



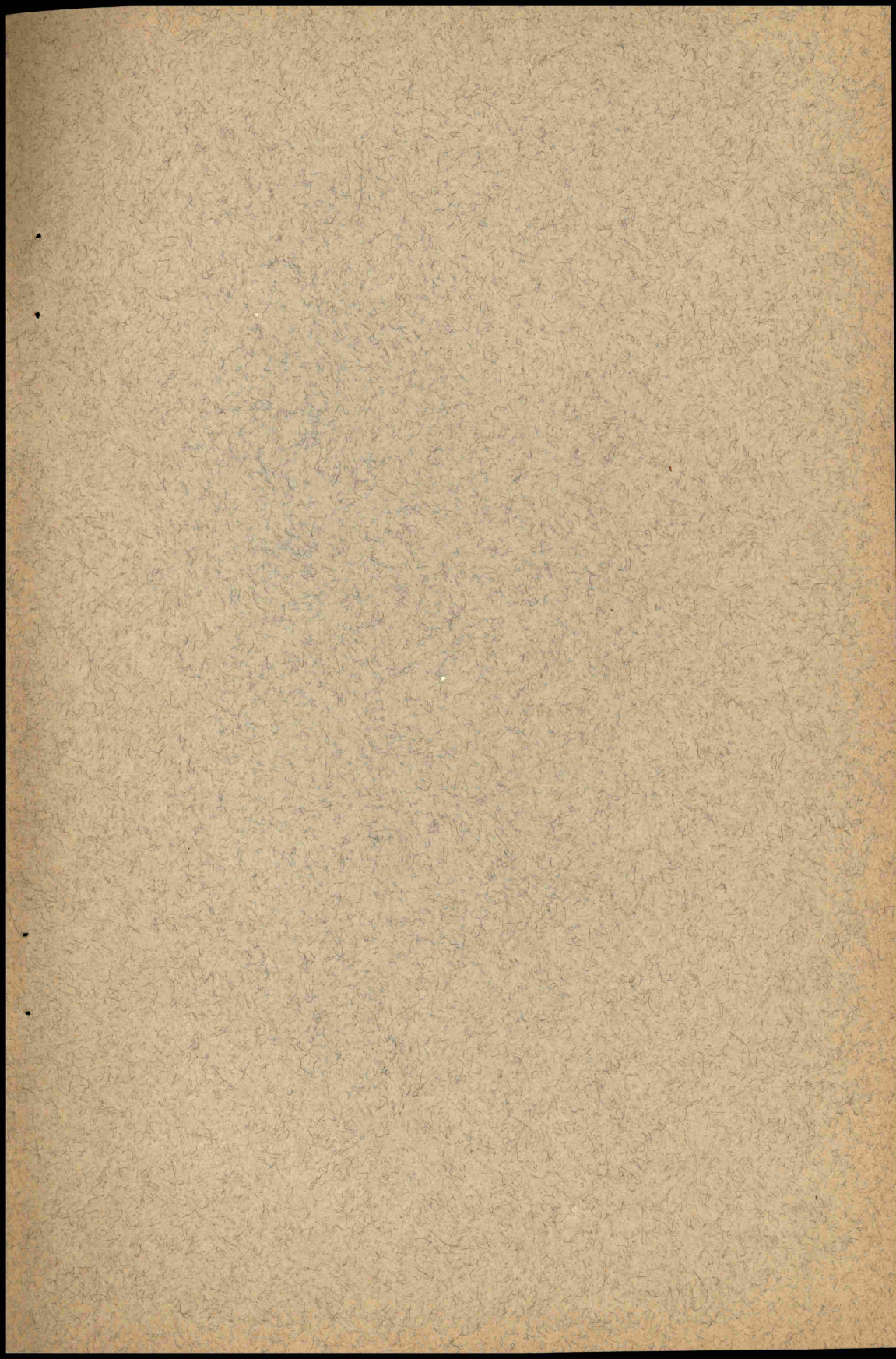
WORK OF THE DIVISION OF FORESTS AND PARKS,



DEPARTMENT OF
CONSERVATION & DEVELOPMENT



PUBLISHED 1937



PROPERTY OF
RECEIVED

JUN 25 1970

Division of State Library
Archives and History
Trenton, N. J. 086

WORK OF
THE DIVISION OF
FORESTS AND PARKS

~

New Jersey,

DEPARTMENT OF

CONSERVATION & DEVELOPMENT,



974.90

P252

1937c copy 3

BOARD OF CONSERVATION AND DEVELOPMENT

STATE HOUSE ANNEX, TRENTON, N. J.

HENRY L. MOELLER, <i>President</i>	Weehawken
ARTHUR J. COLLINS, JR.	Moorestown
WILLIAM C. COPE	Glen Ridge
W. STEWART HOLLINGSHEAD	Riverton
JOHN L. KUSER	Bordentown
CHARLES A. MEYER	Andover
H. ARTHUR SMITH	Lawrenceville
OWEN WINSTON	Mendham (P. O. Gladstone)

CHARLES P. WILBER, *Director and Chief of the Division of Forests and Parks.*

MEREDITH E. JOHNSON, *Chief of the Division of Geology and Topography.*

Part 1

BRIEF DESCRIPTION OF NEW JERSEY'S FORESTS

Quoting from the State Geologist's Report of 1899—"New Jersey as one of the Middle Atlantic States was originally well wooded and well watered, and the early settlers within its bounds had to make their clearings on the border of the great continental forests of North America. A pamphlet published in 1648, entitled 'A Description of the Province of New Albion,' etc., tells of 'the richness of the soil replenished with the goodliest woods of oak, and all timber for ships and masts, mulberries, sweet cypresse, cedars, pines and firres.'"

Gabriel Thomas in his "West New Jersey" printed in 1698, says: "In this country also is great plenty of working Timber, as Oaks, Ash, Chestnuts, Pines, Cedar, Walnut, Poplar, Fir, and Masts for Ships, with Pitch and Rosin of great use and much benefit to the Country."

Johann David Schopf in his "Travels in the Middle and Southern United States of North America," published in Erlangen, Germany, in 1788, shows great alarm at the lack of care in handling the forest resources of the State:—"The owners of forges and furnaces have generally large tracts of woodland, which are cut over without order. . . . There are no game regulations; no forest officials in America. Whoever takes up new land acquires full privileges with all on, over and under it. It would not, therefore, be easy to teach the peasants and land-owners by law how to husband their wood so that their great-grandchildren may have a stick of wood upon which to hang their tea-kettle."

Thomas F. Gordon in "A Gazetteer of the State of New Jersey," 1834, refers to the pine belts as having been largely cut over, owing to the demands of the furnaces, forges, glass-works, and the many steamboats on the rivers.

Again quoting the 1899 State Geologist's Report—"Much valuable wood was consumed as fuel, and the original forest disappeared almost wholly from the lands near navigable waters. The rich agricultural districts had been nearly all taken up in farms at the beginning of the [19th] century, and from that time the progress in clearing was probably due to the increasing demand for wood, rather than that for

farm-land. The growth of the manufacturing interests and the construction of the canals, and then the railway lines, made the consumption of wood so active that cutting made rapid inroads in the deeper recesses of the forests and the whole State was practically cut over by 1850-1860. Since that time, the timber cut has been nearly all of 'second growth' and but a small part of it has been merchantable lumber. The disappearance of the large timber has made it necessary to cut over at shorter periods and leave little or no growth to reach mature conditions fit for lumbering. New Jersey has ceased to be a lumber producing State."

Thus in 1905, when New Jersey became alarmed over the continual abuse of its forested acres, the virgin stand had long since disappeared. Devastation did not stop then. Ungoverned cutting has continued, poor or "weed" species were unwittingly favored, and seedling reproduction of valuable species discouraged. An ever increasing number of fires have prevented forests becoming established in sections of the State.

New Jersey's forested land may be divided, by a line drawn from Trenton to South Amboy, into two distinct regions. The northern or deciduous half consists chiefly of such species as oak, maple, hickory, beech, birch, ash, tulip, gum and elm. In the fertile and moist coves tulip, ash, red oak, pin oak, white oak, black oak, basswood, yellow birch, red and sugar maple will grow, if protected, to heights of 70'-80', and produce 10,000 board feet per acre. Less pin oak, tulip and maple occurs on the slopes where scarlet oak, black oak, red oak, white oak, chestnut oak, black birch, ash, hickory and occasionally white pine are the chief species. Heights reaching 70'-80' and 8,000 board feet per acre are not uncommon. Chestnut oak, with frequent individuals of pitch pine, grows on the ridges. Existing as it does in a shallow rocky soil, the ridge growth is often crooked and stunted, but is valuable in preventing erosion. An understory of varying density of such shrubs as hazel, hazelnut, benzoin, shadbush, viburnum, dogwood, azalea, rhododendron and laurel are typical of the deciduous forest.

South Jersey woodlands, except for the strip along the Delaware Valley which cuts the west ends of Burlington, Camden, Gloucester and Salem counties, is made up of 1,200,000 acres of coniferous forest, The Pines.

The fertile Delaware Valley area consists largely of woodlots that in growth compare favorably with the coves of North Jersey. Tulip, willow oak, pin oak, white oak, swamp white oak, and scarlet oak comprise the typical mixture of species, while in the more swampy areas, sycamore, persimmon, elm, birch, red gum and black gum are

found. Mature stands in the more upland woodlots exist where trees reach the height of 90'-100' and yield 12,000 feet per acre. The characteristics of the Delaware Valley are noted in a narrow belt of the upland bordering Delaware Bay and extending into Cape May County where the soil is more fertile than that of The Pines and more oak is found in the mixture. Likewise similarity is noticed in the transition zone which exists between the North and South Jersey flora, extending northeastward into Monmouth County.

Shrubs from both major divisions of the State are found in the Delaware Valley drainage. Certain areas, such as those in the vicinity of Parvin State Park, are of great botanical interest.

The Pines has suffered more from man's abuse than any other wooded section of the State. Nature has aided in making this section a veritable tinder box in times of drought. Although the chief species are pitch, scrub, and some shortleaf pine, there are also white, scarlet, black, chestnut, blackjack, post and scrub oaks that grow in mixture on the upland. All species sprout prolifically. The sprouts, together with the brush resulting from chopping, burn rapidly carrying the fire into the pine crowns. Before a medium wind these fires travel swiftly over the level terrain and assume such proportions that suppression without the aid of rain or large natural or artificial barriers, is difficult. Burning is followed by sprouting and a new and larger hazard is consequently formed in a few years. Repeated sprouting has caused the stand to become diseased and degenerate until scab logs and fuelwood are all that can be harvested from the upland. Heights average 35' to 40' and seldom exceed 50'. Ten cords per acre is considered a good yield over a large part of the area.

Fires and improper cutting methods tend to convert the swamp into a brushy hardwood growth at the expense of the more valuable southern white cedar. In the Pine belt sycamore and elm is usually absent, the hardwood swamp consisting principally of red maple, black gum and red gum. Scattered pine, willow oak, and white cedar are also found. These hardwoods, because they usually are not allowed to grow to large enough size for veneer logs, are considered nearly valueless, even for fuelwood. Southern white cedar, South Jersey's outstanding tree of value, grows in stands 90% or more pure. Because cedar is used "in the round" as well as for lumber, thinnings and general forest management can be made to pay. Heights of 50'-60', a stand of 5,500 board feet, numbering 1,000 trees to the acre, are common in the second growth.

Shrubs typical of "The Pines" are laurel, sweet fern, several varieties of blueberry and huckleberry, and bayberry on the upland; shadbush, sweet pepperbush, poison sumac, staggerbush, maleberry,

buttonbush, viburnum and azalea in the swamps. Holly and dogwood are also prevalent.

Some 15,000 to 20,000 acres in The Pines deserves special mention. Known as The Plains this area, lying on both sides of Highway Route S-40, is between the towns of Chatsworth and Tuckerton. Growth is peculiar in that the trees thereon seldom exceed four to six feet in height. Several foresters and botanists have offered explanations for the peculiar scrubby wasteland, the latest and most reasonable being, perhaps, that of Professor Harold J. Lutz of Yale University. He concluded that The Plains did not support an "inherently dwarf community," but was "small because it was young." The age of the growth was due to fires which he found burned The Plains on the average of every 8 to 12 years. According to various sources of information "The Plains," as such, have probably existed for two centuries. If the general practice of turning outside fires into The Plains continues, the area will continue to increase and stand less and less chance of recuperating.

The only species able to withstand this repeated burning are pitch pine and scrub and blackjack oaks. Accompanying shrubs are bearberry, crowberry, pixie moss, sand myrtle, laurel, sweet fern, and occasionally huckleberry.

South Jersey's wilderness once supported many small thriving communities throughout its area. These towns were centered on the charcoal, fuelwood, bog-iron and ship building industries. Development of the central coal and iron mines in the Lake Superior region eliminated the bog-iron and the greater part of the fuelwood and charcoal industries.

The lack of care and interest in rehabilitating the forest is, at the present time, speedily eliminating lumbering and kindred occupations with the result that this and future generations of the people of The Pines must move out or depend on relief for existence.

Part 2

THE DIVISION OF FORESTS AND PARKS

As early as 1894, the Senate and General Assembly of the State of New Jersey passed an act directing the State Geologist, "with the assistance of a competent botanist to be selected by said board (Geological Survey Board), for his expert knowledge of forestry and of the forest trees of this State" to make an investigation "to ascertain the extent, character, and location of the wild lands of this State which are suited for permanent occupation by forests rather than by agriculture." The report was submitted principally in the Annual Report of the State Geologist for the year 1899, published in 1900.

No fruitful action on this report was taken until 1905, when an act was passed establishing a State Board of Forest Park Reservation Commissioners who were empowered through the act and amendments dating from 1906 to 1924 to acquire and administer forest reserves; to observe the best methods of reforestation cut-over and denuded lands; to prevent injury by forest fire; to encourage private owners in preserving and growing timber and to promote the general conservation of forest lands around the head-waters and on the watersheds of all the water courses of the State. In 1915 an act was approved to incorporate, in a Department of Conservation and Development, the State Water Supply Commission, the Board of Forest Park Reservation Commissioners, the State Geological Survey, the Washington Crossing Commission, the State Museum Commission and the Fort Nonsense Park Commission. As the name implies, the present Division of Forests and Parks of this Department of Conservation and Development administers the State Forests and State Parks, and other projects concerning forestry and recreation.

Personnel—The Board of Forest Park Reservation Commissioners, on February 1, 1907, appointed a technical forester to administer the Forest Reserves. The personnel of the Division has increased since that time as land was acquired and new services were demanded by the public. Today the technical and administrative personnel of the Division of Forests and Parks is as follows:

Trenton Office :

- State Forester
- State Park Supervisor
- State Forest Fire Warden
- Senior Assistant Forester in charge of State Forests
- Senior Assistant Forester in charge of Reforestation and Shade Trees
- Senior Assistant Forester in charge of Research and Cooperation
- 3 Assistant Foresters
- 5 Division Fire Wardens
- 1 Junior Assistant Forester
- 1 Landscape Architect
- 2 Civil Engineers
- Clerical Staff

Field:

- 7 Foresters each in charge of a Forest or Park
- 4 Division Fire Wardens
- 1 Park Superintendent
- 2 Assistant Foresters on the State Forests
- 2 Nursery Superintendents
- 42 Section Fire Wardens
- 565 District Fire Wardens
- 9 Forest Rangers
- 16 Lookout Watchers
- 8 Park Guards
- 16 Park Helpers
- 3,000 Forest Fire Crewmen
- 1 Boat Tender
- 2 Caretakers
- 3 Nursery Helpers
- 2 Forest Wardens
- 5 Life Guards

A list, giving the names, business addresses and telephone numbers of the Division's personnel, with the exception of the Forest Fire Service Staff, is published periodically for the convenience of the public in using the properties and services. The Forest Fire Service personnel may be obtained from "Forest Firewardens—New Jersey," a circular issued annually.

All but the positions falling in the laborer classification are filled by persons who have passed State Civil Service examinations covering their field. Examinations for the technical positions, such as forester and landscape architect, may be taken only by those who have the necessary professional training and experience. Lists of State examinations are issued from time to time by the Civil Service Commission and may be obtained upon request from that Commission.

PROGRESS IN STATE LAND OWNERSHIP

Although the acquisition of land was commenced soon after the Act of 1905 was passed, the growth of State-owned lands has been slow due to meager appropriations. The early goal of a minimum of 200,000 acres, or 10% of New Jersey's 2,000,000 acres of idle wild land is still far from attainment. An intensive study of the land use situation during the last several years, in which tax-delinquent lands, sub-marginal areas, non-productive woodlands, denuded watersheds and pressure of the population for more and larger recreational areas have been carefully considered, shows that not less than 390,000 acres must be acquired before appreciable progress can be made in solving this enormous economic and social problem.

A more detailed report of this need of New Jersey for more public lands is available in a special bulletin of the Department "A Program for State Ownership of Park and Forest Land in New Jersey."

The slow progress in acquisition of the State Forests and Parks is well brought out in the following table.

<i>Year</i>	<i>No. of Units</i>	<i>Total Acreage</i>
1905	1	871
1910	5	13,202
1915	8	14,210
1920	8	17,251
1925	12	18,270
1930	15	37,202
1937	17	57,415

Note: High Point Park is not included.

Forests and Parks—The original areas purchased by the State were chosen to serve as demonstration forests to the private woodland owners showing both the best methods of silviculture and fire prevention. As time went on and other areas were added through purchase or gift, it became evident that the demand of the nearby urban populations of New York, metropolitan North Jersey and the Camden-Philadelphia areas for woodland parks must be fulfilled and all the natural beauty spots which could be developed were given over to that purpose. There are now one or more recreational units on all but the smallest State Forest. Every State Park is primarily devoted to this purpose. In fact, no sharp distinction can be drawn between Parks and Forests, except that Parks, usually smaller units, are natural beauty spots selected for their recreational value, while Forests, constituting often many thousand acres in New Jersey's wilderness, are managed for multiple use. Selected adaptable units in the latter areas are set aside for recreational purposes. The remaining wood-

lands are managed according to best forestry practice. Every possible step is taken to prevent forest fires, build up the timber supply, protect water sheds, conserve wild life, and reclaim the denuded areas by reforestation.

Full information concerning the State Forests and Parks areas is available. Attractive folders containing typical photographs and maps detailing points of interest in the areas may be obtained without charge upon application to the department. The recently published State Highway map and those of several gasoline companies also feature the State's public reservations.

Hunting and fishing are allowed subject only to the State and Federal laws on the State Forests. Fishing is permitted but hunting is forbidden on the State Parks because of the danger to human life. The Parks serve as wild life sanctuaries.

DESCRIPTION OF STATE FORESTS AND PARKS

Bass River State Forest—Burlington and Ocean Counties—area 8,849 acres. This unit was the first of the present State Forests to be purchased following the Act of 1905. Located north of New Gretna in the Coastal Plain Pines region, this Forest has been one of the proving grounds of the most modern methods of fire prevention and advanced forestry practices applicable to "The Pines." A feature of this Forest is the experimental plantation of twenty acres surrounding the headquarters' buildings. Although northern white pine and southern loblolly pine have to date made the best growth, red and Austrian pines, Douglas fir, Norway spruce, and European larch show varying degrees of response to the sandy, maltreated soil.

Belleplain State Forest—Cape May and Cumberland Counties—5,565 acres. This Forest, located near Woodbine, lies south of The Pines area proper in the more fertile strip bordering the Delaware Bay. Established in 1928, already many miles of fire lines and safety strips have been constructed along the roads and boundaries, many acres of oak and pine have benefited from improvement cuttings, several hundred acres of old field and cut-over land reforested with young trees, and one large area devoted to recreation. On this area, centering around Lake Nummy, facilities for bathing, picnicking, and nature study are available. An excellent view of the Forest may be obtained from the Forest Fire Service lookout tower.

Cranberry State Park—Sussex County—196 acres. This area was acquired by the State at the time of the abandonment of the Morris Canal. Consisting mainly of the 154-acre Cranberry Lake, beautifully

situated in the North Jersey hills, this Park lies between Netcong and Andover and is as yet undeveloped.

Green Bank State Forest—Burlington and Atlantic Counties—1,833 acres. Located near the town of Green Bank this Forest offers bathing facilities in the Mullica River and is exceptional in that it supports an undamaged stand of old growth timber, set off by thickets of evergreen laurel and holly. The feature of this Forest is the 12-acre forest tree nursery where the State's supply of pitch, shortleaf and loblolly pines, as well as several other important species, are grown.

Hacklebarney Park—Morris County—286 acres. Situated in a wooded glen on the steep bank of the Black River near Chester, this Park is a gift of Adolph E. Borie to the State in memory of Susan P. Borie and Susan R. Paterson. The unspoiled hemlock and hardwood grove is intensively developed as a picnic area with all facilities for public enjoyment.

Hopatcong Park—Morris and Sussex Counties—100 acres. This Park, once part of the Morris Canal holdings, includes a considerable stretch of lake shore and an area of woodland that is being developed. The dilapidated dock has been replaced by larger and better facilities more befitting the approach to the State's largest lake.

Jackson State Forest—Ocean County—43 acres. Limited in acreage, this Forest located near Cassville, is given over entirely to demonstration and research. In 1924 the stagnant stand of old shortleaf pine was cut and resulting brush burned. Experimental plantings of white, red, Scotch, pitch and loblolly pines, Douglas fir and Norway spruce were soon started and growth compared with that of shortleaf pine resulting from natural reproduction.

Jenny Jump State Forest—Warren County—1,107 acres. Located on the Jenny Jump Mountain, near Hope, this Forest situated in the deciduous stands of the Highlands, is well known for its picturesque scenery. An exceptional, if not the best, view of the Delaware Water Gap from the Jersey side can be seen from the Jenny Jump headquarters. Recreational facilities are being rapidly developed.

Lebanon State Forest—Burlington and Ocean Counties—21,555 acres. Like the Bass River State Forest, this area is located in the heart of the South Jersey Coastal Plain pines. With several ghost towns, centers of former prosperous industries, this Forest now supports vast stretches of pine "deer woods" that are gradually being made productive by modern forestry methods. Dense stands of valu-

able southern white cedar are found in the swamps. A small sawmill, equipped with eight machines including a complete shingle manufacturing unit is in operation on this Forest. The lumber produced is used only for State Forest and Park developments. By-products such as sawdust and slabs are sold to the general public.

The Lebanon Forest features two recreational units at present. One, Deep Hollow Pond, on the west side of the Forest, is a small artificial body of water with picnic camp sites, including a shelter, tables and benches, a fireplace and parking area. The second, the Butler Place, is adjacent to Highway Route S-40 near the east boundary of the Forest. This picnic area is hidden in a grove of pine and birch where, a hundred years ago, travelers stopped at an old colonial-style hotel, the cellar of which is still visible. Motorists on their way to shore points find this historic spot a delightful picnic place.

Mt. Laurel Park—Burlington County—21 acres. This Park was first taken by the Forest Park Reservation Commission as a demonstration forest because of local interest in Moorestown and the vicinity in preventing this South Jersey "mountain" from being stripped of timber cover. Because of its small size and physical characteristics, the property has far more value for recreation than forestry practices. At the present time the Park is used principally by the local population. Development has been retarded due to the lack of a water supply.

Musconetcong Park—Morris and Sussex Counties—351 acres. This property, near Netcong, consisting principally of Lake Musconetcong, was also taken by the State when the Morris Canal was abandoned. Fishing, boating and bathing were made available to the public after the department dredged the shallow lake and filled some twenty acres. At the present time the narrow fringe of upland does not permit extensive development.

Parvin Park—Salem County—971 acres. Established in 1931, this Park near Elmer and Vineland is one of the most attractive out-door spots in South Jersey. The ninety-acre lake is fed by the two-mile meandering Muddy Run stream. The smaller Thundergust Pond of 12 acres is near completion. On this Park the flora of the Delaware Valley, The Pines and the South meet. The unspoiled upland, transversed by attractive nature trails, is abundant in flowering shrubs and plants and abounds in bird life. The Park, besides being the nesting site of many species of song birds, is used as a resting place during Spring and Fall migrations.

On the north shore of the lake is Parvin Grove, where organized facilities for bathing and small picnics are available. Row boats and canoes can be rented. At Second Landing, further upstream, a picnic site is equipped with fireplaces, tables, a water supply, parking area, a shelter and sanitary facilities. Jagger's Point and Island Point have recently been developed by the C. C. C. Roads, vehicle and foot bridges allow ample access to the area.

Penn State Forest—Burlington County—2,958 acres. This Forest is located in one of the most remote and wildest parts of the Coastal Plain. The nearest town is Chatsworth, six miles to the southeast. Most of the area supports a young pine forest with some cedar in the swamps. The Plains, extend into the northern portion of the Forest and a remarkable view of them can be obtained from the especially constructed observation tower on Bear Swamp Hill. The tower and hill total about 125 feet above the surrounding level country. Eighty-seven-acre Oswego Lake lies along the south boundary of the Forest. This reclaimed cranberry bog, fed by the Oswego River, is one of the best lakes in South Jersey. Two sand beaches, one for adults and one for children, border the section of the lake adjacent to the picnic area where tables, benches, shower baths and sanitary facilities are provided.

Ringwood Manor State Park—Passaic County—100 acres. Ringwood Manor Park is another recent and valued addition to the State's park system. The gift of Mr. Erskine Hewitt, this Park is located northeast of the town of Ringwood Manor on the Ringwood-Sloatsburg Road. The Park and area surrounding it has a rich historical background. Here the first iron mine in the United States was operated. Cannons and munitions were made here for the American patriots during the Revolutionary War. The great iron chain that was stretched across the Hudson River at West Point to prevent passage of British ships was wrought at Ringwood. A section of the chain can be seen at the Park. General George Washington was a frequent visitor here. A rambling manor house of 78 rooms and elaborate formal gardens are features of the property. The grounds are open to the public, but, because of the short time the State has owned this Park, very little development for public use has been made.

Stephens State Park—Morris and Warren Counties—230 acres. This Park, lying about two miles north of Hackettstown on the banks of the Musconetcong River, is a very recent gift to the State by Messrs. A. W. and M. P. Stephens. This Park is open to the public but at present facilities for recreation are limited. Nature trails along both sides of the Musconetcong, with spurs leading to picnic

and camp sites in the hardwood groves, are planned for the near future.

Stokes State Forest—Sussex County—12,428 acres. Stretched along the Kittatinny Ridge, this Forest, with headquarters at Branchville, is unsurpassed for all forms of outdoor recreation. This rugged country lends itself readily to recreational development, Lake Ocquitunk and Tillman's Ravine being picturesque examples. The former, an 11-acre lake recently created, is bordered on the west by a grove of large trees where a colony of 11 log cabins are nearing completion. Equipped with essentials, these cabins will soon be ready for vacationists. The latter, Tillman's Ravine, centers around Tillman's Brook which crosses the area. Its precipitous slopes are shaded by dense stands of virgin hardwood and hemlock, banked with masses of magnificent rhododendron. Hunting and fishing are features of this northern Forest. The Stokes Forest is also the North Jersey laboratory for application of the latest forestry technique. Large areas of thinnings and improvement cuttings have been made on its slopes and coves. Hundreds of acres have been planted to many species of tree seedlings, and a network of roads and fire lines protect it from the forest's worst enemy.

Swartswood State Park—Sussex County—536 acres. Located in the eastern foothills of the Kittatinny Ridge, near Newton, this Park consists chiefly of Swartswood Lake. Emmons Grove, constituting the only land owned by the State, is a very attractive spot situated in a stand of old hemlocks. The small land area prevents further recreational development and is totally inadequate.

Voorhees State Park—Hunterdon County—323 acres. This Park was a gift of the late Governor Foster M. Voorhees to the State. Located about a mile and a half from High Bridge, the Park includes several groves of mature hardwood. Experimental and specimen plantations are a feature of the area. A Civilian Conservation Corps Camp is developing the recreational features.

Washington Crossing State Park—Mercer County—292 acres. This Park commemorates the historic crossing of the Delaware River by the Revolutionary Army at this point just prior to the battle of Trenton, Christmas Day, 1776. Unlike other State parks, this area is maintained and developed as an historic shrine. Continental Lane, which the Army used, is preserved as a ramble. The McKonkey Ferry House, which stood there at the time of the crossing, has been restored and is maintained as a shrine and a museum. There are a number of picnic groves for accommodation of small groups or large

parties. One of the two State Forest nurseries lies east of the Pack Memorial Arboretum south of the Continental Lane.

Development—The State Forests are surrounded by 257 miles of boundary lines that must be maintained annually. Some 7,775 acres of plantations have been established since the first on Bass River Forest in 1913. In order to make the Forests and Parks available to the public and fire fighting crews, more than 350 miles of roads of various widths, entailing installation of 607 culverts, have been constructed. Over 30 bridges span the streams and swamps. Two hundred miles of safety strips and fire lines, covering 2,275 acres, aid in protecting the Forests from fire. Rapid fire suppression has been abetted by the erection of two fire towers on the Forests. Ten lakes with beaches and 3 canoe docks are maintained for public use, with some 24 picnic grounds and 58 camp sites close by or within reasonable distance, 11 cabins have already been constructed and 50 fireplaces, 126 picnic tables, and innumerable pumps have been installed and springs improved for the picnickers' enjoyment. More than 40 especially designed parking areas and spurs solve the parking problem. Fourteen capacious rustic shelters offer opportunities for relaxation. Approximately 50 miles of foot and horse trails entice the hiker and equestrian to wander into the wooded areas. A large bath house with a capacity for 2,240 persons is being constructed at Parvin Park, and smaller ones are available on the other lakes. The observation tower on the Penn State Forest has already been mentioned.

This is a partial picture of accomplishments and facilities. A further idea of the use of the State Forests and Parks may be obtained from the following combined tabulation of income and number of visitors.

<i>Forest or Park</i>	<i>Income Fiscal Year 1935-1936</i>	<i>Income Fiscal Year 1934-1935</i>	<i>Visitors Calendar Year 1936</i>
Bass River State Forest	\$1,086.78	\$871.75	5,304
Belleplain State Forest	1,394.39	1,020.54	5,439
Cranberry State Park	735.94	522.07	*
Green Bank State Forest	2,318.25	2,240.17	1,427
Hacklebarney State Park	82.50		66,732
Hopatcong State Park	1,724.25	1,313.70	88,948
Jackson State Forest	24.35		
Jenny Jump State Forest	757.20	703.50	811
Lebanon State Forest	3,932.64	4,962.84	5,773
Mt. Laurel State Park			*
Musconetcong State Park	165.00	238.50	*
Parvin State Park	1,580.30	1,509.07	82,095
Penn State Forest	90.58	288.65	1,937
Stokes State Forest	2,567.59	2,040.44	6,188
Swartswood State Park	11.30	42.50	58,938
Voorhees State Park	17.00	60.00	11,437
Washington Crossing State Park	1,141.10	1,412.04	172,501
Total	\$17,629.17	\$17,225.77	507,530

* No record.

The income for the past four fiscal years from the above Forests and Parks was: 1932-33, \$9,982.86; 1933-34, \$11,955.31; 1934-35, \$17,225.77 and 1935-36, \$17,629.17.

Although in some cases the figures above are not fair representations of the use of the Forests and Parks because during the last two years many facilities have not been available, due to C. C. C. work projects, they do tend to show that out-doors areas are in great demand and approaching the time when they will be self-supporting. The income on the State Forests is derived from sale of cedar products, cordwood, gravel, sand, and stone, leases, rents, and recreational facilities fees. State Parks depend wholly on fees from use of camp sites, fireplaces, boats and canoes, etc.

All income is paid directly to the State Treasury and is not available to the department for use, except through appropriations by the Legislature. A tax lieu of ten cents per acre is paid on all State Forests to the municipality in which the Forest is located.

NURSERIES AND REFORESTATION

Second only to the problem of preventing fires in New Jersey forests is the task of reforesting burned and otherwise denuded areas. To aid this important work, the Division of Forests and Parks established a forest tree nursery at Washington Crossing in 1926. Due to increasing demands for more seedlings and the desire to raise South Jersey species in the Coastal Plain area where they would not suffer from severe winter conditions, a nursery was established at Green Bank on the north bank of the Mullica River in 1930. Stock grown in these nurseries can be purchased by any land-owner in the State at the production cost price, provided he owns not less than 10 acres of land and agrees to use the trees only to reforest idle land. Stock from the nurseries can not be used for landscaping as State forest nurseries are not intended to compete with commercial nurseries.

The Washington Crossing Nursery, which adjoins the Park, lies in Mercer County. This twenty acres of fertile land is irrigated by a half-mile overhead pipe system. The nursery is capable of producing a total of 7,000,000 seedlings and transplants annually. Four hundred and seventy-seven pounds of seeds were sown in the Spring of this year. The present annual production is about 1,900,000 two-year-old seedlings and 700,000 transplants. At the present time the percentages of seedlings in the nursery are as follows:

Red Pine	40%	Norway Spruce	10%
White Pine	30%	Japanese Larch	3%
Scotch Pine	10%	Hemlock	2%
Miscellaneous species including hardwood		5%	

Red pine, with only one serious enemy, is the most desirable tree for general reforestation in New Jersey. The one pest that can inflict serious damage to a red pine stand, the European Shoot Moth, is limited in its adult flying range and is quite amenable to control measures. The white pine, although at times suffering severe damage from the white pine weevil and a blister rust, is a very valuable tree, desirable because of its workable wood. To date the blister rust, which can be controlled, is not of great importance in the State. It is believed the weevil damage can be greatly reduced by judiciously mixing this species with others and planting closer than the usual six by six feet.

The Green Bank Nursery, in Burlington County, covers, at the present time, 12 acres. This nursery has a capacity of 6,000,000 seedlings. Present annual production is limited to 800,000 two-year seedlings. One hundred and twelve pounds of seeds were planted this

Spring and it is expected that 1,600,000 vigorous seedlings will be in the beds this Fall. The following proportion of species are produced:

Shortleaf Pine	70%	Pitch Pine	10%
White Pine	10%	Loblolly	5%
S. White Cedar	5%		

Three of these species are natives of South Jersey, the shortleaf and pitch pine and southern white cedar. Loblolly pine has been reported as growing naturally in Cape May County. Shortleaf, one of the so-called southern yellow pines, is probably the logical tree to favor for quality. It, and the native pitch pine, once they attain a height of thirty feet or more, are fairly resistant to fires. Pitch pine grows well on poor soils. Southern white cedar, which grows well only in the swamp bottoms, is South Jersey's most valuable commercial species.

Output—Since the Washington Crossing Nursery was started, a total of 17,418,000 trees have been planted on public and private lands. Very careful files of all shipments are kept so that the source, even to the source of the tree seed and the history of all resultant plantations, is known. The State Forests and municipal watersheds require a considerable proportion of the stock grown. An outstanding example of the planting by a private company is that of the Lopatcong Water Company located on Scott Mountain near Phillipsburg, a subsidiary of the Ingersoll-Rand Company. Some 700,000 seedlings of several species have been planted by this Company. The City of Newark's Pequannock Watershed, a tract of about 35,000 acres in the vicinity of Butler, has planted 1,585,000 seedlings produced by the State Nurseries. An idea of State Forest plantations can be obtained from figures given earlier in the text. Many million are used by farmers and small landowners. The nurseries furnish work to five permanent and thirty-five seasonal employees. A recent publication of the department, "Why Idle Acres in New Jersey," is of interest to landowners in this connection.

RESEARCH

Need—Forestry has been practiced in Europe for centuries and for many years in this country. It has been found, however, that often results obtained by the use of certain approved technique in one country cannot be successfully used in another. In fact, region differs from region and locality from locality. To practice forestry with any degree of success in a region or State, some record and correlation of responses to applied silviculture must be maintained. One branch of the Division of Forests and Parks, the Bureau of Investi-

gation and Cooperation handles this sort of work. The greater part of the conclusions reached are obtained empirically from observing the results of thinnings, plantings, fires and cuttings throughout the State. Analytical data is obtained from permanent experimental plots located on private as well as State lands. At the present time the Bureau has plots located as follows:

In the oak-pine forest of the Coastal Plain	11
In the forest of the Delaware Valley	3
In plantations, oak-pine forest of the Coastal Plain	9
In the native-pure pine stands of the Coastal Plain	5
In the southern white cedar of the Coastal Plain	8
In the pure-pine plantations throughout the State	24
In the hardwood plantations throughout the State	9
In the white-pine plantations throughout State (weevil study) ...	8
Cooperative—fire damage	1
Cooperative—seed source study	1
Total	79

Except for the 80-acres cooperative fire damage study and 21-acre seed source study, the plots average about a quarter-acre in size. Each plot is carefully located and mapped and the diameters and heights of the trees thereon measured periodically. Records of all data are carefully kept and conclusions drawn when sufficient data has been accumulated. Some of these plots have been under observation sixteen years.

The work of the department in this line has been abetted by the assignment of a sub-station of the U. S. Allegheny Forest Experiment Station to the State, established on the Lebanon State Forest in 1933.

COOPERATION WITH PRIVATE OWNERS

The acreage of private and municipal woodlands in the State greatly exceeds those owned by the State and probably always will. As early as 1909, the State Forester in the Annual Report of the Forest Park Reservation Commission pointed out the need of aiding private owners. This policy has continued. The services of the Division's professional foresters are available as far as number and time will permit. Advice regarding reforestation, protection of the forest or woodlot, the feasibility of thinning or otherwise improving the stand, and value of the products to be cut, is freely offered. A directory of sawmills and other wood using industries is maintained to aid woodland owners in marketing their products.

Advice concerning reforestation problems is handled by the foresters in charge of nursery work. Other information concerning

woodlands and their betterment and protection is supplied by the research foresters. One of the outstanding examples of this cooperative work occurred in the depression years starting 1932 through 1935. The Emergency Relief Administration in practically all the large municipalities throughout the State were required to furnish fuel to thousands of clients. Also, small allotments in the form of money or food and clothing were given to men who could do nothing to earn it, especially during the winter months. At the same time hundreds of acres of forests in the State supported stands in which fuel wood was going to waste as suppressed and diseased trees died. The private owners felt that they could not afford the necessary improvement cuttings on so extensive an area. Foresters of the Division were able to arrange for relief agencies to make the necessary thinnings, to receive in return the greater proportion of the wood cut. Projects were supervised in ten counties. As an example of the work accomplished during the six months from January 1, 1935, to June 1, 1935, 33 woodlots were improved, 5,720 cords of wood cut, which, figuring one cord of green wood to be equal to six-tenths of a ton of hard coal, was estimated to equal 3,432 tons of coal. The cost of this amount of coal, at \$10.00 per ton, would have been \$34,320.00. The actual extra cost to the E. R. A. was \$17,827.00, saving the relief agencies \$16,493.00 in this six months' period alone. The benefit that this work has been to the woodlands treated is inestimable. Scattered as these stands are throughout the State they have also served as demonstration forests. Work of this type continued until January, 1937. At that time the Emergency Relief Administration was replaced by local relief and the Works Progress Administration, and this type of work was dropped.

OTHER ACTIVITIES

The Division of Forests and Parks offers advice and cooperation to public agencies and owners interested in shade trees, their protection and planting. The State Federation of Shade Tree Commissions, has a department forester as a member of its Board of Directors. At the present time there are approximately 100 shade tree bodies in the State. Laws of New Jersey relating to shade trees have been compiled in one pamphlet, copies of which may be obtained from the Department of Conservation and Development.

Lectures—Attractive and interesting illustrated lectures are available. As time permits, members of the department are available for talks on forestry, recreation, shade trees and related subjects. Some 85 lectures were given to clubs, schools, and other organizations dur-

ing the past year. Field trips are arranged for those who wish to inspect the State Forests and Parks and nature study groups are guided over interesting sections of these areas. A partial list of available departmental publications including those already mentioned follows:

New Jersey State Parks
State Forest Circular
Stokes State Forest Circular
Belleplain State Forest Circular
Bass River State Forest Circular
Lebanon State Forest Circular
Penn State Forest Circular
Washington Crossing State Park Circular
Parvin State Park Circular
Voorhees State Park Circular
Swartswood State Park Circular
Hacklebarney State Park Circular
Let's Shade New Jersey's Roadsides
Laws of New Jersey Relating to Shade Trees
Laws of New Jersey Relating to Forests and Parks
How to Plant Forest Tree Seedlings
A Shade Tree Guide
Common Trees of New Jersey (25¢ per copy)
Washington Crossing Park Souvenir Booklet (15¢ per copy)
The Natural Resources of New Jersey
The Mineral Industry of New Jersey for 1934
New Jersey Geodetic Control Survey Bench Marks
Forest Fire Laws of New Jersey
Fires for Fun
Lookout Guide of New Jersey
Fighting Forest Fires
A Few Scenic Attractions of the Garden State
Why Idle Acres in New Jersey

The Division is making a permanent record of all existing historic and large trees in the State. It is hoped that an illustrated pamphlet may later be published with this interesting information.

STATE FOREST FIRE SERVICE

Problem—The greatest forestry problem in New Jersey is that of controlling and reducing the number of forest fires. As pointed out earlier in this pamphlet, South Jersey—the 1,200,000 acres of Coastal Plain—has been abused by man and fires to such an extent that from the forestry viewpoint, it is one of the greatest fire hazards in the United States. An average of 1,200 fires requiring 80,000 man-hours to extinguish burn 60,000 acres annually. If the number and area of fires can be reduced, the future value of this vast wilderness for timber production, water supplies, and recreation is incalculable.

Besides the value of the forest itself, small towns made up for the most part of inexpensive buildings, yet representing millions of dollars to people of modest means, cranberry bogs and blueberry plantations representing a capital value conservatively estimated at \$5,000,000 and summer estates add vast amounts to the value of the area.

Area—This area, 120 miles long and averaging 30 miles wide, is continuous in the sense that a fire could travel its whole length if unhindered by man or the elements.

Organization—The solution of this problem rests in the hands of the State Forest Fire Service, in charge of a State Fire Warden. For the sake of administration, the State is divided into three Divisions. Division "A" covers the forested area lying between the New York boundary and the Raritan River and has its headquarters at Butler. Division "B" constitutes the area from the Raritan River to the Mullica River, with headquarters at Mt. Holly. Division "C" comprises the remaining portion of the State with headquarters at Bridgeton. Each of these Divisions is in charge of a Division Firewarden who is responsible for all of its personnel, equipment, supplies, reports, statistics, instruction and organization. The Division must be so organized that fire fighting crews are available when needed.

Each Division is divided into strategic areas, called Sections, each in charge of a salaried Section Firewarden. The Section's subdivisions, called Districts, are manned by the combat unit, a District Warden and 10 to 15 men. The District Warden and his crews are paid on an hourly basis for actual fire suppression. The District Warden also receives a small annual stipend for issuing permits, posting his District, keeping himself and equipment in readiness to answer alarms and enforcing the Forest Fire Laws. A District Warden's territory averages about 9,000 acres. The Section Warden, with from 10 to 15 Districts in his Section, is responsible for fighting fires on some 90,000 acres.

State headquarters of the Forest Fire Service are at Trenton. Here the State Firewarden has a staff of 5 division wardens, an engineer, and a clerical force.

In order that fires may be speedily detected each Division is constantly under the scrutiny of lookout watchers during nine months of the year located in strategically placed towers. These towers are fully equipped with instruments to aid in locating fires, to which recently has been added short wave radio equipment. Nineteen towers overlook the State's forest area from the New York State

boundary to Cape May County. Beside the fire towers, six automobiles, the State Firewarden's aeroplane and Trenton headquarters are also equipped with short wave radio.

All wardens in the field have a full supply of fire fighting equipment. This consists of axes, brooms, brush hooks, buckets and cans, steel drums, lanterns, hazel hoes, mattocks, Rich tools, shovels, sprayers and torches. Fifty-three per cent of this equipment is in the hands of the combat units—the District Wardens. Twenty-seven per cent is at the Section Fire Wardens' headquarters and the remaining 20 per cent is held as Division reserves. In addition to the above equipment, 24 power pumps, each with an adequate supply of hose, are in available locations in the three Divisions. A three-man crew is trained to handle each pump.

Progress—That progress has been made since the Service was organized in 1924 is shown in the following figures. The average size fire in 1924 burned 101 acres. In the seven years from 1924 to 1930, the average was reduced to 69 acres and from 1930 to 1937, to an average of 35 acres.

CIVILIAN CONSERVATION CORPS

Creation—The law creating the Civilian Conservation Corps was enacted March 31, 1933. Anticipating the tremendous impetus that would be given the work programs of the State Forests and Parks, the State Forester made early application for services of this agency. Less than two months after the Corps became a reality the first camp in the State set up temporary quarters on the Lebanon State Forest. In a short time five more camps were in the field and by the middle of July work projects on four Forests, eight Parks, and two municipal watersheds were well under way. As the program developed, the department secured additional camps for other public agencies in the State. Thus the number gradually increased until a maximum of thirty-eight were in operation. Some camps have been discontinued since that date as the Federal program was reduced. On April 1, 1937, twenty-eight were functioning under the general supervision of the State Forester.

Organization—To assist in a better general understanding of the functioning of the various administrative, and using agencies connected with the Emergency Conservation Work, the following brief statement may be of interest. Each camp is a unit in itself, made up at full company strength of 200 enrollees recruited from the Nation's young men. The United States Department of Labor acts

as recruiting agent. The War Department is charged with sheltering, feeding, clothing, and maintaining the enrollees' health and discipline in the camps. A civilian project superintendent, aided by eight to ten qualified foremen, is responsible for the development of the work program and for the use and care of the enrollees during working hours. If the camp is one located on a State Forest or Park, the resident State officer who is more familiar with the area and its development aids and advises in the preparation of work plans and exercises general supervision over the work in the field. If the camp is working for another using agency, such as the Dutch Elm Eradication Bureau, a mosquito control commission or a municipal watershed, for the Fish and Game Commission, or a local park commission, technicians from these respective units act in a similar capacity.

Responsibility—Detailed administration of the camps, with the exception of a few camps mentioned later, is handled for State Parks by an emergency C. C. C. staff under the U. S. Department of Interior; for the State Forests and other using agencies by a similar staff under the U. S. Department of Agriculture. Central offices of the U. S. Army C. C. activities for New Jersey are maintained in Trenton. There have been also three Civilian Conservation Corps camps directly under the United States War Department in New Jersey working on Army Reservations, and three United States Soil Conservation Service camps and one National Park Service camp working in the State which are in no way connected with the State Forester's office.

At the start of the Emergency Conservation Work, the State Forester, as the chief of the State's conservation unit, was named general administrative officer for the State by the Federal Government. Beside approving purchases of all materials and supplies used by the camps in carrying out the work program, the hiring of all civilian supervision and administrative personnel, and acting as liaison officer between the Federal Government and the use agencies, these duties entailed general supervision of work programs of all the various use agencies. This task was accomplished without addition to the personnel of the State Forest Service.

Results—An idea of the tremendous amount of work that has been done for New Jersey can be obtained from the following brief summaries. These summaries do not include the work of the War Department and Soil Conservation camps noted above.

Recreation—On State Forests and Parks, there have been developed 280 acres of public camp grounds, including 28 camp sites, 5 shelters, 22 other buildings, 15 sewage disposal plants, 4 incinerators, 100

picnic tables, the development of 11 springs, leveling and beautifying of 14,000 square yards of parking area, and transplanting over 21,000 shrubs.

Roads and Trails—Over 350 miles of much needed roads and trails have been constructed, 40 miles of foot trails, 30 miles of horse trails, and over 60 foot and vehicle bridges open the wilderness to protection and public enjoyment.

Erosion Control—Approximately 400,000 yards of stream and lake banks have been sodded, riprapped, or otherwise protected from erosion. Some 650,000 square yards of stream channel deepened, 15,000 cubic feet of channel and ditch cleaned and straightened, and 1,500 lineal feet of water supply conduit laid.

Silviculture—Approximately 10,000 acres of fields and denuded areas have been reforested and 30,000 acres of woodland improved by thinnings and improvement cuttings. Thirteen thousand man-days have been devoted to forest tree nursery work, and some 30,000 pounds of tree seeds have been collected.

Fire Prevention and Suppression—Five thousand seven hundred and seventy days have been devoted to suppression of forest fires to March 31, 1937. Five hundred miles of fire breaks of varying widths have been constructed, and 17,000 acres of woodland cleared of brush and other inflammable material. Four lookout towers have been added to the State Forest Fire Service's network.

Fish and Game Work—On areas administered by the State Fish and Game Commission, 36 fish ponds have been made, 55 ponds developed for fish and water fowl involving some 2,800 man-days, 75 acres planted to food plants and 185 man-days used in emergency feeding of upland game and water fowl.

Mosquito Control—To March 31, 1937, 62,440 acres of marsh land had been improved with some 2,500 miles of ditch.

Dutch Elm Eradication—One hundred eleven thousand, two hundred seventy-six acres of woodland have been cleared of elm suffering from *Graphium ulmi*, the Dutch elm disease.

Miscellaneous—Eighty hundred forty-seven concrete, masonry and riprap dams have been constructed to impound water for bathing, boating and encouragement of wild life. Insect epidemics have been checked on 2,400 acres. Some 600 abandoned gravel holes have been obliterated and beautified. One hundred forty man-days have been devoted to hunting missing persons. Poisonous plants have been

eradicated from over 300 acres. Assistance was rendered the Division of Forests and Parks in establishing 15 forestry experimental plots.

Although the above brief summaries represent only some of the outstanding features of the Emergency Conservation Work in the State, with such items as surveys and transportation of materials omitted, the tremendous progress made in the State's conservation program can readily be seen.

