

FIRE MANAGEMENT PLAN

Prepared for the
NEW JERSEY PINELANDS COMMISSION

by
Bureau of Forest Fire Management
Division of Parks and Forestry
Department of Environmental Protection

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Two sections of the complete document are included here. They are "Fire Safety Consideration for Development and Homes in Forested Areas of New Jersey" and "Development of the Pine Barrens:A Design for Disaster". The complete report, described in the attached table of contents, can be inspected at the Pinelands Commission office.

INTRODUCTION

This plan was prepared by the New Jersey Bureau of Forest Fire Management for the Pinelands Commission.

The accompanying paper "Development in the Pine Barrens; A Design for Disaster" serves to expand understanding of fire management and wildfire control in the Pine Barrens Region. The paper outlines the basic issues to be considered, existing management techniques, alternatives, and areas requiring further study.

The enclosed plan prescribes the methods and procedures whereby the desired fire management objectives will be accomplished.

The major issues to be addressed are:

1. The Protection of life and property in the Pine Barrens Region.
2. The protection and perpetuation of the Pine Barrens Ecosystem through fire management techniques.

The alternatives to these issues are readily apparent; an increase in the loss of life, the destruction of improved property, and further degradation of the Pine Barrens Ecosystem.

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Fire Safety Considerations
for
Developments and Homes
in
Forested Areas of New Jersey

INTRODUCTION

Land pressures, improved transportation, more leisure time and an increased desire to escape the noise and pollution of the State's urban areas has resulted in a proliferation of wildland residential subdivisions and developments. The majority of these have been planned and built without due consideration to Forest Fire Protection.

The potential for wildfire disaster in New Jersey has been dramatically illustrated in years past. Large conflagrations occurred in 1930, 1954, 1963, and more recently in 1971 and 1977.

The most notable was the weekend of April 20-21, 1963, when a series of wildfires destroyed 183,000 acres, consumed 186 homes, 197 outbuildings, and was responsible for the loss of seven lives. Thousands were forced to flee and entire communities were evacuated. The estimated financial loss to improved property exceeded 8.5 million dollars.

When this tragedy occurred, most wildland areas were still largely undeveloped. However, since that time, development has progressed at an accelerated rate, and there has been a tremendous increase in property values. The results of a similar series of conflagrations today would be staggering and represent a severe economic blow to those communities affected. However, development continues, some in the State's most hazardous wildland fuel types with little or no regard to the dangers of wildfire.

PURPOSE

The purpose of these guidelines is to make local authorities aware of fire related problems associated with wildland subdivision developments and present recommendations for wildfire safety standards. It is suggested that Regional Planning Commissions and local authorities review this document and adopt the proposed fire safety standards through ordinances and codes. Developers are also encouraged to use this publication when planning or building developments in wildland areas.

OBJECTIVE

The primary objective of this document is to protect life and property from the destructive forces of wildfire in wildland developments in New Jersey.

SPECIAL NOTE

The recommendations for fire safety standards are designed primarily as a guide to development in the Pine Barrens. However, the principles of fire behavior and the standards may be applied to any area of the State where subdivisions encroach on wildland areas.

HOW TO USE THESE RECOMMENDATIONS

Not all wildland subdivisions are alike. Each wildland subdivision has a unique degree of fire hazard severity. Therefore, regional planning commissions and local authorities must identify, classify, and regulate wildland subdivisions as to their respective degrees of wildfire hazard severity.

Planning Commissions and local authorities should begin by studying the section on fire behavior. This will give the reader a basic understanding of the factors that contribute to the rate of spread and burning intensity of a wildfire and how it may endanger a subdivision. The reader should next study and become familiar with the Wildfire Hazard Classification System developed for New Jersey on page 6.

Continuing, the reader should study the basic fire safety considerations for wildland subdivisions. Specific recommendations for standards, based on wildfire hazard severity begin on page 9.

Individual subdivision plans should be reviewed by regional planning commissions, local authorities and developers, and classified as to their wildfire hazard severity. The proposed subdivision should then either be banned, because of the inherent risk to life and property, or fire safety standards should be required to make the development as fire safe as possible.

As stated earlier, each wildland subdivision will have its own unique degree of wildfire hazard severity. The proposed standards may therefore, not fit all situations and adjustments may have to be made. In these cases, a meeting of the planning commission, local authority, Forest Fire Management, and the developer should be held to formulate acceptable adjustments.

Fire Behavior

The term fire behavior is a general, descriptive term to designate what wildfire does under given conditions. This section will attempt to give planning commissions, local authorities, and developers a general idea of how fires start, build-up, spread, and decline under varying conditions. Factors that influence the behavior of fire are fuels, topography, and weather.

FUELS

Wildland fire fuels consist of vegetation. Trees, brush, shrubs, and grass make up the wildland fire fuels in New Jersey. Different fuels will burn at different rates of spread and will resist control to varying degrees. Three factors determine the rate of spread and resistance to control in wildland fuels. They are size, continuity, and compactness.

SIZE

Large fuels, such as logs, will not burn as readily as small fuels, such as grass. Large size fuels are hard to ignite and therefore hard to spread. Small size fuels are easy to ignite and spread.

CONTINUITY

Fuel arrangement plays a role in the rate of fire spread. Wildland fuels that are uniform in size, configuration, and arrangement will burn evenly. Where fuels are broken up or patchy, fires will burn unevenly. This is often termed horizontal arrangement.

COMPACTNESS

This is often termed vertical arrangement. Where fuels are deep, such as heavy timber or high brush, more oxygen is available to more fuels and will burn rapidly. Where fuels are compact, such as leaf litter or stacked logs, less oxygen is readily available and will burn slowly.

TOPOGRAPHY

The "lay of the land" affects the spread of wildfire. However, because of its relative flatness, topography is not a factor in south and central Jersey, but should be considered in mountainous sections of north Jersey. Topographic affects in New Jersey are limited to degree of slope.

SLOPE

The steeper the slope, the faster a fire will spread. On steep² slopes, fire burns sixteen times faster than downhill. This is because fuels are in closer proximity to a wildfire running uphill than they are downhill. In addition, heat rises along the slope and fuels in front of the approaching wildfire are preheated and ignite easier. Fire suppression activities become more difficult as degree of slope increases.

WEATHER

This is the most important factor in determining fire behavior.

Wind, temperature, and humidity are the major factors of weather that influence fire behavior.

WIND

Wind is the movement of air. Air contains oxygen, which supports combustion. Wind pressure can increase burning in one direction or another. Wind carries the heat of the fire into unburned fuels, causing them to become more flammable. Also, wind can blow fire brands ahead of the main fire into unburned fuel creating spot fires.

TEMPERATURE

The sun or hot winds can heat fuels and cause them to become

more flammable. High temperatures also reduce the water content in fuels. Extended high temperature periods increase fire danger.

HUMIDITY

The amount of water vapor in the air is called relative humidity. The percent of water vapor in the air has a direct influence on how easily fuels will ignite and how intense they will burn. Fuel Moisture decreases proportionately as the relative humidity of the air decreases. Fuels become drier as fuel moisture decreases: therefore, readily flammable. Extended periods of low relative humidity increase fire danger. Long extended periods of hot, dry weather create extreme fire danger conditions.

Weather is a variable factor and must be monitored daily. The National Weather Service and the U.S. Forest Service have developed a fire weather danger rating system based upon the above factors. The ratings are termed: low, moderate, high, very high, and extreme. Days rated in the very high and extreme categories are considered critical fire weather days. Wildfires can burn in any month of the year in New Jersey. However, under normal conditions, the worst fire weather occurs in the spring. This is the time of the year when weather conditions are most conducive to the spread of wildfires and is termed the primary or spring fire season. A secondary fire season may occur in the fall. During severe drought, a fire season may begin or extend into the summer months.

WILDFIRE HAZARD CLASSIFICATION

The Wildfire Hazard Classification System has been developed so that regional planning commissions and local authorities can rate a proposed subdivision's potential wildfire hazard severity. The primary factor

considered by the system is vegetation (fuels). The ratings are based on the rates of fire spread of the native vegetation and their resistance to fire suppression activities. There are four classes of ratings corresponding to four levels of wildfire hazard severity. A rating of "1" represents a low hazard classification. A rating of "4" represents an extreme hazard classification.

Individual subdivision plans should be reviewed by planning commissions, local authorities and developers and classified as to their wildfire hazard severity using the table below. A vegetative type should cover a minimum of 25% of an area to be considered. When more than one vegetative type is involved a weighted average should be used.

EXAMPLE:

A vegetative survey is conducted on a proposed 200 acre subdivision with the following proportions determined:

Mature Pine Oak	--Rating (2)--	50 Acres
Open Upland Pine	--Rating (3)--	100 Acres
Pine Scrub Oak	--Rating (4)--	<u>50 Acres</u>
		200 Acres

A weighted average is needed for an overall rating:

$$\text{Rating} = \frac{50 (2) + 100 (3) + 50 (4)}{200} = 3$$

The fire safety standards for a high wildfire hazard classification should be used.

If the weighted average exceed a rating, the next highest rating class should be used (E.G. 3.4 would be rounded to a rating of 4).

Adjacent areas should also be considered because wildfires may spread from these areas.

Assistance from the Bureau of Forest Fire Management may be requested in determining vegetative types.

WILDFIRE HAZARD CLASSIFICATION

<u>RATING</u>	<u>HAZARD</u>	<u>VEGETATIVE TYPES</u>
1	Low	Cedar, cedar-maple, maple-cedar, maple gum-magnolia, maple-pine, pine-maple, red gum.
2	Moderate	Mixed hardwood, mature oak, mature oak-pine, mature pine-oak, mature upland pine (dense and large $\geq 20'$ tall and $\leq 20'$ spacing.)
3	High	Open upland pine $\leq 20'$ tall $\geq 20'$ spacing.)
4	Extreme	Upland pine small or variable (plains type) immature pine-oak, immature oak-pine, scrub oak, scrub oak-pine, pine-scrub oak, pitch pine lowland.

Fire Safety Considerations in Wildland Subdivision Design

Wildland subdivisions should be designed to be "fire safe." Public welfare and safety should be important considerations. Wildland subdivisions should be designed so that if a fire should occur in or near the development, the spread of the fire will be hindered, fire suppression activities proceed unimpared and there is safe and ready escape routes for residents.

In order to meet the above fire safety requirements the following design features need consideration:

Project Planning

The developer should contact the agency responsible for fire protection in the early planning phase. Fire safety features should be incorporated into the initial planning. Discussions at this stage can provide for the incorporation of fire safety features at little or no cost. If postponed, the cost of redesign will be much higher. Access for fire trucks to lakes, ponds, and other drafting points should be planned for. A method of insuring the incorporation of necessary fire safety features would be to require the developer to post a performance bond equal to the cost of providing the improvements.

Access Roads

Wildland subdivision design should provide for safe and ready access for fire fighting equipment and provide adequate escape routes for residents. There should be two or more access roads for separate multiple ingress-egress. Access should be provided to all buildings. All roads should be clearly marked and properties identified. Dead end roads should not be permitted. The length of cul-de-sacs should be limited, depending on the hazard. Bridge and culverts should meet the weight requirements of large fire apparattus.

Water Supply

All structural and wildland fire suppression agencies have a basic need for adequate and reliable water supply. Therefore, where practical, a community-wide water system capable of delivering water at high volumes and high pressures for extended periods of time should be required.

Vegetative Manipulations

Forest, brush and grass fuels can burn with intense heat and under extreme fire weather conditions can spread rapidly through an area endangering structures. To protect structures and developments from wildfire some vegetative manipulations may be necessary. Examples of vegetative manipulations are: fuel breaks (both cleared and shaded), thinning, removal of dead vegetation, introduction of fire resistant vegetation, maintenance of public rights of way, and prescribed burning. Developments should have perimeter fire breaks of 100'-200', depending on the hazard. Interior fire break should be considered to break up the fuel continuity of large blocks of vegetation within the development. Individual lots should be large enough to allow a sufficient break between the structure and native vegetation. Native vegetation should not be used for foundation plantings because of its extreme flammability.

Structural Considerations

Structures should be built according to local building codes and designed with fire safety in mind. Structures located in wildland areas should be built of fire resistant materials. Roof, attic, and under floor openings should be screened or closed off. Chimney and stovepipes should be equipped with screens over the outlets. Telephone and power supply systems should be underground wherever possible.

Public Use Areas

Public use areas should be designed so that fire can not spread into them from adjacent areas nor escape from them to surrounding areas. They should have perimeter fire breaks. Native vegetation should be thinned to exceptable standards that will provide fire protection but still be aesthetically pleasing. Access for fire fighting equipment should be planned for.

Specific Recommendations for Fire Safety Standards

Low (Rating 1) Wildfire Hazard Classification:

The vegetative types classed as a low wildfire hazard exhibit a low rate of fire spread and low resistance to control. These types are generally associated with swamps or areas with extremely high ground water tables. They would not normally be suited for development.

Therefore, no standards are recommended.

Moderate (Rating 2) Wildfire Hazard Classification:

The vegetative types with a rating of two exhibit a moderate rate of spread and resistance to control and are classed as a moderate wildfire hazard. The vegetation in this class is represented by mixed hardwood types, generally found in north Jersey but located in some sections of south Jersey; mature forms of Oak-Pine, Pine-Oak, and upland pine forest cover types.

Standards:

1. Road Specifications

- a. Access--A minimum of two roads for separate ingress-egress should be provided.
- b. Rights-of-ways--Major road should have a minimum width of 48 feet

with minimum road widths of 24 feet; minor road rights-of-way should be a minimum of 32 feet with minimum road widths of 16 feet.

c. Cul-De-Sacs--Cul-de-sacs should be a maximum of 1300 feet in length, have minimum rights-of-ways of 32 feet with minimum road widths of 16 feet and have turn arounds of not less than 90 feet in diameter. Dead end roads should not be permitted.

d. Public Access--All lots within a wildland subdivision should be provided with public access.

e. Radius of Curvature--Roads should be constructed with a minimum radius of curvature of 75 feet.

f. Identification-- Roads should be uniquely named or numbered. Signs should be posted at each road intersection. Lots should be uniquely numbered on each road. Lot designation should be clearly visible from road ways.

g. Road Grades--Road Grades should not exceed 12% except for short distances.

h. Bridge and Culverts--Bridges and culverts should be constructed to support a gross vehicle weight of 40,000 pounds.

i. Road Base Specifications--All road construction should meet county standards.

1. Rights-of-Ways Clearance:

Public road rights-of-ways should be maintained and cleared of natural vegetation including all over hanging branches.

2. Water Supplies:

a. Water Distribution. Where practical, a public water distribution system should be installed by the developer. The minimum size of main lines on this system should be 6 inches in diameter. Fire hydrants should be installed on this system as follows: developments

with a proposed maximum population density of two single family dwellings per acre, hydrant spacing should not exceed 660 feet with a minimum 2 hour fire flow of 250 gallons per minute with 20 pounds per square inch static pressure. In developments with a proposed population density exceeding two single family dwellings per acre (Multi-family dwellings), hydrant spacing should not exceed 330 feet with a minimum 2 hour fire flow of 500 gallons per minute. In cluster type developments, fire hydrants should be placed so that all lots are within 500 feet of a hydrant.

b. Water Storage or Source. Water storage or source should be provided to support the required fire flow for a period of 2 hours in addition to maximum daily flow requirements for other consumer uses. Public access should be provided to within 5 feet of stored water supplies.

c. Water Supplies to Lots. Single family dwellings should be provided with water mains with a minimum diameter of 3/4 inch. A minimum of one exterior, freeze-proof tap should be provided far enough away from each structure to permit hose protection for all sides of the building and roof. Single family water systems should have a minimum flow of 15 gallons per minute at an operating pressure of 50 pounds per square inch. Multi-family dwellings should be equipped with automatic sprinkler systems and 2 inch mains.

3. Vegetative Manipulations:

a. Fuel Breaks. Hazardous fuels in the form of native vegetation should be cleared around structures to not less than 30 feet in all directions. Fuel breaks may contain individual tree specimens, ornamental plants, or other similar vegetation to be used as ground cover.

Mountain laurel, sheep laurel, and other highly flammable vegetation should not be used for foundation plantings. All trees left in fuel breaks for aesthetics should be kept free of dead or dying wood. The lower branches should be pruned to a height of 16 feet if the trees are over 35 feet and 1/2 the height of the trees if under 35 feet. Fuel breaks should be maintained by the individual landowner.

b. Lot Size. In order to accommodate the recommended fuel break, all lots should be at least 1/2 acre in size.

c. Chimney, Stovepipes, and Outdoor Fireplaces. All fuels (vegetation) within 10 feet of chimneys, stovepipes, and outdoor fireplaces should be removed.

4. Structural Designs:

a. Roofs and Exteriors. Roofs and exteriors of structures should be constructed of fire resistant materials such as asphalt rag felt roofing, tile, slate, asbestos cement shingles, sheet iron, aluminum, brick, or fire retardent-treated wood shingles or shakes.

b. Structural Projections. All structural projections such as balconies, decks, and roof gables should be constructed of fire resistant materials or materials treated with fire retardent chemicals.

c. Screening. Roof, attic, and under floor coverings should be screened.

d. Chimneys and Stovepipes. Chimneys and stovepipes burning solid or liquid fuels should be equiped with screens over the outlets. Screens should be made of 16 gauge wire and have 1/2 inch holes.

e. Utilities. Telephone and power lines should be underground where ever possible.

f. Flat Top Structures. Structures with horizontal roofs should be prohibited in areas where vegetation is higher than the roof.

g. Disposal of Solid Waste. All vegetation such as trees, branches, limbs, stumps, exposed roots, brush discarded through lot cleaning and excess construction materials should be removed from site and disposed of according to State laws.

High (Rating 3) Wildfire Hazard Classification:

The vegetative types with a rating of three exhibits a high rate of spread and resistance to control and are classed as a high wildfire hazard. The vegetation in this class is represented by open upland pine with tree heights less than 20 feet and tree spacing greater than 20 feet.

Standards:

I. Road Specifications.

a. Access--A minimum of two roads for separate ingress-egress should be provided.

b. Rights-of-Ways--Major road rights-of-ways should have a minimum width of 60 feet with minimum road widths of 30 feet; minor road rights-of-way should be a minimum of 40 feet with minimum road widths of 20 feet.

c. Cul-DE-Sacs--Cul-de-sacs should be a maximum of 900 feet in length, have minimum right-of-ways of 40 feet with minimum road widths of 20 feet and have turn arounds of not less than 90 feet in diameter. Dead end roads should not be permitted.

d. Public Access--All lots within a wildland subdivision should be provided with public access.

- e. Radius of Curvature--Roads should be constructed with a minimum radius of curvature of 80 feet.
- f. Identification--Roads should be uniquely named or numbered. Signs should be posted at each road intersection. Lots should be uniquely numbered on each road. Lot designation should be clearly visible from road ways.
- g. Road Grades--Road grades should not exceed 10% except for short distances.
- h. Bridge and Culverts--Bridges and culverts should be constructed to support a gross vehicle weight of 40,000 pounds.
- i. Road Base Specifications--All road construction should meet county standards.

1. Right-of-ways Clearance:

Public road rights-of-ways should be maintained and cleared of natural vegetation including all over hanging branches.

2. Water Supplies:

- a. Water Distribution. A public water distribution system should be installed by the developer. The minimum size of main lines in this system should be 6 inches in diameter. Fire hydrants should be installed on this system as follows: developments with a proposed maximum population density of two single family dwellings per acre, hydrant spacing should not exceed 660 feet with a minimum 2 hours fire flow of 500 gallons per minute with 20 pounds per square inch static pressure. In developments with a proposed population density exceeding two single family dwellings per acre (multi-family dwellings), hydrant spacing should not exceed 330 feet with a minimum 2 hour fire flow of 750 gallons per minute. In cluster type developments, fire hydrants should be placed so that all lots are within 500 feet of a hydrant.

b. Water Storage or Source. Water Storage or source should be provided to support the required fire flow for a period of 2 hours in addition to maximum daily flow requirements for other consumptive uses. Public access should be provided to within 5 feet of stored water supplies.

c. Water Supplies to Lots. Single family dwellings should be provided with water mains with a minimum diameter of one inch. A minimum of one exterior, freeze-proof tap should be provided far enough away from each structure to permit hose protection for all sides of the building and roof. Single family systems should have a minimum flow of 15 gallons per minute at an operating pressure of 50 pounds per square inch. Multi-family dwellings should be equipped with automatic sprinkler systems and 2 inch mains.

3. Vegetative Manipulations:

a. Fuel Breaks. Hazardous fuels in the form of native vegetation should be cleared around structures to not less than 75 feet in all directions and not less than 100 feet around the perimeter of the subdivision development. Fuel breaks may contain individual tree specimens, ornamental plants, or other similar vegetation to be used as ground cover. Mountain laurel, sheep laurel, and other highly flammable vegetation should not be used for foundation plantings. All trees left in fuel breaks for aesthetics should be kept free of dead or dying wood. The lower branches should be pruned to a height of 16 feet if the trees are over 35 feet and 1/2 the height of the trees if under 35 feet. Fuel breaks around structures should be maintained by the individual landowner. Perimeter fuel breaks should be maintained by the township in which the subdivision is located.

b. Lot Size. In order to accommodate the recommended fuel break, all lots should be at least 3/4 acre in size.

c. Chimney, Stovepipes, and Outdoor Fireplaces. All fuels (vegetation) within 15 feet of chimneys, stovepipes, and outdoor fireplaces should be removed.

4. Structural Designs:

a. Roofs and Exteriors. Roofs and exteriors of structures should be constructed of fire resistant materials such as asphalt rag felt roofing, tile, slate, asbestos cement shingles, sheet iron, aluminum, brick, or fire retardent-treated wood shingles or shakes.

b. Structural Projections. All structural projections such as balconies, decks, and roof gables should be constructed of fire resistant materials or materials treated with fire retardent chemicals.

c. Screening. Roof, attic, and under floor coverings should be screened.

d. Chimneys and Stovepipes. Chimneys and stovepipes burning solid or liquid fuels should be equiped with screens over the outlets. Screens should be made of 16 gauge wire and have 1/2 inch holes.

e. Utilities. Telephone and power lines should be underground wherever possible.

f. Flat Top Structures. Structures with horizontal roofs should be prohibited in areas where vegetation is higher than the roof.

g. Disposal of Solid Waste. All vegetation such as trees, branches, limbs, stumps, exposed roots, brush disturbed during lot clearing and excess construction materials should be removed from the site and properly disposed of according to state laws.

Extreme (Rating 4) Wildfire Hazard Classification:

The vegetation types with a rating of four exhibit an extreme rate of spread and resistance to control and are classed as an extreme wildfire hazard. The vegetation in this class is represented by: Upland Pine that is small or variable, immature Pine-Oak, immature Oak-Pine, Scrub Oak, Scrub Oak-Pine, Pine-Scrub Oak, and Pitch Pine low land. The fuels within this class are considered to be one of the most hazardous Wildland fuel types in the Nation.

Standards:

I. Road Specifications:

- a. Access--A minimum of two roads for separate ingress-egress should be provided.
- b. Rights-of-Ways--Major road rights-of-ways should have a minimum width of 60 feet with minimum road widths of 36 feet; minor road rights-of-way should be a minimum of 40 feet with minimum road widths of 24 feet.
- c. Cul-DE-Sacs--Cul-de-sacs should be a maximum of 500 feet in length, have minimum rights-of-way of 40 feet with minimum road widths of 24 feet and have turn arounds of not less than 90 feet in diameter. Dead end roads should not be permitted.
- d. Public Access--All lots within a wildland subdivision should be provided with public access.
- e. Radius of Curvature--Roads should be constructed with a minimum radius of curvature of 100 feet.
- f. Identification--Roads should be uniquely named or numbered. Signs should be posted at each road intersection. Lots should be uniquely numbered on each road. Lot designation should be clearly visible from roadways.

g. Road Grades--Road grades should not exceed 8% except for short distances.

h. Bridge and Culverts--Bridges and culverts should be constructed to support a gross vehicle weight of 40,000 pounds.

i. Road Base Specifications--All road construction should meet county standards.

1. Rights-of-Ways Clearance:

Public road rights-of-ways should be maintained and cleared of natural vegetation including all over hanging branches.

2. Water Supplies:

a. Water Distribution--A public water distribution system should be installed by the developer. The minimum size of mains on this system should be 6 inches in diameter. Fire hydrants should be installed on this system as follows: spacing should not exceed 330 feet with a minimum 2 hour fire flow of 500 gallons per minute with 20 pounds per square inch static pressure. In developments with a proposed population density exceeding two single family dwellings per acre (multi-family dwellings) minimum fire flow should be 750 gallons per minute.

b. Water Storage or Source--Water storage or source should be provided to support the required fire flow for a period of two hours in addition to maximum daily flow requirements for other consumptive uses. Public access should be provided to within 5 feet of stored water supplies.

c. Water Supplies to Lots--Single family dwellings should be provided with water mains with a minimum diameter of one inch. A minimum of one exterior, freeze-proof tap should be provided far enough away from each structure to permit hose protection for all sides of the building and roof. Single family water systems should have a minimum flow of 15 gallons per minute at an operating pressure of 50 pounds per square

inch. Multi-family dwellings should be equipped with automatic sprinkler systems and 2 inch water mains.

3. Vegetative Manipulations:

a. Fuel Breaks--Hazardous fuels in the form of native vegetation should be cleared around structures to no less than 100 feet in all directions and not less than 200 feet around the perimeter of the subdivision development. Fuel breaks may contain individual tree specimens, ornamental plants or other similar vegetation to be used as ground cover. Mountain laurel, sheep laurel and other highly flammable vegetation should not be used for foundation plantings. All trees left in fuel breaks for aesthetics should be kept free of dead or dying wood. The lower branches should be pruned to a height of 16 feet if the trees are over 35 feet and 1/2 the height of the trees if under 35 feet. Fuel breaks around structures should be maintained by the individual landowner. Perimeter fuel breaks should be maintained by the township in which the subdivision is located.

b. Lot Size--In order to accommodate the recommended fuel break, all lots should be at least one acre in size.

c. Chimney, Stovepipes, and Outdoor Fireplaces--All fuels (vegetation) within 25 feet of chimneys, stovepipes, and outdoor fireplaces should be removed.

4. Structural Designs:

a. Roofs and Exteriors--Roofs and exteriors of structures should be constructed of fire resistant materials such as asphalt rag felt roofing, tile, slate, asbestos cement shingles, sheet iron, aluminum, brick, or fire retardent-treated wood shingles or shakes.

b. Structural Projections--All structural projections such as balconies,

decks, and roof gables should be constructed of fire resistant materials or materials treated with fire retardent chemicals.

c. Screening--Roof, attic, and under floor coverings should be screened.

d. Chimneys and Stovepipes--Chimneys and stovepipes burning solid or liquid fuels should be equiped with screens over the outlets. Screens should be made of 16 gauge wire and have 1/2 inch holes.

e. Utilities--Telephone and power lines should be underground where ever possible.

f. Flat Top Structures--Structures with horizontal roof should be prohibited in areas where vegetation is higher than the roof.

h. Disposal of Solid Waste--All vegetation such as trees, branches, limbs, stumps, exposed roots, brush disturbed during lot clearing and excess construction materials should be removed from the site and properly disposed of according to state laws.

Summary of Wildland Subdivision Standards

1. <u>Road Specifications</u>	<u>Moderate (2)</u>	<u>High (3)</u>	<u>Extreme (4)</u>
a. Access--	Two roads	Same	Same
b. Right-of-ways:			
Major roads--	48 feet	60 feet	60 feet
Minor roads--	32 feet	40 feet	40 feet
Major road widths--	24 feet	30 feet	36 feet
Minor road widths--	16 feet	20 feet	24 feet
c. Cul-de-sacs:			
Length--	1300 feet	900 feet	500 feet
Turnaround diameter--	90 feet	Same	Same
d. Public Access--	To each lot	Same	Same
e. Radius of Curvature--	75 feet	80 feet	100 feet
f. Identification--	Roads & Lots	Same	Same
g. Road Grades--	12%	10%	8%
h. Bridges & Culverts	40,000 lb.	Same	Same
i. Road Maintenance:			
Public Roads--	Co. or Twp.	Same	Same
Private--	Landowners	Same	Same
j. Road Base Spec's--	Co. Spec's	Same	Same

2. Water Supplies

a. Distribution:			
Mains--	6 inch	6 inch	6 inch
Hydrant spacing--	660 or 330 ft.	Same	330 feet
Flow--	250gpm	500-700 gpm	500-750 gpm
Pressure--	20 lb.s/sq.in.	Same	Same
b. Storage--	2 hr. flow +	Same	Same
c. Supply to lots--	3/4 in. main	1 in. main	1 in. main
50 lbs. pressure--	15 gpm	Same	Same

d. Multi-family dwelling--	2 inch mains sprinklers	Same	Same
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3. Vegetative Manipulations

a. Fuel Breaks:

Structures--	30 feet	75 feet	100 feet
Perimeters--	None	100 feet	200 feet

b. Lot Size*--	1/2 acre	3/4 acre	1 acre
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c. Chimneys, etc.--	10 feet	15 feet	25 feet
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d. Dead Vegetation--	Clear & Prune	Same	Same
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4. Structural Designs

a. Roofs & Exteriors--	Fire-resistant	Same	Same
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b. Projections--	Fire-resistant	Same	Same
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c. Openings--	Screened or closed	Same	Same
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d. Chimneys--	Screened	Same	Same
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e. Utilities--	Underground	Same	Same
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f. Flat tops--	Prohibited where vegetation is above roof line	Same	Same
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g. Disposal of flammable solid waste--	Remove	Same	Same
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NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF PARKS AND FORESTRY
BUREAU OF FOREST FIRE MANAGEMENT

"DEVELOPMENT IN THE PINE BARRENS:
A DESIGN FOR DISASTER"

Joseph R. Hughes
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1980

"DEVELOPMENT IN THE PINE BARRENS

A DESIGN FOR DISASTER"

INTRODUCTION

Fire has been a part of the Pine Barrens ecosystem since prehistoric times. Repeated cutting and severe wildfire have played a primary role in the development of a forest cover that is considered to be one of the most hazardous wildland fuel types in the nation. Many of the wildfires have been large and devastating. However, due to the undeveloped nature of the area, the problem, except for an occasional news article, has gone largely unnoticed. The character of the Pine Barrens is changing rapidly. It is no longer uninhabited wilderness. Housing developments and retirement communities are converging on the region and it is more intensively used for recreation. The increased utilization and development of the Pine Barrens has raised the human risk factor significantly along with the likelihood of a future holocaust involving large acreages often interspersed with structures or other improved property.

The potential for wildfire disaster in the Pine Barrens has been dramatically illustrated in years past. Large conflagrations occurred in 1930, 1954, 1963, and more recently in 1971, and 1977. The most notable was 1963, when damage to improved property exceeded 8.5 million dollars. When this tragedy occurred, the region was still largely undeveloped. With increased development during the last seventeen years and a tremendous escalation of property values, the results of a similar series of conflagrations would be staggering. This is the threat of disaster that residents of the Pine Barrens face. Two essential elements are already

present; highly hazardous wildland fuels and numerous human ignition sources. Weather is the critical variable. Conditions need only be similar to April 1963 for a major fire disaster to occur.

This paper will analyze fire in the Pine Barrens and the problems that increased development are expected to cause for fire control personnel. Various initiatives for limiting development and reducing the impact of a major wildland conflagration will be explored.

BACKGROUND INFORMATION

The New Jersey Pine Barrens is one of the largest uninhabited and undeveloped areas on the entire eastern seaboard. It encompasses an area of 1.2 million acres on New Jersey's outer coastal plain and is within 35 miles of the major metropolitan centers of New York and Philadelphia. For years, its poor soils and fire scarred vegetation have been generally ignored. However, the Region has recently attracted State and National attention. Its significance and values have finally been recognized. Uncontrolled development is identified as a threat to destroy them.

The uniqueness of the Pine Barrens is primarily due to three factors:

1. Hydrology and associated soils.
2. Man's disturbance.
3. Fire.

The latter two are somewhat related.

HYDROLOGY AND SOILS

The Pine Barrens is underlain by the Cohansey Sand Formation which is one of the largest freshwater aquifers in the east. It is estimated that the ground water storage capacity of the Cohansey Aquifer is 17 trillion gallons.

During the 19th century, the exportation of freshwater to Philadelphia was envisioned by Joseph Wharton. Large acreages in the central Pine-lands were purchased by Wharton who planned to build a system of aqueducts to the city. However, his plan floundered when the State Legislature passed a law forbidding the export of water from the State.

The unique water storage capacity of the Cohansey formation and the high ground water table of the region have had a major influence on the vegetation and ecosystems. Significant changes in, or pollution of the ground water table could have detrimental effects on the area. Preservation of ground water quality and quantity are recognized as key factors in maintaining regional integrity.

MAN'S DISTURBANCE

The Pinelands were continually cut over from the end of the 17th century to approximately 1860. Extensive logging provided lumber and firewood for the New York and Philadelphia areas. Cedar was cut for shipbuilding, which flourished at the head of the areas navigable rivers.

The discovery of Bog Iron in the late 17th century put a further drain on the areas wood resources. An iron forge required approximately 1,000 acres of woodland for the production of charcoal used in forging. At one time, New Jersey was the leading producer of iron in the country. Historic Batsto Village made cannon balls for Washington's Army and many of the other iron impliments of colonial days came from forges located in the Pine Barrens.

The iron industry disappeared about the mid 19th century due to the discovery of coal and richer iron deposits in Pennsylvania, the development of the railroad and exhaustion of the areas wood supply.

Other industries endemic to the Pine Barrens included glass, paper, and cedar mining. Industry declined dramatically after 1860 with the exception of cedar cutting and glass manufacturing. Numerous ghost towns dot the map of South Jersey and a wall or foundation is all that remains of a number of once busy communities.

At the end of the 19th and beginning of the 20th century, commercial cranberry bogs and blueberry farms gained prominence. Cranberry yields have declined, but New Jersey still ranks third in the nation in cranberry production and second in blueberry volumes.

FIRE

Fire has long been a factor in the ecosystem. According to Day (1953) the Lenape Indians, residents of New Jersey for approximately 10,000 years, burned woods deliberately in the spring and fall, and accidentally at other times. The purpose of these burns was to drive game, improve visibility, facilitate travel, drive away insects and snakes, increase the supply of grass seeds and berries and for offense and defense in war. The predominance of pine in the early history of South Jersey has been attributed to these fires. The large mature pine trees that greeted the white man have long since been removed to support the early industries of the Region. The white man also increased the fire frequency. This combination of relentless cutting and increased frequency of fire resulted in less productive scrubby pine types that dominate the area today.

The scrub pines comprise one of the most hazardous wildland fuel types in the nation. Unincorporated organic matter exceeds 25 tons/acre with the total fuel loadings estimated to exceed 35 tons/acre. The Pine Barrens fuel type is listed under the B fuel model of the National Fire Danger Rating System with California Chaparral and other high hazard types.

The Pitch-Shortleaf Pine type, predominant in the Pine Region, is one of 18 major forest types that partially or wholly depends on fire for its existence. Some characteristics exhibited by "fire" species include: seed production at an early age, thick fire resistant bark, the ability to sprout, and the development of closed cones.

Fire has had the effect of reversing natural succession and if it could be eliminated, the trend would proceed from a pine forest toward a mixed hardwood climax dominated by oak.

The most dramatic impact of recurrent fire has been the development of unique dwarf pine communities designated as the east and west plains. These are areas of pigmy pine and oak approximating 12,000 acres, where tree heights seldom reach 6 feet. Fire frequency of ten years or less is largely responsible for this variation of the Pitch Pine-Scrub Oak cover type.

HISTORY OF FIRE CONTROL

The first study of the forest fire problem in the Pine Barrens Region was conducted by John Gifford in 1895. In that year, he reported to the State Geologist that 49 fires burned 60,000 acres in Burlington, Atlantic, and Ocean counties. Later studies showed that the annual burn may have been as high as 100,000-150,000 acres annually, indicating that the entire Pine Barrens burned over once every ten to fifteen years.

Gifford's study was included in Pinchot's report to the State Geologist in 1899. It emphasized the need for forest fire control and recommended the establishment of a State Forest Service.

In 1905, the first forest protection laws were enacted in New Jersey and in 1908, a Township Firewarden System was established. In 1923, under the Clarke-McNary Act, the present State system for forest fire control was organized.

Since the advent of organized fire control, the acreage burned and the average area per fire have been gradually reduced. The development of mechanized equipment, aerial detection and attack have enabled fire control personnel to hit fires faster, keeping more of them small. However, some fires still continue to escape thereby becoming large and destructive. The explosive combination of highly hazardous wildland fuel, extended drought, adverse winds and numerous ignition sources frequently exceed the best efforts of organized fire control.

POTENTIAL FOR DISASTER

The driest spring on record in New Jersey culminated on the weekend of April 20-21, 1963, when a series of wildfires destroyed 183,000 acres of woodland, consumed 186 homes, 197 outbuildings, and was responsible for the loss of seven lives. Thousands were forced to flee and entire communities were evacuated. The estimated financial loss to improved property exceeded 8.5 million dollars.

More recently, 15,000 acres, 8 homes, and a number of outbuildings were destroyed in the South Jersey region on March 31, 1977. Later that year, four firemen were tragically killed while fighting a 2,300 acre blaze on the Bass River State Forest.

DEVELOPMENT IN THE PINE BARRENS

When the April 1963 conflagrations occurred, the Region was still largely

undeveloped. Since that time, development has progressed at an accelerated rate. There has been rapid growth of retirement communities, particularly in Ocean County. Brick Township, located on the northern edge of the area, led the eastern half of the nation in percentage population growth between 1960-70 and Ocean County led the State in housing starts in 1975-76. This rapid development has occurred for a variety of reasons:

Accessibility

The Atlantic City Expressway and the Garden State Parkway have put the Pine Barrens within easy commuting distance of the North Jersey-New York and Philadelphia-Camden metropolitan areas.

Acquisition Costs

The availability of land and the relatively cheap acquisition costs have attracted land speculators. They have purchased large acreages and pressed various levels of government for development. Some townships, erroneously correlating a dearth of ratables with economic vandalism, have been all too willing to cooperate. In some cases development interests have gained control of local planning and zoning boards.

Waste and Sewage

The underlying Cohansey Aquifer is composed of coarse sands and gravels which provide ideal percolation for septic systems. The Federal Government, under Section 201 of PL 92-500, authorizes up to 75% of construction costs for regional waste water treatment facilities. A number of South Jersey counties have taken advantage of this opportunity and various sewer projects are either completed or underway. This has had the effect of encouraging development.

Taxes

Lower tax rates and more moderate housing costs have attracted many from the more expensive north and west. This advantage will diminish and gradually disappear as the area develops.

The Good Life

Open land and clean air have attracted many from the pollution and overcrowding of the states urban and suburban areas.

Ostensibly, these factors combine to make the Pine Barrens an ideal place for large-scale, relatively inexpensive development.

A number of other factors may accelerate the building pace. Gambling in Atlantic City and off-shore oil exploration in the Baltimore Canyon are relatively new. Their total impact is unknown, however, they could bring about a significant increase in future development.

INCREASED FIRE FREQUENCY

Although the severity of a particular fire season is dependent on cyclic weather influences, increased development and utilization of the Pine Barrens has greatly increased the human risk factor and fire potential. The present trend exhibits an increase in numbers of fires for the State in general and the Pine Barrens in particular.

Another interesting observation is readily apparent when viewing a five year fire occurrence map of the northern and central Pine Region. The majority of wildfires occur around developments and built up areas. As development expands, increased fire frequency will surely follow.

URBAN-WILDLAND INTERFACE

The Urban-Wildland interface is the juxtaposition of urban, suburban type development and wildland fuels. Although this problem has been with us for years, in areas like Medford Lakes, it is now expanding to the heart of the Pine Barrens. Developments are being built in some of the regions most hazardous fuels with little or no regard to the dangers of wildfire. The most dramatic example of this can be seen in the vicinity of Whittings in Ocean County, where random residential and retirement developments are under construction.

Lot clearing, amounts to no more than a swath cut by a bulldozer with little room for the structure. Forest fuels are dangerously close, and in certain instances, are in direct contact with buildings.

A number of dwellings are constructed of flammable building materials such as wood siding and cedar shakes which can ignite readily in an intense wildfire. The problem is compounded because fire control personnel cannot use normal wildland fire suppression tactics when structures are involved. The immediate protection of life and improved property would become a primary concern and control of the wildfire would be delayed. As problem fires gain in size and build up momentum, overall damage to improved property would be greatly magnified. Fire fighters may have to sacrifice structures in order to reduce total damage. This places the fire boss in a very unenviable position.

Additional problems are generated in that State forest fire control initial attack vehicles are not designed to control structural fires nor are personnel properly trained in structural fire fighting tactics.

Many of the rural volunteer fire companies located in or adjacent to the Pine Barrens are poorly equiped and undertrained and would not be able to respond effectively to multi-dwelling fires involved in a major wildland conflagration.

EXPERIENCE OF OTHER STATES

The problems associated with the Urban-Wildland interface have been dramatically illustrated in other states:

California

The combination of urban development and hazardous wildland fuels has caused numerous fire disasters in California:

The Malibu fire of 1957; the Belair fire of 1961; the disastrous series of wildfires in 1970; the Santa Barbara fire of 1977; and the Los Angeles fires of 1978.

The majority of these disasters occurred in areas where developments were integrated with a hazardous wildland fuel complex. When a fire started under adverse weather conditions the results were devastating, not only to the environment, but to improved property and the lives of thousands of people.

The Santa Barbara fire of 1977, is a particularly graphic and tragic example of inept land use planning. A fire started by a kite, coming in contact with a power line, ignited a brush fire which burned a total of 800 acres before being brought under control. This is not an especially large acreage, however, during its run it destroyed over 200 homes and other structures.

The combination of urban development and wildland fuels that has led to disastrous fires in California is similar to the situation that is develop-

ing in the Pine Barrens. Both areas are included in the same fuel classification (Fuel Model B) of the National Fire Danger Rating System. Terrain is the only major difference in the two areas.

California is not the only state to experience a wildland fire disaster involving improved property. Wisconsin and Montana have recently experienced similar problems.

Considering the experience of other states, and the major conflagrations that have occurred in South Jersey, the question, "Are the Pine Barrens being primed for a major fire disaster?" must be asked. Statistics and past history support the premise that it is only a matter of time before such a calamity occurs.

WHAT CAN BE DONE?

There are a number of steps that can be taken to reduce the impact of future wildfires in the Pine Barrens:

State and Federal Level

Several attempts have been made at the State and Federal level to limit development in and preserve certain portions of the Pine Barrens. They are as follows:

Pinelands Environmental Council

The Pinelands Environmental Council, created by an act of the State Legislature in January, 1972, was the first coordinated effort to save and protect the resources of the Pine Barrens. The Council had the authority to review any project that would destroy or substantially impair significant historic or recreational resources or bring about a major change in the appearance of the Region.

One of the Council's primary tasks was to develop a comprehensive plan for preservation, enhancement, and development of the areas resources. Through a variety of problems, both political and economic, their work was never completed.

RUTGER'S STUDY

This study was prepared by Rutgers University at the request of the National Park Service, purportedly to survey the New Jersey Pine Barrens as a possible candidate for incorporation into the National Park System. The plan proposes an outer protection zone and an inner preserve. Plans for both Federal and State control are outlined in the study.

THE PINELAND'S REVIEW COMMITTEE

Governor Byrne created the Pineland's Review Committee by Executive Order 56 on May 28, 1977. The purpose of the committee was to develop a comprehensive land use plan for the Pine Barrens.

The plan proposed an outer protection zone and an inner preserve similar to the Rutger's Study.

Based on the recommendations of the Pineland's Review Committee and Federal Legislation, the Governor issued Executive Order 71 on February 8, 1979, imposing a building moratorium on 1,500 square miles of Pine Barrens territory. This was done to allow sufficient time for the planning process without further degradation of the Pine Barrens Ecosystem.

THE PINELANDS COMMISSION

The Pineland Protection Act became law on June 28, 1979. The Act established the Pinelands Commission and made the building moratorium imposed by the Governor law.

The Pinelands Commission will carry on the work begun by the Pineland's Review Committee and complete the land use plan for the Pine Barrens. The Commission will determine the type and amount of human development that the Pine Barrens can sustain while still maintaining its overall ecological values.

The Management plan will provide guidelines to Municipalities, located in or adjacent to the Pine Barrens, for ordinances and codes necessary to control development within the Region.

The Commission consists of a Federal Representative, seven members appointed by the Governor, and one member appointed by the Freeholders of each of the seven counties which are in or adjacent to the Pine Barrens.

LAND ACQUISITION

Land acquisition by the State or Federal government is one method of controlling development in areas considered critical to saving the Pine Barrens. Both Federal and State initiatives have been made:

1. Federal

A massive parks planning and acquisition bill authorizing 26 million dollars for Pine Barrens land purchases has been passed and signed into law. A 1980 appropriation bill has made available 12 million of the 26 million dollars. The Pinelands Commission will determine land acquisition priorities.

2. State

A 200 million dollar Green Acres Bond Issue was passed in November, 1978. The State is required to appropriate 8.5 million dollars as its share of the Federal bill authorizing 26 million dollars for Pine Barrens land acquisition. This money will come from Green Acres Funds.

EDUCATION

In both the Rutger's Study and Pineland's Review Committee Management Plan, the importance of fire in shaping and maintaining the Pine Barrens is emphasized. The need for prescribed burning and harvesting on a continuing basis is also stressed. However, no reference is made to the danger that wildfire poses to current and future development.

The dangers of wildfire have been generally overlooked by all but fire control personnel. There is a tendency for people to forget, especially if it has been a few years since the last major fire season. Many individuals moving into the Pine Barrens Region have never seen a wildfire and planners and developers ignore its potential when planning, locating, or building a development.

Fire Management Personnel have a responsibility to inform and educate the public about wildfire. Planners, local authorities, developers and residents must be reminded of the possible dangers on a continuing basis and informed about prevention measures and acceptable fire safety standards.

Better wildfire education programs are needed. Currently, a Wildfire Hazard Inspection Form has been prepared by the State Bureau of Forest Fire Management and distributed to residents as part of a contactor program. A brochure outlining fire danger to residents of wooded areas will be prepared and accompany the Hazard Inspection Form. Additional programs are needed to reach planners and developers.

ADOPTION OF FIRE SAFETY STANDARDS AND FIRE MANAGEMENT

Until this time the only means by which fire standards could be enforced was

by the enactment of ordinances and codes by local authorities. Unfortunately, very little was done in regard to wildfire protection.

The Pinelands Environmental Council made the first positive effort to incorporate fire safety features into subdivisions and developments. Plans were submitted to the State Bureau of Forest Fire Management for review and fire safety recommendations. Some recommendations were adhered to, but many were ignored.

The Pinelands Commission has requested the Bureau of Forest Fire Management to develop a Fire Management Plan for the Pine Barrens. This plan outlines fire management policy and practices to be applied to Pinelands Management. Wildfire hazard areas have been designated. A section of the plan outlines fire safety standards for subdivisions and developments. Specific recommendations for standards are made in the following areas:

1. Project Planning
2. Access Roads
3. Water Supply
4. Vegetative Manipulation
5. Structural Considerations

The standards are based on a wildland hazard classification system that is tied to the rate of spread and resistance to control of native vegetation. There is a progressive scale for increasing the standards as the hazard becomes more severe. The standards will provide guidelines to municipalities for the enactment of ordinances and building codes necessary to make wildland subdivisions and developments as fire safe as possible.

HAZARD REDUCTION

A. Prescribed Burning

The highly acid soils of the Pine Barrens lack earthworms that would normally incorporate leaves and pine needles into the soil. Consequently, there is a rapid build-up of litter. Unless this fuel accumulation is periodically reduced, under controlled conditions, intense fires result in mortality and severe damage to the overstory. The vertical continuity of fuels enables flames to spread from the ground into tree tops resulting in dangerous and destructive crown fires. Prescribed fire has the greatest potential for large scale fuel modification and hazard reduction in the Pine Region. Through periodic use of fire, at 3-5 year intervals, horizontal and lateral fuel continuity can be broken and its accumulation reduced.

The effectiveness of prescribed fire as a protection measure, under New Jersey's worst historical fire conditions, has been illustrated by Cumming. Five months after the disastrous 1963 fire season, plots were established and measured. One sample was located on the Lebanon State Forest and had a history of prescribed burning 0-5 years. The second sample was on private land that had no prior burning history. Damage in the untreated stands was far greater, with 97% of the oaks and 79% of the pines killed or severely damaged, compared to 46% and 17% respectively in the previously treated block. Statistics from studies of less severe seasons are even more encouraging.

Prescribed burning has a number of other beneficial side effects:

- a. The preparation of sites for natural seeding or planting.
- b. Recycling nutrients.
- c. Improved wildlife habitat.
- d. Managing understory hardwoods.

- e. Control of diseases.
- f. Enhanced appearance.
- g. Improved access.

In addition to the above benefits, prescribed burning is relatively inexpensive when compared to other methods of hazard reduction. Costs average around \$1.00-\$2.00/acre, as compared to \$200.00/acre up for mechanical means.

The first study of prescribed burning was conducted on the Lebanon State Forest in 1936. In 1948, the practice was introduced to the general public and the State has had an on-going program ever since. Ten to fifteen thousand acres are treated annually between October 1, and April 1. The State Bureau of Forest Fire Management has the long established objective of burning 80,000 acres a year, on a four-year rotation, and will gradually expand its program to reach this goal.

Prescribed burning has been used to some extent as a means of establishing and maintaining fuel breaks around selected developments and other high value areas. This practice should be expanded to other developments to increase fire safety and provide indepth wildfire protection.

B. DESCON

Rather than extinguish an ecologically or otherwise beneficial fire, damage equipment, and spend fire suppression funds unnecessarily, some fires have been allowed to burn under a concept known as DESCON or "Designated Controlled Burn." Under this program, when and where it is appropriate, some fire perimeters are expanded to predetermined boundaries according to official guidelines.

To date the program has been used successfully on a limited basis. Two hundred acres were burned on State Fish and Game Lands in 1977, and several smaller tracts have been treated. Expansion plans are underway.

Because of the vegetative composition and fire history of the Pine Barrens, the use of prescribed fire or DESCON remain the most valuable, and environmentally sound fuel management tools available. They will be important elements of the State's Fire Management Plan.

PREVENTION PLANNING

A significant effort is needed to reduce the increasing number of fires and acreage burned in the Pine Barrens. The State Bureau of Forest Fire Management conducts on going prevention, and information and education programs through schools, social and service groups and the media. Approximately 300,000 pieces of Smokey Bear literature and in house publications are distributed annually. The number of contacts is estimated in the millions.

The State Bureau of Forest Fire Management is expanding prevention efforts to counter the increasing number of wildfires. A fulltime fire prevention officer has been appointed to the State staff, and the Bureau is striving to develop a comprehensive statewide fire prevention plan.

LAW ENFORCEMENT

Incendiary rather than arson is the proper term to indicate an intentionally set wildfire. This is the greatest single cause of wildfires in New Jersey and accounts for 60% of the total in the North and Central Pine Barrens Region.

An effective law enforcement program is the best deterrent against the incendiary. In order to combat this growing problem, the State Bureau of Forest Fire Management has taken the following steps:

1. Law Revisions

Revisions to the existing Forest Fire Laws have been drafted. The changes provide for a substantial increase in penalties for fire law violators. A mandatory jail term is proposed for convicted incendiaryists.

2. Fire Investigation Teams

Three individuals have been hired and are being trained in fire investigation and law enforcement. One investigator is stationed in each division and comprises the nucleus of three fire investigation teams. This individual will also devote a substantial amount of time to prevention.

3. Vehicle Check Program

This program was activated in 1977 to counter the increasing number of incendiary fires occurring on State lands. Road blocks were set up and manned by State Park Rangers. Drivers were warned of the severe forest fire danger, issued fire prevention literature, and a record of all vehicles entering a particular area was maintained.

The program, heavily advertised on the radio and in the newspapers, caused the number of fires to drop sharply. Due to its success, this approach will be continued and employed whenever considered necessary.

4. Permit Restrictions and Woods Closures

Permit Restrictions and woods closures have been effective in reducing the number of ignitions during periods of high fire danger. Permits are required for all recreational fires within the 2.7 million acre service area. Permits are also issued for certain exceptions to the

State's Air Pollution Control Code. As the forest fire danger increases, permits are systematically restricted and finally cancelled. During the month of April, all burning permits are banned. Under conditions of extended drought or extreme forest fire danger, portions or all of the forest and woodlands of the State may be closed by proclamation of the Governor.

ASSISTANCE TO VOLUNTEER FIRE COMPANIES

In order to provide better fire protection in rural areas the Federal Government has sponsored two programs designed to provide additional equipment and increase the effectiveness of rural volunteer fire companies. In New Jersey, both programs are administered through the State Bureau of Forest Fire Management:

A. Rural Community Fire Protection

In 1972, Title IV of the Rural Development Act was authorized by Congress to provide financial, technical and other assistance to prevent and suppress fires within rural areas and communities under 10,000 in population. Grants are made for organizing, training, and equipping volunteer fire companies on a 50/50 cost sharing basis. Since the inception of this program, approximately \$153,000.00 has been distributed to 200 volunteer fire companies and community projects within the state. This money has generated over \$300,000.00 in benefits to these rural communities in the area of fire protection. A number of communities within the Pinelands area have taken advantage of this program to develop or increase their fire fighting capabilities.

B. Excess Property Program

Working through the U.S. Forest Service, the State makes Federal excess

vehicles available to rural fire companies, under cooperative mutual aid agreements. Their purpose is to extend forest fire protection to areas that are presently unprotected or under strength. Through these agreements, the State Bureau of Forest Fire Management has placed 65 excess military 2-1/2, 5 and 5/4 ton trucks with rural fire companies, many of which are located in or near the Pine Barrens.

SUMMARY

Fire has played a major role in shaping and maintaining the New Jersey Pine Barrens. In the past, primary damages from wildfire have been confined to the woodland. However, large areas of the Pine Barrens have been and are being developed, creating a high potential for disaster. An indication of the possible danger occurred in the South Jersey area in 1963, and has occurred in other states on numerous occasions. As development increases, the possible severity of a major disaster is multiplied. However, the following steps can be taken to alleviate the impact of major conflagrations in the Pine Barrens:

1. Pinelands Management Plan.
2. Regulation of development through Federal or State purchase of Pine Barrens land.
3. Continuing information and education about wildfires.
4. Adoption of fire safety standards for subdivisions and developments in wildland areas.
5. Hazard reduction through fire management.
 - a. Prescribed Burning.
 - b. DESCON.
6. Improved prevention planning.
7. Upgraded and improved law enforcement procedures.
8. Assistance to volunteer fire companies.
 - a. Rural Community Fire Protection Program.
 - b. Excess Property Program.

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