, less than three weeks after the previous five-month drought-warning was terminated. On that day, the valley saw the highest waters in the river's main stem since its August 1955 worst flood disaster that was wrought by back-to-back hurricanes Connie and Diane. The April crest at Trenton rose to a threatening 1.5 inches below flood stage — but still 8 feet short of the record-high 28 feet of 1955.

Ground Water Followup

A special advisory committee to DRBC put in a busy year getting implementation started on a recommended interstate management program to protect and enhance ground waters throughout the four-state Delaware River Basin.

The same group of experts that constituted the steering committee for the DRBC study that produced the suggested far-reaching program late in 1982 was retained in an advisory capacity to help guide the agency through the followup period — and substantial progress was recorded.

Chaired by David C. Yaeck, executive director of the Chester County (Pa.) Water Resources Authority, the committee and DRBC staff members began drafting proposed amendments to the Commission's comprehensive plan to carry out specific recommendations in the basinwide study.

Many of the study's suggestions, however, called for action by agencies of DRBC's five signatory parties rather than by DRBC, and work got under way on them too.

One of the 1982 study's recommended efforts is the preparation by the U.S. Geological Survey (USGS) of a basinwide ground water data base needed by DRBC for many phases of the prospective comprehensive program. The data base will be a compendium of information on large existing wells and their volume of use. This USGS work is moving ahead.

Work progressed also on many other measures suggested in the report, but the data base must be completed before some of the final proposals can be made ready for public and DRBC consideration.

At present, registration of wells is required only in a southeastern Pennsylvania region that DRBC has designated as a ground water protected area. However, the ground water committee is recommending that large wells be registered everywhere in the four-state river basin and that withdrawals from them be metered.

Another important suggestion is that DRBC adopt a policy encouraging "conjunctive use," or combined reliance on both ground and surface waters, so that the interrelated resource can be managed more efficiently. The Commission has found conjunctive use to be an attractive alternative for multi-objective resource management.

A policy to require the sponsor of any proposed new well to notify his state's water officials in advance of drilling is in the works too. This would alert water regulators and managers to any intended withdrawals from a possibly water-short or otherwise unsuitable source.

Also, a proposed amendment has been drafted that would redefine a long-standing DRBC policy encouraging large, regional sewage treatment facilities in preference to unsewered approaches or smaller, independent facilities. Experience shows that such regional operations can result in streams going dry. This occurs because ground water drawn for use in one area is piped elsewhere for treatment, depriving local streams of the water.

Another task for the staff and advisory committe is preparation of uniform criteria for managing aquifers and issuing ground water withdrawal

permits throughout the basin. The Commission's enabling legislation, the Delaware River Basin Compact, requires that all water users in the basin be treated equally and uniformly without regard to established political boundaries.

In addition to working on producing a ground water data base for DRBC, the USGS has started a suggested two-year carbonate modeling study of the Little Lehigh Creek watershed in Lehigh County, Pa. The objective is to gain a detailed understanding of flow in a carbonate aquifer system. The conclusions reached should be useful in planning withdrawals from such aquifers anywhere in the basin.

The 1982 ground water report urged that the State of New Jersey make an investigation into the water supply problems of the greater Camden area, and the state has initiated a three-year study into available alternatives. Among the considerations are conjunctive use of ground and surface sources, hooking into the City of Philadelphia's vast water supply system, and tapping the Cohansey Sands aquifer that underlies much of South Jersey.

Part of the problem is that ocean water containing high concentrations of chlorides and sodium can push far enough up the Delaware River during droughts to infiltrate another big aquifer, the Potomac-Raritan-Magothy (P-R-M), that is the Camden area's principal source of drinking water. Excessive chlorides and sodium pose public health, taste and corrosion problems. This New Jersey study also was recommended by the four basin-state governors in their 1983 report entitled Interstate Water Management (see page 4).

The ground water report said there is a potential for infiltration of saline river water into the P-R-M aquifer also in New Castle County, Delaware, on the other side of the river. In response, the State of Delaware, in cooperation with the USGS, has initiated a three-year study to gain a better understanding of the interaction between ground water from the P-R-M aquifer and the surface water systems in that area, including the Delaware estuary. The study also will determine the need for and evaluate the general feasibility of fresh-water injection barriers as a means to prevent infiltration of brackish water into the aquifer.

Other Highlights

Top Court Upholds DRBC On Water Sales Policy

The U.S. Supreme Court turned down the Bucks County Water and Sewer Authority's claim that it was exempt from paying charges assessed by DRBC for surplus water supply acquired from the City of Philadelphia. Under DRBC's enabling compact, it cannot charge Philadelphia and some other parties for drawing water from the basin's streams because they had earlier state permits or pumping capability. The Bucks authority sought to elude DRBC's charges under Philadelphia's "grandfathered" rights. DRBC uses the funds to repay the federal government for incorporating water supply into its network of multi-purpose reservoirs in the basin, thus enlarging the region's water storage capacity to offset shortages in droughts.

Upper Basin Cold-Water Fishery

DRBC permanently adopted the trial program in effect from 1977 that has enhanced the upper basin's principal streams for fishing and recreation by altering conservation release operations at New York City's three Delaware Basin reservoirs. New York State's Department of Environmental Conservation is to administer the program, which has brought increased and more uniform flows to the Delaware's East and West branches, the Neversink River and the upper mainstem.

Biological Studies of New York State Streams

Biological monitoring of the East and West branches of the Delaware River in the western Catskill Mountains was continued to 1983, and a report on the findings was prepared. It includes an analysis of trends in macroinvertebrate data collected since 1976 in order to document changes resulting from the augmented conservation release program involving the Delaware Basin reservoirs of New York City. Late in 1983, consultants to DRBC completed analysis of phytoplankton data it collected from 1969 to 1979. The data provided an excellent baseline from which to assess future changes in the Upper Delaware region. This summer limnological program, responding to varying needs in the upper basin including determination of the nature and causes of water quality problems, has now been in effect for 15 years. It also supplies information useful to planning efforts for the Upper Delaware Scenic and Recreational River.

Pollution Control Progress Evaluated

DRBC participated in the "Step" (States Evaluation of Progress) program of the Association of State and Interstate Water Pollution Control Administrators (ASWIPCA). Information needed by the four basin states on the Delaware River was tabulated state-by-state by DRBC and supplied to the "Step" coordinator for each. In addition, DRBC submitted its own abbreviated "Step" report to ASWIPCA in order to highlight water-pollution control progress of an interstate nature. Success stories presented in the DRBC report included the recently improved shad runs in the Delaware and the cooperative interstate effort concerning New York State's implementation of the augmented conservation releases program for reducing thermal stress on cold-water fisheries.

Flood Loss Reduction Program and Ice-Jam Study for Upper Delaware

The Commission provided an estimate to the National Park Service evaluation team for a flood-plain

delineation study on the Upper Delaware Scenic and Recreational River. A 75-mile portion of the Delaware River included in this study borders New York State.

The Corps of Engineers was authorized by Congress in 1983 to make a three-year study of the feasibility of reducing ice-jam damage on the upper river, as occurred in the Port Jervis, N.Y., and Matamoras, Pa., area in February 1981. DRBC arranged and coordinated the meeting of local officials and regional agencies that recommended the study and plans to cooperate with the Corps effort in both coordination and advisory roles.

Flow Management Committee

DRBC staff provided technical support to the Commission's flow-management technical advisory committee which included representatives from all four river states, the federal government and New York City and Philadelphia. Among the topics investigated was setting criteria to define severe drought and the drafting of operating rules for the Delaware's reservoir system during such events.

Bucks-Montgomery Water Supply

As 1984 rolled around, the ultimate fate still was unresolved on the long-planned and vehemently-disputed project for diverting Delaware River water for community supplies in Bucks and Montgomery counties in Pennsylvania and for cooling at the Limerick nuclear generating station under construction near Pottstown. The year began with the start of construction of the DRBC-licensed and court-upheld pumping station at Point Pleasant in upper Bucks over the protests of waves of demonstrators, many of whom were arrested. At a non-binding referendum in the primary election, Bucks residents backed a move to have the county stop its participation in the project by a vote of 64,363 to 50,905. The ballot language noted that a Bucks withdrawal would not affect the rights of Montgomery County and the power company to proceed with the project. By year-end, political control of the county government had shifted from its proponents to its opponents, who commenced endeavors to withdraw Bucks from its long-standing sponsorship role. DRBC for the second straight year declined to reopen consideration of its 1981 permits for the water diversion system, and still more legal moves were initiated both for and against the project.

Seasonal Disinfection

The Commission went to the public for its views on whether disinfection of treated sewage discharges should be limited to warm weather months of May through September or continued year-round, as now required. The decision is still pending. The change would cover the entire basin, except the 79 miles of bay and river from the ocean to the Pennsylvania-Delaware state line for continued protection of shellfish harvesting beds. There is division among the five DRBC signatories over which arrangement is more desirable from a public health viewpoint. Disinfection kills harmful bacteria in wastewater treatment but adds suspected carcinogens from chlorine to the receiving waters, which often are drinking water sources.

Another Local Flood Study

An investigation was initiated by DRBC into the history of flooding frequency and severity of another community to help its property owners and residents qualify for maximum protection against structural and other losses under the national flood insurance program. This study is in Pocono Township in Monroe County, Pa., and is the 148th conducted by the Commission since 1974, mostly for Pennsylvania communities. The 18-month study will evaluate flood hazards, including lines of inundation and magnitude of various-frequency floods, producing maps with data essential for the township to adopt comprehensive land-use programs to reduce flood damages. DRBC was contracted to do the work by the Federal Emergency Management Agency, which administers the insurance program.

Upper Delaware National Scenic and Recreation River

The Commission continued its involvement in detailed planning activities as part of the cooperative intergovernmental effort to develop a Management Plan and institutional structure for the Upper Delaware River National Scenic and Recreational River. Among the local, state and federal participants in this effort with DRBC are New York State's Department of Environmental Conservation, Pennsylvania's Department of Environmental Resources, and representatives of counties along the upper river in both states. The Intergovernmental Coordinating Committee developed and revised drafts of the Management Plan for the review of governmental agencies and the public and as the year ended was still working toward a final product. DRBC provided technical information and support in response to interstate concerns relating to water quality, environmental protection and especially flow management of the Upper Delaware River.

Financial Summary*

Budgetary

Revenues	Budgeted	Received
Delaware	$ 149,800	$ 149,800
New Jersey	398,000	391,784
New York	180,000	180,000
Pennsylvania	459,600	459,600
United States	269,000	269,000
Water quality pollution control grant from U.S. Environmental Protection Agency	240,000	237,500
Reimbursement of overhead expenditures by Special Projects Fund	20,000	20,000
Sale of publications and sundry	5,800	7,197
Project review filing fees	20,000	6,340
Interest income		121,310
Contingent funding	88,300	
	$1,830,500	$1,842,531

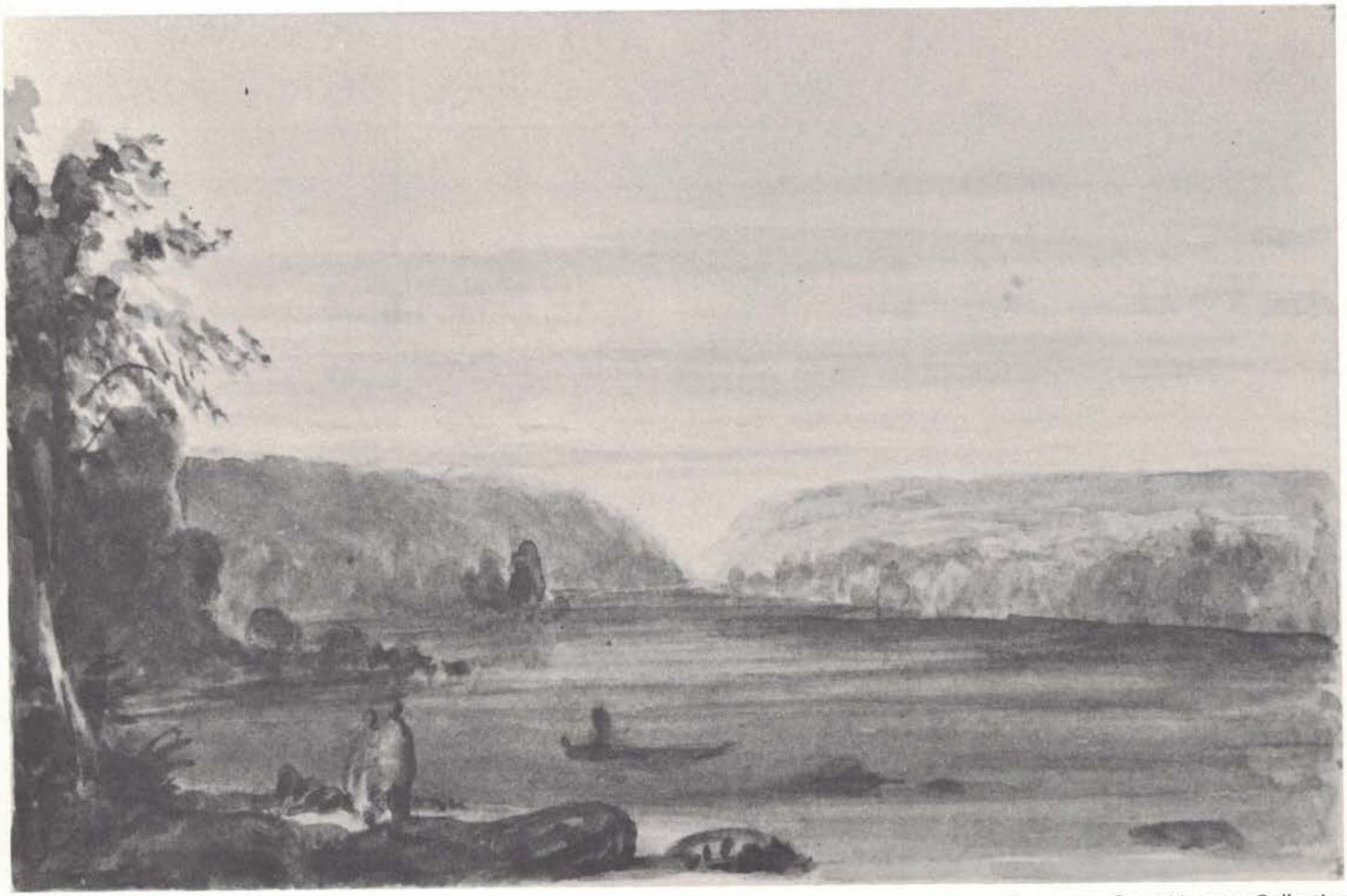
Expenditures	Budgeted	Expended
Personal services	$1,059,800	$ 986,623
Special and contractual services	229,700	229,147
Other services	25,600	24,980
Supplies and materials	40,000	39,932
Space (including $44,528 of principal payments on Plant Fund mortgage)	171,500	171,482
Communications	45,350	45,020
Travel	22,100	22,078
Maintenance and replacements	22,450	22,434
Equipment purchase or rental	32,600	32,548
Fringe benefits and other	181,400	181,224
	$1,830,500	$1,755,468
EXCESS OF REVENUES OVER EXPENDITURES	$ 0	$ 87,063

Non-Budgetary**

Special Programs and Projects	Fund Balances July 1, 1982	Revenues	Transfers	Expenditures	Fund Balances June 30, 1983
USGS gaging	$ 4,380	$104,400	$ 0	$104,180	$ 4,600
Monitoring Ship John Light-Reedy Island	0	17,875	0	17,875	0
Other monitors	0	11,800	0	11,537	263
Flood Plain contract fund — Pennsylvania No. 3	0	26,987	0	26,987	0
Blue Marsh — Prompton Dam	(28,000)	0	0	0	(28,000)
Study of exotic wastes — Phase II	59,497	46,735	0	61,839	44,393
Waste load allocation	42,285	0	0	42,285	0
Ground water	295,943	0	0	141,420	154,523
Merrill Creek	12,590	0	0	0	12,590
Model — Documentation	4,915	0	0	4,915	0
Recreational — Scenic Rivers	3,757	5,000	0	13,757	(5,000)
Water re-use	0	32,207	0	32,207	0
Ground water — Pennsylvania protected area	56,824	119,000	0	48,528	127,296
Merrill Creek-P.S.E. & G.	23,863	93,569	0	79,555	37,877
Ground water — withdrawal fees	895	140	0	0	1,035
Computer	21,094	0	16,637	0	37,731
	$498,043	$457,713	$16,637	$585,085	$387,308

*For Fiscal Year ended June 30, 1983.
**Revenues from sources outside current expense budget.

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



New Jersey State Museum Collection

"Delaware Water Gap,"
watercolor attributed to James Hamilton
(1819-1878).

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