

Large Scale Prescribed Burning

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BEFORE discussing some of the aspects of large scale prescribed burning here in the Southeast, where we do a lot of it, it occurs to me that I should give some dimensions to what we are calling "large scale" prescribed burning. For example, last winter on the National Forests in the Southern Region the Forest Service burned 316,658 acres. Of the 1,075,000 acres of National Forest land in Florida, 508,000 acres are "burnable," that is burnable by prescribed fire. The rest is in swamps, titi bays and hardwood bottoms, or in sand pine type, which is highly flammable, but not burnable. Part of the burnable area is in longleaf pine-scrub oak type but most of it is in longleaf-slash pine-palmetto-gallberry "flatwoods." Of the 508,000 acres of burnable land we burn about 83,000 acres a year.

This area of prescribed burning is located on three separate National Forests—Ocala, Osceola, and Apalachicola, located here, near Tallahassee, near Lake City, and east of Ocala in the middle of the peninsula. These three National Forests are organized into six Ranger Districts. This afternoon we are going to visit some of our prescribed burned areas on the Apalachicola National Forest, close to Tallahassee. The Apalachicola has 286,000 acres of burnable land out of a total of 556,000.

The average size of prescribed burning blocks here in Florida is about 1100 acres, so 83,000 acres represents about 75 separate blocks

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to be selected, planned and burned. Burning 85,000 acres last year involved 725 miles of fire line to plow and fire. All of the burning must be done within the three months of December, January and February. The cost per acre for the past few years has been about 38 cents. The doing of a lot of prescribed burning has problems of its own, so our subject now is not why we burn but how we do it.

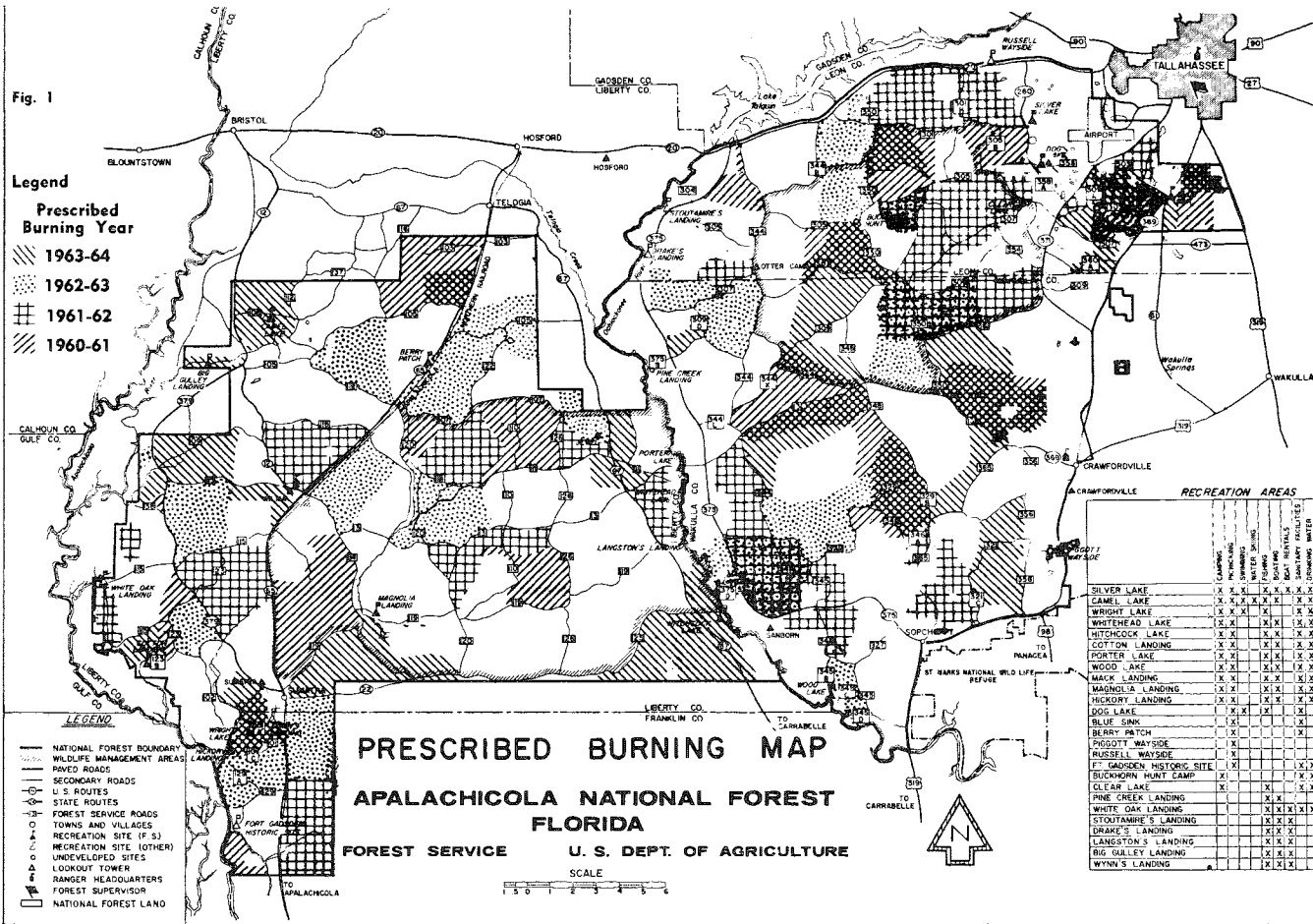
The work of prescribed burning can be usefully divided into planning, plowing, and burning, and each of these elements costs about one-third of the total cost. What we are concerned with first here is planning. For our purpose, I think it helpful to divide planning into pattern planning and block planning and to take up pattern planning first.

Here are maps of the Apalachicola National Forest showing in colors the blocks prescribed burned on the three ranger districts in the past four years (Fig. 1). You will note that the burning blocks are distributed throughout each district each year.

This is how the pattern is planned or formed. The cutting budget of the timber management plan lists the compartments to be cut during the current three-year period. The District Forest Ranger has latitude to select from the budget of three years which areas to include in the annual sales plan and he does. This is done by his making a compartment prescription for the areas to be considered by going over the whole area on foot, taking samples. In the prescription he prescribes the silvicultural treatment for each stand in the compartment. It is a standard practice here to reduce the fuel on a timber sale area by prescribed burning before marking and before adding the fuel from the tops of felled trees. So he usually prescribes a fuel reduction burn for the stands to be cut. He may also prescribe fire for brownspot control, seed bed preparation, understory hardwood control or for wildlife habitat improvement.

In the selection of compartments to be cut, he distributes them to various parts of the district on the basis of silvicultural need, wet logging vs dry logging, kind of product—sawtimber or pulpwood, or kind of cutting—regeneration or intermediate. Having done so, he has a partial pattern of prescribed burning blocks formed a year or more in advance.

The interval between intermediate cuttings in immature stands is about ten years. If prescribed burning areas were limited to those



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made in advance of timber sales, the area burned would be about one-tenth of the whole burnable area. After the District Forest Ranger has made a pattern based on the proposed sales, it becomes apparent that there are large continuous areas of "rough" three to five years old, or more, which will not be broken up by prescribed burns on timber sales. One of the principles of prescribed burning for fuel reduction is the formation of a patch work pattern of blocks in which fuel has been removed so that large continuous areas of heavy rough in which wildfire control is difficult do not exist. Seeing these areas on his prescribed burning map, the Ranger selects blocks for fuel reduction burning which will fit into the pattern of timber sales and add to the pattern of breaking up large areas of heavy fuel accumulations.

Let us take up now the second part of prescribed burning planning—Block Planning. The forester making the compartment prescription has available to him a 2 inch to the mile compartment map showing individual stands of timber. He has also the aerial photos from which the map was made. Aerial photos are an essential tool in planning prescribed burning and in executing it. In his compartment prescription the forester has ordered the treatment each stand is to receive including prescribed fire. In his prescription, he also states the kind of fire to be used—head, back, flank, strip, checkerboard—depending on the factors of overstory, understory, fuel and purpose of burning. He also notes and calls for the exclusion of fire where needed. A block plan for an area not in timber sale is made in the same manner as the compartment prescription—by walking— but with attention directed mostly to burning rather than cutting.

The block plan consists of a 2 inch scale map and a one-page descriptive form on which are recorded all the information needed for a supervisory reviewer and for the technician who may do the actual burning. This information includes the location of plow lines, natural barriers, excluded areas, sequence of line firing, kind of weather desired, wind direction preferred, and other notes for those doing the burning. For review or inspection the form and map show stands, age, density, species, understory, purpose of burning and similar items. Block plans are approved by the Forest Supervisor or by an Assistant Supervisor.

Most of our prescribed burning is fuel reduction by backing fires.

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Under the usual conditions a fire will back one chain or a chain and a half an hour. It would take a single line of fire 50 to 80 hours to back a mile, even if the wind held steady that long. Therefore, a basic principle of block planning is to provide a series of lines of fire all burning at the same time, so that a whole block is burned out in one burning day. This means that the lines of fire must be about 10 chains apart. To keep the parallel lines of fire from running instead of backing, they are held by the seven foot plow lines. It is the use of interior plow lines which makes modern prescribed burning possible, and it was the tractor-plow which made line plowing possible. Without plow lines there is little control to controlled burning, and without plow lines our practice today would be no better than the wanton woods burning of a generation ago.

Here is an actual block plan from the Osceola National Forest for a fuel reduction burn by backing fire into a cold, steady northerly wind, using cross lines 10 chains apart. On account of privately owned land, swamps or bays, roads, areas which should not be burned, and areas which should have flank or head fire instead of back fire, the planning of the burning on large blocks is far removed from simple setting the woods on fire.

We have been doing prescribed burning on these Forests since 1942, and so it follows that we have burned some blocks two, three or four times in the last twenty years. We have found that, if the first block plan was well made and the prescribed burn successfully executed, the subsequent block plans will be so similar that the plow lines will be in the same places. Those who are familiar with tractor-plow lines will realize that it is impossible to put a new one on top of an old one. It is necessary to put it along side and this is undesirable. While in South Carolina, I devised and used what we call permanent plow lines. They are put in this way. If a burn precedes a timber sale and the plow lines are on the right locations, the merchantable timber along both sides of the plow line edge is marked to be cut so as to give 10 feet of space for the plow line. An additional ten feet is marked for cutting alongside the plow line to provide a "jeep road." The purchaser of the timber cuts these trees as part of the sale and pays for them. The stumps are cut so low as to make no obstacle to truck travel. No money is spent in making these lines except the plowing, which had to be done anyway, and the cost of

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marking. When the block is burned again five or six years later the old lines are replowed with a "maintainer" which can be used on old plow lines. Although a number of models have been devised and tried, we are only now getting a satisfactory maintainer, and it is not yet in operational use. Yet, some permanent plow lines have been put in, and they may become a part of large scale prescribed burning practice.

Plowing and burning may be discussed together although plowing precedes burning by days or weeks. If plowing is done too far in advance of burning, needle fall will cover the plow lines and make them ineffective. On the other hand, when good burning days come—which is seldom—it may be desirable to burn two or three blocks on the same day, and they should be ready to burn. Our swamps and bays add a complication to plowing and burning. If the bays are wet, no plowing along the edge is necessary; if they are dry, it is. This may not be determinable until days before burning.

The tractor plows used in prescribed burning are those commonly used throughout the South for fire suppression. The plow is a two-disc with coulter and middle-buster, mounted on rubber tired wheels. Plow depth can be controlled by an hydraulic cylinder. Discs are 28 inch or 30 inch, and the unit weighs about a ton. It is pulled by a crawler tractor of Caterpillar D-4 or International TD-9 class. Tractors are equipped with wide track shoes and brush guards to protect the operator. Tractor and plow are hauled on truck transports. Both tractors and transports are equipped with fire control radios. It is customary to have a tractor plow standing by at a prescribed burning block in case of breakovers. If several blocks are being burned, the unit may be placed to be available to all blocks.

Without attempting at this time to go into prescribed burning weather and weather forecasting for prescribed burning, let me say only, that ideally we want to burn on a Class 3 day with steady cold northerly winds of 3 to 8 knots two or three days after a rain of one-half inch or more. Such ideal days seldom occur so District Forest Rangers learn to make the best of what days they get. Even though they are not ideal, they are usable. During the past burning season on the three Ranger Districts of Apalachicola National Forest only 15 to 20 suitable days occurred. Burning was done on 13 to 15 of these days. In that time 52,000 acres were burned. Here we have, of course,

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the advantage of our decentralized organization. Each of the three District Forest Rangers is authorized to act on his own in this work. It must be kept in mind that during these three months, the same District Forest Rangers had to carry on the marking and measuring of timber for sale, the planting of 2,270 acres, fire fighting and road maintenance with the same crew, while thousands of hunters were camped in our woods. All of this work requires planning to accomplish it, but all plans may be changed on good burning days when all hands are used on prescribed burning. Here is an example of a good day's burning from one of the Apalachicola rangers. On one day seven men fired 35 miles of line to burn three blocks totalling 2,500 acres between 8:30 in the morning and 4:30 in the afternoon.

Another essential tool in prescribed burning is the drip torch. This is a gallon container with a tube, wick and handle by which fuel and fire can be dripped or dropped along a plow line as fast as a man can walk. The tube has a safety loop to prevent ignition of fuel in the tank and a valve to relieve the vacuum. The fuel is a mixture of gasoline and diesel oil. Without the dependable drip torch it would be impossible for a few men to fire as many miles of line as is necessary to get a whole block burning at the same time.

Prescribed burning is not particularly dangerous work but we wear the safety helmets, steel toed boots and clothing customary in fire suppression. Training sessions are held for all hands before prescribed burning season starts. The plans for each day's work are gone over with the crew to be sure that all understand what is to be done, by whom, when and where. Successful prescribed burning, like fire suppression, requires a high degree of training and discipline. Prescribed burning block plans are made by professional foresters. Burning is often carried out by forestry aids or forestry technicians who have acquired, during years of service, great skill in burning and extremely valuable local experience. Young foresters are assigned to them for training in burning.

The block plan form contains a portion on which is recorded the actual burning record. This includes wind velocity and direction, temperature, time of burning, number of men and machines used, and remarks on the kind of results obtained. It is standard practice to have a forester or technician check the lines on each block the morning after it was burned to ascertain the possibilities of break over to

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areas where burning is not wanted. If mopping-up is needed a crew is called to the place.

In summary, in large scale prescribed burning we are talking about burning 83,000 acres a year of 508,000 burnable acres in about 75 blocks on six ranger districts on three National Forests here in Florida. Prescribed burning consists of planning, plowing, and burning. Planning consists of two parts, pattern planning and block planning. Pattern planning consists of compartment prescriptions for resource management supplemented by block selections for fuel reduction to form a patchwork pattern of areas of reduced fuel. Block planning is the prescription of the purpose of burning and the kind of burning to be used and the measures to be taken to control or exclude fire. Cross lines made with tractor plows are essential to controlling fire and are a distinguishing mark between modern prescribed burning and old-time woods burning. Repeated burning of blocks has led to the development of permanent plow lines. Plowing and burning must be timed to take advantage of good burning days but much other regular forest work must be carried on at the same time. The tractor plow, the drip torch and aerial photos are essential to successful prescribed burning but of greatest importance is a corps of well trained men who have acquired local experience in large scale prescribed burning.