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Plans for Studies of Aspen Management on the San Juan National Forest, a Prospectus

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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Dale Bartos

San Juan National Forest

REPLY TO: 2210 Administrative Range Studies November 23, 1970

SUBJECT: Aspen Management (Your ref. 10/5)

TO: Regional Forester

Attached is a copy of the aspen study plan now in use on the San Juan. To date we have thinned with a chopper in strips and have hand thinned 50 acres on 5 ten-acre plots.

R. K. BLACKER
Forest Supervisor

Enclosure

November 25, 1968

PLANS FOR STUDIES OF ASPEN MANAGEMENT ON THE SAN JUAN NATIONAL FOREST, A PROSPECTUS

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Plans for Studies of Aspen Management on the San Juan National Forest, A Prospectus

This prospectus for studies of aspen management on the San Juan National Forest is based on instructions contained in Director Price's memorandum of October 24, 1968 and Assistant Director Hayes' memorandum of October 1, 1968. Guidelines specified in these memoranda include the following:

1. The research team (see title page) will prepare a prospectus of studies. Detailed study plans will be prepared later.

2. The question of whether or not aspen should be thinned will be emphasized.

3. Studies suggested should be those that can be carried out primarily by the San Juan National Forest with Station participation to the extent necessary to assure reliable and conclusive results.

1. INTRODUCTION

The October 1, 1968 memorandum by Hayes, a brief literature review, and a visit to aspen stands on the Mancos District provided information on the current status of aspen stands and their management. Facts considered in developing the proposed program of research include the following:

1. Aspen is a resource worthy of further examination and analysis. There are more than 50,000 acres with site quality high enough to indicate a potential for management. Areas included in this acreage are benches and other topographic features with little slope. They have deep soils and are readily accessible. Markets for aspen are increasing. One recent development is the expansion into production of lumber panels. The increased cut is being used for relatively high-value products rather than for low value products such as pulpwood. This is indicated by recent large advances in stumpage prices.

2. Results of economic studies made in the Lake States are of limited value in selecting management practices for the San Juan. Lake States studies are based on the production of aspen pulpwood. San Juan markets are for much higher value uses such as for lumber panels and match bolts.

3. Natural thinning of aspen on the San Juan is less than would be expected from results obtained in other areas. U.S.D.A.

Bulletin 471, "Effect of Grazing Upon Aspen Reproduction" by Arthur W. Sampson provides an example of this from Utah. Sampson reported high mortality rates in sprout stands following clear-cutting. An ungrazed stand with 82,000 stems per acre the first year after cutting was reduced to 2,000 stems per acre in 4 years. Such high mortality rates apparently do not occur on the San Juan. Stands on the Mancos District have been harvested for 20 years. It is not difficult to find dense stands in cutovers of any age. Many stands averaging 2 to 3 inches in diameter and 15 to 25 feet high are so dense cattle cannot enter them.

4. Dense aspen stands limit access by livestock and may lengthen rotations for high-value wood products. It is possible that some type of thinning will overcome these problems. Two experimental thinnings have been made in sprout stands on the San Juan. Reserve densities look good for wood volume production and tree quality does not appear to have been reduced. Forage was definitely made available to livestock and there may have been increases in forage production. One stand was thinned to 6 x 6 feet spacing (about 1,200 trees per acre) 10 years ago. The second stand was thinned to a spacing of 6 x 8 feet (about 900 trees per acre) 3 years ago. The first density may be the better for wood production. In both areas, resprouting after thinning was so light as to be an unimportant factor in future management.

5. Aspen stands on the San Juan are virtually continuous; open grass parks are relatively rare. Aspen is therefore a grazing type and livestock use is heavier than in areas where grass parks are frequent. Grasses and sedges, with lesser amounts of forbs and shrubs, are found under aspen. Sketchy records from the San Juan indicate that forage utilization in aspen stands accessible to livestock is about 30 percent. Greatest benefit of thinning to the forage resource could come from increased accessibility rather than from increased amount of forage produced.

6. Aspen stands are summer range for deer and elk but there are no indications of heavy game population in the major aspen management areas of the Forest at present. It therefore appears that game use is not now an important factor in aspen management on the San Juan.

7. Existing information on the past utilization of aspen stands is based largely on the production of bolts for match splints. With current demand for aspen lumber panels, large areas will be cut to less strict specifications as to minimum diameter and tree quality. Less standing and down material will remain after logging than is present where match bolts are produced.

8. There is no information available concerning amount of defect and its relationship to tree size or age. This will affect

the economic analysis of management alternatives since the effect of defect and degrade on the potential mix of wood products will be important. Information on lumber recovery by grades will also be needed for economic analyses. Existing uses for aspen have a wide range in allowable defects and in dollar amounts available for stumpage price.

2. STUDY POSSIBILITIES

There are two important aspects to the general problem of aspen management in relation to thinning. One group of problems is concerned with what to do with the approximately 12,000 acres of dense stands that have developed after past cutting. A second, and equally important, aspect is what to do to prevent perpetuation or increase of the area of dense stands with future cutting. The two sections that follow describe: (1) studies to be made in existing dense stands (Section 3) and (2) studies of how to avoid dense aspen stands in the future (Section 4).

A much larger problem concerns the economic evaluation of management practices. This involves large amounts of time and information, so is discussed separately in Section 5.

Anyone can think of things that could be done that are not given in Sections 3, 4, and 5. The committee does not intend to produce such a list. Rather, what follows is intended to improve field practices as quickly as possible and to provide a base for planning future investigations.

3. STUDIES IN EXISTING DENSE STANDS

Several methods of thinning dense, young stands are worthy of test. Four are suggested for the near future. They are listed below in order of priority and with a brief description of each. General details of plot installation and data gathering are given after the listing.

Studies to be made in existing stands are as follows:

Study 1: Uniform thinning by Brushmaster or similar power tool. Spacing and density of the reserve stand should vary with tree age or size, as follows:

Average stand d.b.h., inches	Trees per acre	Approximate Spacing, feet
1	1200	6 x 6
2	990	6 x 7
3	840	7 x 7
4	700	8 x 8
5	600	8 x 9
6	500	9 x 9

One area to be treated should consist of even-aged sprouts 5 to 10 years old and one area should consist of even-aged sprouts 15 to 20 years old. This will provide that variation in tree age and size can be sampled.

This method will partially duplicate work already done and described in section 1. Duplication is justified by the additional information that will be produced.

Study 2: Thinning by tractor-drawn rolling chopper. Treated strips should be 6 feet wide with reserve strips 3 feet wide between them. Amount of natural thinning in the reserve strips and possibility of harmful amounts of resprouting are two of the items on which information will be obtained.

Study 3: Uniform thinning by use of silvicides. Chemical treatment is a constantly changing subject because of frequent changes in the chemicals that have approved labels and are available. The person preparing this plan should contact a person such as Thomas Johnsen (A.R.S., Flagstaff) for assistance in choice of chemicals and concentrations. At present, we visualize thinning with basal sprays that will not travel quickly across root systems to kill entire large clumps of sprouts.

Spacing of the reserve stand should be determined in the same manner as for study 1.

Study 4: Thinning through destruction of the existing stand by chaining and burning and by chaining alone. This is a study of procedures. Its economic value as a management alternative cannot be determined until valid economic analyses can be made. This study must be made after the one described in section 4 because the latter will provide information needed for this study.

Two-way chaining should flatten the sprouts for broadcast burning on that half of the treated area where burning will be used. Density of the new sprout stand will be reduced by grazing, if necessary.

General items concerning treatments and study design are as follows:

1. Treatments should be applied to units about 5 acres each so cost data will be meaningful.

2. At least two units to be treated should be selected for each study. They should be chosen so as to sample more than one average tree size. For example, sprout stands 5 to 10 and 15 to 20 years old could be used. Sale records will help locate suitable stands. Number of trees per acre and average d.b.h. before treatment must be known for each unit of each treatment.

3. If more than two treated units can be installed for a study, the additional units should sample variation in stand density and site quality. A total of 6 units per study would be desirable but this will depend on the manpower and money made available to the San Juan.

4. Each treated unit should be paired with a similar untreated area on which plots described below will also be installed.

5. At least 2 0.5-acre plots should be established in each 5-acre unit. Stand and soil must be uniform within each plot. These will be well marked and maintained for 5 years so aspen growth can be observed.

The 5-acre units must provide costs per acre of each treatment. All costs must be kept separately in man-hours and in dollars so that overhead beyond crew foreman, travel time, and other costs not directly related to cutting can be considered separately.

Measurements of the aspen on the 0.5 acre plots will consist of:

1. A count of all trees less than 4.5 feet tall by 1-foot height classes.

2. D.b.h. to 0.1 inch of all trees tall enough for measurement.

3. Height to 1 foot of sufficient trees to make a good height-diameter curve for each plot.

4. Stand age.

5. Site index.

6. Observations of changes in branching and other aspects of tree form and quality.

Measurements are needed for conditions immediately after treatment and 5 full growing seasons later. These measurements will provide information on tree mortality, resprouting, and net wood growth.

To evaluate the response of the forage to the above treatments a minimum of two types of measurements should be made. Prior to applying the treatment the amount of forage being produced should be measured (usually in mid-summer). This could probably be done best by establishing a series of temporary plots (a minimum of 10 in each treatment area) clipping the herbage to ground level and at the same time segregating by species or at least by grass, grasslike, forbs and shrubs, and placing in paper bags for future air dry weight determinations. A 9.6 sq. ft. plot is suggested. In the fall of the year near the end or after the grazing season, the amount of use by cattle should be estimated on a series of plots similar to those used to measure production. These same types of measurements should be repeated each year for a minimum of three years following treatment or until the vegetation and utilization patterns become stabilized.

4. STUDIES IN FUTURE REPRODUCTION STANDS

As mentioned previously, concentration of interest on existing dense stands will leave the more important part of the job undone. This section describes a study that should be given priority equal to that of the first two studies described in Section 3. It must be completed before study 4 of Section 3 can be concluded.

Sampson's excellent study of the effect of grazing upon aspen reproduction clearly outlines what can be expected when livestock are allowed to graze cutover aspen stands. When stands containing 40,000 sprouts per acre were heavily grazed by sheep for three years following harvest "not a single sprout remained." Grazing by cattle did relatively little damage except along trails or around concentration areas such as salt grounds and water holes. Admittedly Sampson was concerned with the possible destruction of aspen stands through grazing whereas the San Juan is concerned with reducing high sprout densities on clearcut stands of aspen. It would appear that grazing by sheep, used as a management tool, would be a satisfactory and economical method to thin sprout stands on the San Juan to desired stocking levels to promote maximum growth and development of merchantable aspen and to improve range accessibility. This approach should be tried by the San Juan. Some general guidelines for this approach might be as follows:

Assumptions:

1. Cutover areas usually average about 500 acres in size per year (statement by San Juan).

2. Vigorous sprouting of aspen occurs only during the first two years after cutting. Some minor sprouting may occur during the third year on grazed areas, but this seldom lives. (Sampson's studies).

3. Even heavy grazing by sheep on clearcut aspen areas will have minor effects on the sedge and grass understory vegetation (Sampson's studies).

Procedures:

1. Graze each area cut with sheep during first year after cutting and continue for second or third year if necessary.

2. Use small bands (500 head) obtained from adjacent sheep allotments or if necessary truck them in from wherever they are available.

3. Keep sheep on cutover areas until desired number of uninjured stems per acre have been obtained. Suggested stocking levels to be used until better information is available might be:

a. at end of 1st year - 20,000 stems/acre

b. at end of 2nd year - 10,000 stems/acre

c. at end of 3rd year - 2,500 stems/acre

(Sampson states that 2,500 stems/acre at end of 3rd year will result in 450 mature stems/acre at harvest)

4. Cutover areas may be enclosed with brush fences and sheep turned loose as suggested by San Juan, or if herded very open loose herding should be practiced.

5. Ranger and staff should make frequent spot checks to determine number of stems per acre to determine duration of grazing.

More specific procedures will be included in the detailed study plan to follow this prospectus.

5. PROSPECTS FOR ECONOMIC ANALYSIS

It will eventually be necessary to analyze aspen management on the San Juan to ensure that efficient procedures are being used to obtain the greatest possible benefits. Attempts to undertake such analyses now would be completely premature. [illegible] limits on the range within which stand densities, etc. should be studied. We do not even have adequate volume equations for aspen.

It is not too early to start thinking ahead to the time when analyses can be made. The studies already described will provide the basis for future planning.

The most efficient way of providing data on aspen growth will be by use of temporary plots and the procedures given in Research Papers RM-21 and RM-26. This will result in growth equations and yield tables for managed stands with provision for a variety of alternatives. A wide range of stand densities, site qualities, and stand ages should be sampled. A prediction period of 5 years should be used. It should not be difficult to find a variety of conditions to measure in the cutover, selectively cut, and uncut aspen stands of the San Juan.

The forage resource in all stands selected for aspen growth studies must also be evaluated. To do this herbage production by species is almost a must. The same procedures indicated in Section 3 above could be followed. Studies should be repeated for a minimum of three years or until variation in seasonal effects on growth is minimized. Greater emphasis must also be placed on adequate sampling procedures.

There is essentially no pertinent information on the quality and volume of lumber than can be recovered from aspen sawtimber stands in the Region. With growing demand for aspen lumber, it would seem that such information would be essential for Timber Management to establish cutting rotations and for establishing the necessary sanitation practices that might be required. Any marked increases in stumpage prices which are likely to follow will also require complete up-to-date information on lumber yields.

Aspen panel producers rate decay as the No. 1 defect. The characteristically high susceptibility of aspen to a number of air- and soil-born decay organisms would appear to require that any anticipated increase in the harvesting of aspen be guided by studies designed to identify good and bad practices in this regard.

A number of studies that might be undertaken to provide the necessary information as outlined above are:

(1) Determination of lumber yields, by grade, from a representative sample of aspen sawtimber stands.

(2) Identification of the major rots present in the sawtimber and what modifications might be required in harvesting practices to minimize their spread.