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CONSERVATION AND ECONOMIC DEVELOPMENT



new jersey
1960-1961

**DEPARTMENT
OF
CONSERVATION
AND
ECONOMIC DEVELOPMENT**

ANNUAL REPORT

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1960-1961



Discard



The Honorable Robert B. Meyner, Governor
Members of the Senate
Members of the General Assembly

This report concerns the activities of the
Department of Conservation and Economic Development
for the fiscal period 1960-1961.

A handwritten signature in cursive script, reading "H. Mat Adams".

H. Mat Adams
Commissioner

INTRODUCTION

New Jersey is at the threshold of her fourth century of economic and social growth. The State has been a pioneer in the nation's industrial development and is a showcase depicting the evolution of modern industrial America. A leader in many of the basic technological areas, New Jersey also provides a multitude of products known and used all over America.

From an agrarian economy of less than 25 people per square mile at the beginning of the nineteenth century, New Jersey has become a highly industrialized state with a population density of over 800 people per square mile. In the last decade the population has grown from 4.8 million to over 6 million in 1960. By 1970 it will exceed 7 million.

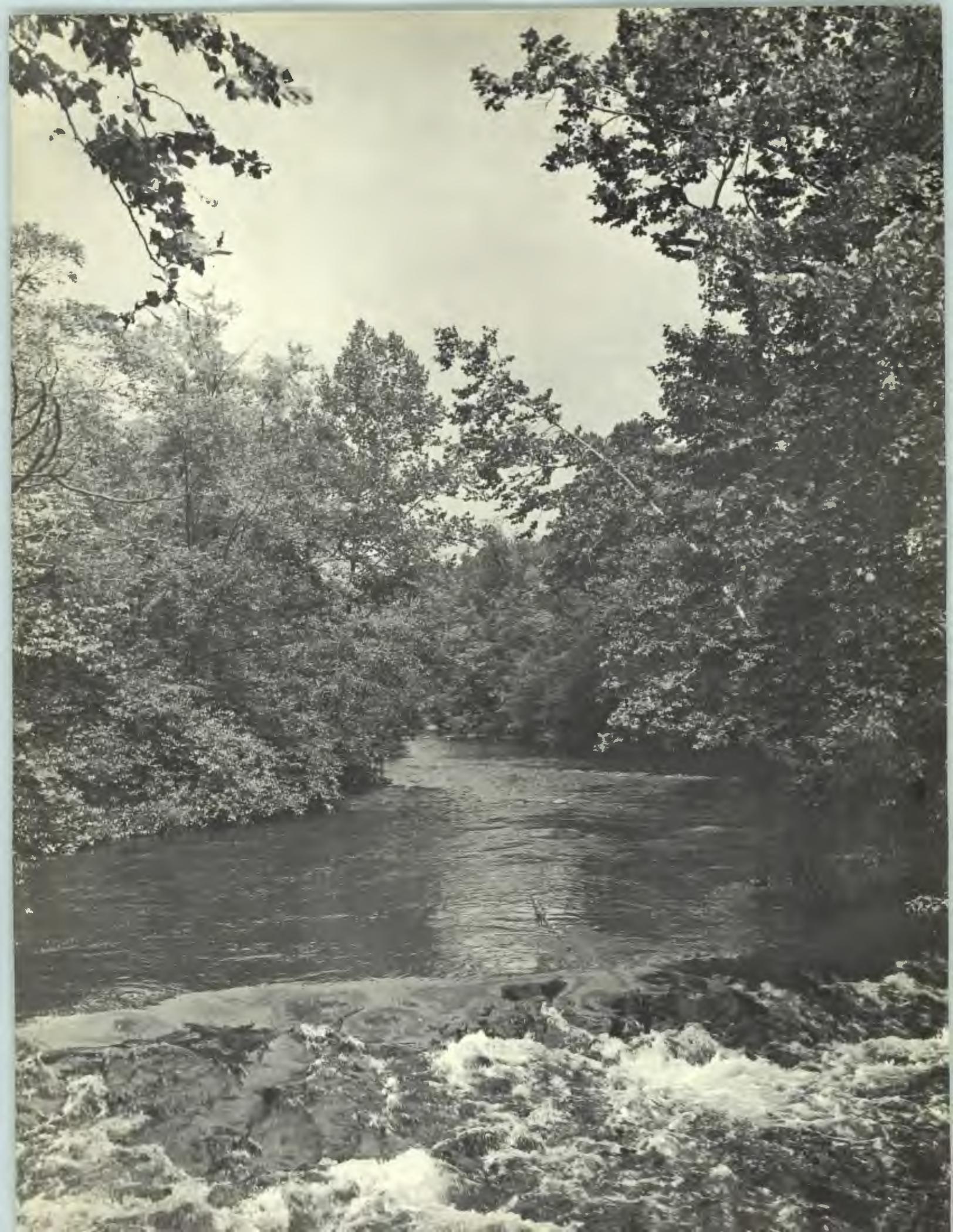
New Jersey's economic productivity has created revolutionary changes in the character of the State. Her citizens are the most mobile in the nation. They have a per capita income well above the national average.

Such growth inevitably creates stresses and strains in the economy. For example, an average of 43,000 housing units must be made available annually to meet the needs of the increasing

population. The State's water resources must bear the brunt of the increasing demands of industrial and residential growth. New Jersey's highways must accommodate an automobile density of nearly 300 cars per square mile. The State's research and development activities must meet the requirements of the second industrial revolution created by automation. New Jersey's highly skilled labor force must be capable of adapting to and meeting the requirements of growth industry, which is adding tremendous impetus to the revolutionary changes in New Jersey's economy.

Perhaps no state in the nation is experiencing the development pressures of the second half of the 20th century as heavily as is New Jersey. New Jersey is in the center of the hub of a great metropolitan complex forming along the eastern seaboard from Boston to Norfolk.

The way New Jersey citizens respond to present economic and social demands will determine the State's long-range development achievements. For example, one of the great challenges is the way the State plans to meet future open land needs.



GREEN ACRES PROGRAM

The Department of Conservation and Economic Development, after extensive study of New Jersey's open space needs, assigned to its Land Use Committee the preparation of a special report which has led to a Green Acres open space land acquisition program to be implemented upon approval by public referendum in November 1961.

New Jersey can lose its wealth of open land and natural beauty. Farm-dotted valleys and hillsides are changing to crowded homesites. Meadows, streams and woodlands are becoming a sprawl of shopping centers. The unspoiled country view could soon be a crisscross of highways and roadside congestion.

These new demands for land are important, and have a needed place. When land was used for farming, it also served for outdoor enjoyment and conservation. Today's developed and settled lands no longer provide this dual role. A balance must be provided.

Open lands and natural beauty are no longer expendable—they are essential to us all. Time in which to preserve outdoor space and to plan for its wise use is fast running out. Pressures on land needs are increasing for homes and industry, for highways, schools and other services. Neither the extent of open land still available nor zoning controls will guarantee sufficient open space for the future. Only

through speedy and broad action can this land be saved.

Green Acres is a plan to act in time. It provides \$60 million to acquire open areas selected for their special value for recreation and conservation. Of this amount, \$40 million is for the State to buy land and \$20 million for State grants to counties and municipalities as a 50-50 share in the purchase price of local acquisitions.

Green Acres is a broad plan. Land acquired may be used for parks, forests, wildlife, natural areas, water reserves, camping, fishing, hunting, boating, reservoirs, winter sports, and similar "public outdoor recreation and conservation of natural resources". Land to be acquired is not restricted as to size and its availability may be maintained through easement agreements as well as by purchase.

Land under the Green Acres program is to be open and suitable for multiple use, to the extent practicable, and is to seek a balance of facilities among all areas of the State. Green Acres assures open space for tomorrow in two ways: it will conserve needed land while it is still available; and it will secure more land for the money without loss from rising prices.

New Jersey's open land and natural beauty are a part of our heritage. They are necessary for enjoyment and inspiration in living, as well as for economic and social growth. They cannot be replaced.



THE MEADOWLANDS

There is probably no other project currently being undertaken in the United States that matches the reclamation and development of the Hackensack Meadows in challenge and opportunity. Generations of men have studied, planned and urged the adoption of techniques that would convert these tidal marshlands to a stable form, permitting appropriate and productive use.

The establishment of the Meadowlands Regional Development Agency in 1960 gives promise that the possibilities will be realized. The Agency is legally empowered to take the necessary steps to accomplish the task of reclamation and development.

Previous efforts at Meadowlands development were unsuccessful for several reasons. Engineering technology was not equal to the job. Earlier programs were generally limited in scope, lacked full local, state and national support and hence could not attract the required capital. Demand for space in the metropolitan region was not sufficiently great to create an interest in an area where intensive site preparation was needed to accommodate new businesses or residences or parks. The foremost problem, however, was the absence of one organization that could speak for all the towns and municipalities comprising the Meadowlands and have the authority to act in implementing planning decisions agreed upon cooperatively. The new Meadowlands Regional Development Agency fulfills this need.

The reclamation of the Hackensack Meadows is now entirely feasible from an engineering point of view. Large scale construction on reclaimed

land is occurring in almost routine fashion throughout the world. The pressure of economic forces has resulted in skyrocketing property values in the New York-New Jersey metropolitan area, justifying additional cost outlays in land development. Hence, the market value of the Meadowlands is now competitive with values elsewhere in the area. No other expanse of vast open land exists in the metropolitan area. The Meadowlands have become the most potentially valuable tract of raw acreage in the world. The only remaining obstacle to the conversion of dreams into plans—and plans to fruition—is proper and far-sighted organization.

A program for establishing a Meadowlands Regional Development Agency was first initiated by the Department of Conservation and Economic Development in March of 1959. The need for an inter-municipal planning and development approach to the problems of meadowlands development called for farsighted organization since the area, comprising some 14,500 acres, encompassed parts of several municipalities and two counties.

In response to the pressing need for factual material and statistical data upon which to base future judgments and action, the Department prepared and presented to the Agency in January 1961 the most detailed report ever compiled on the Hackensack Meadows. It was the first single definite reference on the Meadowlands. Practically all pertinent documents, maps and other data on the 14,500 acres in the thirteen municipalities are collected and collated into this one volume entitled "A Comprehensive Report on the Meadowlands".



The conversion of the Meadowlands to productive uses is a challenge unequalled in the history of New Jersey.

This report is a compilation of important background research that has formed the basis of early Meadowlands thinking. The legal and economic feasibility of a massive Meadowlands undertaking is fully appraised. The status of riparian land ownership is reproduced in its entirety.

The report also lists and discusses state and federal programs having reference to the Meadowlands project. The reclamation and development of the Hackensack Meadows has an impact on all levels of government. The State and the Federal Government have several programs which can provide planning and reclamation assistance, for which the Agency is qualified and eligible to apply. These programs are detailed and related to phases of future reclamation and development activities.

The Department, acting upon the request of the Agency, also has produced a number of important planning documents. In addition, the Agency staff has conducted an extensive mapping program and prepared a series of comprehensive land use and ownership maps and charts, as well as reports treating a variety of vital subject areas. The Meadowlands Regional Planning Board composed of five constituent municipali-

ties, has made noteworthy contributions to the Meadowlands project. Reports of the Passaic Valley Citizens Planning Association, are devoted to planning considerations for the Board. The report of the Netherlands Engineering Consultants is a further interesting and outstanding engineering study.

Current activities include work on a booklet containing statements of endorsement on the Agency's approach to the problem of the Meadowlands from leading citizens, government officials, experts on government relations and others widely respected in their professional fields, and a digest of the comprehensive report.

Other activities include a navigation review and study of the Hackensack River, an appropriation to conduct a thorough appraisal and analysis of flood control and drainage problems along the River, and the construction of a twenty-five foot turning basin in the river near Kearny. The Agency is also studying a tentative proposal from the Corps of Engineers concerning the disposition of silt and mud in the meadowlands as well as an informal proposal made by the United States Fisheries and Wildlife Service concerning the recreational aspects of the proposed meadowlands development.

RESEARCH AND DEVELOPMENT

The revolutionary changes taking place in the character of the American economy are significantly affecting the makeup of New Jersey's industrial and social structure and have far-reaching implications for the long-range growth of New Jersey. The extent and type of research and development activity carried on and promoted in New Jersey in the coming years will significantly affect the future economic and social character of New Jersey. Growth industry requires a reservoir of skilled manpower adaptable to new industrial needs. A sound research and development program means the creation of central depositories of scientific literature, good vocational retraining programs, and the creation of a pool of skilled technicians to back up the research endeavors of physicists, chemists and others engaged in basic research.

New Jersey is already the center of research operations for a multitude of American industries. Well over 600 research facilities are presently located in the State. In order to promote sound research and development, the Department has initiated the creation of a New Jersey Council for Research and Development.

Leaders of industry, educators, government officials and other interested persons have joined together to organize the proposed council and have received an enthusiastic state-wide response. The central purpose of the council is to promote, rather than engage in, research and development. It is expected that the New Jersey Council for Research and Development will be formally organized and functioning before the end of the calendar year.

A PUBLIC MARKET

At the present time, the New York-New Jersey area is desperately in need of a new facility to effectively handle the enormous quantities of foodstuffs that must be brought in daily to feed a metropolitan population of 15 million people.

Probably the availability of transportation is the most important single factor affecting the location of such a distribution center under present-day conditions. Such a center must be easily accessible to all major means of transportation.

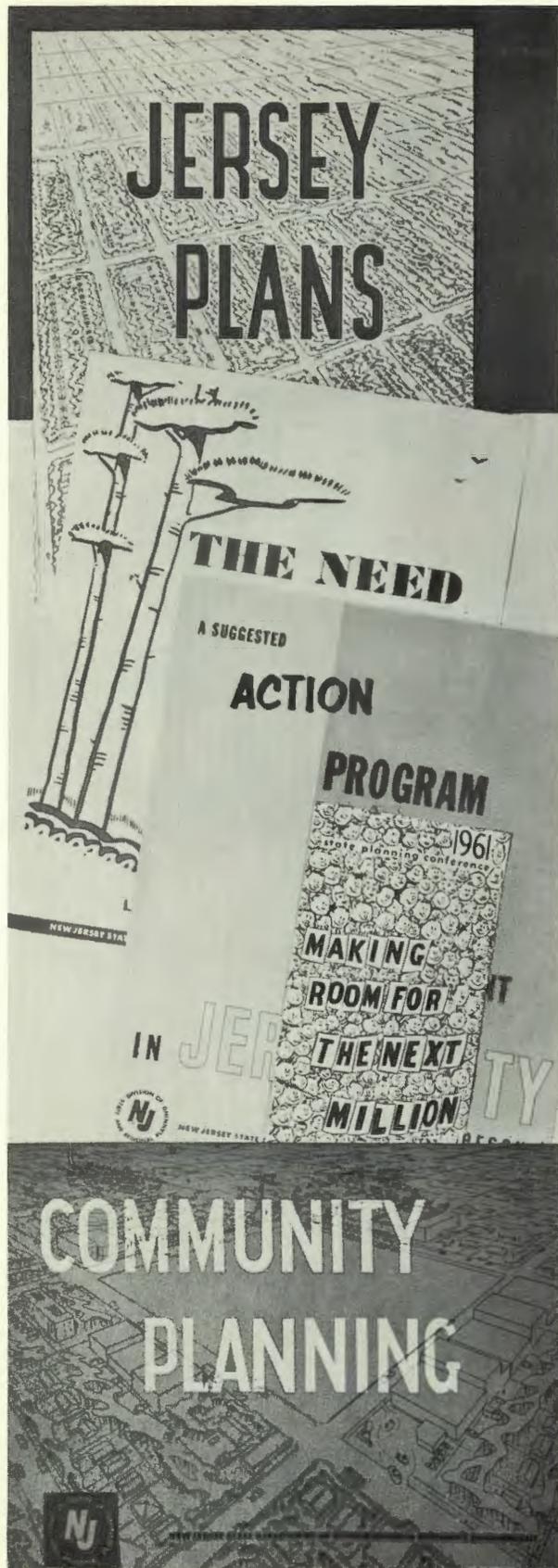
The site of the proposed Food Distribution Center is a 960-acre meadowland tract bounded on the north by New Jersey Route 3, on the west by the New Jersey Turnpike and on the south by the Hackensack River.

The reasons for the choice of this particular site were based upon such factors as land values, transportation facilities, utilities available at the site and its prominent location in the heart of New York and New Jersey markets.

The Pennsylvania, Erie-Lackawanna and New York, Susquehanna and Western railroads are adjacent to the proposed Center. Motor carriers have excellent access to it.

Water-borne cargo unloaded on either side of the Hudson can be moved by truck to the Center via any of the tunnels and bridges connecting New York City and New Jersey. Future plans include pier facilities on the Hackensack River which will provide a deep water port for the Center. The proposed site has been declared the only practical location meeting all the requirements for a major metropolitan food distribution center. It is expected to be in operation in the early part of 1963.

Since the approval of necessary legislation, initiation of promotional studies, formation of a five-member Food Market Commission and the appointment of an Executive Director, significant progress has been made toward the realization of a major food distribution center in New Jersey.



PLANNING

The purpose of State planning is to insure the orderly development of New Jersey's physical assets by assembling and analyzing existing development trends and conditions; preparing and maintaining a comprehensive guide plan and long term development and capital improvement program; achieving fuller coordination of the development activities of New Jersey's administrative departments; stimulating, assisting and coordinating local, county and regional planning activities; and conducting studies to determine the necessity for technical and financial assistance programs for planning, development, redevelopment and renewal projects in New Jersey.

STATE-WIDE PLANNING ACTIVITIES

Considerable progress has been made on the State-wide Development Plan, the foundation of the State-wide Planning Program. An analysis of the inter-relationships between New Jersey communities is underway which will permit effective study of municipality-development problems. The purpose is to delineate natural and functional regions so that effective planning assistance to cooperating community groups can be achieved. Population census, socio-economic characteristics, topographic features such as location of watersheds and open lands, and other significant guides are among the array of criteria being used for regional delineation. Banking, newspaper publications and circulation, employment, retail and wholesale trade, transportation and telephone services are indicators studied to locate the functional centers of regions.

Regional delineation is but one facet of the emerging development plan. Population and economic inventories and the assessment of development trends are other significant attributes. The chief objective is a better understanding of regional dynamics to achieve the maximum growth potential for the entire state.



One of the most significant studies made was the evaluation of industrial, residential and open land uses in the State. The main finding of this full scale exploratory report led to legislative action. Increased population, mobility, leisure time and increased spending power helped to create the need for more recreational facilities, and made it imperative that action be taken to set aside open acres for recreational uses. These lands in the course of unplanned industrial, commercial and residential development would be consigned to the bulldozer. New Jersey's population growth trend shows a 50 per cent increase in the State population between 1930 and 1960. The increase from four to six million, accented by a 25 per cent increase during the last decade of that thirty-year period, points up the necessity for the action taken by the Legislature in passing the Green Acres legislation.

State-wide studies of public facilities and services, and inventory of capital improvement procedures, are steps taken toward the development of a capital improvement program.

REGIONAL PLANNING ACTIVITIES

Surveys and analyses on the development of regional programs have provided facts used by regional agencies working toward the development of the Hackensack Meadows, the Pine-lands of Ocean and Burlington counties, Lake Hopatcong municipalities and the Delaware Bay area.

The municipalities of Carlstadt, East Rutherford, Secaucus, Kearny, Lyndhurst, Moonachie, North Arlington, North Bergen, Teterboro and Rutherford are mutually concerned with the reclamation of marshlands and flood-plains covering an area of twenty-two square miles bordering the Hackensack River. These lands, now wasted, are in the heart of the New York City-northern New Jersey metropolitan area and are potentially valuable because of accessibility to markets and excellent transportation facilities. Several necessary studies have been authorized by Congress, but are lacking appropriations for completion. The study of the Hackensack River by the United States Corps of Engineers also requires additional funds for

completion. The State has been assisting the Agency through technical advice and planning facilities. A publication entitled "Develop the Meadows" has been distributed to explain the work of the Agency and to show why the Meadowlands must be developed as a regional project.

The Pinelands Regional Planning Board, following the recommendations of a special report prepared by the State Planning Bureau, recently requested that the State make application for a grant for the Pinelands Regional Planning Study under the federal aid program for Local Planning Assistance.

The municipalities of Hopatcong, Roxbury, Mt. Arlington and Jefferson have asked for the State's recommendations regarding the creation

of a regional agency similar to the Pinelands and Meadowlands agencies to deal with problems concerning the uses of Lake Hopatcong and its frontage. Planning officials of the Department are advising the four municipalities on the formation of the proposed regional agency and on planning procedures.

The development potential of the Delaware Bay area is being studied by Department planning officials. Proposed land uses such as state parks, marinas, beaches and industrial development are being considered as an advisory and program assistance service to the Delaware Bay Area Development Commission, which was created by the New Jersey Legislature to study the Bay Area and to recommend development and conservation programs.

AREA REDEVELOPMENT

The Area Redevelopment Act, signed by the President in May 1961, has been studied to determine areas in the State eligible for such federal aid. Close coordination has been maintained with the Department of Commerce and the Urban Renewal Administration which will administer federal phases of the depressed areas program. Exact administrative procedures have not yet been established, but the Department expects to take full advantage of the area redevelopment program.

The primary burden for economic rehabilitation is on local initiative and sound economic planning. The emphasis is on long-range recovery. The program clearly is not meant to be used as an anti-recession measure or a quick cure-all, but rather as a sustained and far-reaching approach to improve the economic structure in those areas where unemployment has been severe and persistent. The program

should stimulate economic recovery in such areas by encouraging new investment in plant facilities on the part of private enterprise. The Act provides low interest long-term loans to finance the construction of commercial and industrial projects to create new job opportunities.

In order to enhance the community's ability to attract new plants, the law contains grant and loan provisions for the purchase and development of land dedicated to public use and the installation and improvement of public facilities necessary for economic redevelopment. Finally, the law provides for the retraining of workers needed to fill expected job openings and permits special study of the problems of prolonged unemployment and economic redevelopment. The ARA amends the Housing Act of 1954 by increasing the federal share for urban planning studies to 75 per cent of the total cost of such eligible areas.

URBAN RENEWAL

The New Jersey Regional Urban Renewal Study is almost complete. It was begun last year with the aid of a \$130,000 federal grant. A report entitled *A Guide to Urban Renewal* is being prepared. It is concerned with north-

eastern New Jersey and contains a summary of facts, residential needs and other problems of land utilization, and recommended renewal actions. Newsletters on the study are being published as a service to municipalities.

COMMUNITY DEVELOPMENT ACTIVITIES

The State of New Jersey offers assistance to municipalities participating in programs of planning and redevelopment from funds appropriated by the State Legislature for expanded state and regional planning under various provisions of the Federal Housing Act of 1949 and its subsequent amendments. Four programs are administered by the Department of Conservation and Economic Development.

Under Section 701 of the Housing Act of 1954 as amended, federal funds were made available to municipalities with less than 50,000 population wanting to prepare comprehensive master plans. Since initiation of the program in New Jersey, 163 municipalities have received technical planning assistance. Recent legislation has increased the federal share of the program from one-half to two-thirds of the total cost of preparing the master plan for each municipality. Municipalities which qualify for aid under the Area Redevelopment Act of 1961 may receive up to three-quarters of the total cost of preparation.

A unique program to encourage continuing planning was initiated by the Department in 1960. It provides that municipalities which have completed their master plans may apply for State aid to maintain professional planning services. The State will advance funds to the municipality for a period of five years, beginning with an advance of 50 per cent of the municipality's annual planning expenditure for the first year and diminishing gradually to 10 per cent in the fifth year. In the sixth year, if the municipality maintains its level of planning expenditure, all previous appropriations will be considered grants and need not be repaid. State aid to any one municipality may not exceed \$3,000 in any one year. The purpose of the Continuing Planning Program is to implement the master plan, and to encourage municipalities to make planning a permanent function of local government. The first appropriations to be made under this program will be to Franklin Town-

ship, Wayne Township, Princeton Borough, Kinnelon and Asbury Park.

A concerted attack on blight is being made under the Community Renewal Program. Municipalities suffering from obsolescence or deterioration may apply to the State for funds to supplement grants available from the Federal Urban Renewal Administration. Approved applicants receive grants amounting to two-thirds of the total cost of preparing the Community Renewal Program from the federal government and one-ninth from the State of New Jersey. Trenton will be the first community to receive aid under this program. Applications from Passaic, Woodbridge and East Orange are being reviewed.

Under Section 702 of the United States Housing Act of 1954, the State assists in a program of federal aid to municipalities for public works planning. To date, under this program 101 municipalities have applied for interest-free loans on construction projects ranging from sanitary trunk sewers to a medium security prison. Applications are processed by the State, and the required documentation from various departments which might be affected by the proposal is forwarded to the Community Facilities Administration.

In addition to administering federal aid programs for planning assistance, Department planners help municipalities by publishing information that will be useful to them. In 1960, *Zoning in New Jersey*, Vol. I and II, was published as a compendium of information about extant zoning ordinances in various municipalities. Recently *A Guide to Zoning Boards of Adjustment* was published to help such boards formulate zoning decisions. Phase I of a *Master Plan Evaluation Study* has been completed and is ready for publication. It is a history of planning in various cultures from early times to the present. Special attention is given to planning in New Jersey, and to all aspects of a comprehensive master plan as a planning tool.

PLANNING CONFERENCE

The 1961 New Jersey State Planning Conference, had as its theme "Providing for the Next Million People". The hope that New Jersey citizens might have the amenities of urban living without sacrificing the charm and freedom of New Jersey's natural beauty, was of chief concern to the more than 500 conferees.

In 1962, for the first time, the annual National Planning Conference of the American Society

of Planning Officials, will be held in New Jersey. ASPO is a non-professional society of planning board members and other public officials. The State of New Jersey will be host. Since the conference is expected to generate increased awareness of planning among the people of New Jersey, the full resources of the Department's planning facilities will be used to make it a success.

NAVIGATION

Rising income levels, increased leisure time, increasing industrial and real estate development pressures on riparian lands, heightened demands for improvement of inland waterways

and other factors affecting New Jersey's waters, are adding new dimensions to navigation activities in New Jersey.



Maintaining good safety conditions on New Jersey's waters has come to resemble the problems of safety on her highways.

BOATING

The problem of maintaining good safety conditions on New Jersey's waters has come to resemble the problems of safety on the highways. Over 18,000 hours of marine patrol duty were expended during the boating season by state coastal and lake patrol boats, supplemented by volunteer harbor masters and power boat inspectors who use their own boats. In spite of these increased patrol activities, 17 persons were killed and 18 seriously injured in 114 known boating accidents.

Nearly half of the reported accidents were due to collisions; another 25% hit fixed objects. The balance was caused by capsizing, flooding, or water-ski enthusiasts.

Over 60,000 New Jersey boats are now registered with the U. S. Coast Guard. The revenue

which would have accrued to New Jersey by the passage of suitable boating legislation at the last legislative session would have exceeded \$350,000. This loss necessitated curtailment of projects for channel improvements and marine patrol in New Jersey.

The New Jersey boater with less than a 10 horsepower motor in his vessel is in a legal no-man's land if he wishes to operate in neighboring state waters. While he may legally operate his unnumbered boat in New Jersey's tidal waters, he is subject to arrest in other neighboring states. Both he and the law enforcement agencies are confused. The need for a comprehensive boating bill to assure compliance with federal boating regulations and to assure the safety of the boating public on New Jersey's waters is crucial.

NAVIGATION AIDS

Approximately 300 miles of New Jersey waterways were marked by the placement of 131 floating navigational beacons and range

lights, 180 steel and fiberglass buoys and spars and markers on 4000 stakes.

MARINAS

Substantial improvements were made during the year at the four state-owned marinas. General construction was completed on the new Atlantic City piers, numbers 1 and 2, and utilities and electrical installations are being extended on other piers.

A new office building is under construction at the Leonardo Marina to replace the one lost in the hurricane of September 1960. The parking yard at the Point Pleasant Marina was

paved and a new addition made to the office building to accommodate expanding needs of the Marine Patrol. Plans have been prepared for new shower buildings and sanitary facilities at Forked River.

There is a total of 549 boats at the four marinas: 255 at Atlantic City, 90 at Forked River, 190 at the Leonardo marina and 14 at the Point Pleasant marina.

COAST PROTECTION

New Jersey's shore line is one of the most valuable natural resources in the State. There are now only two sizeable vacant stretches of open land left along the State's Atlantic coast line. The 9½ mile stretch of excellent beach at Island Beach was acquired by the State several years ago to prevent the total loss of natural areas along the shore and is now being further developed for park, natural and intensive recreational areas in certain locations. The other is the Sandy Hook military reservation at the entrance to New York harbor. Significant changes in the nation's defense needs offer a possibility of developing the area as a major park and recreation facility.

Beach erosion remains a threat to efforts to meet New Jersey's emerging recreation needs in the sixties. The State annually appropriates funds for construction of bulkheads and jetties to check the encroachment of the sea on shore lines. The search for the most productive methods continues. A study is now underway, in cooperation with the Beach Erosion Board of the U. S. Corps of Engineers, to determine the effects of navigation inlets on beach erosion along the Atlantic coast. Nearly one and one half million dollars were earmarked for combating beach erosion during the year. The following projects, towards which the State is contributing approximately \$800,000, have either been initiated or completed.



Shoreline Rehabilitation

COAST PROTECTION WORKS

Municipality	Work Type	Total Cost	State Contribution
Asbury Park	Stone Jetty	\$ 39,229.64	\$ 19,614.82
Atlantic City	Concrete Void Filler	10,145.68	5,022.84
Atlantic City	2-Piers	129,000.00	64,500.00
Barnegat Light	Timber Groins	63,079.18	31,539.59
Barnegat State Park	Stone Revetment	46,000.00	46,000.00
Berkeley Township	Timber Groin Beachfill	20,000.00	10,000.00
Cape May Point	Timber & Stone Jetty	48,982.88	48,982.88
Fort Mott State Park	Borings	1,500.00	1,500.00
Harvey Cedars	Beachfill	47,200.00	28,600.00
Island Heights	Timber Bulkhead	25,521.62	12,760.81
Island Heights	Timber Bulkhead	50,000.00	25,000.00
Keyport	Timber Bulkhead	25,000.00	17,500.00
Long Beach Township	Timber Groins	94,106.37	47,053.19
Long Beach Township	Timber Groins	100,000.00	50,000.00
Long Beach Township	Beachfill	28,160.00	14,080.00
Longport Township	Timber Bulkhead	32,127.10	16,063.55
Lower Penns Neck	Steel Bulkhead	97,971.82	48,985.91
Manasquan	Timber Bulkhead	42,102.85	21,051.43
Manasquan Inlet	Earth Dikes	9,360.00	4,680.00
Middletown Township	Timber Bulkhead	29,935.36	14,967.68
Monmouth Beach to Manasquan Inlet	Off-Shore Boring	17,000.00	17,000.00
North Wildwood	Timber Bulkhead	58,286.20	49,143.10
Ocean Gate	Beachfill	8,601.63	4,300.87
Perth Amboy	Seawall	79,371.75	39,685.88
Pine Beach	Timber Groin Beachfill	21,488.32	10,744.16
Pine Beach	Timber Bulkhead	20,000.00	10,000.00
Sea Isle City	Timber Bulkhead	33,217.97	16,608.99
Shark River	Borings	4,365.00	4,365.00
Spring Lake	Stone Jetty	162,190.00	81,095.00
Spring Lake	Stone Jetty	<u>78,525.00</u>	<u>39,262.50</u>
Total		\$1,442,468.37	\$800,108.20

During the year the State contributed over \$300,000 to dredging operations for maintenance and improvement of New Jersey's inlets and

waterways. The following projects were undertaken:

DREDGING OPERATIONS 1960-61

Municipality	Dredging	Cost	State Contribution
Atlantic Highlands	Mooring Area	\$ 47,247.62	\$ 23,623.81
Barnegat Light	Channel	63,000.00	52,000.00
Island Beach State Park	Channel	64,714.41	64,714.41
Little Silver	Channel	50,272.95	31,169.23
Lower Township	Channel	74,503.67	74,503.67
Margate	Channel	15,195.09	7,597.55
North Wildwood	Channel	7,268.40	7,268.40
Oceanport	Channel	33,605.39	20,835.34
Point Pleasant	Channel	13,141.63	13,141.63
Sea Isle City	Channel	2,031.00	2,031.00
Waretown	Channel	<u>9,561.31</u>	<u>9,561.31</u>
Total		\$380,541.47	\$306,446.35

RIPARIAN LANDS

The postwar expansion has had a significant impact on the demand for riparian lands in New Jersey. Industrial and real estate development trends indicate that no relaxation of these pressures is in sight.

The administration of riparian lands involves execution of grants and leases, permits for erection and maintenance of stretches of navigable waters and dredging operations, collection of royalties on materials removed by dredging operations, regulation of land reclamation projects and prevention of unauthorized uses of such riparian lands.

The entire New Jersey seashore, with bays, inlets and streams where the tides ebb and flow, is subject to regulation. Riparian lands can be granted or leased to individuals or groups. They are usually acquired by individuals for the purpose of erecting small piers or bulkheads to protect property. Business concerns apply for these lands in order to improve or expand their water front facilities. During the year, 195 grants and 14 leases were executed. The demands for these lands and their value continue to rise. The area along the Delaware River shore between Paulsboro in Gloucester County and Florence in Burlington County has been subjected to heightened development pressures due to mounting concentrations of industry.

A phenomenon which tends to increase the value of riparian properties along the New Jersey shore is lagoon construction. Professional developers carry out such projects in order to meet the demand for houses overlooking the water and with suitable facilities for boats. Another type of riparian conveyance is the

license issued for a single fee to a public utility, private corporation, or municipal or county governments. This license confers perpetual authority to use riparian lands for such purposes as cable and pipeline crossings. Twenty-seven such licenses were issued during the year.

Riparian grants and leases as well as single-fee licenses are issued only to an exterior line offshore. An annual license is required for the maintenance of structures in some areas beyond this point. Ninety-four were processed during the year.

Another type of license confers the right to engage in commercial dredging in the waters of New Jersey. In return, the State collects a royalty on all materials obtained from dredging. Four commercial dredging agreements were in effect during 1961; royalties therefrom totaled \$40,048.12 Commercial dredging has steadily assumed new importance because of the heavy demand for fill material used in highway construction and real estate development. The amount of fill obtainable from land sources is becoming increasingly scarce. One alternative is to tap the beds of rivers and bays.

As most municipalities require authorization for the construction of houses and commercial buildings, permits are required for the erection and maintenance of structures on riparian lands and for maintenance and dredging in State waters. During the year, 209 permits were issued for activities such as dredging, construction of bridges, structures, and the laying of pipelands and submarine cables. The estimated value of the improvements authorized during the year was \$18,996,694.

STATE PROMOTION

The promotion of the State is essential to New Jersey's growth and economic well being. New Jersey is in an enviable geographic position, at the center of a circle 250 miles in radius encompassing 115 billion dollars worth of buying power and containing one-third of the nation's labor force. But the State is meeting increasing competition with the increasing industrialization of the West and the expansion of manufacturing in the South.

Besides promotion through State advertising, literature and brochures, industrial promotion especially demands direct contacts. This facet of promotional activity is done in cooperation with the "New Jersey Industrial Family", composed of the State's industrial realtors, representatives of utilities, railroads, local and county industrial commissions, the State Chamber of Commerce, and the New Jersey Manufacturers' Association. Similar cooperation between business and government exists through the Economic Ambassadors, 100 respected and successful business and industrial leaders, who aid in the promotion of New Jersey's economic welfare for existing industry as well as for newcomers. A Department-sponsored Conference in April 1960 with the New Jersey Freeholders Association has spurred the growth of industrial development groups on the local level in several counties.

Inquiries from more than 150 firms interested

in locating in New Jersey were processed during the year. Requests sought information on location, taxes, labor, transportation and other pertinent matters. Extensive investigations were made of more than one hundred of the most promising prospects.

Plant location is not the only facet of industrial promotion. Business aids and services, professional services, area aids, industrial activities, and community aids are also important. The services to firms include industrial exhibits, brochures and information ranging from the labor force in New Jersey to the most recent residential data. Approximately 360 such inquiries were processed during the year.

Business aids and services constitute a large portion of promotion work, but inducing new industry to come to New Jersey is a larger part of the promoter's job. Advertisements are placed in major newspapers throughout the country; brochures and other informative materials are widely circulated and industrial exhibits are shown throughout the State and nation. "Fact Sheets" designed to explain various aspects of the State's economy are also printed and distributed. This year the following subject matter was provided: "Water Resources", "Tax Climate", "Labor Training", "Industrial Financing Programs in New Jersey", "Labor-Availability", "Air Transportation" and "Industrial Parks in the Garden State".

RESORT PROMOTION

The resort industry is an important element in New Jersey's economy. The State ranks among the top five recreation states, and exhibits an annual growth of five per cent. Its strength, as an estimated billion-and-a-half dollar generator of business, is seen in the millions of tourists New Jersey attracts, as well as the employment it offers to workers, the solvency it gives to thousands of hotels, restaurants and business establishments and the tax revenues it provides. It is estimated that during

the July-August period alone, the recreation business activity produced more than three million dollars in extra tax revenues.

In order to promote New Jersey's expansion and prosperity, many attractive brochures are prepared and sent in answer to thousands of requests. This activity is closely connected with the New Jersey Resort Association, the New Jersey Hotel Association, Chambers of Commerce and related agencies in an attempt to improve the effectiveness and quality of the

State's resort literature and advertising. Frequent revisions are made to keep the material up to date.

The booklet, "New Jersey Boat Basins," was revised as well as the listing of canoe runs. A new convention folder, "Work in Progress," and the pamphlet, "Twelve Scenic Tours," were reprinted. At the end of the 1960 resort season, a survey of last summer's arrivals was made; a fall folder was distributed; and 100,000 copies of the 1961 "Vacation Guide" were printed. In addition to the survey of arrivals, which was distributed in March, spending trends of 1960 vacationers were studied.

A new "Schedule of Events for 1961" was prepared, and the 1962 vacation brochure is

underway. In anticipation of increases in foreign visitors and federal plans to develop foreign travel to the United States, a new multi-colored resort folder will be printed in foreign languages.

In the past 12 months, there have been 625 showings of four promotion films: "Vacation Fun in New Jersey", "Gold Mine on Main Street", "Camera Eye on New Jersey" and "The Fabulous Decade". Television stations throughout the country have shown these films over sixty times during the year.

The booklet, "You'll Feel At Home in New Jersey," has been completely revised. Other related materials are distributed widely with special emphasis on the large commuter population in the New York and Philadelphia areas.

EDUCATIONAL PROMOTION

The "Jerseyanna" educational promotion program, originally intended to encourage pride in New Jersey, has been broadened to include other areas of state promotion. Thousands of requests for information and inquiries on a wide range of topics are answered. In addition, assistance is provided in the preparation of ma-

terial for exhibits to be displayed in New Jersey or elsewhere. Colleges, universities, schools and other states are assisted. The brochure, "Know Your State" and the flyer, "Facts About New Jersey", were revised this year and prove useful as reference guides.

RESEARCH AND STATISTICS

As the labor force increases, the expansion of industry continues, and the population migration to suburbia changes the composition of the State, businessmen, industrialists, public agencies and financial groups need to know what is happening and how the social, economic and cultural climate of New Jersey will be affected.

By collecting and interpreting statistical information, the conclusions have ready application. Private and public groups supplied with such information as population, housing, income, employment, manufacturing, taxation, transportation facilities and other data are better able to judge the feasibility of any development, expansion or investment.

The Department's research and statistics section works in two basic areas: statistical compilation of basic facts and figures, and

research and analysis. All statistics are compiled so that they are readily adaptable to specific requests. Important unpublished material from public and private sources is collected. The interpretation and coordination of this information for the applied work of planning, promotion and industrial location is the second major function.

The value of research and statistics is substantiated by the hundreds of requests for data by industrialists, engineers, colleges and governmental agencies.

The research and statistics section fills a direct and influential role in state government through its work in the Economic Watchdog Staff Subcommittee. This subcommittee supplements the work of the Governor's Economic Advisors by preparing charts, graphs and tables

showing the basic economic trends and business activities in the State; electric power sales, bank debits in major New Jersey cities, awards of construction contracts, and the number of business failures and new incorporations.

With such statistical information, the Committee is better able to comment upon economic activity and to forecast future economic growth in New Jersey.

PUBLICATIONS

The "New Jersey Economic Review," now published every two months, provides pertinent information regarding employment, business activity, new companies and industrial firms, government agencies, development agencies, industrial commissions and trade organizations. Each issue features an article devoted to one aspect of the economy by an expert in that area.

The content of the "Economic Review" has attracted approximately 1200 subscribers. In preparing this publication, statistical data and other information gathered by the various departments of State government and special agencies are included. A periodical dealing with prime government contracts is also published. It is unique in providing summaries of all non-classified government contracts awarded to firms in New Jersey.

As in the past, detailed and classified information has been supplied to the *Americana Annual Yearbook*, *Information Please*, *Almanac*, *Encyclopedia Britannica*, and *Compton's Encyclopedia*.

Several research reports, population projections, revisions of older reports and up-dating various listings were prepared during the year. One of the most significant is the report and directory of New Jersey's numerous industrial research and scientific laboratories.

Published Report No. 121, "Housing and

Dwelling Units 1950-1959", showed the gain in public and private housing units and listed their rates of growth. Research Report No. 122, "A Digest of Employment—1959", was also published. This comprehensive analysis of New Jersey's employment picture classifies New Jersey workers in retail and wholesale trade and in manufacturing, enumerating by counties the various industries and the employment in each.

Several surveys were undertaken this year. One covered capital expenditures for plants and equipment; another covered capital expenditures on a year-to-year basis from 1951 to 1958. Information on industrial facilities was revised with comparisons to 1959 concerning the number of new industrial firms coming to New Jersey, the number of older plants expanding and branch plants opening. Economic data for various periods and basic information summarizing factors such as non-agricultural and manufacturing employment and per capita income were covered in another survey.

Other material included a comparative study of non-agricultural employment; analysis of the 1958 Census of Business regarding "Retail Trade", "Wholesale Trade" and "Services"; a fact sheet on various statutes; and rules and regulations which must be followed by new enterprises in the State.

AERONAUTICS

Air transportation has become an economic necessity to New Jersey's prosperity. The future economic development of the State depends to an important degree on how well the State meets the demand for this first class mode of transportation. It is one of the fastest growing industries in the New York-New Jersey metropolitan area. More air passenger and cargo

traffic means more jobs for Jersey men; and modern air facilities must be maintained to meet the increasing demands.

Applications for airport projects through the federal aid program were approved for Newark Airport and Mercer County Airport. The Newark project includes a new service road; rehabilitation of runway and taxiway; instal-

lation of high intensity lighting, and expansion of holding pad facilities.

Payments totalling over \$200,000 for projects at Morristown Municipal Airport and Mercer County Airport were approved. Monmouth County, Teterboro and other additional public use air facilities received Federal Airport Development funds.

Recommendations for new airport facilities and expansion of existing ones are made to meet New Jersey's needs in conformity with the National Airport Plan. The most recent called for the construction of seven new airports, improvements on 18 existing airports; and 19 new heliports.

All land and water areas within New Jersey used for take-off or landing of all types of aircraft must be licensed annually. This includes everything from the licensing of helicopter landing areas to major air terminals. Every licensed facility is inspected each year. All complaints and alleged violations of air traffic rules and regulations are evaluated and followed by recommendations for appropriate action in cooperation with the Federal Aviation Agency and State and local police. All major aircraft accidents reported are investigated.

MIDDLE INCOME HOUSING

It is estimated that the population of the great metropolitan region of northeastern New Jersey will increase by approximately 1,000,000 in the next decade. An annual construction rate of over 43,000 dwellings will be necessary, merely to accommodate the projected increased number of needed households, and to insure a reasonable vacancy ratio.

Major housing problems result from the way people, jobs and industries are distributed. The absolute loss of population by New Jersey's major cities, and the phenomenal rise of suburban areas, clearly indicate the large extent to which the State has become suburban. Unless adequate housing is provided at moderate rentals in New Jersey's cities, middle income people will continue to move to the suburbs.

Middle income rental housing is intended to alleviate this basic problem and bring the middle income citizen back to the city. He has long been recognized as the economic and social backbone of the community. Unless

The following tables summarize activities by the Bureau of Aeronautics for the year.

Licenses Issued		
	Renewals	New
Airports	53	2
Landing Fields	12	1
Landing Strips	7	1
Fixed Base Operators	98	16
Heliports	14	9
Temp. Helicopter Landing Areas	30	35
Aerial Exhibitions	0	1
Private Aviation Facilities	54	12
Special Land. Strip (Agriculture Use)	3	1
Total Licenses Issued	271	77

Inspections	
Airports, Landing Fields and Landing Strips	108
Heliports	5
Fixed Base Operators	113
Proposed Airports, Landing Fields, Landing Strips	3
Proposed Heliports	1
Proposed Fixed Base Operators	5
Proposed Temp. Helicopter Landing Areas	39
Proposed Private Aviation Facilities	18
Total Inspections	292

In addition, 53 aircraft accidents were investigated and analyzed in detail.

middle income citizens do settle in the cities, it is highly doubtful that the cities can be restored. Cities today lack many of the workers, consumers and citizens who could do most to quicken the economic and social tempo of urban life. The exodus from the cities will not be slowed or reversed until housing units at moderate rentals are made available in sufficient quantities to satisfy the housing needs. Large numbers of these people—white-collar workers, skilled workers, civil servants, teachers, policemen, firemen and others—continue to move away from the cities.

The number of elderly, unmarried and recently married people is clearly increasing and makes the need for good apartment housing more acute. A large number of people in these groups need and would prefer to live in a city apartment rather than a suburban house.

One very important reason why builders have not erected apartments at moderate rentals in the cities is that they have been unable to



secure private capital at low enough rates and for long enough periods of time to make such apartment construction a profitable venture. Under today's economic conditions, builders have concentrated on constructing urban-located apartments which typically rent for \$45 per room per month and upwards. This luxury rental rate contrasts sharply with the \$20-\$27 per room per month which middle-income families can afford without serious financial hardship. The price of land sites in cities has risen steeply in the last decade, as has also the cost of construction materials and labor. If the high mortgage charges of conventional financing are added to the builder's costs, rents of \$20-\$24 are beyond the realm of the financial possibility.

It is of paramount importance to New Jersey that a better distribution of the middle-income population be brought about between the city and suburban areas. Both the cities and the

suburbs will benefit. Just as the cities depend upon the suburban areas for manpower, the suburban areas depend upon the cities for a large part of the supply of jobs and cultural opportunities. Adequate urban rental housing at moderate prices would promote the interests of the cities, the suburbs and ultimately, the State.

Since the enactment of the Limited Dividend Housing Corporation Law, the only projects built or in process are the College Towers Apartments for 320 families in Jersey City, occupied since 1956; the Monroe Towers for 256 families in Asbury Park, soon to be constructed; and an 800 family unit for the Paterson area, now being processed. The provisions of the law do not meet the need for middle income housing in New Jersey. Legislation was introduced during the fiscal year to alleviate middle income housing problems, but unfortunately did not receive full consideration.

GEOLOGY

Unlike the changes in the landscape made by geologic processes over eons of time, the needs and demands of our culture and industrial civilization make rapid changes in the usefulness of, or need for, our natural resources. Requests for information range from expected questions about minerals, rocks, fossils, ground water, geology, mines, maps and oil or natural gas to the more unusual requests for legal boundaries, geodetic positions, the history of some mineral industry, or whether a road, town or boundary was on the map at a certain date. Some inquiries, such as those on the location of fossils or minerals, or a child's request for mineral or rock samples, can be answered by a form letter or standardized procedures. Others, such as the potential site for a nuclear industrial facility, or for a new plant for a national or international pharmaceutical company, require weeks of effort in the field and office.

An example of the changing emphasis in geologic investigations is provided by the studies made on potential sites for nuclear industrial facilities in New Jersey. Less than ten years ago there was no thought of the problems related to the handling of products resulting from the use of nuclear reactors nor, for that matter, was there much general knowledge or information about industrial research or power reactors themselves. New Jersey now has one of the largest research reactors in the country, with several large nuclear research laboratories as satellite facilities in the area of the research reactor.

Prior to their construction, the State Geological Survey was called upon to provide information on ground water and subsurface conditions. More recently, the Geological Survey was called upon to evaluate potential sites for nuclear industrial facilities which were not reactors. A number of requirements were included. The nature of these facilities required that the area be one with a low population density, yet relatively close to major centers of industry and research.

The sites themselves needed transportation facilities permitting shipment by rail, truck, airplane or ship. With these favorable transportation facilities, because of the restrictive

population density requirement, the area also had to be one in which industrial or real estate development had not taken place to any great degree. The sites had to be of a specified elevation above sea level or adjacent rivers to protect against floods or abnormally high storm tides. The earthquake history of the region had to be extremely favorable. Surface drainage, ground water recharge and the shallow ground water flow had to meet very specific standards.

Although it was desirable that the subsoil from thirty to fifty feet below the surface be well drained and dry, it was also desirable that the ground water movement be slow. Although isolated in the actual plant site, staffing requirements demanded that the site be near major institutions of higher learning and important research facilities. The general living conditions in the area had to be attractive to personnel with more than average education and a background emphasizing certain rather intangible cultural and educational associations.

In the selection of sites with these diverse and at times contradictory requirements, topographic relationships of the sites were of primary importance. The subsurface geologic conditions, as related to the movement of ground water, water table depth and the relationship to surface drainage, were additional controlling factors. Sites with favorable topography and geology were then eliminated by the population density requirements, by present and potential land use and finally by transportation and general environmental factors.

In addition to the rather intensive investigations of the general geographic and geologic conditions it was necessary to assemble and review all of the available information about subsurface conditions, not only about the ground water levels and direction of movement, but also about the nature of the geologic materials. The investigations indicated that several areas in New Jersey met the diverse requirements essential for the coming development of the peaceful uses of the atom.

In April 1960 an international pharmaceutical company requested assistance in locating one or more sites in New Jersey where a new facility could be located requiring at least ten million

gallons of water a day, with an ultimate doubling of the water requirement. Several sites were selected and eventually, after further consultation and site evaluation by staff geologists, a site was placed under option by the company. A test well program proved that sufficient water was available; purchase of the property was completed in May 1961.

The quality of water required in this type of operation is extremely important. Since the site is located between two rivers, whose waters are quite different in composition, the investigation of the subsurface conditions and rock structure is being continued to determine how much ground water will be derived from each river when the plant is in full operation. Such an investigation requires not only a knowledge of the earth materials from which the water is being drawn, but also of the geologic history of the region and how this history has changed the characteristics of the materials, their interrelationships, and their present extent and occurrence.

The required information is obtained from test drilling, studies of stream flow, changes in ground water movement and chemical analyses by the use of geophysical surveys using changes in the vibration transmission speed or electric resistivity of the various subsurface formations; from regional mapping, and from knowledge of geologic principles and conditions as demonstrated in other areas of the state or other parts of the world. The information gathered is then evaluated and correlated to provide clues from which the estimates of present subsurface conditions are prepared.

Geologic activity has changed in two areas.

For the first time, there was a sufficient staff to examine files containing over 30,000 well records, appraise the data, and make maps and summaries of yield and depth of wells by formations and municipal subdivisions. This project not only reduces the time needed to service the more than 600 specific ground water problems presented each year, but also makes it possible to prepare county and township summaries of well information useful to industry, drillers, realtors, planners, municipal officials and individuals.

The increasing emphasis on science has led to greater survey personnel participation in presenting geology to science teachers as part of the Science Workshops, National Science Foundation Institutes, Science Teachers Association meetings and other educational activities of the State Education Department, the state colleges and individual school groups. In most instances, an all-day field trip or an evening lecture is given by a geologist to a teacher's group in the cooperative interdepartmental program at the School of Education. Over thirty-six geology days were devoted to such service, and the Stokes-High Point area is being mapped for a geologic guidebook of the area to be used as a teaching aid.

From atoms to aerial photos, from geology to geodesy, from mines to maps, from resource to "rock hound", and from well water data to "what is it?", the geologist is expected to either know what materials are in, on and under New Jersey land, or to be able to provide guidance to the answer whenever a citizen has a problem in geology or topography. Over 9,000 requests for such information were received during the year.



Island Beach State Park—one of the most popular recreation areas on the New Jersey shore.

PARKS

Island Beach State Park is becoming one of the most popular recreation areas on the New Jersey shore. Since 1954, attendance has risen from 38,000 to a third of a million visitors annually. Island Beach, with its dunes, wildlife and ten-mile strip of almost virgin beach, offers visitors a wealth of natural beauty unexcelled on the eastern seaboard. The purchase of the park in 1953, and subsequent improvements are proving to be one of the wisest park and recreation investments ever made in New Jersey.

High Point State Park, in Sussex County, had the highest attendance this year with an estimated 335,000 visitors; thirty picnic grill and table combinations were added to meet the increased demand for new facilities. There are now fifty campsites in the park. Construction is nearly completed on additional overnight guest facilities, to be operated in conjunction with High Point Lodge and Inn. These facilities feature large windows overlooking the Delaware River Valley, and are designed to provide for year-round occupancy.

A stone revetment was placed along the south promenade in Barnegat Lighthouse State Park. An existing spur jetty was raised and lengthened to deflect erosion currents menacing the base of the Lighthouse. As a result of the jetty work, the beach is again building, and is now approximately 200 feet wide.

The bathhouse approach has been paved and an attractive brick terrace has been added at Cheesequake State Park. An improved drainage system has been installed with curbs, gutters and drains to arrest and guide water runoff. An engineering study has been completed to support plans for reconstruction of the pier at Fort Mott State Park.

A new refreshment concession building was completed and operated this year at Ringwood Manor State Park.

Recreation equipment has been installed at eleven forest and park areas. At Washington Crossing State Park, recreation equipment has been supplemented by additional features such

as shuffleboard courts and pavements for children's games.

Attendance and Income at State Parks During the Fiscal Year 1960-61

Park	Attendance	Income
Allaire	76,480	\$ 7,755.94
Barnegat Lighthouse	160,256	25,554.70
Cheesequake	165,385	32,684.20
Edison	302	73.47
Fort Mott	41,384	1,385.80
Hacklebarney	32,940	1,921.10
High Point	334,839	47,735.90
Hopatcong	210,620	53,304.82
Island Beach	318,586	142,745.26
Musconetcong	38,265	125.00
Parvin	90,295	28,328.08
Princeton Battlefield	16,857	790.00
Ringwood Manor	70,569	11,138.50
Stephens	85,122	1,115.80
Swartswood	69,682	15,583.71
Voorhees	31,126	1,589.25
Washington Crossing	179,326	4,178.90
Washington Rock	14,504	445.11
Worthington Tract	15,260	101.80
	<u>1,951,798</u>	<u>\$323,707.77</u>



Bog Iron Furnace Stack—Allaire State Park, Monmouth County.



Washington Crossing State Park

FORESTS

Bass River State Forest, a favorite area for all types of outdoor recreation, ranks high among southern New Jersey park areas, with an estimated 82,000 visitors this past season. Facilities at the park have been expanded to meet increasing demands. At Absegami Beach, a new bath-house, concession and an enlarged camping area with laundry facilities and shower-house has been constructed.

All camping facilities in Belleplain State Forest were enlarged and improved. A modern laundry and shower-house were constructed, as well as installation of sanitary units and a more convenient portable water supply. Lake Nummy Beach has been rehabilitated, and a complete

line of recreation equipment has been installed near the picnic area.

Attendance and Income at State Forests During the Fiscal Year 1960-61

Forest	Attendance	Income
Bass River	81,824	\$22,071.94
Belleplain	38,597	8,994.60
Green Bank	14,672	6.00
Abram Hewitt	6,010	(no income)
Jenny Jump	14,508	1,851.40
Lebanon	71,931	8,712.35
Norvin Green	7,490	(no income)
Penn	18,540	455.60
Stokes	294,375	28,931.40
	<u>547,947</u>	<u>\$71,023.29</u>

State-owned Parks and Forests—1960-61

Parks	Year Acquired	County	Acres In Land	Acres In Water	Total Acreage
Allaire	1940	Monmouth	1,278		1,278
Barnegat	1951	Ocean	13		13
Cheesequake	1938	Middlesex	903	15	918
Cranbury Lake	1925	Sussex	70	129	199
Edison	1947	Middlesex	30		30
Farny	1944	Morris	803		803
Fort Mott	1947	Salem	104		104
Greenwood Lake	1925	Passaic	2		2
Hacklebarney	1924	Morris	193		193
High Point	1923	Sussex	10,982	79	11,061
Hopatcong	1925	(Sussex	13	2	
		(Morris	78	14	107
Island Beach	1953	Ocean	2,694		2,694
Little Basin	1925	Hudson	2	10	12
Mount Laurel	1908	Burlington	20		20
Musconetcong	1925	(Sussex	14	231	
		(Morris	14	231	343
Parvin	1931	Salem	918	107	1,025
Princeton Battlefield	1946	Mercer	40		40
Ringwood Manor	1936	Passaic	569	10	579
Stephens	1925	(Morris	94	4	
		(Warren	133		231
Swartswood	1914	Sussex	185	519	704
Voorhees	1929	Hunterdon	429		429
Washington Crossing	1912	Mercer	369		369
Washington Rock	1913	Somerset	27		27
			<u>19,977</u>	<u>1,204</u>	<u>21,181</u>

(Cranbury Lake, Farny, Greenwood Lake, Little Basin and Mount Laurel are not developed.)

Forests

Bass River	1905	(Burlington- Ocean	6,820	67	
			1,531		8,418
Belleplain	1928	(Cape May- Cumberland	5,944	93	
			455		6,492
Green Bank	1930	(Atlantic- Burlington	300		
			1,533		1,833
A. S. Hewitt	1951	Passaic	1,874	16	1,890
Jackson	1915	Ocean	43		43
Jenny Jump	1931	Warren	882	33	915
Lebanon	1908	(Burlington- Ocean	15,145	71	
			7,000		22,216
Norvin Green	1946	Passaic	2,260		2,260
Penn	1910	Burlington	3,228	90	3,318
Stokes	1907	Sussex	12,439	56	12,495
Wharton	1954	(Atlantic- Burlington- Camden	10,252		
			70,916	535	
			13,403		95,106
Worthington	1954	Warren	6,158	42	6,200
			<u>160,183</u>	<u>1,003</u>	<u>161,186</u>

HISTORIC SITES



The recently renovated foreman's cottage at the Allaire Homestead.



The antique charm of the colonial home is recreated at Allaire.



The warmth and simplicity of the renovated foreman's cottage is a great attraction to those who relish the charm of the simple life.

Structural repairs are underway or completed at several historic sites. Redecoration of the Rockingham Historic Site is 60 per cent complete. A workman's house in Batsto Village is being restored and furnished in a manner typical of the period when Batsto was industrially significant. A road to carry traffic around, instead of through, the Village has been completed.

At the Deserted Village of Allaire, restoration and reconstruction began in 1956, is being continued. Restoration has been completed on the bakery, enameling furnace, carriage barn, store, carpentry shop, chapel, blast furnace, foreman's cottage, manager's cottage and the Allaire homestead. Attractive picnic areas have been developed on the perimeter of the Village.

Improvements were made at several locations on the Wharton Tract. The Richards Mansion is being renovated. Archeological exploration was completed to determine the Mansion's original structure before renovation work could begin. Modernization of ten cabins at Atsion Lake was begun. These cabins are to be provided with plumbing and rented on a weekly basis.

All State-owned historic sites are to be restored in time for the Tercentenary Celebration in 1964. Extensive repairs are being made at Rockingham at Rocky Hill. Pointing of the Trenton Battle Monument and exterior painting of Boxwood Hall, in Elizabeth, have been completed.

A Committee for Historic Sites Evaluation has been established to compile an inventory of all historic sites in New Jersey. A revised historic roadside marker program is underway. A new type of marker made of reflective material fabricated on aluminum has been adopted. These markers, headed by the State Seal, carry buff letters on a blue shield. The first marker has been erected and unveiled at Bayonne, New Jersey. The rest will be distributed throughout the twenty-one counties depending on the importance of sites to be identified. Both the historic sites inventory and the marking program are to be completed by 1964.



Clear water and invigorating air beckon thousands to New Jersey's waterways.



Pop's domestic prowess is being demonstrated at High Point State Park, which attracts many do-it-yourselfers annually.



Sun, surf and sand continues to be the number one attraction for vacationers from all over the State.

Summary of Income and Attendance 1960-1961 (All Facilities)

Location	Attendance	Income
Forests	547,947	\$ 74,828.29
Parks	1,702,913	331,904.77
Historic Sites	27,583	8,229.08
Wharton Tract	283,668	52,280.36
Morris Canal (Parks)	248,885	53,429.82
	<u>2,810,996</u>	<u>\$520,672.32</u>

RECREATION

Recreation in New Jersey has become an important resource in the life experience of its citizens; in the development of community moral fiber and in making leisure hours meaningful and satisfying.

The rapid increase in leisure time is bringing about a revolution in America. In the past ten years the ratio of work to leisure time in the average man's life has been reversed. For the first time in history, more men have more waking hours off the job than on it. Individual free time today amounts to over 5 billion adult leisure hours per week. It has become America's newest frontier; a frontier which offers opportunities for the continued growth of the American ideal.

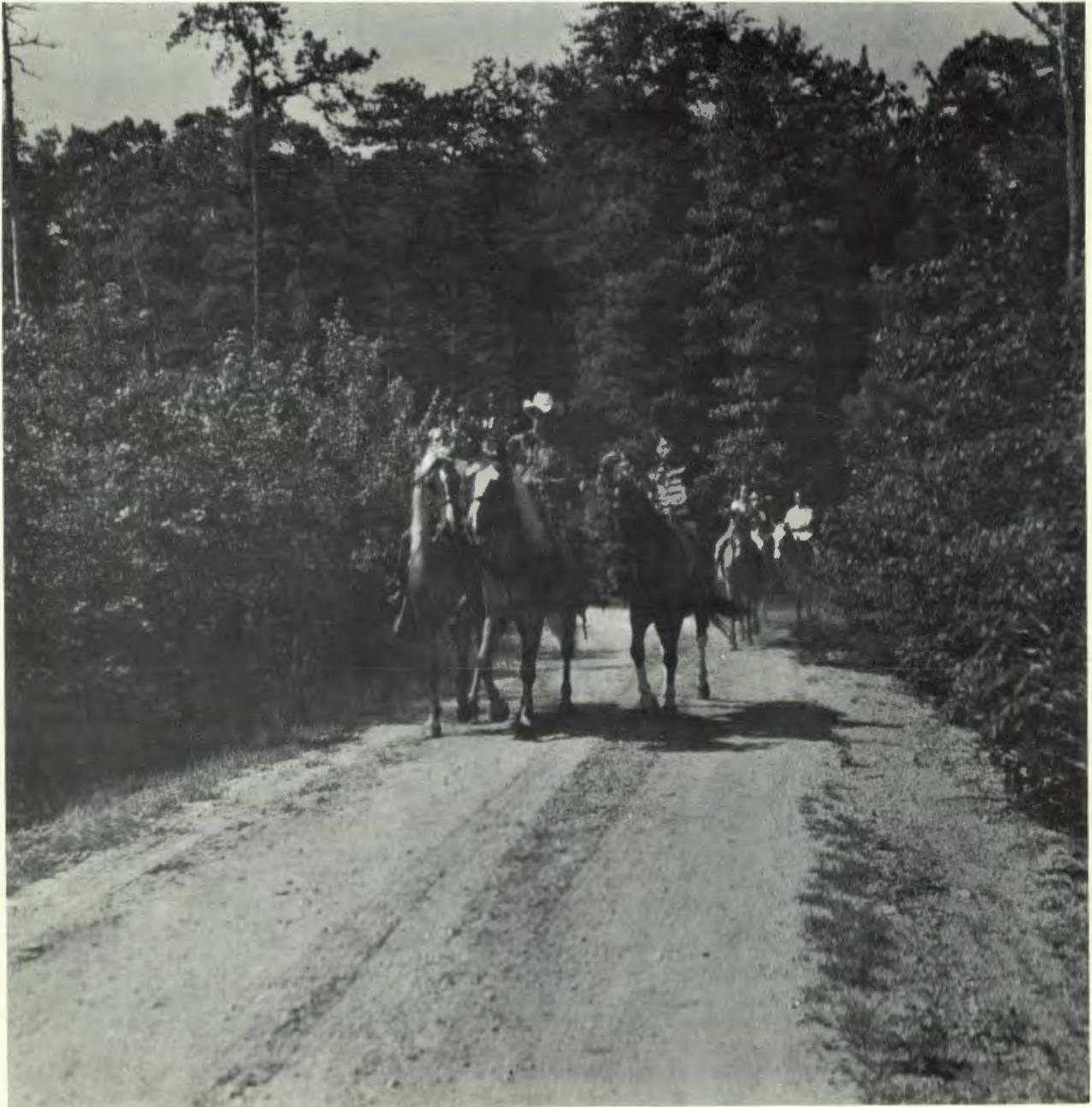
The State's role in meeting the demand for recreation is comparable to the part that it plays in helping communities in such fields as planning, education, welfare and health. It is the responsibility of the municipality to inaugurate and develop public recreation along lines consistent with local conditions. It is the responsibility of the State to aid any political subdivision in establishing a suitable framework for its recreation programs, and to provide such technical services as may be useful in improving existing programs. Surveys of facilities and programs for 16 New Jersey communities were completed this year.

The Department cooperates with groups conducting state-wide programs and in particular with the New Jersey Public Recreation Association in the sponsorship of "Playground Championships" and physical fitness programs. During the year, twenty-two recreation commissions or committees were organized. Technical advice, consultation services and general assistance to a municipality on problems and facets of recre-

ation at the local level include, but are not limited to: conversion of summer programs to year-round recreation activities, organizing new summer programs, planning schedules, organizing "Teenage" clubs, "Golden Age" clubs, physical facilities layouts, budgeting, personnel, financing and similar administrative matters, community centers, swimming pools, skating rinks, and play and sports fields. Eighty communities in the State were provided with this type of specialized service. Literature, correspondence, telephone and other media were used in response to nearly a thousand requests.

"New Jersey Recreation Development", a round of articles on contemporary problems, ideas and news about recreation is now being distributed quarterly to 2,000 subscribers.

A "Recreation Kit", designed to stimulate interest in recreation, was published due to increased demands for a more impressive format containing laws, by-laws, bibliographies and informative material for communities contemplating the organization of formal programs. One hundred fifteen communities were serviced in connection with local plans to formulate programs, and a total of 500 kits were distributed.



WATER RESOURCES

THE DELAWARE RIVER BASIN

After years of controversy, the four Delaware River Basin states have agreed upon a plan for developing the water resources of the Delaware River. The primary long range purpose is to provide dependable water supply, flood control, stream flow regulation, pollution abatement, such hydro power as can be efficiently developed, recreation needs and other benefits through development of basin water control projects. The most fundamental reason for New Jersey's interest in this four-state effort is the fact that the Delaware River is the last remaining large source of surface water available for New Jersey's long range needs.

The water resources of the Delaware River contribute to the economic well being of well over 20 million people, which is certainly a significant percentage of the nation's population. Painstaking effort has gone into the preparation of an inter-governmental compact to achieve effective administration of a region-wide water development and control program. The U. S. Army Corps of Engineers, in response to the directive of Congress in 1955, has completed a two-million-dollar multiple purpose survey of the water needs and the means of water control in the Delaware Basin area.

With each passing year it becomes more apparent that lack of water may actually deter growth in the highly urbanized and heavily

industrialized East, unless early action is taken to assure a continued supply of water. The Delaware River is small in comparison to streams in other river basins, but its waters figure so heavily in the ability of the region to continue to grow that it would be a calamity to neglect its development.

It is obvious that future needs in the field of water resources development will be so great that they will require the combined efforts of federal, state and local governments and private enterprise, all working together with a high degree of coordination.

The Delaware has been surveyed and a blueprint is ready for its thorough development. The development program is based upon the knowledge that the Delaware River and its tributaries form a single unified system which cannot be comprehensively developed if attempted in separate geographic parts. Both the federal and the affected state governments in the compact have a means to accommodate the interests of their various agencies and to bring about unified direction to an effort in which all have a distinct and important stake. The compact has been ratified by the four states of New Jersey, Delaware, Pennsylvania and New York and is now awaiting action by the Congress of the United States.

SPRUCE RUN-ROUND VALLEY RESERVOIR PROJECTS



The core trench and concrete cutoff wall on the center line of the dike at Round Valley.

The investigation phases of the construction program, authorized by the Water Legislation of 1958, included: first, the exploration of the subsurface conditions under the proposed dams and dikes and at certain portions of the perimeter of the reservoirs; and second, the determination of the location and quantity of soils with suitable characteristics for the construction of these structures. The core boring and soil investigations at Spruce Run and Round Valley were thorough and extensive.

The rock under the dam area at Spruce Run and along the easterly ridge of the reservoir is limestone. In certain locations along the axis of the dam, zones of solution cavities, joints and fractured rock and relatively tight rock were found. For the purpose of arriving at a sound and reasonable design for the dam, the rock foundation was explored by drilling 220 core borings having a total length of approxi-

mately 25,000 linear feet. Based on this extensive exploration, the engineers of the State, the consulting firm responsible for the design and experts with international reputations in this type of construction agreed that the rock foundation of the dam could be satisfactorily sealed. Experimental grouting operations indicated the methods by which this could be accomplished.

The core boring explorations at the sites of the dams and dike in Round Valley revealed the rock to be diabase and gneiss at the South Dam, diabase at the North Dam and diabase and quartzite at the dike. The top portion of the rock at the three locations was shown to be broken by fine fractures. Grouting requirements, not as complex as at Spruce Run, were determined by an experimental grouting program under an engineering service contract.

PROBLEMS OF EARTH DAM CONSTRUCTION



Drilling and grouting operations in the core trench of the dike in Round Valley.

Building an earth dam is not the simple process of depositing any available earth to form a barrier. Foundation problems are a challenge in the construction of any engineering project. Of equal importance in the construction of an earth dam are the soils available for the various zones of the structure. The reservoir areas were thoroughly investigated for soils with the required characteristics and in sufficient quantities to build the structures. Soil samples were classified as to grain size, permeability, specific gravity, maximum moisture-density and tested for shearing resistance. Soils used for construc-

tion of earth structures must be carefully analyzed and controlled in their placement.

A cofferdam is built to divert the stream around or through the construction area by using the release water conduits which are a part of the permanent installation or by using temporary piping. A second step involves the excavation of a core trench, cleaning the top of the rock and placing the impervious core material in the trench. The impervious core is the barrier to objectionable seepage through the dam. The two zones of material on both sides

of the core, known as envelopes, give the dam its stability and mass to resist the pressure of the impounded water. The embankment soils, obtained from selected borrow areas, are deposited in their proper zones in layers six to eight inches thick, and compacted by means of sheeps-foot or cylindrical rollers, as required. All parts of an earth dam are built up simultaneously.

The soil in the envelopes should be pervious, in other words, have the quality of draining reasonably fast. This characteristic assures the

stability of the dam. To assure controlled and proper drainage of the envelope on the downstream side of the core, vertical and horizontal drains are built into the structure. The drains are made of selected clean sand and gravel. Drain details and requirements are determined by the characteristics of the soil available for the downstream envelope. To complete the construction of an earth dam, the slope on the reservoir side is protected by a blanket of broken stone or rip-rap and the downstream slope is covered with top soil and seeded.

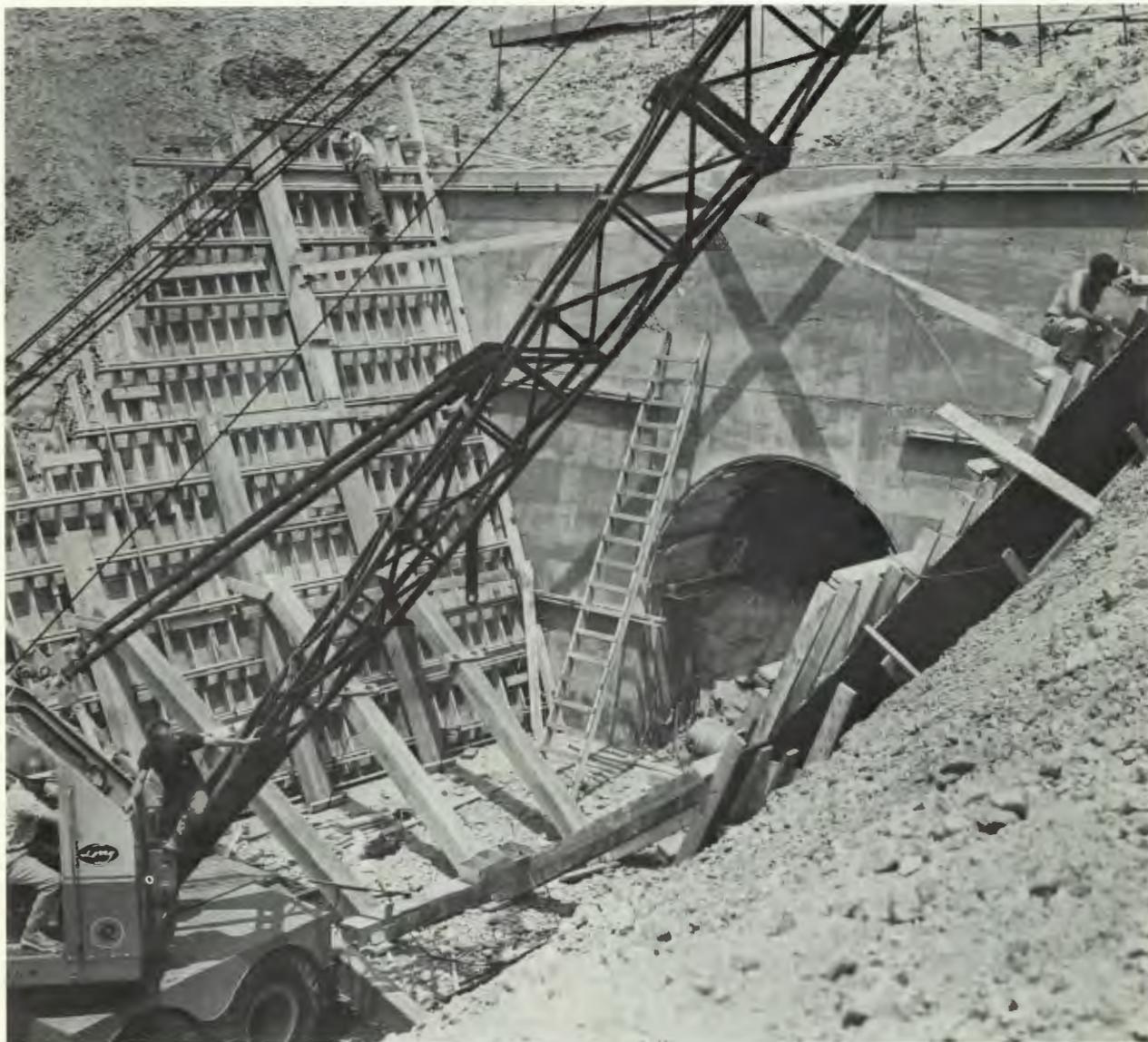
CONSTRUCTION PROGRESS



Construction of the reinforced concrete tunnel entrance at Round Valley.

Five major construction contracts were prepared, advertised and awarded to the lowest bidders. They cover the major portion of the work on the Spruce Run-Round Valley water supply projects. The contract specifications and drawings were prepared by consulting firms engaged by the Department. The relocation of roads and power and telephone lines within the reservoir areas were the first steps taken in the construction program in order to route traffic away from the construction sites and outside the limits of the future reservoirs, and to remove the utilities from the reservoir area and work sites.

Under agreements with the New Jersey Power and Light Company, the relocation of the power transmission lines at Spruce Run and Round Valley has been completed. Through a similar agreement with the New Jersey Bell Telephone Company, the relocation of a telephone line in Round Valley began near the close of the fiscal year. Two culverts and a bridge for the new road at Spruce Run were completed and the major portion of the new Lebanon-Stanton road at Round Valley will be completed by August 1961.



Construction of the steel roof in the tunnel which will serve as an intake to the Round Valley reservoir.



The core trench on the center line of the dam at Spruce Run showing the exposed rock.



The base of the outlet tower in front of the giant conduits at Spruce Run.



Children observing the construction of the dike at Round Valley.

The contract, covering the construction of Spruce Run dam, dikes, weir, spillway and appurtenant works, was awarded on February 14, 1961. The contractor has excavated about 800 feet of core trench down to rock at the easterly end of the dam, which runs parallel to Route 69 at that location. A subcontractor has begun the drilling and grouting operations in the trench along the axis of the dam. The purpose is to seal all openings and fractures in the rock with a grout of cement and water in order to form a reasonably water-tight curtain under the dam.

The conditions of the rock revealed by the drilling operation determined the depth of holes in the area. In June the grouting operations went on three eight-hour shifts per day and the drilling operations went on two shifts. Through another subcontract, trees and underbrush have been cleared away from the dam site, spillway area and fifty-foot strips along both banks of Spruce Run and Mulhockaway Creek. The prime contractor began excavating the trench for the two 84-inch steel pipe conduits to be used for releasing water from the reservoir and for temporary diversion of Spruce Run water during the construction of the dam in the flood plain area. The rock from the excavated trench was placed upstream to form a stream diversion cofferdam. Suppliers of materials and equipment have been approved. Submitted shop drawings and equipment details have been checked for approval. The fabrication of the 84-inch steel pipe was practically completed by the end of June.

The contracts for the construction of South Dam, tunnel and appurtenant works and for the construction of the North Dam, dike, part of the relocated Lebanon-Stanton road and appurtenant works at Round Valley were awarded March 30, 1960. Operations began as soon as weather permitted. The earth and shattered rock were excavated to the rock face at the entrance to the south end of the tunnel and tunnel excavation is underway. The excavation of the core trench for the dike has been completed, as well as a trench in rock for the concrete cutoff wall. The 10-foot deep trench was filled with concrete in which steel grout pipes were set at 10-foot intervals along the axis of the dike. As portions of this construction were

completed, the drilling and grouting contractor proceeded to drill and grout the rock under the dike to form a reasonably water-tight grout curtain. The material excavated from the core trench was placed and compacted in the reservoir toe of the dike.

The area of the North Dam has been cleared of trees and underbrush and the topsoil removed or stripped. In June the prime contractor began excavation of the core trench for the North Dam and the trench for two 72-inch steel pipe conduits through which reservoir water will be released for distribution to purchasers.

The engineering design contract for the South Branch Pumping Station and Force Main of the Round Valley project was awarded in November 1960. The consultants reviewed the

hydrologic data, had the site of the pumping station and the right of way of the force main surveyed and the rock surface explored by borings. The questions of power requirements, available power facilities and power rates were discussed in joint meetings attended by the Department's project engineers, the consulting firm, and the New Jersey Power and Light Company. The locations of the pumping station and force main right-of-way have been selected and preparations for property or easement acquisitions have begun. During the period from September 15 to June 15, excess flows in the South Branch of the Raritan River may be pumped into the Round Valley reservoir. A design contract also has been awarded for the Administration Building for the Spruce Run-Round Valley system.

OPEN SPACE AND RESERVOIR SITES

The Water Bond Act of 1958 provided funds to initiate a long-range acquisition program to assure the availability of vital storage reservoir sites. The need for such a program has been stressed in numerous reports which repeatedly emphasized the steadily increasing demands for water, the scarcity of suitable reservoir sites required for maximum utilization of surface water resources, and the high demand for other development purposes.

A similar need exists for a long-range program to assure the availability of open spaces for recreation and related activities. Supporting data has been prepared on the natural facilities available for long-range, multiple-purpose development of open spaces for recreation in the Delaware River Basin and its adjacent areas. The multiple-use of land offers a solution to many of the problems concerning the future resource needs of New Jersey's citizens.

Each year the cost of open lands for reservoir sites and recreation uses continues to soar, but more important than cost, is the availability of open spaces twenty, thirty or forty years hence. Unless provided for now, the demand for these future facilities will require displacement of homes and industries and the relocation of roads and other utilities on a far greater scale than has ever been experienced in the past.

Providing open space for the construction of reservoirs is considerably more difficult than reserving open spaces for recreation uses. A reservoir site must satisfy certain basic criteria: it must have sufficient storage capacity to catch the available runoff and it must provide adequate conditions for the construction of a dam which must be suitably located to impound the water. The unit cost of land for a reservoir program therefore can be expected to be considerably higher than other open space lands.

The policy of acquiring needed reservoir sites in advance of actual demand is sound and should be encouraged. While they await development, which may require many years, such sites provide excellent areas for many recreational activities. An open space program would make use of much land unsuitable for certain types of development. Provisions have been incorporated in the Water Supply Law of 1958 and in the proposed Green Acres Program, which offer close coordination of water and recreation development and preserve as far as possible the natural benefits of New Jersey's marvelous network of streams. The proposed Green Acres program does not constitute a substitute for the reservoir land acquisition program authorized by the water supply law; it supplements the program and provides for greater use of facilities.

CONSTRUCTION CONTRACTS

Contract	Contractor	Date of Award	Contract Completion Date	Bid Price
SR-1 Spruce Run Dam, Dikes, Spillway, Weir and Channel and Appurtenant Works	Hagen Industries	2-14-61	4-14-64	\$7,347,771.50
SR-2 Bridge and Culverts, Spruce Run Relocated Road	George M. Brewster & Sons	10-14-60	6-14-61	\$ 109,501.50 (completed)
RV-1 South Dam, Tunnel and Appurtenant Works	C. J. Langenfelder & Sons	3-30-61	3-30-64	\$3,222,504.90
RV-2 North Dam, Dike, Part of Relocated Road and Appurtenant Work	C. J. Langenfelder & Sons	3-30-61	3-30-64	\$4,150,159.06
RV-3 Part of Relocated Road, Round Valley	S. J. Groves & Sons	10-18-60	6-18-61	\$ 380,201.00 (completed)

CONSTRUCTION AGREEMENTS

Agreement	Contractor	Date of Execution	Amount
DC-30 Spruce Run Relocated Road	Township of Union	10-5-60	\$ 257,500.00
DC-37 Spruce Run Relocated Power Lines	N. J. Power & Light	10-24-60	\$ 66,250.00
DC-45 Spruce Run Relocated Telephone Lines	N. J. Telephone Co.	4-19-61	\$ 8,000.00
DC-31 Round Valley Relocated Power Lines	N. J. Power & Light	10-24-60	\$ 97,755.00
DC-44 Round Valley Relocated Telephone Line	N. J. Telephone Co.	4-19-61	\$ 35,000.00

STATE WATER DEVELOPMENT FUND

TABLE I

June 30, 1961

Funds Available:	
Bond Referendum NJSA 58:22	\$45,850,000.00
(Series A \$25,000,000.00)	
(Series B 20,850.00)	
Gift from State Committee on Water Resources Information—Balance in Study Funds	2,714.21
Proceeds from rental of land and dwellings and from sale of timber and hay	<u>23,441.93</u>
Total Available	\$45,876,156.14
 Disbursements:	
Round Valley Reservoir Project including Pumping Station and Force Main	\$ 3,686,283.74
Spruce Run Reservoir Project	3,975,551.77
State-wide Ground Water Investigations	224,510.93
Pennsauken Studies	4,913.21
Surface Water Resources—Raritan/Millstone	33,987.80
Surface Water Resources—Balance of State	<u>26,295.96</u>
Total Disbursements	7,951,543.41
 Balance in Fund as of June 30, 1961	 <u>37,924,612.73</u>
	\$45,876,156.14

TABLE II

Allocation of Costs	Spruce Run Project	Round Valley Project
Preliminary Studies	\$ 94,540.80*	\$ 76,558.44
Land Acquisition		
Purchase of Property	2,362,986.34	2,328,727.13
Salaries	107,613.54	34,375.20
Appraisals	42,772.25	47,650.52
Special Services	25,029.57	20,043.82
Engineering Services & Surveys	45,641.66	36,527.55
Supplies and Expenses	12,920.01	7,648.18
Equipment	8,306.46	564.35
Tax Lieu	33,944.27	75,566.70
Sub-total	<u>\$ 2,639,214.10</u>	<u>\$ 2,551,103.45</u>
*See Detailed Statement on Page 103, Annual Report 1959-1960.		
Administration & Engineering (Design, Investigations and Surveys)		
Salaries	\$ 375,600.48	\$ 304,378.64
Consultant Services	19,798.13	9,144.66
Surveys	17,479.64	4,190.00
Investigations: Subsurface	239,548.01	76,626.70
Hydrologic	5,000.00	5,583.33
Designs:		
Dams and Dikes	200,357.97	178,275.61
Relocated Roads	0	40,000.00
Bridges	8,500.00	0
Pumping Station	0	18,554.56
Administration Building	0	0
Supplies and Expenses	64,896.20	54,653.94
Equipment	29,234.34	20,964.20
Damages	1,605.00	0
Sub-total	<u>\$ 962,019.77</u>	<u>\$ 712,371.64</u>
Construction		
Culverts & Bridges:		
George M. Brewster & Sons, Inc. SR 2	91,410.38	0
Power Line Relocation:		
N. J. Power & Light Co. DC 31,DC 37	11,710.81	8,478.18
Telephone Line Relocation:		
N. J. Telephone Company DC 44,DC 45	0	0
Road Relocation:		
Lebanon Township DC 30-A	0	0
Clinton Township DC 28	0	0
S. J. Groves & Sons Co. RV 3	0	122,017.41
Spruce Run Dam:		
Hagan Industries SR 1	176,655.91	0
Round Valley North Dam:		
C. J. Langenfelder & Sons RV 2	0	173,515.64
Round Valley South Dam:		
C. J. Langenfelder & Sons RV 1	0	42,238.96
Sub-total	<u>\$ 279,777.10</u>	<u>\$ 346,250.21</u>
GRAND TOTAL	<u>\$ 3,975,551.77</u>	<u>\$ 3,686,283.74</u>

GROUND WATER INVESTIGATION

The quantity of ground water stored in the natural sand and rock reservoirs beneath New Jersey's land surface is enormous. Most of this great volume of water, larger than all the water contained at any particular time in the rivers, lakes and storage reservoirs on the land surface, slowly percolates to areas of natural discharge. Only a very small part, probably less than ten per cent of the total quantity of water moving through these underground reservoirs each year, is now being utilized.

Contrary to legend, there are no underground rivers fed by New England streams, the Great Lakes or any other distant sources, which—if located and tapped by wells—would solve all of New Jersey's water problems. Essentially all ground water in New Jersey has its source in precipitation. Although average rainfall is more or less evenly distributed over the State, there is a pronounced difference between geologic formations as to the amount of water they contain and the rate at which water can move through them. Consequently, some areas of New Jersey are suitable for the development of large quantities of ground water, whereas other areas are capable of supporting only small to moderate development.

All of the Atlantic Coastal Plain in New Jersey is underlaid by layers of sands, gravels and clays which dip gently to the southeast. The coarser beds in these deposits are very suitable for storage and movement of ground water. A large percentage of regional precipitation enters the soil in this province and a considerable part of it is transmitted through permeable formations to the ocean and to the banks and beds of nearby streams. A vast amount of water moves through these formations; the sediments of the Coastal Plain contain many hundreds of billions of gallons.

The ground water resources of the Atlantic Coastal Plain are largely undeveloped. A large portion of the area, approximately 2,000 square miles, is underlaid by the highly permeable sands of the Cohansey Formation which has a very high infiltration capacity. The magnitude of water in storage and the ease and economy by which it may be developed indicates that

this formation has no equal in the northeastern United States. Properly constructed large-diameter wells often can yield 500 to 1,000 gallons per minute or more.

The importance of these ground-water resources increases as the competition for remaining surface-water supplies heightens. Not only will there be a need to greatly expand the development of this resource for local area requirements in the future, it also may become necessary to export from abundant ground water regions to deficient areas.

The long-range ground-water investigation program, is being conducted on an equal cost sharing basis with the groundwater resources division of the United States Geological Survey. The basic purpose is to secure geologic and hydrologic data needed to evaluate, plan for the development and allocate New Jersey's subsurface waters.

Although these investigations are of State-wide importance, they are especially so to the Coastal Plain region of New Jersey where, except in certain localized areas, groundwater constitutes the basic source of fresh water supply. Extensive observation well drilling, close study of these observations and outpost wells, and thorough hydrologic studies are underway to determine distribution, quantity and quality of these resources and to secure the data needed to protect certain areas from salt water intrusion and other sources of contamination.

Two investigations of primary interest have been completed. One was a large scale pumping test to evaluate the river recharge capacities and the ground-water potential of the Cohansey Sands in the Wharton Tract. The first of the deep observation wells in the vicinity of Berlin in Camden County has been completed. Analysis of water in the well confirms the salt water front predicted in the lower Raritan Formation in Special Report No. 13. A report on the findings of the river recharge investigation is now being prepared.

Significant progress has been made during the year on the state-wide ground-water investigation program. The final draft of the compre-

hensive report on Cape May County is under review in Washington and Trenton. Drafts of revised reports for Mercer and Gloucester counties have been completed and are now ready for review. The field investigations for Camden, Ocean, Salem and Burlington counties are approximately 75 per cent completed; one deep observation well, the first of the deep well observation network; and three smaller wells

have been completed in Camden County. The field investigations for Morris County have been completed. The final draft of the comprehensive report for Monmouth County has been prepared and is ready for review in Washington and Trenton. The Sayreville area draft report is also ready for review. Field investigations and pumping test evaluations have been completed on the Wharton Tract.

SURFACE WATER INVESTIGATION

Eighty-two automatic record gaging stations were maintained during the year in cooperation with the Water Resources Division, United States Geological Survey. Seventy-seven low-flow partial-record stations, established during the previous two years, were continued and eight additional ones were started on small streams not previously gaged. The regular annual streamflow records were completed, and two special reports on surface water resources have been prepared for publication.

A total of 673 stream discharge measurements were made during the year, the most in any year since stream gaging began in New Jersey. Of these, 445 were at regular gaging stations, 23 were to support research projects on the hydrology and ground water resources of the Lebanon State Forest and the Wharton Tract; 13 were for sediment load and water quality studies in the Stony Brook watershed; and 192 were made during base-flow conditions at partial-record stations.

Modification was begun on three gaging stations in the Passaic River Basin for installation of automatic telephonic flood warning equipment on the Passaic River at Chatham, Pomton River at Pompton Plains, and Ramapo River at Mahway. These instruments will greatly improve the speed and accuracy of flood warning forecasts in the Passic River Basin.

A second report on the extent and frequency of inundation of flood plains of the Raritan River has been published. Another, covering a stretch of river from the gaging station at Bound Brook to the tidal waters below Fieldville Dam also was completed. Each of these reports delineates on a map the limits of flood-

ing on both sides of the river for different flood magnitudes varying from a small flood that would occur every other year, on the average, to a flood with a probable recurrence of once in 35 years. The profile of the different flood elevations also is shown, with average depth of inundation for points along this reach of the river.

New Jersey streamflow records for the five-year period from October 1950 through September 1955 have been published and summary tables for each gaging station showing monthly and annual streamflow data for the years 1951 to 1960 is being prepared. A report of streamflow records analyzed by electronic computers, with a brief text and illustrations explaining the use of the tables and analyzed data, is now being compiled which will contain tables of processed streamflow records just as the tables were printed out by the computer.

Precipitation and runoff were above normal from July through September, and from February through April, with the rest of the year being about normal or slightly below. The statewide average precipitation varied from about 5 inches above normal in the north to about 6½ inches above normal in the south for the year. Principal hydrologic events were the hurricane storm on September 12, which dropped from 5 to 7 inches of rain over most of the State; and the heavy snows in December and January which set a new two-month record for Trenton of 37.6 inches. A few stations in northern New Jersey reported an accumulation in excess of 100 inches for the season. A period of 15 consecutive days from January 19 through February 3, when the temperature remained continuously below freezing, set a new record

and caused the snows to accumulate to unusual depths for this part of the country. Fortunately, very gradual melting occurred before the precipitation of February 24-25 and only minor flooding resulted. Hurricane Donna on September 12 caused bankfull or slightly higher conditions over the entire State, and the area from Asbury Park to Camden flooded to a level that might be expected once in a dozen years. Principal damage, however, resulted from high winds. Reservoir storage and groundwater

levels were above average at the end of the year.

The following table shows consumption of water in millions of gallons daily in various areas of the State during the calendar years 1954 to 1960. The computations do not include consumption from private sources for domestic, industrial or irrigation uses. The figures for 1959 have been changed from last year's listing, because those were preliminary estimates. These figures for 1959 are final. The figures for 1960 are preliminary.

WATER CONSUMPTION TABLE

	1954	1955	1956	1957	1958	1959	1960
Northern							
Metropolitan Area	413.37	431.28	430.84	453.20	439.01	465.561	460.352
Southern							
Metropolitan Area	80.02	85.25	81.72	87.62	86.43	93.588	93.871
Seashore Area	48.02	49.48	47.60	52.02	50.71	57.061	57.513
Rest of State	50.33	52.35	50.40	55.22	55.10	59.081	60.474
Total	591.86	618.35	610.55	648.02	631.24	675.291	672.210
Surface	399.48	410.44	409.24	429.88	414.82	443.343	440.813
Subsurface	192.38	207.91	201.31	218.14	216.42	231.948	231.397

ADMINISTRATION

Water Allocation

Public Hearings Held	48
Division Grants Authorized	49
Water Supply Inspections	42
Well Drillers Licensed	501
Well Permits issued—	
Delineated Areas: Special	180
Stream Gaging Stations Maintained	82
Ground Water Observation	
Wells Maintained	585
Samples Analyzed for Chloride Content	520

Dams & Encroachments

Construction Permits Issued	123
Proposed Projects Reviewed	41
Inspections—Dams	32
Inspections—Encroachments	48
Conferences with Applicants	223
Public Hearings Held	7

Water Development

Surface Water Investigations	3
Supervision Ground Water Investigations	3
Contracts Administered	3

Flood Control

Flood Control Investigations	129
Field Inspections and Conferences	129
Federal Assistance Projects Investigated	4
Flood Warning Stations Maintained	22
Flood Data Inquiries	34

Delaware and Raritan Canal

Miles of Canal Waterway	
Operated and Maintained	60
Buildings and Structures Repaired	25
Water Customers Served	20
Water Delivered (Billion Gallons)	7.2
Leases and Agreements Supervised	150

DELAWARE AND RARITAN CANAL OPERATIONS

Water consumption by the 20 customers now served from the Delaware and Raritan Canal totalled 7,179,312,000 gallons or an average of 19.67 million gallons daily as compared to 7,380,206,000 gallons or an average of 20.22 million gallons daily during the preceding fiscal year. Income from water-use agreements

amounted to \$196,807.91 as compared to \$178,276.91 for the preceding year. Miscellaneous rentals totalled \$14,638.70. Operations costs came to \$115,070.43. Sixty miles of canal waterways are maintained and operated. Twenty-five buildings and other structures were repaired.

INDUSTRIAL WATER

On June 16, 1961, the Water Policy and Supply Council approved plans for the Forsgate Industrial Park Water Company. This project provides for the development of a source of common water supply for sale primarily to industrial plants. The Forsgate project constitutes a new approach in the development of an industrial water supply which may prove to be highly beneficial to the industrial development of the State.

As proposed, the Forsgate Industrial Park aims primarily at supplying water to industrial plants. However, after a specified period, if

there are not enough industries to consume the available supply, the water will then be distributed to whomever shall be in need of it. The company has a period of three years in which to build up a demand for at least one million gallons of water per day. If at this time the demand does not materialize, the supply will be directed to other channels. At any rate, there will have been developed a valuable water supply in relatively deficient areas. The territory to be supplied by the Forsgate Industrial Park Water Company shall be a tract of approximately 1,600 acres in Monroe and South Brunswick townships in Middlesex County.

THE CHARLOTTEBURG DAM

The Charlotteburg Dam and Reservoir, begun in February 1959, was placed in service by the Newark Water Department in May 1961. The reservoir can store 2.9 billion gallons of water and yield 7.5 million gallons daily. As

a result of this installation, the new yield of the Pequannock System is 58.7 million gallons daily. The dam is 675 feet long and 83 feet high. Water depth when full is 76 feet.

THE DELAWARE RIVER MASTER

The Delaware River Master was appointed by the United States Supreme Court to administer the Decree of 1954 concerning the diversions of water from the Delaware River. The provisions of the Decree have been substantially

complied with and no related special problems have occurred.

No unusual activities developed in the operation of the Delaware River Basin reservoirs of the City of New York.



The inevitable consequence of man's continued encroachment on river flood plains.
—Photo by N. Y. Daily News

FLOOD DAMAGE ALLEVIATION

During the year, the Department published a report entitled "Flood Damage Alleviation in New Jersey". It defines New Jersey's flood problems; summarizes steps being taken to reduce the existing flood damage potential; and to prevent the occurrence of additional future flood damage; reviews and examines steps being taken throughout the nation to regulate the development of flood plains to prevent future flood damage; it identifies some of the questions which must be answered, and suggests a first step if New Jersey is to have a realistic flood damage alleviation program.

The essential feature of the flood damage problem is the same everywhere; the continued encroachment by man on flood plains. Builders of many of the new shopping centers, industrial plants, and residential developments, which are being constructed on flood plains, have recognized the danger and have taken precautions to avoid frequent flooding. Others have not. All will someday suffer flood damage which is the inevitable consequence of flood plain occupancy.

If prudent use of flood plains can be achieved, rivers like the Millstone can become a valuable asset; otherwise they will become, like the Passaic, a constant source of anxiety and a great financial burden.

The matter of preventing the creation of additional new flood problems will be an essential feature of all future Corps of Engineers studies for flood damage alleviation. Under the provisions of Section 206 of the Flood Control Act of 1960, the Corps is now compiling data on floods and flood damages, including identification of areas subject to inundation by floods of various magnitudes and frequencies. This information will permit communities in the Passaic Valley to evaluate the flood hazard realistically, through reasonable and proper zoning to encourage flood plain uses which do not result in flood damage.

Flood forecasting is recognized as one of the best means of reducing flood losses; it helps determine when to evacuate families, merchandise, and industrial equipment. A comprehensive

flood warning system is now operated in the Delaware, Passaic and Raritan River basins by the United States Weather Bureau in cooperation with this Department. Electronic equipment is being installed in the Passaic Basin, and will be installed in the Raritan Basin in the near future. Such equipment has been used in the Delaware for a number of years.

Since the enactment of Public Law 566, a number of projects providing drainage, reclamation, sediment control and flood prevention benefits have been completed by the United States Soil Conservation Service in New Jersey. Due to the nature of the program authorized by Public Law 566, it offers no hope in the battle to cope with the many serious flood problems plaguing urban watersheds.

The Municipal Encroachment Law permits communities to construct improvements, remove obstructions, define locations, establish widths, grades and elevations of any stream and prevent encroachments thereon, subject to approval of the flood-carrying capacity to be provided. The authority given under this law is not mandatory, but is similar to that given for the authorization of police, fire, garbage disposal, water supply and other civic services designed to promote the health and general welfare of the community. Counties are permitted to assist municipalities in flood damage alleviation programs. Local efforts to alleviate flood damage have been almost entirely protective rather than preventative.

State responsibility for flood damage alleviation in New Jersey is defined by the 1929 Encroachment Law, which is essentially a preventative measure requiring permits for the construction of bridges, culverts, fills, walls, channel improvements, pipe crossings and other encroachments located within the natural and ordinary high water mark of streams. This law was not designed to control the development of flood plains. Thinking and acting in terms of flood damage prevention or avoidance—as a full partner with flood control is needed—to prevent spread of flood problems to the many areas now experiencing the pressures of urbanization.

As a matter of public record, a comprehensive program is required to delineate flood plains and to designate the various portions thereof, according to relative risk. Delineation and designation of flood plains should be done on a regional basis without reference to municipal or county boundaries, and whenever possible, should be based upon information developed in cooperation with the United States Corps of

Engineers and the United States Geological Survey. The Department submitted a legislative proposal during the year to establish such a program; it did not receive action. The purpose of the proposed legislation would be to provide a sound basis upon which municipalities can encourage the proper utilization of flood hazard areas.

FLOOD CONTROL

A new concept for the control of floods in the Passaic River Basin—New Jersey's major flood problem area—has been developed by the United States Corps of Engineers following investigations of the practicability of the detention basin concept proposed in 1948.

The new approach calls for the diversion of flood waters around the highly industrialized areas to the lower reaches of the river. This would involve the construction of a large diversion tunnel 46 feet in diameter and approximately seven miles long, it would be from the vicinity of Little Falls to Nutley, designed to supplement the flood-carrying capacity of the lower river as it affects the highly industrialized Paterson-Passaic-Clifton area. It would call for extensive channel improvements in both the upper and lower portions of the Basin; the development of detention basins in the natural storage area of Troy Meadows and on the Ramapo River upstream from Oakland; and

a reservoir above Millington to maintain present low flows with freeboard for flood storage.

The benefits would include, in addition to the flood control attributes, land enhancement of approximately 23,000 acres in the Upper Basin, mosquito control and recreation. No water supply is included in the concept other than storage to maintain present stream flow.

The U. S. Corps of Engineers, scheduled to complete its survey report by June 1962, will include details of a definitive plan of flood control based upon the new concept, economic justification of projects, cost estimates, and local participation requirements.

The new concept, which greatly reduces the area in the upper valley needed for detention storage which was included as a necessary feature of all previous plans, will provide greater benefits to all areas of the Passaic Valley. It has won enthusiastic support from all portions of the Basin.



FISH AND GAME

New Jersey traditionally has enjoyed a bountiful supply of wildlife, but it is being jeopardized by urban sprawl. The city is overtaking wood, field and stream. Although metropolitan expansion is an index of growth, its impact on wildlife habitat is devastating. Interest in outdoor recreation is skyrocketing the legitimate insistence upon more opportunities for hunting and fishing.

Only through the intelligent use of fish and wildlife resources, can the growing needs of

New Jersey's sportsmen be met. Research programs have led to many fruitful discoveries which will guide new conservation practices. Substantial increases in state forest and park lands, public shooting and fishing grounds, coupled with the policy of multiple use, represent gains in creating an environment in which fish and wildlife can flourish. These developments suggest that even in the face of existing difficulties New Jersey can preserve its fish and wildlife resources.

WILDLIFE MANAGEMENT

The purpose of wildlife management is to provide the greatest amount of sport possible, compatible with other land uses, to best serve all citizens. Urban development, loss of farm-type habitat, and the closing of land to the hunter, contribute to the difficulties of New Jersey's sportsmen. Nevertheless, the hunting season of 1960-61 was one of the finest. Part of the excellent gunning available during the past season can be attributed to prolific reproduction of important game birds and animals. Pheasants, quail and grouse were abundant. The deer population remained high.

The Fish and Game Council granted a three-day extension of the firearm deer season, because heavy snow at the opening of the season greatly curtailed hunting opportunities. The total legal deer kill amounted to over twelve hundred during the bow and arrow season, and over six thousand during the regular nine-day season. The total kill was well below the record 1959 harvest, because there was no antlerless deer season this year.

New Jersey hunters still do not take full advantage of the State's fine waterfowl hunting opportunities. Only 10 per cent of the license

buyers purchased duck stamps. There are ample hunting opportunities in many areas of the State for waterfowl, especially brant.

The important activity of creating, improving and maintaining food and cover facilities for wildlife was stressed on both State and privately owned lands on a state-wide basis. A total of 356,500 tree and shrub seedlings and 11,450 pounds of food patch mixture were distributed to cooperators who carried out their own planting activities with privately owned equipment. In addition, 271 acres were seeded to rape; 42½ acres to burnet, lespedeza, birdsfoot trefoil and hay mixture and 8 acres of soybeans. There were 10,160 feet of hedgerow managed; 438 wildlife food patches maintained and 3½ acres of woodland border cut.

A total of 64,230 feet of lespedeza border, 10,000 tree and shrub seedlings, 101.2 acres of food patch mixture, 132.25 acres of rye, 20 acres of corn, 11 acres of birdsfoot trefoil, 40 acres of burnet-lespedeza, 4.5 acres of soy beans and 14 acres of burnt-red clover were planted on state-owned lands. A total of 50 acres of food area was cleared and 1,500 feet of hedgerow were managed on the state-owned tracts.

WILDLIFE HARVEST 1960-1961

During the past season, 160,438 hunting licenses were sold. Rabbits were by far the most popular game, with over 500,000 taken by 112,000 hunters. Pheasants were the second most popular game; over 89,000 hunters killed nearly 160,000 birds. Pheasant and rabbits thrive on farm-type habitat which is diminished as land is developed. Another popular game bird is the bobwhite quail; over 30,000 hunters sought this species. Over 200,000 squirrels and 25,000 ruffed grouse were harvested during the past season.

Species	Total Killed	No. of Hunters
Deer	7,375*	90,000
Rabbits	505,940	112,070
Squirrel	201,627	62,773
Pheasant	167,218	89,302
Quail	67,806	32,014
Ruffed Grouse	25,688	19,400
Ducks	54,845	18,809
Brant	26,032	8,429

*1,299 killed during bow and arrow season.

Three game farms are in operation in New Jersey. Pheasants and quail are raised for public

shooting grounds and as a supplement to the wild birds in areas where some calamity has drastically reduced the population. The game farms have raised and released a bountiful supply of pheasants and quail during the past year.

The cooperative youth program which sponsors a pheasant and quail rearing project with 4-H clubs, F.F.A. groups, junior sportsmen, Boy Scouts, and other youth groups, produced a total of 13,838 sexed, day-old pheasant chicks that were distributed to 109 youth cooperators. Similarly, 14,065 day-old quail chicks were delivered to 92 cooperators who reared 12,129 bobwhite to 12 weeks of age. All pheasants and quail reared by youth cooperators were picked up and liberated on the open lands of the State.

Bird Production on State Game Farms

Game Farm	Species	No. of Birds Raised
Rockport	Pheasant	29,998
Forked River	Pheasant	16,762
Lakewood	Quail	19,169

FISHERIES MANAGEMENT

Excellent water conditions and fine hatchery production contributed to a good fishing season this year. The extensive spring rains maintained good water conditions on major trout streams. Each year more and more anglers are discovering the fine fishing opportunities in the Delaware River. The construction of new ponds and the reclaiming of six spoiled lakes will contribute to future fishing just as previous efforts have

contributed to this year's angling. A very cold, wet spring provided excellent conditions for trout, which still remain the most popular fresh water fish. The Hackettstown hatchery stocked 510,000 trout in public waters throughout the State. Improved management techniques on New Jersey's lakes and streams enable the angler to secure the maximum amount of fish from such stocking.

WILDLIFE RESEARCH

Research projects dealing with waterfowl studies have been continued this year. Observations, counts and banding projects give valuable information which can be used im-

mediately in predicting seasonal hunting opportunities, as well as providing for the forecasting of future trends.

MOSQUITO CONTROL

Two significant cooperative mosquito control projects were placed in operation during the year. An intensive field test of several insecticides was established in cooperation with the New Jersey State Mosquito Control Commissions and county mosquito extermination commissions. The object of the study was to ascertain the efficiency of the respective chemicals in the control of mosquitoes, the more efficient formulations, development of application techniques, the proper time for application, and the effects of chemical applications to macroscopic and microscopic animal life.

A most significant experimental project was

established at Manahawkin in cooperation with the New Jersey State Mosquito Control Commission and the Ocean County Mosquito Extermination Commission.

This project entailed the construction of four ponds on the salt marsh, incorporated with the principle of low level dikes, for the impoundment of water to abate mosquito production and improve habitat conditions for wildlife. Approximately 8,000 feet of dike was constructed with proper water control structures. To date, mosquito production has been controlled and wild fowl populations have increased significantly.

HABITAT DEVELOPMENT

Restoration and construction of new areas have made more warm water fishing available to the New Jersey angler. Many of the lakes reclaimed during the past few years support excellent fish populations. Cooperative fisheries

investigations by biologists from New York, Pennsylvania, New Jersey and the United States Fish and Wildlife Service have done much to attract anglers to the Delaware River.

POLLUTION CONTROL

The battle for clean New Jersey streams is carried on by various State and local pollution control agencies. Two hundred twenty-three

investigations were made of real or potential pollution causes.

CONSERVATION OFFICERS

In addition to the primary duty of enforcing fish and game laws, conservation officers' activities include: the stocking of fish and game, hunter safety programs, information, educational activities, opening of land and water to public uses, initiating fish and game management programs and reporting seasonal hunting and fishing opportunities.

New Jersey Conservation Officers serviced more than 7,000 persons during the fiscal year and supervised enforcement duties in Hudson, Bergen, Essex and Union counties. They also investigated 258 complaints of damage to crops by deer. Reports show that 12,849 individuals

were contacted in the field. Of this total, 1,720 were found to be committing offenses against fish and game laws. Warnings were issued to 483 persons. During the fiscal year, 1,857 deer were recovered that had been killed accidentally, illegally, by dogs or by permit to kill in order to forestall property damage. The majority of deer killed were struck by automobiles.

Deer Recovery 1960-1961

	Buck	Doe
Accidental	724	936
Under permit	22	30
Illegal	103	167
By dogs	8	14

PUBLIC RELATIONS

The purpose of public relations in fish and game management is to keep the license-buying public informed on the fish and game program. This is accomplished through news releases, lectures, movies, exhibits, and the publication,

"New Jersey Outdoors". Another goal of the public relations unit is to develop a better understanding of conservation and the intelligent use of wildlife resources.



SHELL FISHERIES

Several boats were hired in August to transplant oysters from the northernmost to the two southernmost seed beds of the Delaware Bay in an effort to revitalize them. These beds, at one time prolific producers, probably can be brought back into production. Several days were spent in advance in preparing the beds for placement of the oyster transplants, and removal of the oyster drill, the oyster's natural enemy.

Between May 15 and 26, 175,000 bushels of seed oysters were transplanted from the natural seed beds to privately-leased grounds in the lower part of Delaware Bay. It is expected that a small portion of these oysters will be harvested during October 1961, while the major portion will remain for the 1962 or 1963 season. The transplanting program is being watched with great interest because it is the first planting that has been made since 1958. That year the disease "MSX" killed 90 per cent of the planted

oysters. If the present transplants are able to survive, or if the 90 per cent mortality rate decreases considerably, then the industry is on its way back to normal production.

A total of 11,335 hours of patrol duty was spent in New Jersey waters during 1960-61, as well as 122,913 miles of shoreline patrol by automobile.

Polluted waters off the New Jersey coast presented an additional problem for enforcement officers, when health authorities indicated that a possible relationship exists between outbreaks of hepatitis and "bootlegged clams" taken from waters legally banned to clammers. As a result patrol activities were accelerated and additional clamming areas were closed for further study. It is expected that this will encourage a greater sense of responsibility on the part of commercial clammers so that clams will be taken only from pure open waters.

OYSTER INVESTIGATIONS

The long-established program of natural seed bed surveillance is being continued. Field sampling, experimental plantings in leased areas, and the sampling of selected grounds have been executed to determine mortality rates and degrees of infection caused by the pathogen "MSX" and *Dermocystidium*. These studies are being conducted on a month to month basis. In addition, an extensive series of tray studies of seed bed stocks are being continued and extended. The relative number of oysters resistant to the pathogen "MSX" has approximately doubled. The detailed tray study of selected oyster stocks exposed to heavy disease pressure, while protected from drills (members of the snail family which bore into the oyster and devour the meat) continues to provide valuable information about the Delaware Bay oyster disease and its interactions with host populations. The continued introduction of small lots of known susceptible stock shows conclusively that "MSX" is still killing oysters in Delaware Bay.

The apparently low death rate recently on planted grounds has led many to believe that the worst of the disease is over. This may be

true as long as resistant stocks of oysters are planted in the Bay. However, the tray studies indicate that if large numbers of susceptible stock are planted, a heavy disease kill can again be anticipated.

The central laboratory problem associated with "MSX" is its transfer under controlled conditions to previously uninfected oysters. Successful transfer would permit rapid advance along many fronts in determining details of life cycles, defense mechanisms, possible direct attack on the organism and the general problems of parasite-host interaction. After more than two years of extensive experiment, it has not been possible to establish infection experimentally in the laboratory, although infection continues to occur simultaneously in tide flat trays. Failure to obtain direct disease transfer strengthens the probability that some stages that are passed in an alternate host are being overlooked. Collection of possible alternate host material is underway, and if current transmission attempts fail, a search in other invertebrates will begin.

SEED BED MANAGEMENT

The fall and early spring oyster population study involved three dredge hauls in each of 62 areas. Samples of each of the three stages in the life cycle of the oyster; spat, yearling, and box respectively, were studied. The spat is the seed which gives rise to the adult oyster, the yearling marks the oyster's second year of growth, and the box is a large affected choice oyster. Spatfall, or oyster reproduction, was extremely light in 1960. However, good survival of the light sets of 1958 and 1959 produced moderately good dredging for the industry in May of this year. At the opening of the season, the principal producing beds averaged close to 50 per cent by volume. Some beds have failed to show improvement for the past three years and were closed to all dredging in the spring of 1961.

The seed beds were left in better condition at the end of this dredging season than at any other season since 1952. The 1961 planting is experimental; with partially resistant stock

planted in a disease area, the level of mortality cannot be predicted.

It is anticipated that disease kill will be less severe than with the susceptible stock planted in 1958. Whether the kill will be low enough to make the planting profitable will largely determine the immediate future of the industry. After the mortality problem is solved, the industry's central problem will be replenishment of seed stock.

The physical appearance of the oysters in Delaware Bay is encouraging. A greater amount of immunity to "MSX" seemed to have been established. If this is true, greater efforts will be made in the future to increase the output of the natural seed beds by the planting of shells, transplanting oysters to sanctuaries, and the scraping and de-boring of the beds. These procedures will be used in the Atlantic Coast section to further the development of the oyster and clamming industries located there.

VETERANS SERVICES

Since ancient times, grateful governments have honored returning war veterans or the survivors of those who died in battle by granting them benefits not accorded to those who remained at home. At the close of the Civil War, President Abraham Lincoln told the nation that it was the duty of a grateful people "to care for him who shall have borne the battle, and for his widow and his orphan". The rationale for veterans preference has weathered many attacks, most of which have been based upon the contention that service programs for veterans is class legislation and therefore unconstitutional.

After Pearl Harbor, the American people realized that the war into which they were being drawn would involve more men, money and equipment than was required in all past wars. Thinking men realized that the country could ill-afford a repetition of the chaotic debacle following World War I, when returning servicemen ended up on street corners selling pencils

and apples. Many living today remember the bonus march of ragged veterans upon Washington. On July 1, 1944, the New Jersey Legislature created the Division of Veterans Services to make certain the aftermath of World War I would not be repeated.

Over 800,000 veterans live in the field area serviced by the Department's Veteran's Services Division, which coordinates all services and information for the benefit of war veterans and their dependents, and assists any honorably discharged veteran or his dependents in obtaining all federal and State benefits to which he or his dependents may be entitled. Each veteran, statistically speaking, has at least one and one-half dependents. The number of veterans, dependents and servicemen who are now, or may be, eligible for veterans benefits approaches the two and one quarter million mark. Since 1944, monetary recoveries for veterans has totaled over \$53,000,000, a sum which has had a signi-

ficant and beneficial effect upon New Jersey's economy. Nearly a million veterans have at one time or another sought and received veterans services. During the year, over 77,000 contacts, advisements and claims were filed.

New Jersey has one of the lowest veteran cost-services ratios in the nation. One of the major reasons for this is the fact that 18 or 24 field offices are given rent-free facilities through the courtesy of various organizations, which in addition provide for utilities without charge.

The filing of a veteran's claim is just the beginning of veteran service work. Generally a claim for compensation or pension is a continuous operation because it is open or reopened as many times as the service connected condition improves or deteriorates and culminates eventually in claims for orphans, widows, and dependent parents; and of course more veterans become eligible over the years for pensions, medical aid, hospitalization or domiciliary care.

In addition to the administration of federal benefits, the Department's Division of Veterans Services is charged with the administration of laws pertaining to paraplegia, hemaplegia, osteochondritis, multiple sclerosis, amputees, blind veterans and war orphans. In the last decade nearly \$1,500,000 has been awarded to those who suffer from these service-connected diseases. During the year, \$132,064. in monthly payments was awarded for this purpose.

During the fiscal year, \$3,101,451 in cash and monthly payments was awarded; 57.87 per cent

for non-service connected pensions, 17.75 per cent for insurance, 13.85 per cent for service-connected compensation, 7.95 per cent for burial allowances, 2.53 per cent for miscellaneous State benefits and .05 per cent for re-employment rights. The following table shows cash awards and monthly payments secured for veterans by counties and includes out-of-state awards.

County	Amount
Atlantic	\$ 102,849.05
Bergen	478,306.95
Burlington	34,729.82
Camden	124,297.62
Cape May	1,605.12
Cumberland	104,233.84
Essex	147,997.20
Gloucester	115,011.63
Hudson	467,826.81
Hunterdon	11,268.07
Mercer	133,413.48
Middlesex	113,570.66
Monmouth	441,894.80
Morris	57,229.09
Ocean	30,984.76
Passaic	162,729.88
Salem	6,753.11
Somerset	59,315.36
Sussex	2,382.74
Union	398,441.74
Warren	15,967.65
Out-of-state	90,638.82
Total	\$3,101,451.17

Monetary recoveries credited to the various field offices during the year for such services as service-connected disability compensation, disability pensions, life insurance, dividends, burial allowances and other essential purposes totalled \$3,021,253.

DEPARTMENTAL ORGANIZATION

The Department of Conservation and Economic Development is divided into five divisions: Fish and Game, Shell Fisheries, Planning and Development, Water Policy and Supply and Veterans Services. The Commissioner of the Department is appointed by the Governor and serves at his pleasure. Division directors, with one exception, are appointed by the Governor for four-year terms. The Director of the Division of Fish and Game is appointed by the Division Council for a four-year term, subject

to gubernatorial approval. In addition, each of the five divisions has an advisory council composed of citizens appointed by the Governor for four-year terms. The activities of the Councils vary according to statute. The Division of Planning and Development and its Bureau of Planning become the *Division of Resource Development* and the *Division of Planning and Regional Development* on July 1, 1961, pursuant to legislation enacted in June 1961.

PLANNING AND DEVELOPMENT

Planning and Development. The Division of Planning and Development is responsible for the administration of an overall program of State-wide planning and development which is organized into the following bureau activities:

Aeronautics. The Bureau of Aeronautics is responsible for all matters concerning aviation in the State, including the establishment of standards for airports, landing fields and other aviation facilities.

Commerce. The Bureau of Commerce, through its State Promotion Section and its Research Section, advertises the advantages of New Jersey from all standpoints and gathers, analyzes and disseminates information on the State's economy. It also serves as a coordinating and service agency in handling inquiries for industrial site locations.

Forestry. The Bureau of Forestry is responsible for forest management and forest fire prevention.

Parks and Recreation. The Bureau of Parks and Recreation is responsible for the operation

of all publicly-owned forests, parks and historic sites.

Geology. The Bureau of Geology and Topography is the primary source of information on the geology, mineral resources and topography of the State.

Housing. The Bureau of Housing administers problems dealing with public housing.

Planning. The Bureau of Planning is responsible for the orderly development of the State's physical assets through various studies of present and future land uses and through stimulating, assisting and coordinating local, county and regional planning activities.

Navigation. The Bureau of Navigation administers riparian lands, issues permits and licenses for structures on navigable or tidal waters, maintains the inland waters of the state, installs and maintains navigation aids on lakes, issues licenses for boats and operators on inland lakes and non-tidal waterways, maintains the State-owned marinas, builds and maintains beach erosion control structures and is responsible for marine policing.

PLANNING AND DEVELOPMENT COUNCIL

(Becomes the Resource Development Council on July 1, 1961)

EUGENE L. LORA, *Chairman*

*OKA V. SWISHER

JACK M. KANE

MAJ. GEN. EDWARD C. ROSE

FRANK J. VALGENTI, JR.

WAYNE D. McMURRAY

*As of June 30, 1961 Mr. Swisher was Chairman of Council

HENRY WIETSMA

WILLIAM A. HAFFERT

WILLIAM E. WATERS

MARK ANTON

ROLAND DEWILDE

J. NEVINS McBRIDE

STATE HOUSING COUNCIL

CHARLES MESENAZOS, *Chairman*

RICHARD P. DONOVAN, *Secretary*

JOHN I. MEYERS

RAYMOND W. TIERNEY

EMANUEL A. SMITH

WATER

Water. The Division of Water Policy and Supply is responsible for the planning, development, conservation and equitable distribution of all surface and subsurface waters of the State.

The Division performs its regular duties through three permanent bureaus: The Bureau of Water Resources, the Bureau of Water Control and the Bureau of Water Supply. A temporary

Bureau of Design and Construction was established specifically for the Spruce Run-Round Valley reservoir projects.

Water Resources. The Bureau of Water Resources develops plans and policies for the orderly and equitable solution of New Jersey's water development and flood problems. The Bureau conducts long-range studies of future reservoir sites which have the potential of meeting the fundamental concept of maximum utilization of New Jersey's surface waters, and conducts flood problem studies to guide local flood problem interests and to promote State and Federal projects. The Bureau also maintains a working relationship with several Federal agencies. The long-range ground-water investigation program, a part of the State Water Program, is now being conducted by the Bureau through a cooperative arrangement with the Water Resources Division of the United States Geological Survey. It also cooperates with the Survey in collecting data on high water to guide flood plain zoning, and participates with the United States Weather Bureau and Director of Civil Defense in issuing flood warnings.

Water Control. The Bureau of Water Control acts as the administrator and engineering staff of the Water Policy and Supply Council in

fulfilling its quasi-judicial duties. It exercises statutory regulating powers on water supply, dams and stream encroachment. It also approves structural characteristics of dams, inspects dams, licenses well drillers, issues well permits and maintains water use records. The Bureau also maintains stream gauging stations and ground-water observation wells through cooperative arrangement with the United States Geological Survey and represents the Division on water rights legislation.

Water Supply. The Bureau of Water Supply manages and operates water supply facilities administered by the Division, represents the Division in matters pertaining to water use and negotiates contracts for sale of State-developed waters. The management of the waters of the Delaware and Raritan Canal, Spruce Run-Round Valley and of any new State water sites developed under New Jersey's State Water Programs are also included in the primary responsibilities of this Bureau.

Design and Construction. The temporary Bureau of Design and Construction was established to provide the State with continuing engineering reviews of designs submitted for the Spruce Run-Round Valley projects and to provide State supervision over actual construction.

WATER POLICY AND SUPPLY COUNCIL MEMBERS

KENNETH H. MURRAY, *Chairman*
WILLIAM G. BANK
I. RALPH FOX
THOMAS J. MULLEN
AUGUST C. SCHULTES

MRS. LILLIAN M. SCHWARTZ
DAVID I. STEPACOFF
VINTON N. THOMPSON
HERMAN A. KLENNER

FISH AND GAME

Fish and Game. The Division of Fish and Game carries out its duties through the Bureau of Wildlife Management, the Bureau of Fisheries Management, the Conservation Officers Service, a Public Relations section and an Administrative section.

Wildlife Management. The Bureau of Wildlife Management is charged with wildlife research, habitat improvement, game propagation and distribution, predator control, public hunt-

ing and fishing ground acquisition and management and related activities.

Fisheries Management. The Bureau of Fisheries Management handles all fisheries research, fish propagation and distribution, salvage operations, stream and lake acquisitions and development, creel census, stream and lake improvement, marine research, pollution investigations and related activities.

Conservation Officers. The Conservation Of-

fficers unit is the enforcement arm of the Division and coordinates all activity done in the field.

Public Relations. The Public Relations section prepares exhibits, presents school programs, aids youth programs in conservation activities

and publishes the Division's monthly magazine, "New Jersey Outdoors".

Administrative. The Administrative section issues licenses, prepares budgets and payrolls, handles fiscal accounting, correspondence and all general administration.

FISH AND GAME COUNCIL MEMBERS

EARL L. McCORMICK, *Chairman*
WILLIAM C. LUNSFORD, JR.
RALPH T. McNEEL
GEORGE H. McCLOSKEY
FRED TOTTEN
DAVID H. HART

LAWRENCE BOHM
GEORGE C. ONSKT
HENRY J. KELLY
HARRY FROME
CLARENCE SHEPPARD

VETERANS SERVICES

Veterans Services. The Division of Veterans Services coordinates all services and information for the benefit of war veterans and their dependents and assists any honorably discharged

veteran or his dependents in obtaining for them all Federal and State benefits which they may rightly claim.

VETERANS SERVICES COUNCIL MEMBERS

WILLIAM G. MCKINLEY, *Chairman*
JOSEPH G. CARTY
ALBERT J. GIFFORD
CHARLES E. KINNEY
THOMAS F. MURRAY

JAMES P. ROGERS
DR. HUMPHREY WOLFE
STEPHEN M. LINZENBOLD
JOSEPH R. RUSSO

SHELL FISHERIES

Shell Fisheries. The Division of Shell Fisheries is responsible for the protection of 75,000 acres of New Jersey shellfish ground. The Di-

vision's work consists of law enforcement, licensing and leasing and the planning of an over-all clam and oyster development program.

SHELL FISHERIES COUNCILS

Atlantic Coast Section

Chairman pro tem, FRANK GARRISON
JOHN M. PANCOAST
CARL TARNOW
A. PRATT CRAMER
Vacancy, Atlantic County

Maurice Cove Section

Chairman pro tem, HAROLD BICKINGS
JOHN M. PANCOAST
WILLIAM H. RIGGIN
WILLAM M. SHARP
FENTON ANDERSON

FINANCIAL REPORT
DEPARTMENT OF CONSERVATION & ECONOMIC DEVELOPMENT

Summary

STATE APPROPRIATIONS & APPROPRIATED RECEIPTS

	Expenditure Available	Expended	Returned to State Treasury	Reappropriated
Office of the Commissioner	\$ 335,426.74	\$ 300,111.48	\$ 1,103.31	\$ 34,211.95
Division of Planning & Development	9,911,821.12	6,600,005.47	27,720.68	3,284,094.97
Morris Canal & Banking	87,288.24	46,728.31		40,559.93
Division of Water Policy & Supply	421,326.11	385,081.28	2,539.76	33,705.07
State Water Development Fund	1,747,798.58	1,747,798.58		
Division of Shell Fisheries	238,765.86	233,327.62	2,723.24	2,715.00
Division of Fish & Game	2,116,610.55	1,828,103.15		288,507.40
Division of Veterans Services	<u>416,772.00</u>	<u>414,682.03</u>	<u>2,089.97</u>	
	15,680,809.20	11,555,837.92	36,176.96	3,678,794.32
Debt Service	<u>2,720,125.00</u>	<u>2,720,125.00</u>		
TOTAL	<u>\$17,995,934.20</u>	<u>\$14,275,962.92</u>	<u>\$36,176.96</u>	<u>\$3,683,794.32</u>

UNAPPROPRIATED RECEIPTS

	Deposited to School Fund	Deposited to State Treasury
Division of Planning & Development	\$659,595.18	\$1,638,275.77
Division of Water Policy & Supply		312,695.97
Division of Shell Fisheries		<u>70,338.35</u>
TOTAL	<u>\$659,595.18</u>	<u>\$2,021,310.09</u>

OFFICE OF THE COMMISSIONER

	Expenditure Available	Expended	Returned to State Treasury	Reappropriated
General Operations	\$255,924.79	\$254,821.48	\$1,103.31	\$
Study of Small Business	34,501.95	25,290.00		9,211.95
Disabled War Veterans	25,000.00			25,000.00
Catholic War Veterans	<u>20,000.00</u>	<u>20,000.00</u>		
TOTAL	<u>\$335,426.74</u>	<u>\$300,111.48</u>	<u>\$1,103.31</u>	<u>\$34,211.95</u>

**DIVISION OF PLANNING AND DEVELOPMENT
APPROPRIATIONS**

	Available for Expenditure	Expended	Returned to State Treasury	Reappropriated
GENERAL OPERATIONS				
Directors Office	\$ 147,182.39	\$ 147,149.73	\$ 32.66	
Bureau of Aeronautics	55,180.97	55,016.55	164.42	
Bureau of Commerce	318,305.73	313,643.00	45.40	\$ 4,617.33
Bureau of Forestry	529,448.35	506,930.93	164.70	22,352.72
Bureau of Geology	101,903.83	100,258.94	81.92	1,562.97
Bureau of Housing	96,977.41	91,686.75		5,290.66
Bureau of Navigation	419,495.51	418,314.63	644.53	536.35
Bureau of Parks and Recreation	1,239,041.51	1,231,654.92	3,086.47	4,300.12
Bureau of Planning	764,827.38	755,136.07	771.53	8,919.78
Board of New Jersey Pilot Commissioners	19,847.81	19,847.81		
TOTAL	<u>\$3,692,210.89</u>	<u>\$3,639,639.33</u>	<u>\$4,991.63</u>	<u>\$47,579.93</u>
STATE AID EXPENDITURES				
Bureau of Navigation				
Beach Protection	\$3,428,891.29	\$1,296,017.67		\$2,132,873.62
Inland Waterway	482,199.35	379,726.34		102,473.01
Atlantic City Marina	273,247.95	144,291.05		128,956.90
TOTAL	<u>\$4,184,338.59</u>	<u>\$1,820,035.06</u>		<u>\$2,364,303.53</u>
CAPITAL EXPENDITURES				
Bureau of Navigation	\$ 146,397.00	\$ 10,802.59		\$ 135,594.41
Bureau of Parks and Recreation	1,212,549.03	476,678.71		735,870.32
TOTAL	<u>\$1,358,946.03</u>	<u>\$ 487,481.30</u>		<u>\$ 871,464.73</u>
FEDERAL FUNDS				
Federal Forest Fire Fund	\$ 113,695.97	\$ 100,771.77	\$12,924.20	
Federal Forest Nursery Fund	7,426.64	2,196.99	5,229.65	
Federal Farm Forestry Fund	37,138.61	32,563.41	4,575.20	
Federal Soil Bank Account	746.78			746.78
Federal Airport Grant	515,028.89	515,028.89		
Watershed Programs	2,288.72	2,288.72		
TOTAL	<u>\$ 676,325.61</u>	<u>\$ 652,849.78</u>	<u>\$22,729.05</u>	<u>\$ 746.78</u>
GRAND TOTAL	<u>\$9,911,821.12</u>	<u>\$6,600,005.47</u>	<u>\$27,720.68</u>	<u>\$3,284,094.97</u>

**DIVISION OF PLANNING AND DEVELOPMENT
UNAPPROPRIATED RECEIPTS**

	Deposited to School Fund	Deposited to State Treasury
Bureau of Commerce		
Sale of Back Pamphlets, etc.		\$ 6,189.48
Bureau of Aeronautics		
Sale of Licenses		610.75
Bureau of Forestry		
Rentals & Fines		4,657.38
Sale of Seedlings		9,386.70
Bureau of Geology		
Sale of Maps		7,083.97
Bureau of Housing		
Veterans Housing		1,004,776.06
Bureau of Navigation		
Marina Rentals—		87,552.96
Marina Concessions—		6,557.70
Preparations of Instruments		6,890.00
Atlases and Maps		456.00
Power Vessel Licenses		59,680.00
Riparian Rights—		2,065.77
School Fund Income Account		
(Lease Rentals, License Fees)	\$109,730.89	
School Fund Investment Account		
(Grants, easements, one-fee sale)	550,507.73	
Guarantee Deposits		
(To be refunded when terms of lease are met)	(643.44)	
Bureau of Parks		
Permits, Rents, Fees, Sales of Commodities		441,160.70
Bureau of Planning		
Sale of Maps & Pamphlets		1,208.30
TOTAL	<u>\$659,595.18</u>	<u>\$1,638,275.77</u>

DIVISION OF WATER POLICY AND SUPPLY

	Available for Expenditure	Expended	Returned to State Treasury	Reappropriated
General Operations	\$373,812.81	\$371,254.59	\$2,539.76	\$ 18.46
Flood Control Passaic & Morris Counties	41,263.30	7,576.69		33,686.61
Sedimentation Study-Stony Brook Watershed	6,250.00	6,250.00		
TOTAL	<u>\$421,326.11</u>	<u>\$385,081.28</u>	<u>\$2,539.76</u>	<u>\$33,705.07</u>

DIVISION OF FISH AND GAME

(The Fish and Game Division is supported entirely from receipts and Federal Funds. Although moneys are appropriated in the regular manner unexpended funds do not lapse but carry over,)

	Balance	Receipts		Expended	Outstanding Balance	
	7-1-60	7-1-60 to 6-30-61	Total		Requisitions	7-1-61
					1958-59	
					1959-60	
General Fund				\$1,438,604.00	\$1,291.02	
Federal Aid to Fisheries (Reimbursable by 75% from Federal Government)				33,950.63		
Total General Fund & Federal Aid to Fisheries	\$185,220.63	\$1,546,117.41	\$1,731,338.04	1,472,554.63	1,291.02	\$257,492.39
Public Shooting & Fishing Grounds Fund				268,832.46	1,309.05	
Federal Aid to Wildlife				84,115.99		
Total Public Shooting and Fishing Grounds Fund and Federal Aid to Wildlife	54,037.30	331,235.21	385,272.51	352,948.45	1,309.05	31,015.01
TOTAL	<u>\$239,257.93</u>	<u>\$1,877,352.62</u>	<u>\$2,116,610.55</u>	<u>\$1,825,503.08</u>	<u>\$2,600.07</u>	<u>\$288,507.40</u>

ANALYSIS OF RECEIPTS

General Fund and Federal Aid to Fisheries	
Hunters' and Anglers' Licenses	\$1,326,119.95
Fines	44,806.50
Other Receipts	95,450.78
Federal Aid to Fisheries	79,740.18
TOTAL	<u>\$1,546,117.41</u>
Public Shooting and Fishing Grounds Fund and Federal Aid to Wildlife	
Hunters' and Anglers' Licenses	\$ 189,703.70
Recoveries, Sales, Rentals of Equipment, Rents	58,943.14
Federal Aid to Wildlife	82,588.37
TOTAL	<u>\$ 331,235.21</u>
TOTAL DIVISION OF FISH AND GAME RECEIPTS	<u>\$1,877,352.62</u>

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