

INSTRUCTIONS FOR PRESCRIBED BURN VEGETATION/FUEL LOAD PLOTS
BRYCE CANYON NATIONAL PARK
1991 Field Season

As part of the on-going prescribed fire program at Bryce Canyon, Resource Management staff have developed a program to determine fire effects on vegetation and fuel loads. The following procedures should be used to set up permanent monitoring plots and collect data prior to conducting prescribed burns. Methods generally follow the procedures described in the Western Region Fire Monitoring Handbook (NPS 1990). Data should be collected during summer, when most plants are flowering, and plant cover is at its peak.

Postburn data should be collected on all plots immediately following the burn (2 weeks to 2 months after), and 1, 2, 5, and 10 years following the burn, and at 10 year intervals thereafter. Postburn data collection should follow the same methods used for preburn data collection.

In 1989 and 1990 these procedures were generally followed to set up plots and collect data in the Residential Area, Corral Meadow Edge, Paria North, East Creek Meadow Edge, and Paria South study areas. However, methods varied to some extent each year, so specific postburn data collection instructions that have been documented for each of these study areas should be followed to ensure comparability.

PLOT LOCATION

The Resource Management Specialist will provide a map showing random plot locations for each study area. A compass bearing and distance from a reference point to the starting point for each plot will also be provided.

Each plot should be located in the field using a map and compass. From the reference point, pace the appropriate distance at the given bearing to reach the starting point. From this point, proceed a random distance (0 to 20 m) along a randomly selected compass bearing (0 to 360 degrees). This is the plot origin point (plot center). If the origin point and surrounding area meet any of the rejection criteria listed below, return to the plot starting point, orient 180 degrees away from the previously selected bearing, and move 50 m to a new plot origin. If the second location meets any rejection criteria abandon the plot location and a new random location will be selected. After the plot location is determined complete the "Prescribed Fire Plot Location Data Sheet."

For meadow edge study areas plots should be oriented along the length of the meadow. For these areas, it is necessary only to get to a random starting point for each plot, and begin from there.

PLOT REJECTION CRITERIA

Each plot should be located in an area that is representative of the homogeneous community being sampled. Plots that fall in areas that are not representative should be rejected. This would include plots within 30 meters of roads or edges of the community type, and plots in drainage bottoms, other anomalous vegetation patches, or large rock outcrop or barren areas.

PLOT SET UP

When laying out the plot and collecting data be very careful not to trample vegetation in the area. Each plot consists of a 20 meter by 50 meter rectangle, divided into 4 quarters (figure 1). Plots will be permanently marked with rebar stakes (2.5 feet long; with at least 6 inches above ground) and brass identification tags. All rebar stakes should be painted bright red with heat resistant paint to aid relocation in the field. Follow the steps below to set up each plot.

Figure 1. Plot set up.

1. Mark the origin point with a reference stake. As you proceed with plot set up, all stakes should be marked with flagging tape to make them easy to see.
2. Select a random compass bearing and lay out a 50 m tape along the bearing, with the plot origin midway on the tape (25 m). If the axis of the plot runs across the slope the 0 point should be on the left as you face uphill. If the axis of the plot runs up and down the slope the 0 point should be at the high point of the slope. Mark the 0 m (0P) and 50 m (50P) points with rebar stakes. In narrow study areas, such as meadow edges, it may be impossible to randomly orient the plot. In those cases, orient plots along the axis of the study area.
3. The plot must be laid out as a true rectangle. Two people must work together in order to properly "square" plot corners.
4. From the origin (center point) extend a second tape measure out 4 m perpendicular to the center line. One person should hold the tape at that point, while the other person takes the rest of the tape back to the center line, forming a triangle following dimensions on figure 2. Pull the tape tight to find the correct tape position at the 4 m mark. Straighten the tape out and line up the 10 m point with the origin and 4 m point. The line should now be positioned correctly. Mark the 10 m point with a rebar stake. This is the midpoint of one side of the plot.

Figure 2. Positioning lines.

5. Follow the same procedure on the other side of the origin point, marking the midpoint of the other side of the plot with a rebar stake. Midpoints of side lines are referred to as P1 and P2 (P1 on side line between Q1-Q4; P2 on the side line between Q2-Q3). These points are not labeled with brass tags, but will be referenced in photo point procedures.
6. Move to the 50 m point on the original tape (center line). Follow the same procedure to install the plot end line. Before permanently marking the plot corner with rebar stake measure the side section. The corner should be 25 m from the side midpoint. If necessary adjust the corner point. Do not adjust the center lines.

7. Continue installing the three other end lines, always adjusting the new corner to correct distances. Mark each corner with a rebar stake.
8. At this point, 9 rebar stakes permanently mark the center point and perimeter of the plot. If at any point a stake location falls on a tree, stump, or downed log put the stake off to the side, and record the change on the plot location data sheet.
9. The plot consists of 4 quarters divided by the center line and midpoint line. Number plot quarters from 1 to 4, with quarter 1 (Q1) on your left when standing at the center point and facing the 50 point end, and proceeding clockwise.
10. Use brass tags to label each stake, including quarter number (Q1, Q2, Q3, Q4), plot number, plot identification code, and date of installment.

SPECIES CODES

Each species is recorded using a four letter code made up of the first two letters of the genus followed by the first two letters of the species. Where two species would have the same code following those procedures one will be altered. Species nomenclature follows that used in A Utah Flora (Welch et al. 1987).

A complete species list should be kept for each study area. As species names are changed (following Welch) species lists should be updated. In order to complete comparisons of data sets for each study area over time, all databases will also need to be updated as species names change.

COLLECTING TREE DATA

Methods for collecting data on overstory trees, pole size trees, and tree seedlings, were taken from the Western Region Fire Monitoring Handbook (National Park Service 1990). Data for overstory, poles, and seedlings will be collected on different parts of the plot, as shown in figure 3.

Figure 3. Tree data sampling areas.

Overstory Trees:

Overstory trees are defined as both living and dead trees with a diameter at breast height (dbh) greater than 15 cm.

1. Delineate the plot quarters using string between rebar stakes.
2. Record data on the Overstory Tree Data Form.
3. All overstory trees in the plot should be marked with a numbered tag. Start in Q1 and continue sequentially through Q2, Q3 and Q4. Tags should be nailed to the tree at breast height, on the side facing the plot center. Use aluminum nails. Nails should be driven in leaving the tag hanging down and several centimeters of nail exposed, allowing space for tree growth. Trees forked below breast height should be considered separate trees and tagged separately. Trees on the plot boundary line are included if their base is halfway or more inside the plot.
4. Record dbh for each tree. To minimize variation, always measure dbh immediately above the tag. For trees on a slope determine dbh while standing at the mid-slope side of the tree.

5. Record crown position according to the following definitions:

1 = Dominant:	trees with crowns extending above the general level of the crown cover
2 = Codominant:	trees with crowns forming the general level of crown cover
3 = Intermediate:	trees shorter than those in the two preceding classes, with crowns either below or extending into the crown cover formed by codominant and dominant trees
4 = Subcanopy:	trees with crowns below the general level of crown cover
6. For each tree record species, and whether the individual is alive or dead. Record snags separately.
7. Map the location of each overstory tree by tag number on the appropriate data form. Use the expanded version for each quarter if trees are numerous.
8. In the comments section on the data form, record miscellaneous information including pest infestations, fire scars, cracks or breaks, forked trees, leaning trees, or other factors related to the trees form or vigor.

Pole Sized Trees:

Pole sized trees are defined as living trees with a dbh greater than or equal to 2.5 cm (1 in), and less than or equal to 15 cm (6 in).

1. Record data on the Pole Sized Tree Data Sheets.
2. If sufficient numbers of pole sized trees exist, data on poles should be collected in Q1 only. However, it is recommended that at least 15 poles be considered. Therefore, in study areas in which pole sized trees are sparse, pole data should be collected from 2 or more quarters to obtain adequate data. The number of quarters considered should remain consistent for all plots in each study area. Therefore the number of quarters to be included must be determined in advance, based on an assessment of pole density.

3. List each individual by species and dbh. Measure and record height according to the following classes:

1 0-15cm	5 100.1-200cm	9 500.1-600	13 900.1+
2 15.1-30cm	6 200.1-300cm	10 600.1-700cm	
3 30.1-60cm	7 300.1-400cm	11 700.1-800cm	
4 60.1-100cm	8 400.1-500cm	12 800.1-900cm	

Height is measured from ground level to the highest point of growth on the tree. A bent tree can have a highest point below the growing apex. Height class can be estimated using a rod marked in 10 cm intervals.

4. Map the location of the pole size trees in the space provided on the Pole Size Tree Map data form.
5. Tag all pole sized trees for which data is collected at the base of the tree on the side facing the plot center. Continue using sequentially numbered tags where overstory trees left off. Allow room for growth as with overstory trees.

Seedlings:

Seedling trees are defined as living trees with a dbh less than 2.5 cm (1 in).

1. If sufficient numbers of seedlings exist, a 5 meter by 10 meter subplot inside Q1 should be used to record seedling data (figure 4). However, it is recommended that at least 15 seedlings be considered. Therefore, in study areas in which seedlings are sparse, seedling data should be collected from all of Q1 (or more) to obtain adequate data. The area considered should remain consistent for all plots in each study area. Therefore, the area to be included must be determined in advance, based on an assessment of seedling density.

If a subplot is determined to be adequate, use three large spikes to temporarily mark subplot corners. From the outside corner of Q1 measure 5 meters along the long side of the quarter (mark with a spike). Then, again from the outside corner measure 10 meters along the short side of the quarter to the center line (this spot is already marked with a rebar stake). Mark the last corner with a spike in the location where tapes laid out from these two corners meet. After the seedling data is collected remove the spikes.

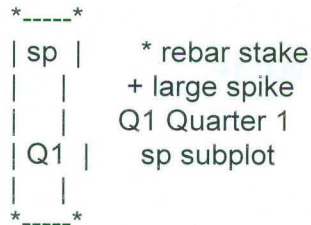


Figure 4. Subplot location.

2. Record seedling data on the Seedling Tree data sheet.
3. In the area selected record each individual by species and measure height using the following height classes:

1 0-15cm	5 100.1-200cm	9 500.1-600	13 900.1+
2 15.1-30cm	6 200.1-300cm	10 600.1-700cm	
3 30.1-60cm	7 300.1-400cm	11 700.1-800cm	
4 60.1-100cm	8 400.1-500cm	12 800.1-900cm	

Height is measured from ground level to the highest point of growth on the tree. A bent tree can have a growing apex below the highest point. Height class can be estimated using a rod marked in 10 cm intervals.

4. Map the location of seedling trees in the space provided on the Seedling Tree Data form. It is not necessary to tag Seedlings.

COLLECTING UNDERSTORY DATA

Composition of grasses, forbs and shrubs will be determined. Cover analysis follows the method described by Daubenmire (1959), while frequency analysis is done using nested quadrats described by Smith (1986). Follow procedures described below.

1. Record data on the appropriate data sheet. Each transect has a number that refers to the general area the plot is in, and to a specific plot and transect. For example, R04B is the second transect in plot 4 of the Residence area plots. There are only two transects per plot so there can only be an A or a B at the end of the number.

Record hits, frequency, and cover values for each plant species, and separately for rock, litter, wood, bare ground or any other cover type. Record two numbers in each box on the data sheet, one on top of the other (see sample data sheet). The top number is the frequency value, and the bottom number is the cover class. Record an asterisk in the box to indicate a hit.

2. Lay out a 50 meter tape along each of the 50 m sides of the plot. Start the zero end on both tapes at the 0 point (on the side of Q3 and Q4).
3. Starting at the 1 meter mark lay the quadrat centered along the length of the tape, with the smallest nested quadrat in the lower right hand corner as you face forward down the tape, as in the following diagram:

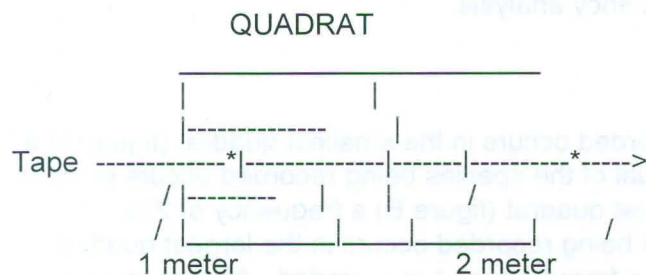


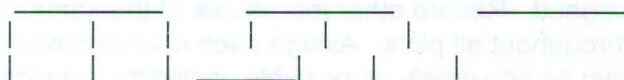
Figure 5. Quadrat placement.

4. Estimate percent cover for each cover type within the quadrat (how much area within the quadrat frame a species takes up). Rock, bare ground, wood, and litter are each potential cover types. Record plant cover by species. Include overhanging branches from small trees (up to 2 meters tall), herbs and shrubs. Plants do not have to be rooted in the quadrat to contribute to total cover.

Estimate cover using cover classes described by Daubenmire (1959):

- 1 = 0-5%
- 2 = 5-25%
- 3 = 25-50%
- 4 = 50-75%
- 5 = 75-95%
- 6 = 95-100%

5. Record the nested frequency code by species. Frequency is the rate of occurrence of individual plants rooted within the quadrat frame. Frequency is recorded using codes that correspond to different sized quadrats nested within the large quadrat as shown in the following diagram.



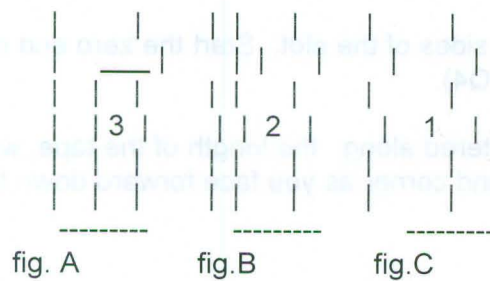


Figure 6. Frequency analysis.

If any individual of the species being recorded occurs in the smallest quadrat (figure A) a frequency of 3 is recorded; If any individual of the species being recorded occurs in the medium sized quadrat, but not the smallest quadrat (figure B) a frequency of 2 is recorded. If any individual of the species being recorded occurs in the largest quadrat, but not either of the other two (figure C), a frequency of 1 is recorded. Always record the smallest frame the plant occurs in.

It is possible for a species to have COVER but no FREQUENCY. A shrub, tree, or herb may not be rooted within the transect frame but the foliage hangs over into the quadrat and is part of the cover value.

6. Record hits by cover type. Hits are an indication of prevalence, and could provide important information if cover or frequency changes drastically over time. Record hits by placing an asterisk next to the appropriate cover type. Record a hit for any cover type touched directly by any corner of the quadrat. If the quadrat does not touch any cover type, record a hit for the cover type directly below the quadrat corner. Only 1 asterisk is recorded for each cover type with a hit, regardless of how many corners touch.
7. Continue along the tape, recording cover, frequency, and hits at each subsequent whole meter mark from 2 to 50 meters.
8. Repeat the procedure from 1 m to 50 m along the transect on the other side of the plot. At this point you should have collected data in 50 quadrats along two transects, for a total of 100 quadrats.
9. List all species encountered along or in the vicinity of each transect even if they do not appear in the quadrats. These species contribute to the species list for the area.
10. If an unknown species is encountered assign the species an unknown number (i.e. UNK#). Record each unknown as either a grass, forb, shrub, or tree on the data sheet, along with the unknown number assigned. Record other individuals of the same species using the same unknown number throughout all plots. Assign each unknown species its own number. Describe each unknown as accurately as possible, including drawings.

Collect a specimen of the unknown species outside the plot and attempt to identify it later using keys and the herbarium. Once species are identified write the species code in on each data sheet.

11. Total numbers on the data sheets and record totals on the right hand side. Count the number of times a number occurs in a particular value class for each species for frequency and cover. Double check the totals for each class to make sure that they correspond and are correct. Total hits in the last column.

The number of quadrats that frequency and cover values occur in for each species should be equal, unless there were quadrats in which the species had cover values, but no frequency values. For this reason, total each row (frequency and cover for each species) and make certain that the totals are the same. If they aren't, then check to see if there were quadrats that had no frequency but did have cover, and add that number to the frequency total. These should then be equal, or a mistake has been made.

FUEL LOAD METHODS

Fuel load samples should be collected in each vegetation plot for forest communities. It is not necessary to collect fuel load data for meadow or meadow edge study areas. Methods follow procedures outlined in the "Handbook for Inventorying Surface Fuels and Biomass in the Interior West," by James K. Brown, Rick D. Oberheu and Cameron M. Johnston (1982). Record data on the Fuel Load Inventory form.

Transect Selection

1. Install 4 fuel inventory transects originating from the plot center line at 10 m, 20 m, 30 m, and 40 m. Use a random compass bearing to determine the direction each line extends from the center line (figure 7). Record the transect start point and bearing on each Fuel Load Data Sheet and the Plot Location Data Sheet.

Figure 7. Fuel load transect locations.

2. Lay out a 50 foot tape along the random direction. This is the sampling plane. Mark the beginning and the end of the sampling plane (50 foot mark) with rebar stakes. All subplots are measured from this line, and data for downed woody material and duff depth are collected along the line.

Data Collection

Herbaceous plants and Litter:

1. Use a 6.8 foot pole to set up 4 relative estimate subplots by placing the pole on top of the tape starting at the stake (figure 8). The four subplots will be used to measure herbaceous vegetation and litter. Place the first quadrat at the end of the 6.8 foot rod. Place the second quadrat parallel to the line at the 13.6 foot mark. Place the third quadrat 6.8 feet parallel to the second one. Place the fourth 6.8 feet parallel to quadrat number 1.

Figure 8. Placement of relative estimate subplots.

2. Herbaceous plant cover includes all live and dead grasses, sedges and forbs. Dead grasses and forbs detached and fallen from their growing point should be considered litter. Some small woody plants such as kinnikinnick (*Arctostaphylos uva ursi*) should be sampled as herbs because the shrub method is inapplicable. Follow the steps described below.

Step 1. Use the 4 subplots previously set up. View all four subplots and judge which one has the greatest weight of herbaceous plant, both live and dead. Select the subplot with the greatest weight as the standard subplot. This subplot should be recorded as an 8 on the data form. Be careful to record the number in the box corresponding to the correct subplot (subplots are not labeled on the form).

Rate the amount of herbaceous plants, both live and dead, on the remaining three subplots as a percentage of that on the standard subplot using the codes established for these procedures listed below. Record the code in the box for the appropriate subplot on the data form.

Percent	Code
0-5	1
6-20	2
21-40	3
41-60	4
61-80	5
81-95	6
96-100	7

Step 2. For each individual subplot, ocularly estimate the percentage of herbaceous vegetation that is dead. Use the established percentage codes.

Step 3: Ocularly estimate, in percentage, cover of herbaceous vegetation on subplots 1 and 2 (Percentage of cover is the percentage of subplot area covered by a vertical projection of herbaceous material). Record cover using the established codes.

Step 4: Clip the herbaceous vegetation from the herb standard subplot and place in a paper bag. Label the bag with the date, stand number, and plot number.

The samples should be oven dried at 95 degrees celsius for a period of 24 hours. Record the oven-dry weights, labeled as base weights on the inventory form, to the nearest 0.01 gram. Brown paper bags work well for transporting and storing samples. Airtight containers, such as plastic sacks, may promote decay.

3. Litter is the layer of the forest floor which includes freshly fallen leaves, needles, bark flakes, cone scales, fruits, dead matted grass, and a variety of miscellaneous vegetative parts. Include cones that are more than one-half in or above the litter. If they are more than one-half below the litter, treat as duff. Omit sampling downed woody material as part of the litter because it is sampled separately. Follow steps outlined below.

Step 1. View the right half (while facing the 50 foot end of the tape) of all four subplots and judge which one has the greatest quantity of litter. Occasional probing of the litter may help in judging quantities. Be sure to examine only material qualifying as litter. Record the standard litter subplot with an 8.

Rate the quantity of litter on the remaining three subplots as a percent of that on the standard subplot. Be sure to view only the right half of each subplot. Use the established codes.

Step 2: Collect litter from the litter standard subplot (right half only) and place in a paper bag. Label the bag with the date, stand number, and plot number.

The samples should be oven dried at 95 degrees celsius for a period of 24 hours. Record the oven-dry weights, labeled as base weights on the inventory form, to the nearest 0.01 gram. Brown paper bags work well for transporting and storing samples. Airtight containers, such as plastic sacks, may promote decay.

Downed Woody Material:

Tallying downed woody material involves counting the intersections of woody pieces along a vertical sampling plane that resembles a guillotine dropped through the downed debris. This includes dead twigs, branches, stems, and boles of trees and shrubs that have fallen and lie on or above the ground. Count intercepts along the transect plane from ground level up to 6 feet above the ground. Do Not count cones, bark, needles, leaves, stems, or branches attached to standing shrubs or trees. Follow tally rules listed below.

1. Particles qualifying for tally include downed, dead, woody material (twig, stems, branches and boles) from trees and shrubs. Dead branches attached to boles of standing trees are omitted because they are not downed vegetation. Consider a particle downed when it has fallen to the ground or has been severed from its original growing point. Dead woody stems and branches still attached to standing shrubs and trees are not counted.
2. Twigs and branches lying in the litter layer and above are counted. But they are not counted when the intersection between the central axis of the particle and the sampling plane lies in the duff.
3. If the sampling plane intersects the end of a piece, tally only if the central axis is crossed. If the plane exactly intersects the central axis, tally every other such piece.
4. Do not tally any particle having a central axis that lies parallel along the sampling plane.
5. If the sampling plane intersects a curved piece more than once tally each intersection.
6. Tally wood slivers and chunks left after logging. Visually mold these pieced into cylinders for determining size class or recording diameters.
7. Tally uprooted stumps and roots not encased in dirt. For tallying, consider uprooted stumps as tree boles or individual roots, depending on where the sampling planes intersect the stumps. Do not tally undisturbed stumps.
8. For rotten logs that have fallen apart, visually construct a cylinder containing the rotten material and estimate its diameter. The cylinder will probably be smaller in diameter than the original log.
9. Be sure to look up from the ground when sampling because downed material can be tallied up to any height. A practical upper cutoff is about 6 feet.

Proceed using the following steps:

Step 1: Along a 6.8 foot section count the number of 0 to 0.25 inch and 0.25 to 1 inch particles intersected by the sampling plane. Tally each class size separately and record on the data sheet.

Step 2: Along a 13.6 foot section count the number of 1 to 3 inch particles intersected by the sampling plane. Tally on the data sheet.

Step 3: Along the entire 50 foot transect measure or estimate the diameters of all pieces 3 inches and larger at the point of intersection with the sampling plane. Record true piece diameters to nearest whole inch regardless of angle of intersection. Record sound pieces and rotten pieces separately. Consider rotten when the piece at the intersection is obviously punky or can easily be kicked apart.

Duff Depth:

Duff is the fibrous, consolidated decomposed layer on the forest floor. It does not include the freshly cast material in the litter layer. The top of the duff is where needles, leaves and other castoff vegetative material have noticeably begun to decompose. The bottom of duff is mineral soil.

Step 1. Measure depth of duff to the nearest 0.1 inch, using a ruler held vertically at 10 points along the sampling plane: 1, 5, 10, 15, 20, 25, 30, 35, 40, and 45 feet from the stake. When stumps, logs and trees occur at the point of measurement, offset 1 foot perpendicular to the right side of the sampling plane. Measure through rotten logs whose central axis is in the duff layer. Use the "Forest Index Plot Fuels Inventory Data Sheet" from the Western Region handbook to record duff depths.

Shrubs:

Include all woody shrubs except those included in the herbaceous sample. Shrubs are tallied on two 1/4 milacre subplots. To locate the subplots, lay the 6.8 foot rod perpendicular to the sampling plane with one end at the transect starting point (rebar stake). The end of the rod is the center of the 1/4 milacre plot. Repeat on the other side (figure 9).

Figure 9. Placement of 1/4 milacre subplots.

Step 1. Using a 1.86 foot rod, swing around the subplot center parallel to the ground and note the species that occur. Within each subplot, ocularly estimate percent cover of all shrubs together, both live and dead, according to the established percentage classes.

Step 2: Ocularly estimate the percentage of shrub biomass that is dead according to the established percentage classes.

Step 3: Measure the height of shrubs within each subplot from the forest floor to what appears as the average top. Record to the nearest whole inch.

Step 4: On each subplot, count the number of stems by species and the following basal

diameter classes:

0.0 to 0.2 inch (0 to 0.5cm)
0.2 to 0.4 inch (0.05 to 1.0cm)
0.4 to 0.6 inch (1.0 to 1.5cm)
0.6 to 0.8 inch (1.5 to 2.0cm)
0.8 to 1.2 inches (2.0 to 3.0 cm)
1.2 to 2.0 inches (3.0 to 5.0 cm)
over 2.0 inches (5.0 cm)

For each stem that falls within the subplot, determine the basal diameter by measuring the stem above the root crown, which is usually within 1 or 2 inches above the top of the litter. A go/no-go gage is helpful for checking diameters. The go/no-go gage is a template made of the above diameter classes and allows you to count diameters sizes with ease.

Small Trees: Include all conifers except common juniper. Small deciduous trees such as aspen can be handled as tall shrubs.

Step 1: Delineate the plot by swinging the 6.8 foot rod around the transect starting point (rebar stake) and parallel to the slope (figure 10). Within the 1/300-acre plot count the number of trees less than 10 feet in height by species. Record the number of trees within each species and average their height to the nearest 0.5 foot. Do not average heights differing by more than 5 feet in height; record them separately on the data form. If more than five species are identified, consolidate similar species. Tally only individual trees that have survived one growing season, have freedom to grow, good coloration, and root systems in mineral soil.

Figure 10. Placement of small tree subplots.

PHOTO PLOT METHODS

Photographs should be taken from the same points and in the same sequence for all plots. For each photo stand two meters behind the referenced stake. All pictures should be taken with the camera in the horizontal position.

Take all pictures with a 35mm camera and a 28mm lens on ASA 64 color slide film. Try to avoid shadows. Take notes so that photos can be easily identified after processing. Identify and label developed slides as soon as they are available.

For each photo record the plot identification code, photograph location code, and date on a piece of white paper. Include this paper in the photograph as a label.

Photograph the following locations for each plot:

<u>Location</u>	<u>Code</u>
1. From 0P toward the plot center (reference stake)	0P
2. From stake Q4 toward stake Q1	Q4-Q1
3. From stake P1 toward the plot center	P1
4. From stake Q1 toward stake Q4	Q1-Q4
5. From 50P toward the plot center	50P
6. From stake Q2 toward stake Q3	Q2-Q3
7. From stake P2 toward the plot center	P2
8. From stake Q3 toward stake Q2	Q3-Q2

VOUCHER COLLECTIONS

A voucher collection should be made to document existing species and aid in later identification. Collect plant specimens for species not already included in the working herbarium collection and for all unknown plants. Collect several specimens of each unknown, some to key out and some to press. Follow guidelines listed below.

1. Collect specimens outside the plot. Collect enough of the plant to enable identification. Take special care to collect as much of the root as possible (using a spade) and any underground portions, such as bulbs.
2. Press plant materials immediately.
3. Record pertinent information and store it with the specimen. This should include date of collection, location (including plot number), plant community type and major associates, and collectors name.

POSTBURN DATA COLLECTION

Postburn data should be collected on all plots immediately following the burn (2 weeks to 2 months after), and 1, 2, 5, and 10 years following the burn, and at 10 year intervals thereafter. Recollect all data previously collected (preburn) on permanently marked plots. Tree data can be collected prior to full green up, if necessary. Understory and fuel load data should be collected and photos taken during the peak of vegetative cover, mimicking preburn collection.

Collect data following procedures used for preburn data collection. For tree data, other information is required in addition to data collected for preburn analysis, as described below. No additional information is required for understory, fuel loads, photographs and voucher collections.

Additional Tree Data:

Bring preburn tree data sheets and maps in the field to help relocate individuals. Record postburn data for overstory trees on an Overstory Tree Postfire Assessment Data Sheets.

For each tree (overstory, pole and seedling) record species, tag number, and whether the individual is alive, dead or consumed. Record snags separately; note all individuals previously recorded as snags, as this is important to the analysis. In some cases tags may have fallen or melted off trees. Re-tag these trees and record the new tag number.

For each tree class (overstory, pole, and seedling), tag and record any trees which were not recorded previously (i.e. overstory trees which qualified and were recorded as poles during the previous assessment; poles which qualified and were recorded as seedlings during the previous assessment; seedlings which have appeared since the previous assessment).

Map overstory, poles and seedlings for areas mapped in preburn analysis.

Record maximum scorch height for each tree under SCHGT (necessary only for immediate postburn and 1 year postburn assessments). Measure maximum scorch height from ground level to the highest point in the crown where foliar death is evident.

Estimate the percent of the entire crown that is scorched for each tree and record as SCPER (necessary only for immediate postburn and 1 year postburn assessments).

Rate postfire burn severity at 10 points along the 50 foot fuel load sampling plane: 1, 5, 10, 15, 20, 25, 30, 35, 40, and 45 feet. Record the data on the Overstory Tree Postfire Assessment Data Sheet. At each sample point evaluate burn severity in a 2 decimeter by 2 decimeter area using the codes listed below. Rate burn severity at each point based on the code covering the majority of the 2 decimeter by 2 decimeter area. Then calculate the average burn severity for the index plot.

1 = Heavily Burned. Deep ash layer present; organic material in the soil consumed or nearly so to mineral soil; no discernible plant parts remaining. All fuels completely consumed.

2 = Moderately Burned. Organic layer partially consumed; shallow ash layer present, parts of woody twigs remaining. Heavy logs not completely consumed.

3 = Lightly Burned. Plants charred, but original form of mosses and twigs visible.

4 = Scorched. Moss and other plants brown or yellow, but species usually identifiable.

5 = Unburned. Plant parts green and unchanged.

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