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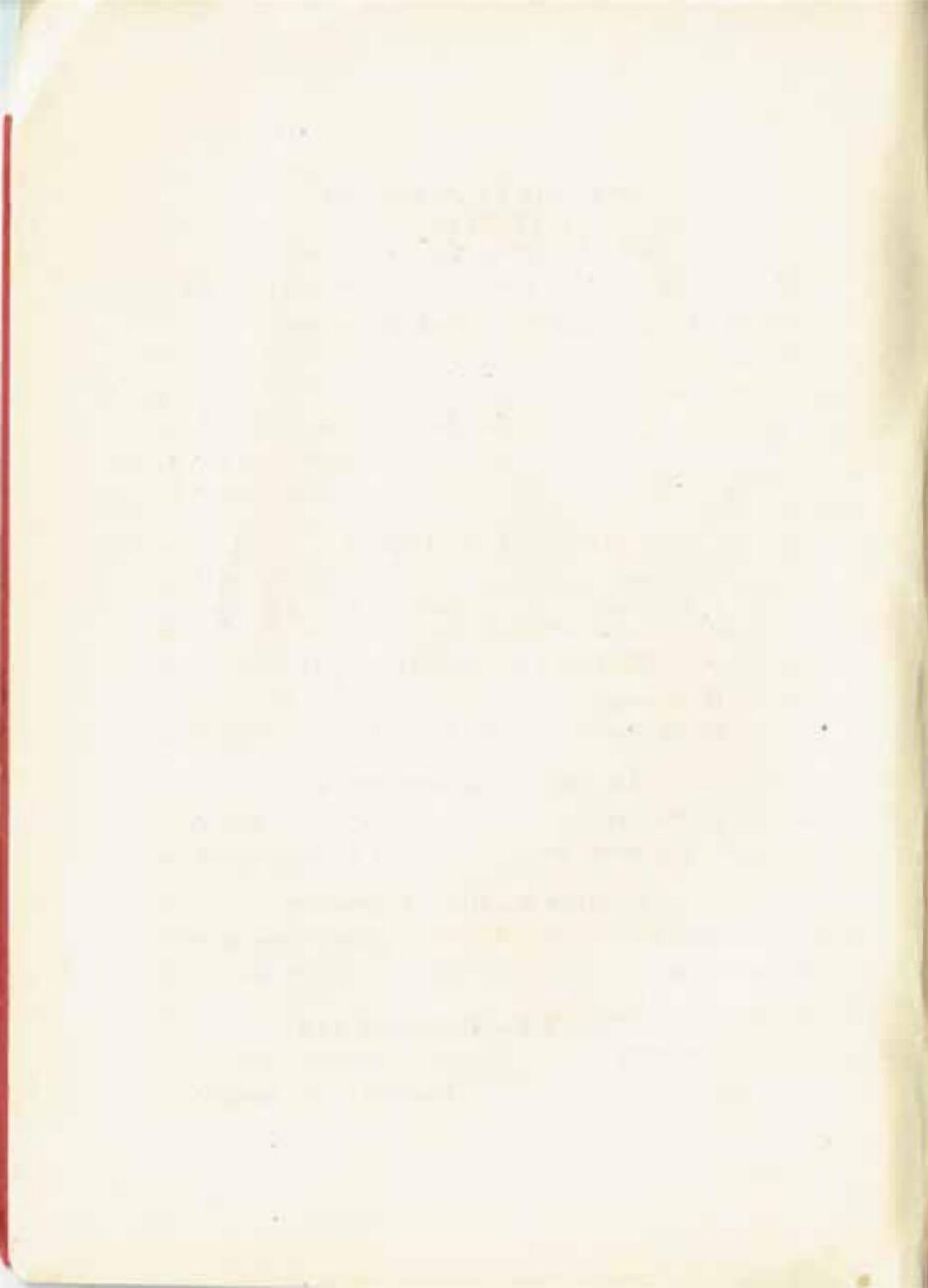
Manual of Instructions *for* Forest Wardens

By

W. C. McCORMICK,
Chief of Forest Fire Control



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MANUAL OF INSTRUCTIONS FOR FOREST WARDEN FORCE

INTRODUCTION

It is estimated that over twenty-two million of the total area of thirty-one million acres in North Carolina is either producing timber or best adapted for timber production.

It is an undisputed fact that the timber resources of North Carolina represent one of her greatest assets. It is now generally recognized that forest fires are the greatest enemy to this natural resource, and people generally throughout the State are strongly in favor of forest fire control through organized efforts in forest fire prevention and suppression.

A forest warden organization is now functioning within the counties cooperating with the State in forest fire prevention work. This organization is made up of residents of the State who are interested in conserving the State's timber resources and represents the highest type of public-spirited citizens organized under one head to combat the forest fire menace.

This warden organization has grown from a few men to over a thousand, and as funds become available and the work is organized in additional counties,

any considerable area of the State, but much progress has been made in the past ten years.

In addition to the protected county as a unit, the Forest Service also has a number of Private Protective Associations. Such an association may be entirely within a cooperating county, or only partly so. It consists of an organization of forest land owners, who desire special fire protection and who appropriate annually for this protection a sum based on the acreage of their lands, which sum is matched dollar for dollar by the Department, just as in the case of the protected county. In general, such an association has a minimum area of 30,000 acres, fairly well consolidated.

STATE ORGANIZATION

State Forester.—At the head of the Division of Forestry, Department of Conservation and Development, is the State Forester. He has charge of all branches of the work in the Division.

Assistant State Forester.—The State Forester has assigned the general supervision of all forest fire prevention and suppression work within the State to the Assistant State Forester. He is known as Chief of Forest Fire Control and devotes the major part of his time to such work.

Forest Inspector.—Assistant to Chief of Forest Fire Control, working throughout the State from the latter's office in an inspectional capacity. He is acting in charge of fire control during the Assistant State Forester's absence.

District Forester.—The District Forester, working under the general supervision of the Assistant State Forester, is in charge of a District comprising a number of counties. His time is spent in supervising the forest protection work and other Forest Service activities in his District. At present the State is divided into seven Forest Districts, six being organized and in operation. The seventh represents a number of Piedmont counties to which protection activities have not yet been extended.

Assistant District Forester.—Is responsible to the District Forester for carrying out the latter's instructions in operating the District. He is acting in charge of the District during the District Forester's absence, and is also a technically trained forester.

District Forest Ranger.—Works directly under the supervision of the District Forester and is generally a man promoted from the warden organization. He is the contact man between the District Forester's office and the warden organization in the field. He is the District Property Custodian, issuing and keeping in repair all equipment. As far as possible he assists County Wardens on all large fires; keeps the District Office in touch with the needs of the warden organization; supervises construction and maintenance of improvements such as towers and telephone lines, under direction of the District Forester. He is primarily a field man and devotes practically his entire time to field work.

County Forest Warden.—In each county under protection of the State Forest Service there is a full

time County Forest Warden. He works under direct supervision of the District Forester and heads the warden organization in his county. He recommends for appointment or dismissal all District Wardens, Towermen, Smokechasers and fire crews in that county. All accounts submitted for payment must pass through his hands before going to the District Forester. He issues all tools, equipment and supplies to the District Wardens; inspects the warden organization at such times as may be desirable and in every way is the active head of the Service in his county. He is appointed at the recommendation of the District Forester. He is expected to personally attend as many as possible of the fires which may occur in his county and is subject to duty call at any hour of day or night. The writing of newspaper articles, and other forms of local publicity, represent one of his important duties, and he is the contact man between the Forest Service and the County Commissioners.

Association Ranger.—Supervises fire protection activities on a private protective association. Wherever financially possible the Association Ranger is placed on a year-long salaried basis. His specific instructions come from the District Forester; however, his work will be generally supervised by the District Forest Ranger and the County Forest Warden, and his reports will go through the County Warden's hands.

District Forest Warden.—One in each township or fire district of a protected County, employed on an

hourly basis only when fires occur in his District or when assigned special work. He is recommended for appointment by and receives his instructions from the County Forest Warden. As soon as appointed, he is expected to sign the oath of office furnished him. He is largely responsible for the forest fire suppression work within his district, and is expected to be of all possible assistance in the prevention of fires through talking with and cautioning his neighbors. The average District Warden throughout the State has about 14,000 acres of forest land in his territory. He is expected to:

1. Handle every fire occurring in his district (either with or without the County Warden's presence), and direct the work of the fire fighters under him.

2. Make reports to the County Warden of all such fires on regular blanks provided him.

3. Talk fire prevention at every opportunity, such as at picnics and other gatherings.

4. Discuss with private timberland owners the work being done and the need of adequate finances to handle it.

Lookout Smokechaser.—Is stationed at a tower or other lookout point and is available for immediate dispatch to any fire spotted. On duty during fire season only and is employed on a monthly basis under supervision of the County Warden.

Towermen.—Is stationed at a lookout tower during fire season and employed on a monthly basis under supervision of the County Warden. He reports by

telephone or radio the location of all fires spotted within his area of responsibility. He lives either in the cabin quarters furnished at the tower or in a location near the tower, and during fire weather is considered to be on duty twenty-four hours a day. He has been fittingly called "the eyes" of the warden organization.

Fireman.—Employed during fire season in crews of from two to five men each who are stationed at a tower or other convenient point, from which they can proceed at once to extinguish any fire reported to them. Such a crew is always led directly by a District Warden, who works under supervision of the County Warden.

Pre-arranged Fire Crew.—A crew of from two to five men who sign pledges to report to a certain warden immediately when called upon for fire fighting. Paid on an hourly basis, and at a higher rate than temporary fire fighters. Such crew men are usually tenants on a District Warden's farm, members of his family, or very close neighbors. It is desirable that every District Warden have such a pre-arranged fire crew signed up on regular blanks provided for this purpose.

Temporary Fire Fighter.—Men employed at a small hourly wage rate and used by a warden when necessary for suppressing a fire. As noted below under "Powers of Forest Wardens" such men can be summoned to assist in an emergency. It is the endeavor of the State Forest Service, as available funds increase, to depend more and more upon firemen and

pre-arranged fire crews, and less upon temporary fire fighters. For the same reason cities and larger towns have full time fire departments replacing the old volunteer fire departments.

Leave or Resignation.—When a warden leaves his district for any period of time during a fire season he should notify, in writing, his immediate superior, and suggest a substitute to fill his vacancy during such absence.

Wardens desiring to be relieved of the duties of such position should also take the above action so stating in writing fifteen days in advance of their intention of resigning, and on acceptance of their resignation should at once turn over their badges and other equipment so that prompt steps may be taken to appoint and equip a successor.

Promotions.—When a vacancy occurs it is the policy of the Service to fill it by the promotion of a man in the organization who has shown special qualifications for such position.

Powers of Forest Wardens.—All Forest Wardens, regardless of grade, have the following powers vested in them by Section 6137, Consolidated Statutes, as amended:

1. To enforce all statutes of this State now in force or hereafter enacted for the protection of forests and woodlands from fire.

2. Control and direction of all persons and apparatus while engaged in extinguishing forest fires.

3. They may arrest, without warrant, any person *caught in the act of violating any of the laws for the protection of forests.*

4. They may summon any physically sound male resident, between the ages of eighteen and forty-five, to assist in extinguishing fires, and may require the use of horses and other property. To properly summon a man the warden should say: "Mr.----- I, as a State Forest Warden of this County, summon you under the law to help in putting out the fire at-----."

5. They may secure the arrest, through the proper authorities, of any party *refusing or neglecting* to render assistance or allow the use of horses or other material, and proceed to prosecute such party or parties under the proper section of the State laws.

6. They may enter, cross, or work upon the lands of another in connection with their duties without being liable for trespass of themselves or their crews.

Game Wardens.—Under the State Game Law each Forest Warden becomes automatically an ex-officio Deputy Game Warden and is empowered as such to assist in the work of the Department's Division of Game and Inland Fisheries.

Badges.—Each Warden is furnished with a badge. This should be worn at all times during the fire season and on any other occasion when he may be obliged to show his authority as an officer. Each badge is charged to the Warden to whom it is issued, and must be turned in to his immediate superior if he leaves the Service.

FOREST AND GRASS FIRES

Preparedness.—The aim of the State Forest Service is to *prevent* fires. To do this forethought and work is necessary, much of which is outlined under the duties of the Wardens.

All tools should be put in first-class condition and distributed to the best advantage before the fire season opens. Each District Warden should have a pre-arranged fire crew in his immediate neighborhood. This crew should consist, as stated previously, of from two to five men properly signed up on the regular blanks. From time to time some of these men may move out of the district, or take jobs elsewhere; therefore, the District Warden should renew his crew organization before the start of each fire season. He will be assisted in this by the County Warden. The crew members should be so located as to be quickly available for call by telephone or by some pre-arranged signal, such as the ringing of a farm bell or the blowing of a horn.

Arrangements should be made with mill or other crew foremen for the use of their crews for fire fighting, informing such foremen and men that in event they are called upon to fight a fire they will work under the immediate direction of their foreman.

District Wardens should have a well-defined plan thought out for their districts as to the logical and best methods to be used in stopping *any* fire which may occur within their territory; such as location of roads, streams, fields, or other natural fire breaks

that may be used in emergencies, thereby saving time, labor and resources.

Prevention.—More time and thought devoted to *prevention* means less suppression work and less burned area.

During periods of high hazard, due to high winds, a lack of moisture, or other causes, patrols are necessary and County Wardens are expected to carry on such patrols until the District Forester informs them such is no longer necessary.

Of particular importance in fire prevention work is the education of the public. It is to be remembered that about ninety-eight percent of our fires in North Carolina are man-caused and are therefore PREVENTABLE.

FIRE FIGHTING

Initial Action.—When a fire is discovered or reported, it should be gotten on to with the least delay possible, *day or night*, and work started *at once*.

If the pre-arranged crews are properly organized they will be on every fire occurring within their districts before such fire gains much headway. If it becomes necessary to call additional help the wardens have authority to summon men and equipment by virtue of their appointment.

Organization on the Fire.—There must be *one* man in charge—one boss—with full authority and responsibility on each fire. This should be the District Warden. The District Warden should direct the work as a whole. Employ only sufficient men to

handle the fire. Large crews do not work well. Designate some responsible man as crew leader, if desirable to divide into crews. "Haphazard" organizations, where every man is his own boss never get results. As stated above, it is often desirable to divide the men into crews with a leader in charge of each. The leader should take the lead with an axe, brush hook, rake, or tool best suited to the work, and lay out the line where it should go, the men being instructed to follow the marked line. The ideal crew consists of from three to five men, including the leader in charge. Suitable tools and equipment should be supplied each man. Under no circumstances should men be allowed wages unless they have tools with which to work and actually *work*.

Following is a list of tools set up as standard for a five man crew:

Eastern Districts	Mountain Districts
2 knapsack water pumps	1 knapsack water pump
1 brush hook or single bit axe	1 brush hook
1 swatter (fire flap)	1 D. B. Axe
2 fire rakes	3 fire rakes
1 galvanized water bucket	1 5 gal. Supply Tank

With this assortment five men can be equipped to secure the desired results under normal conditions. Other tools and equipment, of course, are in use by the Forest Service (See "Equipment" in Table of

Contents); the above lists represent minimum requirements. In the Eastern Districts some District Wardens are supplied with equipment trailers to be fastened to the rear of an automobile. The trailer carries tools and equipment for ten or more men, in addition to a large water supply drum for feeding the knapsack pumps.

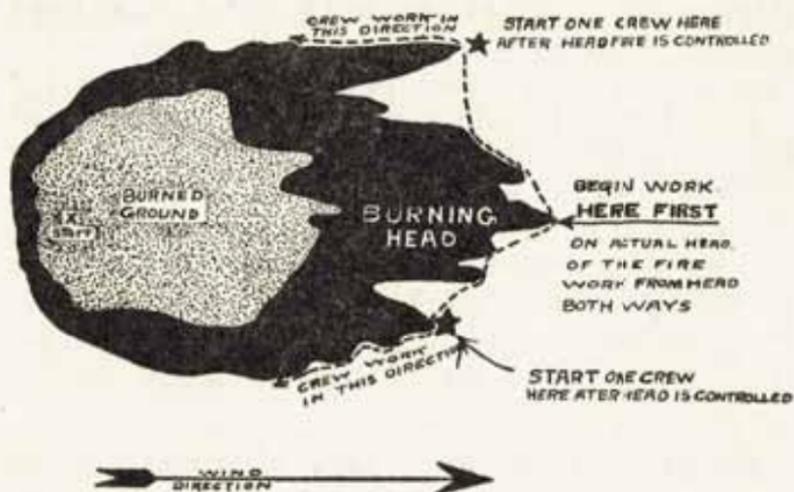
Plan of Attack.—As soon as the crew or crews have been formed work should begin *immediately* upon what appears to be the “head” or “lead” of the fire.

Immediately after starting the crew to work the warden in charge should go completely around the fire to determine the most dangerous points and definitely decide upon the most effective plan of attack. After this plan has been decided upon—*following a trip around the fire*—the crew should be placed where the most effective work can be accomplished. (See diagram.)

Where more than one warden is present definite sections of the line should be assigned each crew and it should be insisted upon that they complete that work and *stop the fire* in such section before moving on. Men should never be allowed to “bunch up.” The warden in charge should be the District Warden in whose district the crews are working, or the County Warden if he is present.

He should keep in constant touch with the progress being made by the leaders and their crews by repeated trips around the fire, transferring crews from one point to another as conditions demand. As the

line construction progresses a man should be dropped out from time to time to patrol the completed sections of line and guard against fire breaking over after the crew has worked ahead.



Pointers on Attack.—Always take advantage of every favorable condition. All fires are more easily controlled during the *night* and the *early morning*, when the combustible material is damp and many points along the edge have died down or are out.

This same condition applies following a light rain. *It is the ideal time to do the fastest work.* One hour at daylight is worth many hours later in the day. Night work is less effective than early morning work, due to the lack of light and inability of the crew leader to keep in close touch with his men; but if a fire is reported in the evening **DO NOT WAIT** until daylight.

In the Eastern Districts water is generally available with much less effort than in the Mountain Districts. Therefore, it should be used to the fullest extent practicable. Where a knapsack pump is available one man should be assigned to use it where most needed. Frequently he can spray the blaze (on the edge of a broom sedge or pine needle fire, for example) in such fashion as to reduce the flame and heat so the line-building or swatter crew can do close up work. He can also, of course, wet down burning snags and stumps adjacent to the completed line to prevent sparks blowing across the line. When water is close by, one man should be detailed to carry it to the pump man or men, using the bucket supplied for this purpose. The crew's drinking water may be supplied also by this man.

Where no other water supply is available it has been found very satisfactory, where conditions permit, and when thought necessary, to employ a man with a two wheeled cart to haul water in barrels for feeding the pumps. Such equipment as this should be pre-arranged for by the District Warden, so that it can be obtained for use IN GOOD CONDITION at short notice.

In the Mountain Districts much less use can be made of water in fire fighting, due to difficulty of transportation and frequent long distance from water supply to fire line. The knapsack pump and supply tank finds its chief value here in mop-up work, such as deadening burning snags and stumps.

FIRE FIGHTING METHODS

Three methods of fire fighting will be discussed. One or a combination of these three methods will be found practical on any ordinary fire. They are here discussed that all members of the North Carolina Forest Service may have a common understanding of these approved methods.

The Direct Method.—Under this method the work is done directly on the edge of the fire, thus making the *fire edge* the *fire line*.

Action under this head may be obtained by:

1. Beating the fire out with pine tops or swatters.
2. Smothering the fire by throwing *clean* sand or dirt on the burning edges.
3. Shoveling in, scraping or raking in, or digging out and throwing in toward center of fire, all burning materials.
4. Completely extinguishing the natural burning edge of the fire by the use of water, with spray pump followed by the swatters or pine tops.

This method is recognized as the best where conditions will permit of its use.

It should be used:

1. On all smoldering or slow burning fires where it is possible to work on the actual burning edge, *regardless of size of fire or material burning*.
2. On steep side-hills above the fire, to prevent a "run" to the top of the hill. In this case, it must be done quickly and thoroughly, before fire gains much headway.

Its advantages are:

1. It keeps down the area of the burn, thereby accomplishing the main aim.

2. By immediately robbing the fire of all new inflammable material it offers no opportunity for the fire to generate sufficient heat to gain momentum and get beyond control.

3. It eliminates the use of costly and dangerous backfires, thereby reducing the area burned, as well as the sacrifice of additional timber and the danger of losing control of such backfires through wind shifts and failure to burn clean after being started.

The Two-Foot Method.—This method differs from the direct method only in that the line is constructed *not over two feet* from the edge of the fire and is used only as a *substitute* for the direct method where the heat will not allow the crew to work *directly on* the burning edge.

To use this method:

1. Swamp out and clear of *all* inflammable material a trench from twelve to twenty-four inches wide *down to the mineral soil* (sand, clay, or other soil containing no vegetable matter), using fire rakes.

2. All material removed in constructing the trench should be raked or thrown to *outer edge* of line and *not* toward the fire.

Its advantages are:

1. It allows the crew to work very close to the edge of the fire *when due to excessive heat the direct method is not possible.*

2. No backfire is necessary. The line being only two feet from the fire allows the fire to burn up to the trench and die out.

3. It can be instantly transferred to the direct method by connecting the line with such "dead" edges of the fire as may be encountered.

4. It is a substitute for the direct method to be used in places where the other is impossible.

The Indirect Method.—This is purely an emergency method and should be used *only* after it is *fully* determined by *actual* work that the direct method or the two foot method *will not* stop the fire.

It consists of locating the fire line along natural fire breaks such as roads, trails, streams, small lakes, plowed fields, previously constructed fire lines, or constructed trenches along ridges, etc. *After* such location of a line backfires are set to burn *toward* the oncoming fire, so as to provide a wide enough burned space to stop the main fire when the backfire and it meet.

This method may be used:

1. When high winds generate excessive heat and smoke from the fire, thereby preventing "close up" work and causing a fire to be beyond control by the other two methods.

2. When such uncontrolled fire is burning over a wide front, through grass or other highly inflammable material representing small damage and such fire would leap the natural barriers ahead and cause additional damage.

3. When natural fire breaks are *close* to the fire and backfiring may be done safely and with little cost.

4. WHEN THIS METHOD IS PURELY A LAST RESORT.

How to use this method:

1. *Thorough preparations* for the setting of backfires must be made before starting them.

2. The natural or constructed lines must be completed to prevent the backfire from spreading around the lines.

3. Burn only small stretches at a time. *Never set long strings* of fire.

4. Never leave any part of a backfire line unattended. Drop men out to watch the line as the work progresses.

5. *Burn away from actual edge of trail or line* toward fire, and *burn clean*. Always set the backfire at the *edge* of the cleared space and not several feet from the raked or cleared space.

6. Never attempt to backfire unless wind conditions are favorable and you are *absolutely* sure you can *control your backfire* and that *no other method* will stop the fire.

Comments on Backfiring.—Backfiring is a difficult task if it is to be successfully accomplished.

Regardless of labor and care, it is *always* dangerous.

Thousands of acres of land have been needlessly burned through the unnecessary setting of backfires that either got away through improper management

and "ran wild", or burned large additional areas that would not have been burned had no backfire been set.

There is no question that there are times when backfires are necessary, but *they must never be set except under conditions listed* and when no other method will stop the fire.

PATROL

The term "fire suppression" means two things:

1. Controlling a fire.
2. Extinguishing a fire.

Fires are fought to *stop* their spread. This is *control*.

If the proper patrol is not carried on after the spread is controlled, and the fire gets away, all work has been wasted. For this reason the *patrol or mopping up* is just as essential as successfully stopping the spread.

Therefore, the *patrol* work completes the suppression by guarding against further spread and completely extinguishing all live fire inside the fire line, that in any manner could cause further spread. This, together with re-visiting large fires, is commonly known as "mopping up."

Organization of Patrol.

1. All constructed line should be held, even if it takes the entire crew.

2. The number of men required to properly patrol a line depends upon the conditions of the fire, such as intensity of heat near line, wind conditions and

inflammable material still burning, sparks from burning snags, etc.

3. The distribution of patrolmen must depend upon the danger points along the line. Where the greatest danger exists is where the strongest patrol force should be placed.

4. Stronger patrol is needed during the heat of the day than is necessary at night or at times when the fire dies down. Usually uphill sectors need closer watching than the sides or downhill. Chestnut burrs and pine cones in the mountains oftentimes roll downhill and set fire below. This must be watched.

5. Men selected for patrol work should be the most *reliable* and *active* men in the crew. The success of the whole work depends upon their alertness and attention.

They should be instructed to smother out all remaining blazes and smoldering spots near the line and to cut down all burning or smoldering snags from which sparks could cross the line.

They should be so distributed along the patrol line that in case of a break-over *someone* will see it at once and trench it with the least possible delay.

Under no circumstances should patrolmen be allowed to "bunch up."

6. When a fire has been made safe and only a few spots need watching, the main part of the crew can be allowed to leave, retaining a sufficient number of the *best men* for patrol.

7. A fire should never be left unattended until the *line is cold* and all ground fires within thirty yards

and all burning snags within one hundred yards of the line are *extinguished*.

On large fires, where there is *any chance* of further spread, definite arrangements should be made for one man to return to the fire each day, usually at mid-morning and make a complete trip around the fire. These trips should be made until *every spark is dead*.

Fires that break away after the warden in charge "thought it was out" represent a very serious blunder. If the patrol work is properly conducted this will never occur. Proper and necessary patrol is WORTH what it costs.

ACTION IMMEDIATELY FOLLOWING FIRE

Fire Time Reports.—All time submitted for fire fighters must be on the regular fire time reports—Form 3.

Before *any* of the crew leave the fire each man should be asked by the warden in charge *if he desires to contribute his time*. If he does not, and wishes pay for his services, a time slip should be made up in full and signed by him before leaving the fire. Full instructions for making up fire time reports will be found in this Manual.

Law Enforcement.—It is our aim to definitely place the responsibility for each man-caused forest fire.

Usually this work should be done by the Warden in charge and steps should be taken as *soon* as such Warden reaches a fire toward determining who was

responsible for it. This information should be turned over to the County Warden. Every person responsible for the spread of a fire should be either prosecuted under the proper State forest fire law or required to reimburse the State for the *total* cost of fighting such fire as each individual case shall warrant.

No person shall be exempt from the above.

What action shall be taken should depend upon actual conditions and be decided upon by the County Warden. In case of doubt the matter should be referred to the District Forester. Full instructions for conducting prosecutions, together with extracts of the State forest fire laws, will be found in this Manual.

Injury to Fire Fighters.—If a man is injured while fighting fire under a Warden's supervision he should be given medical attention by a physician as soon as possible. Furthermore, the County Warden and the District Forester should be notified of the Case AT ONCE, so that proper steps may be taken to protect both the injured man and the Forest Service.

FIRE FIGHTING SUMMARY

Following are the main points to be remembered in fighting forest fires:

1. *Be prepared.* Have your crews always ready. Have tools ready. *Plan in advance.*
2. Get to every fire without delay—day or night. Catch them small.

3. Have enough men to handle the job quickly and thoroughly, thereby *eliminating large fires*.

4. Hit it hard at start. Plan your work. Have a *reason* for every act. Place your crews to get the best results. Use two to five men crews with *one man always* in charge.

5. Cut off head of fire first.

6. *Use direct or two-foot methods in ninety-five per cent of all fires fought.* Do not let it get a start.

7. Use indirect method as *last resort only*. Avoid *backfiring* where any other method will get results.

8. Construct a CLEAN line; rake it down to mineral soil and put it, if possible, BETWEEN the fire and old windfalls or down timber because these represent long-burning hazards. Under severe drought conditions it will be necessary to actually *dig a trench*, particularly in peat soil or deep humus. A trenched fire requires especially good PATROL, since conditions are so hazardous.

9. Hold every foot of constructed line—even if it takes entire crew.

10. Get rid of the burning snags.

11. *Maintain proper patrol until last spark is out. Small fires indicate efficiency, good judgment, and fire fighting ability.*

In the foregoing pages an effort has been made to cover the main points of fire prevention, administration, and fire fighting.

The following pages will cover the details of the work expected of the Wardens in an effort to eliminate errors and act as a guide in standardizing the work in the field.

FORMS

No. 3—Fire Time Report.—

One form for each fire fighter, except District and County Warden. Fill out complete on fire line immediately after fire is out and before any man leaves.

Show in the proper columns the hour in A.M. or P.M. when *each* man began and stopped work. Space is provided to show the hours worked by a man who worked a period of time in the A.M., left the job and returned to work an additional shift in the P.M., of the *same day*.

Sufficient space is provided for one man's time for a five day period; if work is performed for longer than five days make up additional slips to cover.

Adding the total hours worked and multiplying this time by the rate per hour will give the total amount due.

Show to each man the amount due him after the form is made up and have him sign on the proper line, after which the Warden in charge should sign on the last line. Then forward these to the County Warden along with the fire report.

Travel Time.—Travel time, not to exceed one hour each way, *may* be allowed men from place of employment to fire and return, if in the judgment of the Warden in charge such is just and fair.

Working Periods.—If the fire requires a longer period than sixteen hours to suppress it the work of the men should be limited to not more than twelve

hour shifts and a portion of the force should be sent home to obtain sleep and rest, with the understanding that such of them as will again be needed will report for work promptly at the end of a twelve hour rest period.

No pay will be allowed for time of men absent from a fire on such rest periods.

Rest Periods.—In extreme emergencies, when men cannot be spared from the fire line to go home for rest after having worked a maximum of twelve hours, a limited number of men may be *allowed* not to exceed four hours for sleep on or near the fire line. Men so held shall be paid at the regular rate.

This applies *only* to emergency cases, and must be approved by the County Warden or his superior.

No Pay Allowed.—No pay will be allowed men, their employees, or *members of their own family* for fighting fire on their *own property* or on the property of another when such work is being done for their own protection. *There is no exception to this rule.*

No man who claims time for fire fighting *not* done under the supervision of a Warden shall receive pay unless the Warden in charge *fully* satisfies himself that such claim is fair and just.

Paying Fire Fighters.—*Before making out the time for any man it should be ascertained if such man wishes to contribute his services.* A special effort should be made to secure the contribution of time amounting to less than \$1.00.

Remember.—It is not *necessary* to pay any party summoned to help fight fire, and *in no case shall the*

rate of pay exceed the amounts per hour as set up from time to time by the State Forester's Office.

Amounts Less Than \$1.00.—Fire fighters' time will be made up on the regular Fire Time Report (No. 3) in the usual manner. *When the time due any man amounts to less than \$1.00* a cash payment voucher (Form 5) should be made up in full, entering on one line the name and address of each man, together with the sum due him.

The Warden in charge of the fire will then pay these men the amounts due them, asking each man to sign his name on the line opposite his name and amount as a receipt for such payment.

The form then represents a paid receipt and should be forwarded, along with the Fire Time Report (No. 3) and Fire Report (Forms 1 and 2), immediately through the County Warden to the District Forester, and a check in the full amount of this voucher will be sent the Warden making such payments, as reimbursement.

When it is impossible for a Warden to pay his men as above outlined, due to lack of funds, a cash payment voucher (Form 5) *must not* be made up, but simply send in all the men's time on the Fire Time Report (Form 3), together with the regular Fire Report (1 and 2), to the District Forester in the usual manner (through the County Warden).

Fire Report—Form No. 1.—A complete and accurate report must be made of EVERY illegal fire, regardless of size and regardless of whether or not

it cost money to put it out. Illegal fires are defined as follows:

"All unauthorized or uncontrolled burnings occurring on forest land, and those on grass, marsh or brush land adjacent to or intermingled with forest lands in such manner that fires thereon threaten the forest land."

Legal fires, on which no reports are desired, are defined as follows:

"Authorized slash or brush burning, controlled burning, the burning of turpentine orchards, rights-of-way and the like, where the fires occur at the wish of the owner or his representative, are confined to the desired areas and are not in violation of the State law."

However, it must be remembered that if such authorized or controlled fires get out of control and burn adjoining forest, grass, brush, or swamp lands then a report should be made on this adjoining area burned.

Give every fire a name that will best identify it. This name should appear on both the Form 1 and Form 2.

Cause.—For "Cause of fire" one of the nine headings listed in the upper right hand corner of the report, should be used for every fire.

Care must be exercised in *determining* the correct cause.

There should be very few cases when actual cause cannot be shown, and *only after thorough investiga-*

tion has been made and no accurate cause determined should "unknown" be used. *Keep this down to the minimum.*

Following is a description of the nine causes:

1. *Brush burning.*—Fires caused by clearing lands for any purpose (except railroad rights of way and logging operations), burning rubbish, new grounds, weeds along ditch banks, or firing brush lands to destroy insects or reptiles.

2. *Hunters, Fishermen and Campers.*—Fires resulting in *any manner* from carelessness or accident on the part of hunters, fishermen, campers, stockmen, picnickers, berry pickers, automobilists, and others camping in or travelling through timbered lands, and fires caused by smoking out animals from dens or burrows.

3. *Railroads.*—Fires caused by the construction, maintenance or operation of any common carrier railroad. This includes fires from locomotive sparks, cinders from fire boxes, lighted matches, cigars or cigarettes thrown from car windows, the clearing of rights of way and the burning of old ties by section crews, or by the individual carelessness of any railroad employee or passenger.

4. *Lumbering.*—Fires caused *in any manner* by logging operators or sawmill men or by sparks, cinders, or any other means from logging trains and sawmills.

5. *Incendiary.*—All fires maliciously set, regardless of whether or not they *can* be classed under some other head.

6. *Smokers*.—All fires that can be traced *directly* to someone carelessly throwing a burning match, cigar, cigarette, or pipe "heel" away and same starts a fire. (Do not confuse this cause with No. 2, hunters, etc. If hunters, fishermen, campers, and others under No. 2 cause fire through carelessness in smoking, such fire would not be a "smokers" fire, but a "hunters", etc.)

7. *Lightning*.—Fires directly traceable to lightning.

8. *Miscellaneous*.—All fires the origin of which is known, but which cannot properly be classified under one of the above heads. This includes fires set by children while playing, fires spreading from burning buildings, sparks from chimneys, etc. When the cause of a fire is classed as "Miscellaneous," the actual cause must be given. Burning for pasture will be included here.

9. *False alarm*.—Sometimes a Warden will take a crew to what he thinks is a forest fire, only to discover when he gets there that the smoke is from a brush burning that is under full control, or from a sawmill or burning slab pile that is being watched. If the fire crew has spent two hours or more on this trip, the Forest Service is willing to pay them for their time. In that case, the Warden will make out the usual Fire Report, classing the fire as a false alarm and writing on the Form 1 sufficient information to explain the circumstances.

Under "Land Burned Over" the Warden should place an ACCURATE estimate of acreage burned;

NEVER GUESS. To overestimate acreage not only furnishes incorrect data, but tends to lower the warden's record. Remember that the average man's tendency is to OVERESTIMATE acreage, particularly in case of a night fire. Also bear in mind the following:

A circle 236 feet in diameter = 1 acre

An area one quarter mile square = 40 acres

An area one mile square = 640 acres.

"Merchantable Timber Land" is forest land that can be PROFITABLY cut over for saw timber, telephone poles, building logs, railroad ties, piling, tan bark, extract wood or pulpwood.

"Second-growth land" is forest land that is more or less covered with young tree growth that cannot as yet be cut and sold at a profit.

"Open land" represents grass or brush land that has practically no tree growth, either large or small, on it.

It is important to indicate the TYPE of forest burned. "Upland hardwoods" represents the mixture of oaks, poplar, maple, chestnut, etc., commonly found in the western counties. "Pine hardwoods" represents a mixture of either white or yellow pine with the hardwoods. The other types are self-explanatory.

Damage.—The calculation of fire damage figures is not a very simple operation, since so many factors must be considered. The type and species of timber, the relative severity of the burn, the time of year involved will all influence the damage figures. Fur-

thermore, many fires do considerable damage that does not show up until some time after the burn; such, for example, as future erosion on steep slopes, the destruction of wild game and game food, loss of the water-holding ability of the forest soil, weakening of trees for future entry of insects and disease.

However, in order to secure fairly uniform damage figures on all fires, the following suggestions are given to assist the wardens in making up fire reports:

1. Whenever merchantable timber land is burned, an allowance of \$3.00 per acre will be made as damage to the *merchantable timber itself*. In the Mountain Districts an additional \$2.00 will be allowed for the young growth on each acre of the merchantable timber land (in the Eastern Districts this figure will be set at only \$1.00).

2. Whenever second growth (unmerchantable) land is burned, an allowance of \$2.00 per acre in the Mountain Districts and \$1.00 per acre in the Eastern Districts will be made.

3. No damage figure will be set for open land.

4. Damage to forest products such as cut lumber, cordwood, cut logs, and to improvements such as buildings and fences, will be estimated by the Warden according to his knowledge of the local value of such material.

As an example, then, if a fire in the Mountains burns ten acres of merchantable timber land, twenty acres of second growth land, and five acres of open land, and some rail fence, the damage would be set down as follows:

1. To Merchantable timber (10 x \$3.00) -----	\$30.00
2. To young growth (30 x \$2.00) -----	60.00
3. To forest products -----	—
4. To improvements (4 panels of rail fence)----	8.00
5. To other materials -----	—
	<hr/>
Total damage -----	\$98.00

It is recognized that some fires will do much greater damage than the above method of calculation will show; others will likely do less. As a "rule of thumb," however, this method is felt to be quite satisfactory and should be used in making up fire reports.

Occasionally it may be desirable for a Warden to conduct a more detailed and accurate survey of the damage done by an individual fire (Generally this would be done at the specific request of the District Forester). In that case the following information and table should be used as a guide:

Merchantable timber.—Trees that have reached their growth limit or are *now* suitable for sawlogs, that have been entirely killed by fire, that have been so seriously burned that there is *no question* that they will die or be blown down, will be considered a total loss and the damaged estimated according to the number of thousand board feet destroyed in such trees. Use the total stumpage value based upon *local market values* for such species. One dollar per acre should be added for damage to the site.

Young growth.—The acreage of young timber destroyed should be first determined. If only a portion of the stand is killed, figures must be reduced ac-

cordingly. Then by referring to the following table based upon stumpage value of \$1.00 per 1,000 board feet, by various heights, you can determine the value of such damage per acre at \$1.00 per thousand board feet.

By multiplying this by local stumpage prices you can arrive at local values lost per acre, and this multiplied by the number of acres damaged will give total damage to young growth.

Many-aged stands.—Damage by fires which burn over many-aged stands should be obtained by allowing for the number of thousands of feet of merchantable timber destroyed by the fire at the local stumpage price per thousand feet, b.m. The average height of the unmerchantable timber should be estimated and one-half of the figure given in the table for trees of this estimated height class should be used. One-half of the figure from the table multiplied by the local stumpage rate will give the damage to the unmerchantable timber. The damage to the merchantable timber, plus the damage to the unmerchantable timber, plus the damage to the site (\$1.00 in all cases) gives the total damage per acre. The total damage per acre, multiplied by the number of acres burned over, gives the total damage done by the fire. The following example will illustrate this method.

Severe fire.

25 acres burned over (many-aged forest).

\$5.00 local stumpage price per thousand feet, b.m.

1,000 feet of merchantable timber destroyed per acre.

40-50 feet average height of unmerchantable timber.

\$0.55 value of unmerchantable timber 40-50 foot class from table.

\$0.27 one-half of value from the table.

1,000 feet of merchantable timber destroyed per acre, multiplied by \$5.00—local stumpage price.

\$5.00—Damage to merchantable timber per acre.

.27—Half of figure from table, multiplied by

5.00—Local stumpage price.

\$1.35—Damage to unmerchantable timber per acre.

\$5.00—Damage to merchantable timber,

plus 1.35—Damage to the unmerchantable timber,

plus 1.00—Damage to site.

\$7.35—Total damage to stand per acre, multiplied by

25—Number of acres burned over.

\$183.75—Total damage done by the fire.

Re-burned areas.—Damage to stands which have been burned over once before within the five-year period just preceding the fire should be figured at one-half the values given in the table.

Damage to areas which have been burned over twice within a period of ten years prior to the fire should be figured at one-fourth the values given in the table.

Damage to pure second growth even-aged stands should be figured at twice the values given in the table.

Classes of fires.—Three classes of fires are recognized to allow for the difference in the amount of damage done by fires of various intensities:

Very severe—Killing over 50 per cent of trees forming upper crown cover.

Note: Such fires seldom occur.

Severe—Killing from 10 per cent to 50 per cent of trees forming upper crown.

Light—Killing less than 10 per cent of trees forming upper crown.

Damage per acre to young growth by height classes (based on stumpage values of \$1.00 per thousand feet, b.m.)

TYPE OF FIRE

Height—Feet	Light	Severe	Very Severe
0-10	.10	.10	.10
10-20	.10	.13	.22
20-30	.10	.23	.39
30-40	.15	.36	.60
40-50	.23	.55	.92
50-60	.36	.87	1.45

Example:

3 acres—Actual area of young growth burned.

10-20 feet average height of young growth.

\$0.22—Value of this height class per acre at \$1.00 per thousand feet, b.m.

\$4.00—Local stumpage price.

Very severe fire.

\$0.22

4—Stumpage value.

\$0.88

1.00—Damage to site.

\$1.88—Value at \$4.00.

3—No. acres burned.

\$5.64—Total value of damage to young growth on 3 acres.

Complete destruction to young growth.—When young growth is completely destroyed and will not

restock itself through natural reseeding, \$5.00 per acre should be added to the "damage to young growth" figures as the cost of replacement by planting.

Fire Time and Expense Account—Form No. 2.—

Fill out heading in full. From the Fire Time Reports—Form 3—enter the time of each fire fighter, using one line for each man's time.

If any men fought fire and asked no pay for such services, show their names, addresses, and number of hours worked, drawing a line through "rate per hour" and "total." This is needed on *every fire*, that a proper record can be kept of such volunteer contributions. When crews, such as mill or logging crews, work under their own foreman and are paid by the company or employer for such fire fighting time, and such company or employer wants a check for such crews' labor sent direct to him in a "lump sum," list each man on a separate line and state to whom the total amount of such time is to be sent. Also note in the space provided the time of the County and District Wardens on every fire.

Special Report on Railroad Fire—Form No. 4.—

Whenever a fire is caused by a common-carrier Railroad this Special Railroad Report must be completely filled out IN ADDITION to the regular Fire Report (Forms 1 and 2). It is imperative that this Special Report be filled out as accurately and completely as possible. Answer ALL questions on it. If at all possible secure WRITTEN statements from

witnesses who saw the fire start at about the time the train passed, or who saw the RR Section Crew burning Right-of-Way just before the fire got out. It is particularly important to get the right location (for example, so many yards east or west of a given mile-post or Station).

Warden's Monthly Service Report—Form No. 20.—

All service reports *must* be filled out promptly at the end of each month in which work was done and immediately forwarded to the County Warden, that they can be passed for payment or payment will be delayed until the following month. The law stipulates that claims over 60 days old are void. No service reports should be held over and submitted later. Get them in promptly. No expenses for meals will be allowed District Wardens, except while on fire fighting work.

Any Form 20, containing claims for cash expenditures covering any cash purchases, must be accompanied by signed receipt for such purchases, or entire account will be returned for such receipts, thus delaying payment.

A District Warden is paid from his monthly Report and not from the individual fire reports he sends in.

Warden's Diary—Form No. 21.

A brief yet complete statement should be made on one or more pages of the diary notebook covering *every* day work is performed. This report should detail the work performed, showing character of

work, hours worked, miles traveled, names of people interviewed, notices posted, names of firemen appointed, and in every way be a complete record of *each day's work performed*. From these diary sheets the Form 20 should be made up. For a sample diary, see inside page of regular Diary Books.

Law Prosecution—Form No. 22.—

Fill this form out in full for every prosecution conducted, regardless of the court's decision, and forward to the County Warden immediately after a case is closed or appealed.

ACCOUNTS

Submitting Accounts.—All accounts must be submitted promptly.

Except where proof can be given that bills could not be submitted earlier, Wardens will themselves become responsible for all accounts not submitted *within sixty days* after services have been rendered or material purchased.

Checks for services or reimbursement should be deposited for collection at once, as the bank will decline to cash them after sixty days from date of issuance. *This is a State Law.*

Monthly Service Reports—Form No. 20.—Warden's monthly service reports must be forwarded at the end of each month to the County Warden for approval. *No accounts will be paid unless approved by the County Warden.*

Purchases by Wardens.—All purchases of material, meals for fire fighters, automobile hire, or any other item of expense, *regardless of sum or sums paid out*, must be accompanied by a clear statement *itemizing* such purchases and signed by the party rendering such services or furnishing such material. Where this is not done the payment of accounts must be held up until such vouchers are received.

Receipts for Purchases and Auto Hire.—These vouchers may be in duplicate and on a regular voucher form or a bill from the party from whom purchase is made, and must be *itemized fully*. Auto hire should show where journey started and ended, as: "From Bakersville to Deep Run fire and return to Bakersville, 10 miles round trip." Automobile hire in excess of 5 cents per mile will not be allowed.

Food Supplies.—The purchase of food supplies for fire crews is not encouraged.

Food should only be purchased when the Warden in charge fully determines that such purchases are to the best interest of the work, and should be confined to the following items:

- Weiners ("hot dogs").
- Sardines or canned meats.
- Cheese.
- Crackers or bread.
- Canned pork-and-beans.

Charges for expensive canned goods and soda water (coca-cola and other drinks) will not be approved for payment. Orders for food supplies should

be written out by the Warden in charge and only enough ordered to meet the immediate need of the crew.

Bills for food supplies purchased for fire fighters should be itemized fully. Meals purchased at farmers' homes for fire fighters should be the exception, not the rule, and then should be accompanied by a voucher as per sample:

Mill Town, N. C., Dec. 1, 1935.

Received from T. W. Brown, Dist. Warden, \$1.00 as itemized:

John Jones 1 dinner	-----	\$0.25
John Holt, 1 dinner	-----	.25
Tom Marsh, 1 dinner	-----	.25
W. H. White, 1 dinner	-----	.25
		<hr/>
		\$1.00

(Signed) JOHN DOE,

Mill Town, N. C.

Summary of Reports.—The few reports asked from the Warden are absolutely necessary to properly conduct the work. Payment for time in preparing these reports is allowable.

Above all, make them out in detail, answering every question, and BE PROMPT in submitting them.

EQUIPMENT

Accountability.—All State owned property will be issued to the County Warden by the District Forester or District Ranger. County Wardens should keep a record of such property in their files, that they may know at all times the location of all State property.

Transfers.—When property is transferred the Warden making such transfer should take a receipt for such property on the regular Form 24 (property transfer slip), having the party receiving the property sign the transfer. These receipts should be kept for record, and the information sent the District Forester. Both the District Forester and County Warden should have a current record of the location of tools and equipment in a given County.

Purchase.—No purchase of tools or other such semi-permanent equipment is to be made by any Warden without DEFINITE authorization from the District Forester, *except in cases of emergency when a forest fire is burning and a small quantity of equipment is absolutely needed.* When such purchase is made the District Forester is to be notified as soon as possible and he will attend to the making of proper transfer slips. However, the County Warden, the Towerman, and others of the Warden organization are permitted and expected to make such minor purchases as nails and tacks for posters, kerosene and stove polish for tower stoves, wedges for axe handles and other such supplies as may be needed to keep the equipment and property in good condition. Itemized receipts must be obtained for all such purchases, and the receipts attached to the Warden's Monthly Report.

Ordering.—Except in cases of great emergency, all property must be requisitioned from the District Forester.

Prior to each fire season District Wardens should supply their County Warden with a list of all equipment needed to properly conduct the work within their districts. From these District Warden requisitions the County Warden should forward to the District Forester a list of equipment needed to properly equip the county. In this manner the District Forester can better prepare his requisitions to the Raleigh office.

Care of Property.—All tools and equipment should be cleaned up, oiled, and stored after each fire season. Prior to each fire season all tools should be repaired and put in serviceable condition for use; and material, such as handles, new sections in the fire rakes, etc., should be ordered. All tools should be distributed for the most effective use of the organization as a whole.

No large supply of tools should be stored at any one place and thereby kept out of use. Axes, brush hooks and fire rakes should be kept sharp. A good workman always keeps his working tools in good condition.

Fire tools and equipment should be kept in a dry, weather-tight, convenient location. Knapsack pumps should be completely drained of water after being used on a fire to prevent freezing. UNDER NO CIRCUMSTANCES is anything else to be put into these pumps or tanks except water and used only on fires.

Any replacements needed, such as rake handles, rake teeth, pump parts should be reported to the

County Warden and by him to the District Office as soon as possible.

Loss.—When property becomes lost through any cause the Warden responsible for such property will be expected to render a satisfactory explanation covering such loss, or such property must be paid for by the party to whom it was charged when the loss occurred. If a satisfactory statement is made showing that the loss was due to no fault of the Warden to whom the property was charged, he will be relieved of such property and it will be removed from the County Warden records after approval by the District Forester.

Use of Property.—Fire fighting equipment purchased by the State Forest Service and issued to the Wardens is for *forest fire work only*. No State property should be loaned to any one not in the Warden organization, except to members of duly organized fire crews.

List of Equipment.—The following equipment has been approved as standard for use by the Warden force in fighting forest fires within the State as a whole. Due to the different conditions existing within the State all tools listed here are not available in any one district, it being considered best to supply each district with such tools as best suit its needs:

Axe, single or double bit, 2½ to 4½ lbs.

Badge, Warden.

Backfire torch—"Hauck".

Bucket, galvanized iron, 12 qt.

Canteen, cloth-covered, 1 gal.

Hook, brush—"Council No. 210".
Lantern, Kerosene (RR type preferred).
Pump, knapsack—"D. B. Smith".
Rake, fire—"Council".
Saw, cross-cut (5½ ft., 2 handles).
Shovel, long-handle.
Swatter (Fire flap)—"Council".
Torch, forest fire (fusee)—"Central RR Signal".
Trailer, F. F. auto (with water tank).
Trucks, F. F. (½ ton or 1 ton with or without motor pump, tanks, hose, etc.)

Marking Tools.—All State owned tools will be stencilled, branded, or stamped with the letters N. C. F. S. Handles of FF tools such as rakes, brush hooks, axes and shovels will also be painted bright red for eight inches upward from the head of the tool. The lower one-third of lanterns and buckets will be likewise painted red.

LOOKOUT TOWERS

There are now 71 fire Lookout Towers in the State under supervision of the State Forest Service. This number does not include, of course, the towers and lookout houses built and used by the National Park Service and U. S. Forest Service for the protection of National Parks and National Forest lands.

To properly conduct the work of fire protection the State needs many more towers and, as funds become available annually, such towers will be built and towermen placed on duty during the fire seasons.

A man in a properly located and equipped tower can determine quite accurately the location and approximate size of a fire up to fifteen miles or more

distant (depending upon weather conditions and topography). Immediately upon spotting what he believes to be a forest fire the towerman reports it by telephone or radio to the Warden nearest to it or to some pre-arranged Central Dispatching Officer. The Warden or Dispatcher then gets a crew on the fire as soon as possible. The Towerman is often called "the eyes of the Forest Service," and efficient action by him, in cooperation with the "ground force" of Wardens and Fire Crews, results in small burned area.

The great majority of the towers are of steel construction, there being at present one wood tower in use and, in the Mountain Districts, one lookout house simply placed on the ground on a sharp peak. Each tower is equipped with a properly-oriented Map on which is a graduated circle of 360 degrees. Fire locations are obtained by sighting on the smoke with an alidade, noting the position of the alidade on this graduated circle and informing the Dispatcher of this position so he can note it on his own key map. By obtaining another reading on the same smoke from a different Tower, the Dispatcher can easily "spot" the fire on his key map and send a crew to the indicated location. Further detailed instructions are, of course, issued to the individual Towermen by the District Foresters.

Since a Towerman must be in direct communication with the Ground Force (except in the case of a Lookout Smokechaser, who "runs down" his own fires) telephone lines have been and are being built

from the towers to connect with Wardens, as funds are available. Furthermore, as funds permit, the definite use of radio communication to supplement or replace telephone lines is expected. Such radio communication will permit the Towerman to keep in constant touch with District Office personnel, County Wardens and other Ground Forces who may be moving about by automobile.

The tower detection and communication system is a highly important phase of Forest Service work. Suggestions from the Wardens to the District Foresters for improving and enlarging the system are always welcome.

FOREST FIRE LAW ENFORCEMENT PROCEDURE

Every forest fire must be investigated by the Warden in charge, to determine the exact cause. Sufficient time should be spent to collect this information. Every case should be carefully worked out, and if the fire is man-caused, witnesses should be interviewed and the blame definitely placed.

Each case where the law has been violated should be handled on its individual merits. After a Warden has determined the identity of the party or parties responsible for the spread of a fire, together with all facts pertaining to the case, he should immediately decide upon the proper action and *take such action without delay.*

If it is decided that the fire spread accidentally and that the guilty party made every effort to confine it to his own land, and acted in good faith by working hard upon the fire after it got beyond his control, it

is oftentimes satisfactory to ask such a party to pay to the State the full amount of the extinction costs, informing him that no further action will be taken by the State. This is not to be interpreted, however, as an offer by the Forest Service to accept the suppression costs IN LIEU OF PROSECUTION. The responsible party should simply be told that evidence indicates he caused the fire in violation of the State law, and asked whether he wishes to pay the suppression costs. When such costs are paid to a Warden he should obtain them in the form of a check, bank draft or postal or express money order drawn payable to the N. C. Department of Conservation and Development, which he will then forward to the County Warden and on to the District Forester. No other method of payment is desired. DO NOT ACCEPT CASH.

If on the other hand, it is decided that the fire was of incendiary origin, or maliciously set, or that it spread through carelessness on the part of the responsible party and such party made no effort to prevent its spread and did not assist in extinguishing it, or if for any other reason it is considered best by the Warden in charge to prosecute, immediate steps should be taken to bring the guilty party before a court.

As a general rule, the County Warden will handle prosecution cases, and will also assist the District Wardens in the collection of suppression costs.

Conducting Prosecutions.—When a prosecution is decided upon the responsible party should first be

asked if he is willing to accompany the Warden to the nearest justice of the peace and avoid the cost of issuing a warrant. If he is willing to thus submit he should be taken to the justice of the peace and the trial proceeded with at once.

If he refuses to accompany the Warden a warrant should be sworn out for his arrest, *entering in the complaint the section* of the State forest fire law under which he is to be prosecuted, and this warrant served by the proper officer. If witnesses are to be used and it is felt they will not appear voluntarily, subpoenas should be issued in the regular manner.

In event the defendant pleads "not guilty," usually the Warden conducting the prosecution will be asked to testify for the State, and his evidence should consist of the facts gathered by him while making his investigation.

Payment of Reward.—Under section 4309, Consolidated Statutes, as amended 1925, any person furnishing the State evidence sufficient for the conviction of a violation of section 4309 shall receive the sum of \$50.00, *to be taxed as a part of the court costs*. This section of the law is clear. The reward is to be taxed and collected by the court *as a part of the costs* and paid only by the court to the informant.

No Warden in the State Forest Service is entitled to claim or accept this or any other reward in a forest fire case, as the courts have held that he is an employee of the State.

When a Case is Lost.—When a decision is rendered in favor of the defendant the court cares for all costs connected with the case. The Warden's wages are paid him by the Forest Service in the regular manner, regardless of the outcome of a case.

Receiving Funds.—*Under no circumstances* should a Warden accept any money as fines or costs from a guilty party, or pay out any rewards in connection with a prosecution.

Employing an Attorney.—Under no circumstances shall a Warden employ an attorney or other legal counsel whose compensation is to be paid by the State. The regularly elected District Solicitor is the State's legal representative, and advice on law enforcement cases should be secured from him.

Closing a Case.—Form 22—Report on Forest Fire Law Prosecution—must be filled out in full for each case prosecuted just *as soon as action* has been taken, and forwarded to the District Forester. When a case is appealed a second report must be made up, giving final disposition.

Forest Fire Laws.—Special printed pamphlets, containing such extracts of the North Carolina forest fire laws as will be used by the Wardens, are furnished the Wardens for their own use and for distribution where desired. Copies of these laws should be carried by all Wardens as guides in conducting law enforcement work and for handing to the general public where desired.

SUPPLY OF FORMS

A small supply of all necessary forms should always be kept on hand and can be secured from the County Warden.

Stamps for official use will not be purchased by Wardens. The District Forester will furnish each County Warden with stamped envelopes for this purpose.

Sample forms are shown on the next several pages.

STATE OF NORTH CAROLINA
Department of Conservation and Development
Division of Forestry
RALEIGH, N. C.

Fire No. _____
(Use for Work Day)

FIRE REPORT
REPORT ONE FIRE ONLY ON EACH FORM

1. Location: Limestone Township or District Burnswick County
Describe location: Near head of Thompsons Creek
(Give road names, township, creek, or other landmarks)

2. Who saw the fire: G. N. Robinson, Raleigh, N.C. and James Heins, Southport, N.C.
(Give names and addresses)

3. Cause of fire. (Investigate fully and determine cause—do not guess)

If cause is probably as stated and give your opinion:

Corn Hunters (found camp-fire)

4. State size of fire when reached 3 acres

(If a retained fire, County Warden must fill out retained Report Form 4 which must accompany this report.)

5. Give name and address of person or company responsible for fire

John Doe and James Black, Yorktown, N.C.

Is evidence you found sufficient to prosecute responsible party Yes

6. Who reported fire to you Bellina Powerman Date Nov. 3 Hour 6 A.M.

7. Fire Time:

a. When do you think the fire started

b. When was the fire first seen

c. When was the fire reported to a Warden

d. When did actual fire fighting work start

e. When was the fire under control and main crew left off

f. When was fire completely out and patrol ended

A.M.	P.M.	Date
	11	Nov. 3, 1931
11:45		Nov. 3
6		"
6:30		"
10		"
12 noon		"

8. Land Burned Over:

Merchantable timber land only

Second-growth land—not merchantable

Open land—not harvested

Total acres burned

4 Acres in this fire were previously burned in

1931
(Once or more)

No. Acres	Second-Growth	Open	All Other	Long Leaf	Second
3					3
1				1	
4					

9. Estimated Damage to Property:

To merchantable timber \$ 9.00

To young growth \$ 4.00

To forest products (cut logs, softwood, bark, leather) \$ _____

To improvements (buildings, fences, etc.) (1 hunting cabin) \$ 25.00

To other material (grain, houses, etc.) \$ _____

Total damage \$ 38.00

Was the fire light, moderate, or severe moderate

(IF FEEL)

STATE OF NORTH CAROLINA
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
DIVISION OF FORESTRY
RALEIGH, N. C.

FIRE TIME REPORT

NAME John Jones
POSTOFFICE Fayetteville, N.C., Route 3
Name of Fire Green Swamp
Month October, 1936

DATE	BEGAN WORK HOUR	QUIT WORK HOUR	BEGAN WORK HOUR	QUIT WORK HOUR	HOURS DURING DAY
<u>Oct. 3</u>	<u>8 A</u> _M	<u>3 P</u> _M	<u>8 P</u> _M	<u>11:30 P</u> _M	<u>10 1/2</u>
<u>Oct. 4</u>	<u>10 A</u> _M	<u>4 P</u> _M			<u>6</u>
	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	
	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	
	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>	
Total hours worked					<u>16 1/2</u>
Rate of pay per hour					<u>10 cents</u>
Rate per day					
TOTAL AMOUNT DUE					<u>1.65</u>

I certify that the above time as itemized is satisfactory.

Signature

John Jones
(Fire Fighter)

Forest Warden

T. L. Johnson
(Warden in charge sign here)

(See other side for instructions)

STATE OF NORTH CAROLINA
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
DIVISION OF FORESTRY
RALEIGH, N. C.

SPECIAL REPORT—RAILROAD FIRE

1. What railroad and the line? North Carolina Central (Greenville - Boston Division)
2. Where did the fire start in reference to the nearest village or R. R. station? 300 yards S. of mile post 50.
3. On what side of the track did the fire start? East
(East, West, South or West)
4. From what direction was the wind blowing when the train passed? Southwest
(East, West, South or West)
5. How far from the track did the fire start? 30 feet
6. What was the strength of the wind when the fire started? High wind
7. What time did the fire start? about 3:00 P.M.
8. What time was the fire discovered? 3:10 P.M.
9. What was the area burned when the fire was discovered? 1/2 acre
10. What time did the train pass? 2:55 P.M.
11. What direction was train travel? North
(East, West, South or West)
12. Was it freight or passenger? Freight
(Freight, Pass, South or West)
13. What was the number of the train or of the locomotive? Train # 62 from Greenville
14. Who discovered the fire? H. Sweeney, South Boston, N.C.
15. Give name and official position of R. R. employee who was notified or saw Grace Henderson,
Union Foreman at cuts Boston
16. Give names of R. R. men on fire. Gen. Hender, in and his crew of 4 men
17. Give names and addresses of witnesses with the facts they can give:
H. Sweeney watched train pass the above point.
It is in a yard and locomotive was throwing sparks.
Sweeney was driving his team toward the railhead and
new fire start up about 16 minutes behind the train.
18. Remarks: Mr. Sweeney's signed statement of the
above facts is attached to this report.
- Date of fire. Oct. 14 1926
- Date of this report. Oct. 15 1926

Signed T. L. Williams
Forest Ranger, Raleigh
Approved J. H. Williams
Chief Ranger

On the back of this report, give a diagram showing where the fire started in relation to the railroad track.

ANSWERING THE WOODS BURNER

There are many persons who are either in favor of woods burning, or else see no harm in it. They can advance what they believe to be valid reasons for this attitude. Prevention work must reach these persons through direct personal contact. Every Forest Officer, new or old, must have at his command concrete arguments to effectively refute such reasons.

The following is a check list which will serve to keep these arguments fresh in the minds of forest officers:

A.—Woods burning is advocated by some as a means to improve the range. For the following reasons it does *not* improve range:

(1) It kills the better species of grass.

(2) It is not a fact that burning the range increases forage. On unburned areas, new shoots are intermingled with the old and therefore are not discernible. Stock will do better if their early spring food consists of both new and old growths, because the contents of the new grass is mostly water, lacks fattening qualities and develops "scours." Accordingly cattle weaken and a higher death rate results.

(3) The short stubble left after a burn causes cattle and sheep to have sore mouths.

(4) Burning kills leguminous plants, pea vine, the wild oat, begger lice and the best of the forage plants.

(5) Hog ranges are greatly depleted through loss of mast and hogs running on burned areas are sub-

ject to disease of the lungs by inhaling fine ashes.

(6) Burning increases the stand of briars, which injure the quantity and quality of the wool crop.

(7) Burning brings in inferior and worthless species of brush.

(8) Ashes cause sheep itch.

B.—Woods burning reduces loss by distribution of ticks, bean beetles, and boll weevils.

(1) Ticks are more numerous in open, burned woods, exposed to the sun than in virgin forests. (Dipping is the only method known to control ticks.)

(2) The bean beetle hibernates in uncultivated parts of the field, in over-grown fence corners, and in small crevices in buildings, not necessarily in the woods. In fact, by far, the larger percentage hibernates near cultivated country. Woods-burning could, at best, reach but a small percentage of the insects and the damage done would many times offset any small imaginary advantage.

(3) The boll weevil also hibernates near the cotton fields and not to any great extent in the woods. The worst known ravages by this insect are in the Texas cotton fields where there are but few remaining forests.

The quail, or bob white, is the greatest natural enemy of the boll weevil. Woods burning destroys the nests and young of this natural enemy and gives the boll weevil ever greater advantages.

C.—By some misguided and misinformed sportsmen it is intimated that woods burning improves

hunting. It will be of some effect to inform them as follows:

(1) Burning destroys the nests, eggs and young of game birds. Fires occur at their worst intensity just when the ground nesting birds are nesting.

(2) Burning destroys the natural cover for deer and other larger animals. These animals will not stay in a burned area.

(3) It is impossible to track an animal in a burned area, and dogs cannot follow the trail.

(4) Fire destroys the food for game and birds.

(5) The resultant stunted growth which follows a fire makes trails through the woods difficult and dangerous and makes bird hunting almost an impossibility.

D.—There are many people who have an indifferent attitude toward forest fires, a condition resulting from lack of information and failure to understand the principal damages involved.

This condition can be largely offset by stressing the following facts:

(1) Any fire damages mature timber to the extent that both quality and quantity are reduced.

(2) Young timber is destroyed outright, thereby reducing future supply of timber.

(3) Forest fires are a most fertile cause of local timber shortage, resulting in higher timber prices and high freight charges.

(4) Fires destroy the natural ground cover which retains moisture and cause unequal run-off. This

results in freshets and floods during the rainy season and dried stream beds during the summer. Frequently farm land is damaged by the floods.

(5) Fires impoverish the soil by destroying the leaf cover which is the natural fertilizer.

(6) Fires destroy the attractiveness of the forest, and thus we lose recreational use.

(7) Sediment and ashes from burned areas kill fish.

(8) Valuable herbs, roots and berries are destroyed by fire.

(9) Fire reduces the vitality of trees and scars them, making them liable to insect and disease attack.

(10) Fire destroys great quantities of fuel wood.

(11) Charred wood is not accepted as poles, ties, or pulpwood.

(12) Fire reduces revenue to a county and state by reducing taxable wealth.

(13) Fire reduces revenue of a community by loss of employment in woods work.

(14) Forest fires destroy fences, domestic stock, buildings and often human lives.

(15) It is recognized that where fire is kept out of the woods, there is a period of years when the risk is somewhat increased; but this is confined to a period of from five to ten years, when the risk again decreases and reaches its minimum in old mature stands.

GLOSSARY

A list of some of the terms used in Fire Control Work by the North Carolina Forest Service:

Alidade—A simple sighting instrument used by a lookout towerman for locating a fire on his map.

Authorized (legal) fire—A controlled burning under proper authority.

Backfire—A fire purposely set by fire fighters inside a constructed line or natural fire-break to increase the width of that line and help control an approaching blaze.

Blanket Smoke—Smoke that is hanging low over a considerable area with comparatively little movement.

Broadcast burning—Intentional firing of the woods for the purpose of burning litter and slash. Generally refers to logging operation slash that has not been piled or otherwise handled preparatory to burning.

Brush (or debris) burning—The intentional burning of brush, weeds, debris or other undesirable material. Generally refers to debris piled by hand or to small areas of brush such as new-grounds, gardens or ditch banks.

Cap—A layer of earth, sand or other non-inflammable material placed on top of a stump or felled log to prevent it from throwing sparks or being ignited by sparks during a fire.

Cate Face—A partially healed fire wound on the trunk of a tree.

Crown Fire—A fire burning in the tree tops. Such fires are rare in North Carolina.

Detection Time—The interval of time between the starting of a fire and the first discovery of it.

Dew Point—The temperature at which dew begins to form. This varies with the humidity of the atmosphere.

- Drift Smoke*—Smoke that has been carried a considerable distance from its source by the wind.
- Fall Fire*—A fire occurring during the Fall of the year.
- False Alarm*—A smoke which is investigated by a Warden or a fire crew and found to be a legal fire under control.
- False Smoke*—Anything which resembles smoke but is not, such as haze, fog, mist, etc.
- Firebreaks*—A strip or space containing no combustible material. Firebreaks are of two kinds—natural (stream, rock-cliff, etc.), and artificial (road, plowed line, etc.).
- Fire Control*—All activities having to do with preventing and suppressing forest fires.
- Fire Edge*—The burning edge of a fire.
- Fire Finder*—An instrument often used in lookout towers or houses to accurately locate the position of a fire. Much more accurate than a simple alidade.
- Fire Hazard*—The relative danger of fire in a given forest area. Also used to designate some particularly dangerous spot or area, such as a large pile of dry brush near a highway, or a heavy growth of broom-sedge near a saw-mill.
- Fire Line*—The line constructed by a fire fighting crew in bringing a fire under control.
- Fire Plan*—A detailed plan in writing for the protection of a forest area from fire.
- Fire Risk*—An instrumentality or a condition which is likely to cause fires and must, therefore, be watched; such as a sawmill, a logging railroad or a lightning storm.
- Flank*—The side of a fire.
- Forest Officer*—A regularly appointed member of the State Forest Service. Does not include members of pre-arranged Fire Crews or Firemen.
- Front*—That part of a fire that is extending most rapidly.
- Grass Fire*—A fire confined chiefly to the grass cover.

Ground Fire—A fire confined to the material on the forest floor.

Head—The front of a fire.

Humidity—The presence of moisture in the air in the form of vapor. Humid air represents poor burning conditions; dry air represents dangerous burning conditions.

Incendiary—A person who deliberately and/or maliciously sets a fire with no intention of keeping it under control.

Light Burning—An intentional and authorized burning of the litter in the forest with a view to preventing a dangerous accumulation of inflammable material. Such burning is done when weather conditions are not hazardous.

Lookoutman (Towerman)—A man employed at a tower or lookout point to watch for and report fires occurring within a definite territory.

Lookout Tower—A tower built for the detection of forest fires.

Mineral Soil—Soil which contains no inflammable vegetable matter.

Mopping-up—The process of making a fire-line safe after the control of a fire. Involves felling of dangerous snags, deadening of burning stumps and logs, etc.

Patrol—(1) Refers to travel during periods of fire danger in order to discover fires that may occur. (2) Refers to travel along a fire line just before, during, or just after the mop-up work.

Primary Lookout—A lookout point or tower covering a large area for fire detection purposes and maintained continuously during fire season.

Reburn—Additional burning of the same area during the same fire season.

Relative Humidity—The ratio of the amount of vapor (moisture) in the air as compared with the greatest amount the air can possibly hold at the given temperature.

- Secondary Lookout*—A lookout point or tower covering a comparatively small area and maintained periodically as an aid to the primary lookouts when detection conditions are very poor (hazy, smoky, etc.).
- Slash*—The debris left on the ground as a result of lumbering or wood-cutting.
- Spark Arrester*—A device for preventing live sparks from leaving a smoke-stack or exhaust pipe.
- Spark Thrower*—A piece of burning forest material, particularly a snag or high stump, from which sparks may be blown a considerable distance by the wind.
- Spot Fire*—A small forest fire less than one-quarter acre in size. Generally used to describe a small fire set ahead of the main fire by sparks or burning leaves or chips blown from the main fire.
- Spring Fire*—A fire occurring in the spring of the year.
- Summer Fire*—A fire occurring in the summer.
- Surface Fire*—A fire confined chiefly to surface material.
- Unauthorized (illegal) Fire*—A forest, grass-land, marsh or brush fire that is not a controlled burning under the State Fire Laws.
- Underground Fire*—A fire that, because of drought conditions, burns the vegetative matter or peat beneath the surface of the soil.
- Visibility*—The relative ease with which a fire can be seen through the atmosphere. It depends upon smoke, haze, fog or dust in the air and, of course, upon the degree of daylight or darkness.
- Volunteer*—A person who assists in fire fighting without pay.

