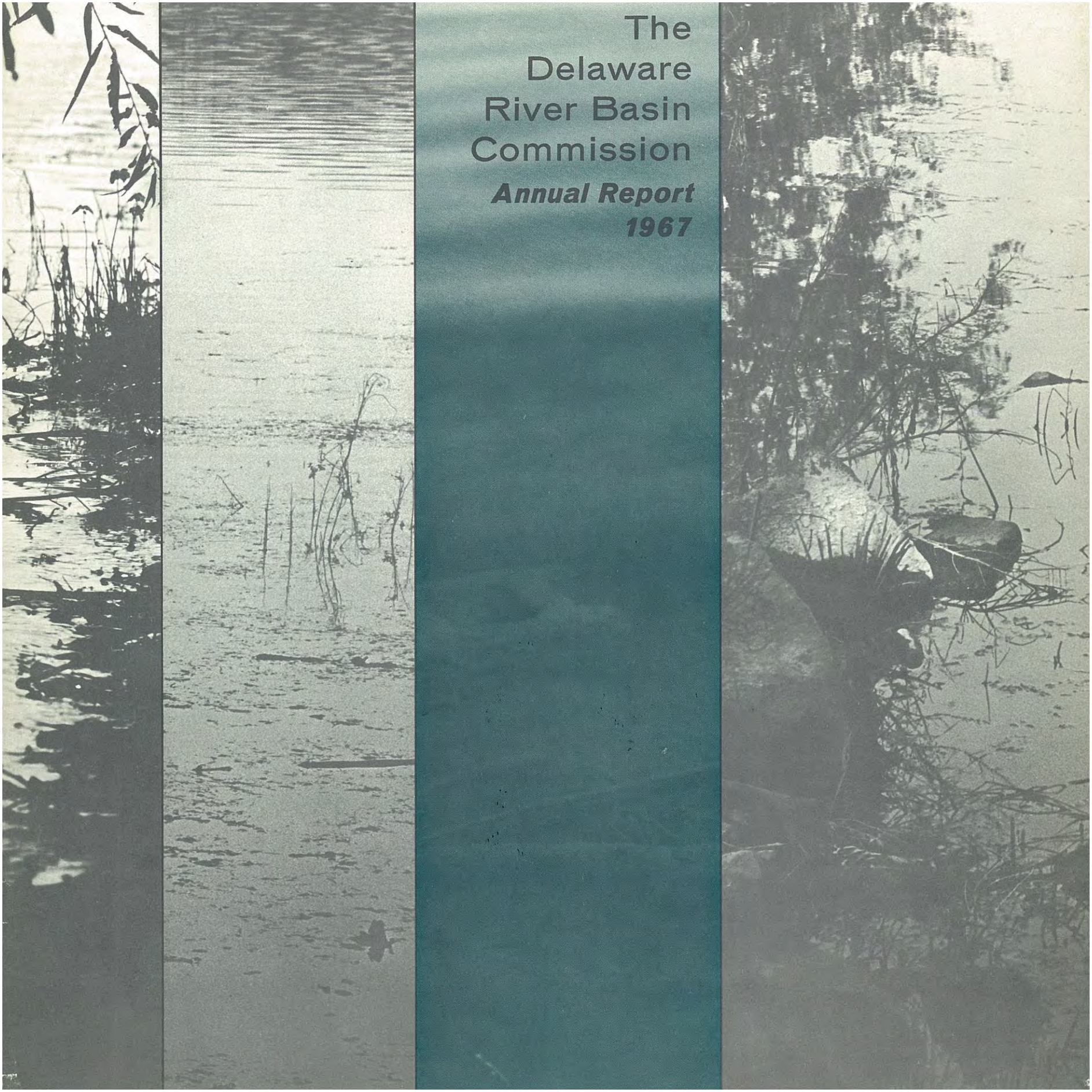
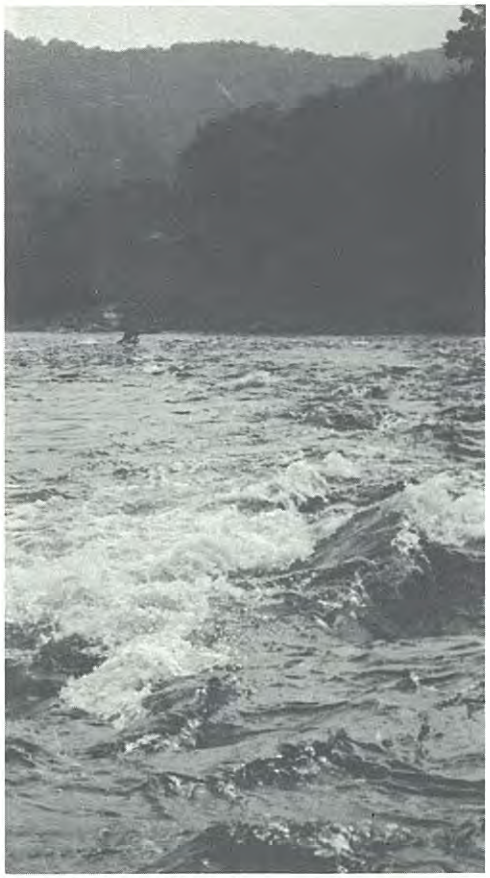


The Delaware River Basin Commission

Annual Report 1967

Contents

Cover photography by George J. Fistrovich



Photos by James M. Staples

Introduction

Unlike most other American rivers, the water affairs of the four-state area that is drained — and served — by the Delaware River and its many tributaries are the responsibility of a regional planning-operating instrument of government, the Delaware River Basin Commission.

Since it was organized in December 1961, the Commission has endeavored to bring into harmonious interdependence all the demands, competing as well as compatible, that a highly developed and crowded society can impose on a river. The Commission has worked toward this sometime difficult goal daily and in a mutually helpful atmosphere with the agencies of the five signatories of the Delaware Basin Compact that gave life to the Commission.

This is a report on the developments in this effort during the year ending June 30, 1967, a period marked by headlined situations as well as vital but less-heralded activities.

It was the year the Commission came to grips with a great public problem by enacting a pollution-control law that will bring the region a purer river, reversing the trend toward giving waste disposal the upper hand over other river uses.

Nature's unpredictability, sometimes the purveyor of hardship or worse, brought improved fortune to the 13,000-square-mile basin in 1967 by easing off on the drought conditions that had plagued it for six years.

The comprehensive responsibilities assigned to the Commission by the Compact equip it to respond to a drought's water shortages or the consequences of some other unpredictable turn in nature's conduct. This multipurpose nature of the Commission's duties, its regional jurisdiction, the high-level membership and a unique interstate-federal partnership also provide the mechanism for dealing with the other river resource problems.

In the hope that the Commission is effectively using this mechanism, this fifth annual report is presented respectfully to the basin's 7 million citizens and their representatives in the Legislatures of Pennsylvania, New York, New Jersey and Delaware and the United States Congress. ■

The Commission • 1967

Chairman
Raymond P. Shafer*
Governor, Pennsylvania

Vice-Chairman
Stewart L. Udall†
U.S. Secretary of Interior

Nelson A. Rockefeller*
Governor, New York

Richard J. Hughes*
Governor, New Jersey

Charles L. Terry Jr.*
Governor, Delaware

*Ex-Officio
†By appointment of the President

Governors Rockefeller, Hughes, Terry and Shafer and Secretary Udall

Alternate Members

Maurice K. Goddard	*Pennsylvania*
Vernon D. Northrop	*United States*
R. Stewart Kilborne	*New York*
H. Mat Adams	*New Jersey*
Harold L. Jacobs	*Delaware*

Advisors

Samuel S. Baxter	*Pennsylvania*
Col. William W. Watkin	*United States*
James L. Marcus	*New York*

Mr. Northrop, Mr. Jacobs, Mr. Kilborne, Mr. Adams, Dr. Goddard

The Staff

Mr. Wright

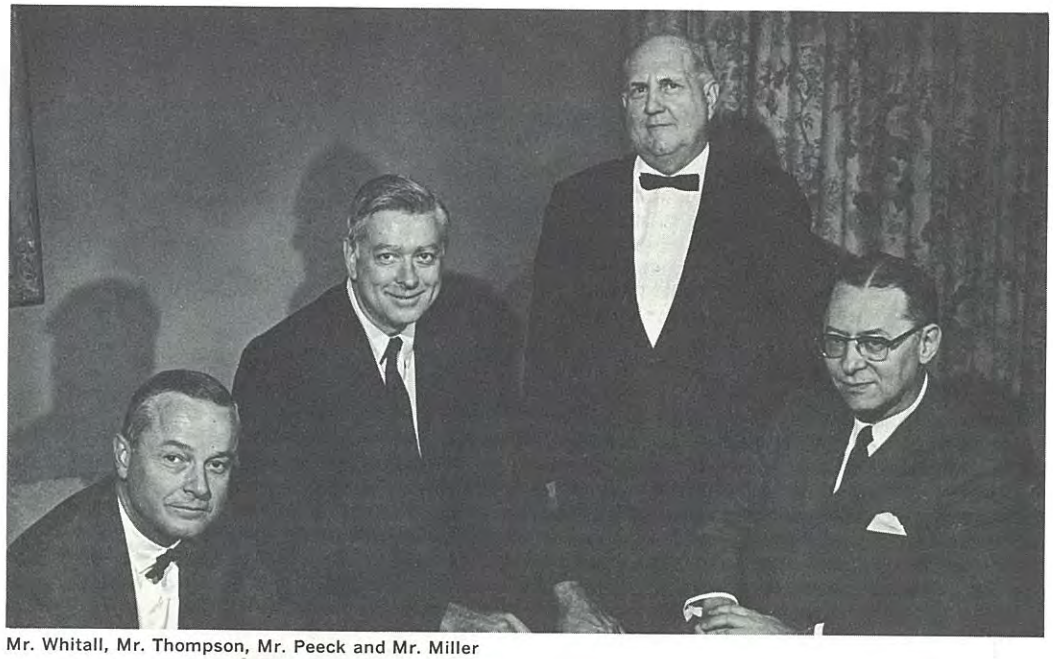
James F. Wright
Executive Director

William Miller
General Counsel

W. Brinton Whitall
Secretary

Dawes Thompson
Public Information Officer

Arthur E. Peeck
Chief Administrative Officer



Mr. Whitall, Mr. Thompson, Mr. Peeck and Mr. Miller

Mr. Howlett

Mr. Goodell, Mr. Porges, Dr. Hull, Mr. Briganti, Mr. Thursby and Dr. Hastings

Planning Division

Herbert A. Howlett
Chief Engineer

Ralph Porges, *Head*
Water Quality Branch

Theodore Briganti, *Head*
Project Review Branch

Robert L. Goodell, *Head*
Operations Branch

C. H. J. Hull, *Head*
Program Planning Branch

J. W. Thursby
Staff Economist

V. Stevens Hastings, *Assistant Head*
Program Planning Branch

The Year Reviewed

Commission, 5 years old, enacts broad clean-streams code: Valley shakes off worst drought

The big water story of the year in the Delaware River Basin was the adoption of pollution control standards recognized widely for their comprehensive scope.

Of further consequence to the well-being of the four-state area dependent on the Delaware was the welcome termination of the basin's severest and most prolonged drought.

The 1967 anti-pollution action marked just the beginning of what is to become the Delaware Basin Commission's permanent water quality program. But time may show that the beginning step, in this instance, was the momentous one. Opportunely, current public demand for cleaner environment enabled — or obliged — the river community's regional water agency to set the goals high from the start.

The criteria are established. Now comes the implementation.

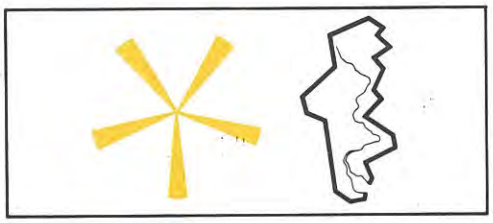
The standards selected, keyed to water uses, will require greater initial improvement of the lower river than the discarded lesser alternative plans. They will take longer — and more money — to achieve, but once attained will give the public a cleaner river. Residential and industrial development intensifies each year, constantly increasing the waste loads, but the new program is geared to attaining precise quality levels by whatever degree of waste treatment necessary.

Fortunately, the Delaware above Trenton is still a clean river, and it is to be kept that way.

After six years of drought, conditions began picking up during the 1966-67 winter in precipitation, streamflows and reservoir storage. By spring, it appeared that the drought had been broken, and by summer, the picture, customarily one of abundance in a valley usually bestowed with 45 inches of precipitation yearly, was happily getting back to normal. There was even a return of the usual spring flooding of smaller streams.

Most critical in 1965, the drought was straining the good water relations between regions competing for the then-dwindling supplies of Delaware water. But water peace prevailed as the Commission's five signatory participants used its emergency powers to protect both New York City and Philadelphia, with a twentieth of the nation's population, from the threat of water calamity.

A fortnight after the normal termination of the drought, fast-accumulating water in Cannonsville, newest of New York City's Delaware Basin reservoirs, reached 50 billion gallons, automatically making it a functioning part of the city's water system under a court ruling. This entitled the city to pipe more water for its own needs out of the basin, and at the same time obligated it to release more water and increase low flows to benefit areas downstream.



The period covered by this report, having marked the first five years of the Basin Commission's existence, provided an appropriate time for reflection on the performance of the first — and only — federal-interstate regional river management agency in the United States.

Both the 1967 pollution control action and the management of the river's deficient supplies during the 1960s encompassed operations transgressing state boundaries. Willingness of the neighboring states to cooperate on both critical issues was nourished by continuous association through the Basin Commission. Still, without the Commission, there would have been neither the apparatus nor jurisdiction for enacting the legally binding interstate drought and pollution decisions.

In earlier years, the Commission adopted, then enlarged upon, a Comprehensive Plan reflecting its responsibility to provide the water needs of 22 million persons living in the basin and its service area, and of the generations to come. The plan, for instance, prescribes an interstate network of more than a dozen large, multi-purpose reservoirs now at various stages of development and it contains the basin's anti-pollution standards and other policy requirements.

Sixth annual meeting of Delaware River Basin Commission was held in Senate Chamber of the scenic State Capitol in Dover, Del. Gov. Charles L. Terry Jr., the host chief executive, opened the session before being succeeded as chairman by Gov. Raymond P. Shafer of Pennsylvania.

Review

The Commission's interstate operations and planning programs are varied. They involve such present and future activities as reducing flood damages by means other than reservoirs; a 10-year fisheries research plan reaching into all corners of the four-state basin; the collection and publication of river recreation maps and information; formulation of pricing policies on interstate marketing of water supply and other potential commodities; development of a good waste disposal and water supply system in and around the Delaware Water Gap National Recreation Area; and centralized manipulation of flows for flood control, water supply and flow augmentation, among others.

In another activity heavily oriented to regional protection, 172 water-connected projects planned by public agencies, businesses or others were screened this year for possible harmful effects on water resources. This brought the five-year total of projects reviewed to nearly 500. This year's list included 128 public, industrial and farm water supplies, 20 sewerage projects, 19 industrial waste operations, and two watershed development programs, one of them the vital multi-purpose reservoir system to develop the Neshaminy Creek in Bucks and Montgomery Counties (Pa.) for flood control, water supply, recreation and pollution control.

Both the adoption of the new anti-pollution standards and the action officially ending the water supply emergency took place at the Commission's sixth annual meeting, held March 2, 1967 in Delaware's historic and picturesque State Capitol at Dover.

This year's "summit" meeting marked the passing of the chairman's gavel to Gov. Raymond P. Shafer of Pennsylvania from Gov. Charles L. Terry Jr. of Delaware. Pennsylvania thus became the first signatory to hold the rotating chairmanship for the second time around, the late Gov. David L. Lawrence having been the original presiding officer when the agency was organized late in 1961.

The 1967 vice chairman is U. S. Interior Secretary Stewart L. Udall. He and Gov. Nelson A. Rockefeller of New York are the only original members still on the Commission.

Gen. Norman M. Lack retired as Delaware's Commissioner after serving for 5½ years. He is pictured welcoming his successor as Gov. Charles L. Terry Jr.'s alternate member, Harold L. Jacobs, a veteran industrial water quality engineer.

As 1966-67 drew to a close, Brig. Gen. Norman M. Lack, who is "Mr. Water" in his home state of Delaware, disclosed his plan to retire as Gov. Terry's Alternate Member, having served from the Commission's inception. Gov. Terry announced that his new Commissioner would be Harold L. Jacobs, who recently retired as the E. I duPont de Nemours Co.'s principal consultant on water pollution and waste. Three of the five original Commissioners, H. Mat Adams for New Jersey, Vernon D. Northrop for the United States and Secretary Maurice K. Goddard for Pennsylvania, were still serving.

The long-awaited project to restore the Lambertville-New Hope wing dams got under way toward the end of the year after the Commission, acting for Pennsylvania and New Jersey, awarded a $395,000 construction contract to the low-bidding contractor. The badly deteriorated, century-old dams back up a five-mile "pond" that makes the area one of the river's most popular recreation attractions.

A five-man team of West German water scientists and administrators made the Delaware Basin Commission the first stop of a coast-to-coast tour of American pollution control agencies and installations last May. The visit was part of the United States-German Cooperative Program in Natural Resources, which began in September 1966 with a similar tour in Germany by an American group which included James F. Wright, the Commission's executive director.

The Commission's current and capital expenditures for fiscal 1967 totaled $611,203 to support programs staffed by 39 persons, mostly resource professionals. This was $29,897 over the previous year. For the coming year, fiscal 1968, the Commission adopted a $1,056,000 budget with nearly all of the non-mandatory increases earmarked for a sizeable expansion of the pollution cleanup program. In fiscal 1967, the Commission also spent $110,112 from grants and other sources on projects not included in the regular operating budget. ■

Aerial photo shows Lambertville-New Hope wing dams in run-down condition before start of restoration work in mid-1967 under Delaware Basin Commission contract.

Water Quality Action

Estuary and non-tidal standards, keyed to water uses, adopted: Implementation work begun

Public impatience with impure rivers and streams, a subject of increasing national intensity through the 1960s, won unprecedented response this year on the Delaware, culminating in the adoption of comprehensive basinwide water quality standards developed with new scientific approaches.

The momentum came from many directions:

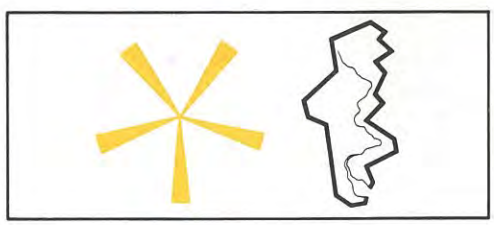
- Enactment of stringent federal and state anti-pollution laws and passage of financing referendums for waste disposal programs reflected the public's pressure.
- The findings came in from a five-year study by federal pollution control scientists into the severe pollution of the Delaware's tidal estuary, reaching 133 miles up the river to Trenton.
- The Delaware River Basin Commission's broad pollution control authority was being geared up to convert the results of the federal research program, named the Delaware Estuary Comprehensive Study, as well as other programs, into an extensive water quality improvement program.

The year's pollution control events started in July 1966 with a public unveiling of the findings of the federal estuary study, which for the first time employed a computerized river model for interpreting stream conditions and projecting future quality. The report revealed that the wastes being discharged into the estuary, much of it even after treatment, are eating up the river's oxygen at about a million pounds a day. These wastes are about two-thirds municipal and one-third industrial. The discharges, combined with sludge and other demands, so tax the river's assimilative capacity that there is virtual complete oxygen depletion in the water just downstream of Philadelphia for extended periods each spring and summer. This interferes with recreation and fish life and generally depresses the river aesthetically. High levels of coliform bacteria and heavy acid discharges also were detected.

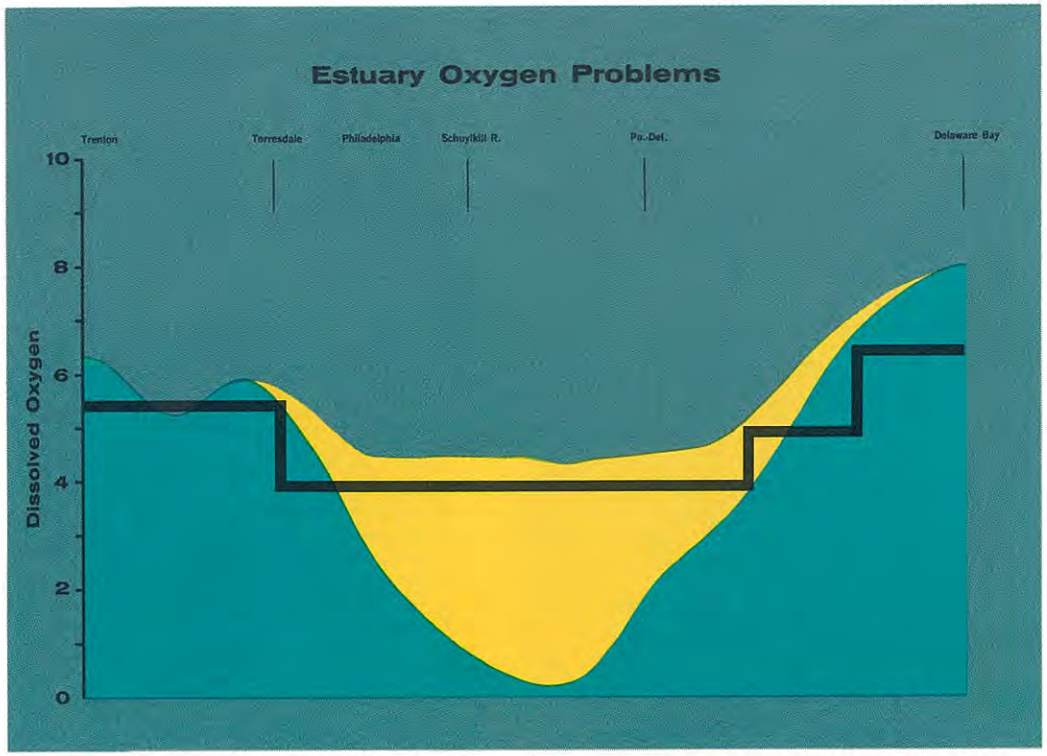
The federal pollution team offered five alternative levels of cleanup ranging from merely preventing further quality impairment to a sophisticated program under which up to 95 percent of the pollution load might be removed in treatment.

At a basinwide water quality conference convened by the Commission, the findings and alternatives presented by the federal estuary group were analyzed and evaluated as the job of formulating the program got under way. The months that followed were devoted to preparation of a pair of alternative standards from which the Commission staff felt a new pollution law for the estuary should be selected. At a spirited public hearing held January 26, 1967, a high level of cleanup was endorsed by civic groups, pollution control officials and public health spokesmen, while the principal waste dischargers pleaded for a more moderate — and less costly — improvement in the river. The two alternatives offered were roughly equivalent to the second and third highest plans offered in the federal study.

At the Commission's annual meeting held March 2, 1967 in Delaware's State Capitol, a compromise version of the higher level program was adopted by a four-to-one vote. Gov. Charles L. Terry Jr. of Delaware, calling for a program that would attract "the full support and aid of industry," urged instead adoption of an approach that could be upgraded to the stricter and costlier level at a later date.



Public impatience, 5-year research findings instrumental in new pollution-control law



DISSOLVED OXYGEN is a main water purity measure. Levels below 4 (parts per million) harm fish and aquatic life, with kills occurring more often as oxygen drops. Chart shows (bottom line) typical warm weather oxygen sag in Delaware estuary; (straight lines) the oxygen criteria specified in Commission's new standards; and (top line) projection of oxygen when the standards are achieved.

The adopted version, by setting a modified load requirement in part of the estuary, represented a significantly less costly plan. At the same time, it includes a series of requirements that it feels will produce a generally healthier and more attractive river, among them treatment of wastes to a degree that will leave enough oxygen in the river at all times to protect fish and aquatic life. It also requires disinfection of sewage to kill disease-carrying bacteria. The program to keep the stream quality high would be perpetual, with the first 20-year period of sharpest improvement costing public and private dischargers some $250 million for installation, upgrading, operation and maintenance of treatment facilities.

Within two months after its action on the estuary, the Commission offered for public hearing then adopted additional standards — for non-tidal waters in the four-state basin. In contrast to the need for quality improvement in the estuary, the goal in the non-tidal streams is to maintain the waters at their already generally good condition. Nonetheless, some non-tidal areas have pollution problems stemming from coal mine acid, high industrial-urban concentrations and fast-growing suburbs without regional sewerage facilities.

The Standards' Features

Here are the key features of the basin's new standards, effective immediately for new facilities and pending adoption of implementing rules and regulations for existing discharges:

1) Water uses are paramount in setting stream objectives which, in turn, determine effluent quality. Recognized uses include supplies for agriculture, industry and public consumption (after treatment, except where precluded by salinity); wildlife, fish and other aquatic life; recreation; navigation; and controlled waste disposal where compatible with other uses.

2) All wastes must receive minimum of secondary treatment (removal of practically all suspended solids and reduction of oxygen consuming pollutants by at least 85 percent). Except for stormwater bypass, discharges containing human wastes or disease-producing organisms must first be disinfected, thus protecting river recreation users and shellfish.

3) Where needed to meet stream quality goals, the waste assimilative capacity of the streams will be allocated under the equitable apportionment doctrine provided in the Basin Compact. It is likely therefore that, with the passage of time, waste treatment in excess of 85 percent may be required in the estuary.

Water Quality

Cont'd

4) Stream standards vary within the basin, with higher oxygen requirements in the estuary when anadromous fish make their runs and in trout waters. Other requirements are set on water temperatures, alkalinity-acidity balance, phenols, odor, detergents, fluorides, radioactivity and turbidity (cloudiness).

Implementation

The months since adoption of the new standards, which are under review by the Federal Water Pollution Control Administration for conformity with the Federal Water Quality Act of 1965, have been devoted to staff preparation of rules and regulations and implementation procedures. These will be proposed for public hearing and adoption in 1967-68.

Besides offering precise definitions of the terms used in the adopted standards, the rules will expand and contain more detail on the general requirements. They will list the actual maximum waste assimilative capacity in terms of oxygen-demand poundage allowable in each of the four zones of the estuary from Trenton to the beginning of Delaware Bay some 20 miles downstream of Wilmington. The assimilative capacity of each zone later will be allocated among individual dischargers, including those along tributary tidal waters.

Procedures and policies for attaining and enforcing the adopted standards, including delineation of responsibilities between the Commission and state pollution control agencies, will be detailed. Step-by-step action in processing pollution abatement orders will be listed, as well as in handling of complaints and enforcement where there is noncompliance. In 1968, individual polluters can expect to be put on notice by the appropriate state agencies.

As the year came to a close, the Commission also was negotiating agreements with the estuary states of Delaware, New Jersey and Pennsylvania calling for surveillance of major dischargers to the estuary and tidal tributaries. The State of Delaware will also collect samples on weekly boat runs on the river. Each state will handle analysis of samples and other laboratory work.

Other Activities

Action was getting under way during the year on programs with local authorities toward regionalizing the collection and treatment of wastes along small tributaries throughout the basin where flows are inadequate to handle large numbers of isolated discharges. This is an effort that will receive concentrated attention from the Commission in the immediate years ahead, particularly adjacent to the estuary region as the abatement program there gets into full swing.

The water quality staff was preparing to seek demonstration grants as the Commission searches for more sophisticated and economical means of treating wastes to keep pace with pollution problems that magnify along with population and industrial expansion. For example, it could strive for an efficient solution to the potential problem of removing nutrients that overfertilize organic life, resulting in unpleasant water taste and other quality problems.

The Commission found several occasions to employ the alert system it had set up for quick notification of downstream water users in case of suddenly developing quality problems. Among the Commission's warnings was an alert issued to purveyors of water when the June 5, 1967 power blackout caused waste treatment shutdowns and consequent discharge of raw sewage.

Breaks in old pipelines that sent petroleum discharges into otherwise clean streams prompted initiation of a program of pinpointing for warning and safety purposes the stream-crossing locations of scores, perhaps hundreds, of old pipelines. This is an extension of the protection assured by Commission review requirements that newly-laid petroleum pipelines must be of strong construction with shutoff valves. ■

Tocks Island Environment

Study progresses on giving reservoir-park region a water supply-sewerage plan

Map shows tri-state, six-county region, surrounding the Tocks Island reservoir and Delaware Water Gap National Recreation Area, that is under study for the best long-range sewerage-water supply system to meet demands from future visitor and resort development influx. Study is in second year.

Water-wise, the environment of the six-county region surrounding the coming Tocks Island reservoir and Delaware Water Gap National Recreation Area is generally excellent, and a program aimed at keeping it that way has entered its second year.

Within a decade, the reservoir and companion park will be one of the nation's most heavily-patronized outdoor recreation attractions. More than 10 million day-visits are expected at the park annually, most of them in the summer months. And that is only part of what is to come, considering the vast permanent and summer home boom that will mushroom outside the 70,000-acre parkland.

The protection program is the Tocks Island Region Environmental Study, which the Delaware River Basin Commission is coordinating for a large group of participating state, local and federal agencies. It is a three-year effort that was launched by the Basin Commission in May 1966 to devise the best means for disposing of wastes and for providing an abundant water supply in and around the reservoir and park that will stretch about 40 miles along the Delaware River from the Water Gap to Port Jervis, N. Y. It is crucial also to the prevention of contamination of the Tocks Island reservoir itself.

The intent is to give the area a workable plan that can be implemented in plenty of time to avert a series of future crisis solutions in the six counties of Orange in New York, Sussex and Warren in New Jersey, and Northampton, Pike and Monroe in Pennsylvania. The prospective influx volume would overwhelm the limited water-supply and waste-disposal facilities there now.

It is the hope of the Environmental Study's sponsors that fast-growing public sensitivity to conservation needs and natural beauty preservation will produce local acceptance of some efficient long-range water and sewerage scheme for the region. A good water-sewerage system could help guide a well-planned development in the area as well as respond to its water resource needs. The study also encompasses disposal of solid wastes where they could affect water.

The first year of the study began with organization of four task groups — population and land use, water supply, liquid wastes, and solid wastes — which concentrated on an extensive data collection program prior to the analytical and planning work now under way toward preparation of a master plan. Also, a consulting engineering firm was retained to help in the data collection and planning work.

The master plan is to evaluate alternative suggestions for solving the region's water supply and waste disposal problems, of which sewage disposal is prospectively the knottiest.

The early phases of the study have indicated a number of sewerage alternatives to be considered, including:

A regional system with large interceptor sewers conveying waste waters to a central treatment facility below the Water Gap; a series of six subregional systems providing for collection, treatment and disposal of waste waters within each; a series of about 60 localized systems; or a combination of subregional and local systems. Whatever solution is adopted, however, will involve substantial construction cost — out of the same dollars which ultimately would be needed anyway to protect the quality of the water in the reservoir.

Since the rugged terrain would preclude gravity flows in many locations, a series of high-lift pumping stations would be required in the regional or subregional systems.

Some of the severest water quality situations facing the Commission elsewhere in the Delaware Basin can be met only by cleanup of existing pollution. By contrast, the Tocks Island Environmental Study, a $430,000 program that includes $260,000 in federal demonstration grant funds, happily is able to put the emphasis on prevention rather than cure.■

Returning to Normal

Water supply emergency called off as 6-year drought eases; Spring rains flood some streams

After its driest six years on record, the Delaware River Basin's worst drought appeared to be at an end.

For the Basin Commission, which came into existence some months after the dry spell began, being without a drought was a new and welcome experience. It meant that much of the concentrated staff effort that had been diverted into managing the river's deficient resources finally could be turned more to development of constructive solutions to other water problems in the four-state area.

The new year opened in July 1966 with a discouraging three-month intensification of the drought. Autumn did bring some encouraging above-normal rains, and this might have been another false break — but it wasn't. Modest but continued improvements in precipitation, streamflows and well-levels persisted, and by mid-winter the upswing was sharp. After years of substandard levels, normal storage volumes had accumulated in New York City's reservoirs on the Delaware's Catskill Mountain headwaters. (This was partly due to economical water management in 1965 and 1966.)

By March 1967, the Commission felt it was safe to terminate the water supply emergency that had been in continuous effect for 20 months. President Johnson's Drought Disaster declaration for the Delaware and its service area, including New York City and North Jersey, also was ended.

Under the Commission's emergency powers, court-sanctioned allocations of Delaware River water to New York City had been cut by one-third, and privately-owned reservoirs were tapped to assure sending enough flow down the Delaware to keep the advancing ocean salt out of Philadelphia's water supply. These arrangements prevented a reopening of old court battles over Delaware River water between New York City and the downstream states.

By spring 1967, two of New York City's Delaware reservoirs were overflowing and another was near-full. The end of the water year (June 30) found streamflows and most groundwater tables at long-term normal levels. Precipitation was better than normal.

Flooding Helped Signal Drought End

Indeed, by springtime, nature was over-generous to some of the tributaries in the southern half of the basin. In one 24-hour period on March 6 and 7, many points in the Trenton-Philadelphia area were drenched by nearly as much rain as they normally get in the whole month, overflowing the banks of some small streams.

Assunpink Creek, which drains much of Mercer County in New Jersey and empties into the Delaware in downtown Trenton, was especially hard-hit. Factory workers were evacuated in the Trenton area and total damage to industries, residences, automobiles and public facilities was about a half-million dollars. The first stages of a long-range flood control-recreation-water supply system of reservoirs for the Assunpink watershed were getting under way, but they were not far enough along to hold back the torrents this time.

The March flooding, generally the heaviest around the basin since the beginning of the drought in 1961, occurred also along the Cooper River and Newton and Rancocas Creeks in New Jersey and on several streams in the Philadelphia area, including Wissahickon, Perkiomen, Darby, Neshaminy and Cobbs Creeks. These escaped serious damage, however.

Meanwhile, the efforts to hold to a minimum damage and casualties from local flooding by calling public attention to the boundaries of high-risk flood plains were continued. During the year, the Basin Commission and U. S. Geological Survey published another flood history map — for the 15-mile reach of the Delaware River's shores in Northampton County, Pa., and Warren County, N. J., in the Belvidere area. In addition, a new mapping project was begun for the Perkiomen Creek in Montgomery County, Pa.

Another key method of cutting down on the consequences of floods is through advance warning of coming high waters. In June 1967, the U. S. Weather Bureau unveiled the details for strengthening existing river forecasting services, including flood waters, in the Delaware Basin and in its neighboring river valley to the west, the Susquehanna. The stepped-up operation involved establishment of a computer-equipped river forecasting center at Harrisburg for both basins and a river district office at Trenton to collect data from upper-Delaware sources to be used in the forecasts. In addition to federal, state and Basin Commission cooperation, the expanded program involves non-government volunteers or part-time helpers located at nearly 200 "observation" locations.

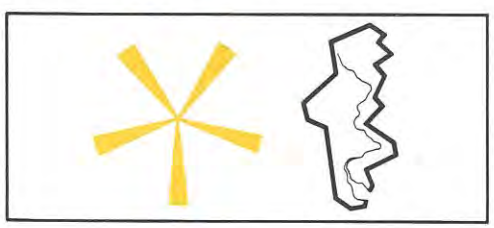
March 1967 flood pictures show bus stranded in waters of Wissahickon Creek watershed on Pennsylvania Turnpike near Fort Washington Industrial Park, and inundation in Trenton from overflowing Assunpink in Trenton, with DeLaval Turbine, Inc., plant seen in distance. Water came within inches of flooding Pennsylvania Railroad main line, beyond water tower.

Evening Bulletin, Philadelphia
George Moldovan, Trentonian

River Yield Reappraised

Cannonsville, New York City's newest reservoir, is shown full of Delaware River west branch water in Spring 1967. When storage recently hit 50 billion gallons — capacity is 95.7 billion — New York's taking rights to Delaware water and guaranteed-flow obligation to benefit downstream areas were altered.

In view of dry spell, are old water crop forecasts, reservoir plans realistic? Another NYC reservoir



Much of the existing plan for future development of the Delaware is based on the water history of the four-state basin prior to the unprecedented drought. Accordingly, the plan fails to take into account that nature delivered to the Delaware the equivalent of less than five years' precipitation in the six-year dry spell.

In the wake of the drought, thus, there is considerable concern by water experts over the ability of the Delaware River system to deliver water at the old rate and over the adequacy of existing and planned water supply facilities in the Basin Commission's Comprehensive Plan. This is particularly so with the yield capacity and operational procedures that have been assumed for New York City's reservoir system on the Delaware, which supplies that city with nearly half of its water by way of diversion tunnels through the Catskill Mountains.

At its first meeting following the termination of the Drought Emergency, therefore, the Commission set into motion in March 1967 a study to determine if the basin's water supply sources and storage facilities — existing and planned — are realistic in view of a hydrologic history that now includes the drought.

The study, in which the Army Engineers and other federal agencies are cooperating along with the four basin states and Cities of Philadelphia and New York, paves the way for possible revision of policies and planned projects. Conclusion of the study in 1968 is anticipated.

Another New York City Reservoir

Last year, the Commission reported that New York City had completed construction of Cannonsville, its third large reservoir in the upper Delaware Basin. Located on the West Branch of the Delaware about 25 miles east of Binghamton, this 95.7-billion-gallon facility is the second largest lake in the Delaware's four-state drainage area.

On March 30, 1967, water storage in Cannonsville hit the 50-billion-gallon level, automatically triggering an important change in the allocation of Delaware water between New York City and the downstream states of New Jersey, Pennsylvania and Delaware under a U. S. Supreme Court decree.

In ruling on the disputed claims to upper basin water, the court said that New York City was entitled to divert from the Delaware valley an average of 490 million gallons a day and that, in compensation, it must release enough storage from its reservoirs to guarantee a flow of not less than 1525 cubic feet a second where the river passes between Milford, Pa., and Montague, N. J., a short distance downstream of the Tri-State Rock.

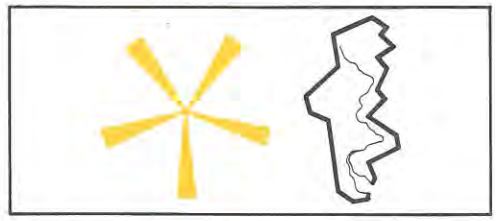
Under the decree, the permissible daily allowance to New York jumped to 800 million gallons daily and the minimum downstream flow obligation increased to 1750 feet a second when storage in Cannonsville hit 50 billion gallons, about half-full. This provides added available storage to meet the city's expanding needs and, at the same time, assures that flows in the river no longer would be so low during the annual warm spells when precipitation drops off sharply. With no reservoirs in the upper basin, the uncontrolled flow often would drop below the required minimums.

Spring rainfalls were so abundant that within a few weeks of becoming half-full, the newest of New York City's large mountain reservoirs was overflowing.

The other Delaware River reservoirs of New York City are Pepacton, on the East Branch, and Neversink, named for the Delaware tributary river on which it is located. ■

Fish Research

10-year program approved on shell, migrating and resident species; Tocks Island phase under way



One of the great lures to man of a fine river system is its fisheries.

Such a river is the Delaware, with a rich endowment of shellfish in the ocean-influenced bay, of shad and other popular fin species that run between the ocean and various upstream reaches of the river, and of trout and many other fresh water fishes that spend their life cycle in the main stem and in tributaries reaching upstream to the Pocono and Catskill Mountains.

Ironically, society's attraction to rivers is so intense that it inevitably disrupts the very resources it pursues.

Discharges of sewage, acid and other wastes from our cities and industries cause problems of stream quality, especially oxygen depletion. Hot water dumped by industry into a river alters natural water temperature. Dams and other impoundments cut down on natural mobility of fish, and so on.

A comprehensive river management program is one that achieves a reasonable balance of all beneficial resource uses. Among other things, the Delaware Basin supplies domestic water to two great cities and hundreds of smaller communities, it feeds the region's thousands of industrial and commercial enterprises, it is the recreation haven for millions of people, and still it carries off massive volumes of the basin area's wastes every day. One of the responsibilities of the Delaware Basin Commission is to insure that fishery resources get their share of protection in a river with so many competing uses, and a number of studies and programs to that end have been initiated.

Basinwide Fisheries Program

In 1964, the Commission established a Fisheries and Wildlife Technical Assistance Committee representing the fisheries agencies of the four basin states and federal government. This advisory group went to work with the staff on recommending a long-range fisheries protection and enhancement program that the Commission approved in January 1967 as the fisheries research plan for the interstate river and bay. This comprehensive plan calls for a series of efforts over the next decade that could cost about $1 million. The executive director was authorized to proceed on getting the early phases of the program under way in cooperation with the signatory agencies, and implementation of some has now begun.

Generally, the plan covers these subjects: The effects of the Tocks Island reservoir project on fish life; problems of American shad and other anadromous species making their annual runs up and downstream; problems of resident Delaware River finfish, and the declining shellfish industry of the lower river.

The first phase of the Tocks Island fisheries work is a three-year inquiry, now under way, relating to a proposed pumped-storage hydroelectric installation that would be integrated into the dam project. The generating system would work by water being pumped from the Tocks Island reservoir up to smaller high-level ponds, then being released back downhill to produce energy at peak-demand periods. The Commission is studying how fish would be affected by the resulting fluctuations in the water level in the Tocks lake.

Annual harvests from spring shad runs in the Delaware were nearly 20 million pounds before heavy pollution loads started going into the lower river early in the 20th Century, but they have dwindled to less than a hundredth of that figure in the past two decades. Large shad kills have become common. The fisheries plan includes a six-year study aimed at improving the plight of shad and other migratory fish, including striped bass, alewives, blueback herring, white perch and sturgeon.

The lower Delaware's sagging oyster industry could yield more than $14 million a year, but only a small fraction of that potential crop has been raked in over the last decade. A five-year shellfish research effort will deal with the oyster problem and also encompasses blue crabs, clams and mussels.

With present research inadequate to assure balanced management of the basin's finfish, the Commission will study this resource in both the estuary and upper river. This is a 10-year program that will include walleyes, small and largemouth bass, sunfish, and brook, rainbow and brown trout.

Not all the activity during the year that will benefit aquatic life was conducted exclusively in the name of fisheries work. Probably the greatest boon ever registered for fish on the Delaware came with adoption of new water quality standards for the basin's interstate streams. The standards for the estuary will assure adequate oxygen to accommodate runs of migrating fish, while new non-tidal standards are designed in large measure for the protection of trout and other species in upper river areas.

Basin Commission research to determine pumped-storage hydro-power effect on fish is being conducted in these four ponds near the Tocks Island damsite.

Tocks Island Fluctuation Study

Pumped-storage is a young technique for generating peaking electricity, and little is known about its effects on resident fish in reservoirs. The level in the reservoir could fluctuate several feet daily as water is exchanged between the lower and upper ponds.

Largely because spawning activity of many fresh water fishes occurs in shallow water near the banks, concern has been voiced over possible disruption of this natural reproductive process.

A pioneering research project that will shed light on the relation between pumped-storage and fisheries thus has been launched by the Commission.

With funds supplied by the utility company applicants, the Commission has constructed near the Tocks Island damsite four two-acre ponds in which the aquatic environment in the Tocks Island reservoir is being simulated. Staff biologists are checking whether the spawning, hatching, development, growth and behavior of selected native fish species are undergoing any significant changes due to rising and falling pond levels, or to resulting temperature changes. They are also checking the effects of pumped-storage on plant life for possible reactions on the fish, and whether the surges of water rushing to and from the upper ponds would alter fish behavior.

Each pond is stocked with about 100 fish of varied species and daily water levels are being fluctuated automatically. At pre-established intervals, fish are caught by nets or electric gear and checked for growth, weight, length and other features. Meanwhile, daily and weekly records are kept on a dozen-odd physical qualities of the water, on plant life, and on general fish conduct.

With the results of the study, the Commission will be equipped to evaluate the utilities' application for biological consequences. Hopefully, the research also will add generally — and valuably — to existing knowledge on reservoir fisheries and their management. Meanwhile, studies dealing with other phases of the pumped-storage proposal also are in progress.

Lehigh Investigation

In recent decades the Lehigh River has appeared increasingly less able to support the abundant fish and plant life that once existed in this large tributary, which drains about a tenth of the Delaware Basin in the Pocono Mountain region. While conjecture has produced a number of theories, the Commission felt a technical study into the relation between the river's water quality and its present and potential fish life would better equip it to manage the Lehigh's resources.

A three-year biological-water quality investigation was recently concluded, scientifically establishing a close correlation between pollution and poor fish environment. The study, a joint Basin Commission-Pennsylvania Fish Commission effort, showed that coal mine acids degrade a 45-mile stretch of the 105-mile river from below White Haven in the headwaters to Northampton, five miles upstream of Allentown. However, below that five-mile recovery area, the quality again dips, this time from oxygen depletion due to heavy industrial waste and sewage, for 17 miles between Allentown and the confluence with the Delaware at Easton. Despite the low quality of the Lehigh from White Haven to Allentown in terms of depressed biological life, the oxygen counts were uniformly healthy. Only minimal adverse effects to the Delaware were found immediately below Easton. The study revealed excessive plant life from Easton to Trenton, a generally high-quality 45-mile reach of the river, but did not link this Delaware condition to the Lehigh.

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A separate three-year research project on temperature and fish is under way at Rutgers University. This program, financed in part by the Commission, seeks to determine the tolerance of five species — American shad, striped bass, alewife herring, blueback herring and white perch — to heat and cold and how different measures of oxygen, salts and pollutants in the water affect their tolerance levels. The tests are being made in laboratory tanks simulating actual conditions in the river, where heated discharges often hit fish already under stress from pollutants and other poor conditions.

Reservoir Gains

Progress listed on most projects;
Tocks Island slowdown posed
by war budget

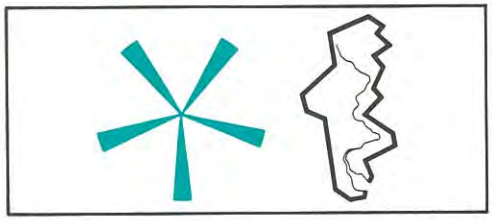
The Commission has a Comprehensive Plan for the long-range development of the four-state river basin that includes, along with pollution control standards and other features of a non-structural nature, a network of large multi-purpose reservoir projects.

Here is the current status, as of the summer of 1967, of reservoir projects in the plan that are moving ahead:

Tocks Island

Best known and largest of the basin's reservoir jobs, Tocks Island moved ahead generally, but because of military demands on the federal budget dam construction may be put off until 1969-70 and project completion for seven years thereafter. Land is being purchased for the reservoir and surrounding Delaware Water Gap National Recreation Area. The Army Engineers' general design is under review, plans for relocating Rt. 209 on the Pennsylvania side of the Delaware are taking shape, design of levees and other works for protecting Port Jervis and Matamoras from reservoir waters is progressing, and initial National Park Service facilities are to be ready next summer.

Artist's rendering of Beltzville dam, now under construction on Pohopoco Creek, a Lehigh River tributary.



Beltzville, Blue Marsh

Another Corps of Engineers dam project, Beltzville, is now under construction on a Lehigh River tributary. In October 1966, the Delaware Basin Commission contracted with the Corps to buy Beltzville's water supply storage, equivalent to the needs of a city of 100,000 population. The Commission will wholesale the water supply in federal reservoirs. Blue Marsh, a Schuylkill River valley reservoir, is nearing preconstruction design completion by the Corps.

Prompton, Trexler

Design funds also have been provided the Corps for Prompton, a reservoir to be enlarged in the Lackawaxen River valley in northeast Pennsylvania, and for Trexler reservoir, a dam to be built on a Lehigh River tributary. Construction schedules will depend on the need for water supply.

Tohickon, Evansburg

The Commonwealth of Pennsylvania has designed a recreation and future water supply dam on Tohickon Creek, east of Quakertown in Bucks County, as part of its Nockamixon State Park. Construction may begin by 1969. The Commonwealth's Forests and Waters Department and the Delaware Basin Commission have recommended to the State Planning Board that plans proceed for developing Evansburg reservoir in Montgomery County. Tohickon and Evansburg are to become important links in a chain of recreation facilities around the Philadelphia and suburban metropolitan area.

Hackettstown

New Jersey has now acquired a substantial part of the lands needed for development of Hackettstown reservoir on Musconetcong River and for the surrounding recreational facilities. To be located inside the new Allamuchy Mountain State Park, initial development of this property will be for recreation, with the reservoir planned for construction in the mid-1970s.

The Basin Commission's Water Resources Program, an annual document citing resource needs in the valley, lists projects desirable for development in the ensuing six years. In addition to Beltzville, Tocks Island, Blue Marsh and Tohickon, the latest edition urged that steps be taken toward development of Newark reservoir, which would lbe built on White Clay Creek straddling the Delaware-Pennsylvania boundary and of Marsh Creek reservoir, the largest unit of the Brandywine Creek watershed development program, in Chester County, Pa.■

James M. Staples

Financial Summary

Budgetary

1967 REVENUES

Budgeted	Received
Delaware 22,800	22,800
New Jersey 143,000*	143,000*
New York 142,000	142,000
Pennsylvania 143,000*	143,000*
U. S. 115,000	115,000
Public Health Service Grant 45,223	45,223
Miscellaneous 200	4,219
Working Reserve 0	0
TOTAL 611,223	615,242
4,019**	
615,242	

*Includes $1000 appropriation for Capital Budget

**Unencumbered balance transferred to working reserve—Total $4,039

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

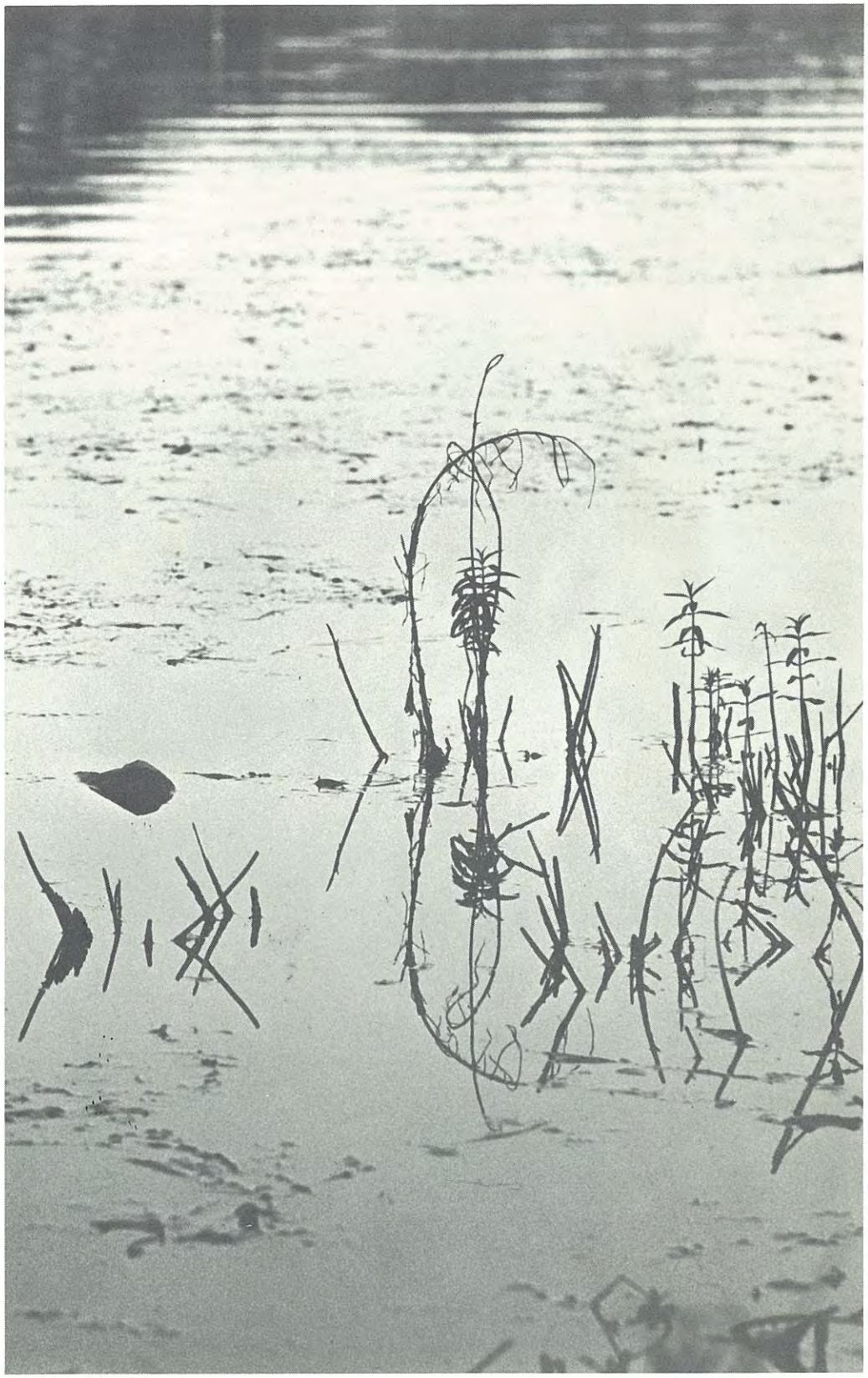
1967 EXPENDITURES

	Appropriations	Expended
By Organization		
Directorate	118,387	119,492
Administrative Division	74,027	76,246
Planning Division	416,809	413,465
TOTAL	609,223	609,203
By Program		
WATER SUPPLY	30,000	45,378
WATER DEMAND	45,000	35,664
RECREATION	31,000	46,010
POWER	28,000	27,467
PROJECT REVIEW	142,000	83,682
WATER QUALITY	128,223	161,841
COMPREHENSIVE PLAN	144,000	152,484
FLOOD LOSS	11,000	7,356
BASIN OPERATION	50,000	49,321
TOTAL	609,223	609,203
Capital Program	2,000	2,000
Excess Appropriations over Expenditures	—	20**
GRAND TOTAL	611,223	611,223

Non-Budgetary

	Funds Available	Expenditures	Unexpended Dedicated Allotment
Tocks Island Region Environmental Study	119,772	92,532	27,240
Drought Projects	10,301	10,301	0
Wing Dam	430,465	4,993	425,472
Tocks Island Fish Research	50,000	2,286	47,714
TOTAL	610,538	110,112	500,426

Delaware River Basin Commission
25 Scotch Road, Trenton, N. J.



George J. Fistrovich