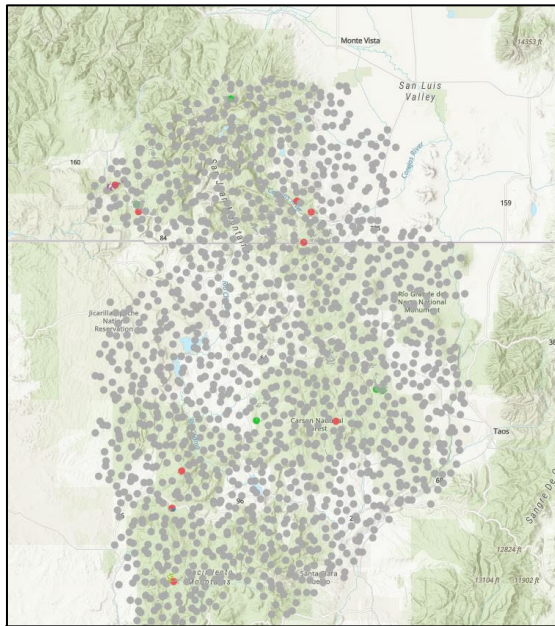


Forest Plot Field Manual

Forest plots support the 2-3-2 Cohesive Strategy Partnership’s (2-3-2) Multiparty Monitoring plan for the Rio Chama Collaborative Forest Landscape Restoration Program (CFLRP). Plot locations were determined through a multi-step process decided upon by the 2-3-2 Monitoring Committee, with input from individuals at the Southwest Ecological Restoration Institutes.

1. **FIA Grid:** The US Forest Service Forest Inventory and Analysis (FIA) program developed a systematic sampling grid to locate potential monitoring sites within the CFLRP footprint. This effort followed existing FIA hexagon grid protocols to select 1 site per every 2,000 acres (“intensified” from the national standard of 1 per every 6,000 acres).
2. **Treatment Map:** All known forest treatments slated for 2023 implementation were mapped.
3. **Spatial Overlay:** Using spatial mapping tools, anywhere a potential monitoring site overlapped with a planned treatment, that location was selected for monitoring.
 - a. This approach supplements supports adding future treatments as they are identified.
4. **Plot layout:** At each monitoring site, nine plots are laid out in a 3x3 grid (with one plot per 10 acres).
 - a. The 3x3 grid clusters plots to provide efficiency for field crews and standardize the amount of data collected from each site, to measure landscape-scale effects of treatments.
5. **Process Review:** After one or two years of data collection, the CFLRP will conduct a plot network analysis to determine the hybrid landscape grid – clustered plot approach is sufficient.



Example of FIA Grid sites with those in treatment areas colored red or green.



Example of 3x3 plot grid, with center plot located at coordinate determined by FIA Grid.

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Before leaving the office:

1. Record plot coordinates and upload Avenza map.
2. Download the Survey123 app and the appropriate photopoint survey for your project (scan QR code ->).
3. Download phone applications for assistance with vegetation ID (Seek by iNaturalist, New Mexico Wildflowers, Colorado Wildflowers).
4. Print data sheets (have extra).
5. Inspect and maintain equipment.
 - a. Check all equipment for defects (fraying tapes, worn/illegible tape labels, missing screws, etc.)
 - b. Perform any necessary general maintenance (clean sap off logger's tapes, tighten screws, etc.)
6. Pack all necessary gear (see equipment checklist).
7. Review and submit an emergency plan. Print a copy to have on hand.



Per Plot Equipment Checklist:

All Plots – (9 per site)

- GPS (Charged? Spare batteries?)
- Phone camera or tablet (with Survey123, Avenza, and Seek apps)
- Paper maps of unit (or Avenza map)
- Emergency plan (one copy filed with supervisor, one on hand)
- Field Manual
- Sharpies
- Pencils
- Clipboard
- Data sheets
- Rebar (1' piece of 0.5", with top 2" spray painted orange)
- 2 Tree Tags (aluminum only)
- Sledgehammer
- Whiteboard (photoboard)
- Dry Erase markers
- Compass (declination adjusted to 9.5°E)
- Ruler
- DBH/Logger's tapes
- 3 tape measures (75'+)
- Pin Flags (minimum 8)
- Chaining pins (minimum 5)
- Laser Hypsometer
- Quadrat Frame (10.7ft²)
- Densitometer (sighting tube)

Bee Monitoring Plots – (3 per site)

- Everything on "All Plots" checklist
- Blank paper
- 2 one-gallon jugs of soapy water (one tablespoon of **blue Dawn** dish soap each)
- 10 white pantraps (9oz. cups)
- 10 fluorescent blue pantraps (9oz. cups, colored with Krylon spray paint)
- 10 fluorescent yellow pantraps (9oz. cups, colored with Krylon spray paint)
- 1 blue vane trap (1 per site)
- P-Cord (hang vane trap)
- 3 strainers
- 10 Whirl-paks
- Alcohol
- Tupperware container

Measurement cheat sheet:

' = feet/foot

" = inches/inch

1/100th acre plot = radius of 11.8'

1/10th acre plot = radius of 37.2'

1/2 acre plot = radius of 83.3'

DBH = Diameter Breast Height = 4.5'

DRC = Diameter Root Collar (see page 11)

Navigate to and Establish plots:

Plot locations will be pre-generated.

Navigate to plot center using GPS coordinates (Datum NAD83; decimal degrees), Avenza, and printed maps. *If plot is unsafe, notify the monitoring coordinator and move on to the next plot.

For new plots:

1. Mark Plot Center
 - a. Hammer a piece of rebar (1' piece of 0.5", spray painted orange) into ground, leaving 1" above the soil surface, at plot center.

*NOTE: If plot center cannot be marked (e.g. located in a tree or large rock, under a hazard tree, etc.) or is unsuitable for measurement (e.g. located on a road or trail, etc.), move plot center 100' in a cardinal direction from the original GPS point (starting due west, then south, east, and north) until the site is suitable. Note the change on the plot data sheet by recording why plot was moved and record the new GPS coordinates.
2. Reference Trees
 - a. Select two distinguishable reference trees near plot center – record tree species, DBH or DRC (use DRC for juniper, pinyon, and oak) in inches (rounded down to the tenth), and any notes on data sheet to make re-finding trees easier.

*NOTE: Select trees with “character” and limited signs of decay.

 - b. Attach tree tags within 6" of the soil surface and facing directly toward plot center.
 - c. Record azimuth and distance (decimal feet rounded to the tenth) from reference tree to plot center.

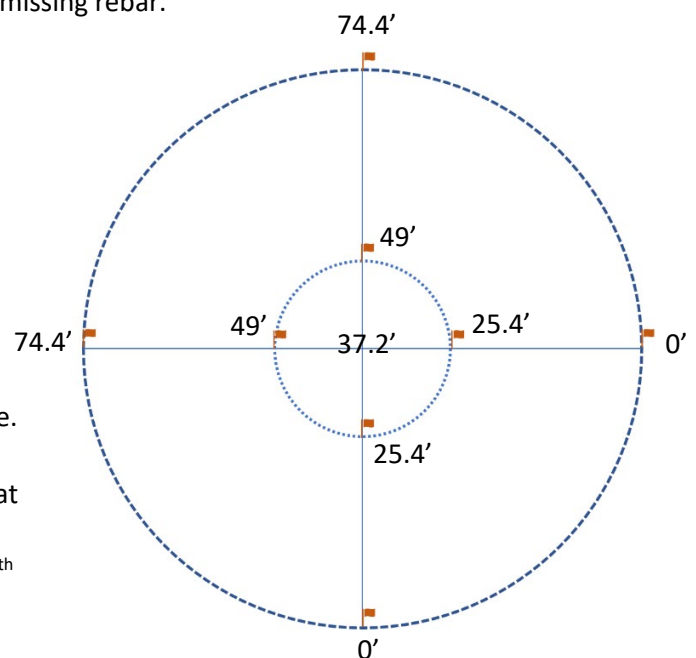
For repeat plots:

1. Locate rebar via GPS coordinates, visual search, and/or use of reference trees.
2. If rebar cannot be found, estimate rebar location using reference trees and GPS coordinates.
Note the updated coordinates and replace the missing rebar.

Plot Set-Up

1/10th acre circular plot (37.2' radius) with a nested
1/100th acre circular subplot (11.8' radius).

1. Lay out two tape measures (with feet and inches). One runs S-N and one E-W, with 37.2' at plot center, and 0' at the South and East ends of the transects, respectively.
- *NOTE: Keep tape measure as taut as possible. Limit placing tape over shrubs/branches.
2. Place a flag at the ends of both transects - at 0' and 74.4'
 3. Place flags to mark the extent of the 1/100th acre subplot – at 25.4' and 49'



Site Data

Write down the following information at the top of your data sheet:

- Project Name - Record project name as it is listed in the Survey123 drop-down. Ex: SJNF_Fuels_KennyFlats; SFNF_Divide
- Site - Record project name as it is listed in the Survey123 drop-down. Ex: KennyFlats_1
- Plot # (1-9)
- The first initial and last name of all present crew members
- Date

Site Notes

Document any pertinent information related to the condition of the plot or data collection process. For example:

- Is the plot representative of overall site conditions (Y/N)
- Are there any identifiable anthropogenic disturbance agents across the plot? (e.g. skid trails, recreational trails, log decks)
- Are there any notable signs of biotic (insect/disease) disturbance in plot or forest stand?
- Are there any identifiable ecological disturbance agents across the plot? (e.g. wind throw, evidence of fire)
- If returning to a pre-established plot, were you able to find plot center?
- If establishing a new plot, note if the plot center was moved. Record the direction, distance, and reason the plot center was shifted and record the new coordinates in the 'Plot Center' section.
- Are there any notable signs of biotic (insect/disease) disturbance in plot or forest stand?
- Other?

Transects

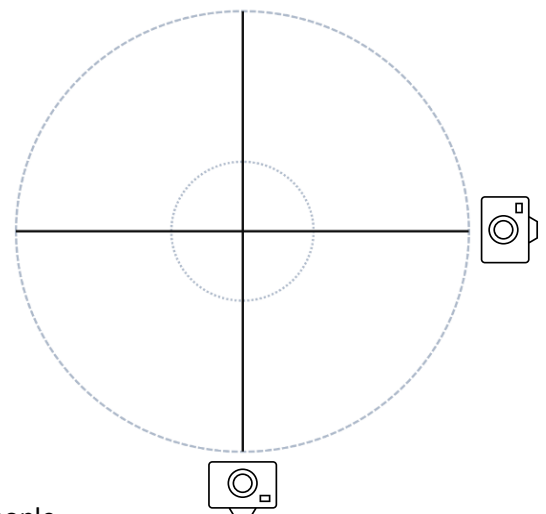
Along both transects, capture plot photos and collect canopy and shrub cover measurements. If indicated, conduct wild bee monitoring by deploying pantraps.

Site Photos

1. While standing at 0' on the tape measure, take a plot photo toward the opposite side of the plot (see page 14) and upload to Survey123.
 - a. Hold the camera horizontally, approx. 4.5' (breast height), and with the center of the photo pointed at the flag marking the other side of the 1/10th acre plot. Include whiteboard in photo (noting date, site name, site #, plot #, and photo direction) but ensure photo is free of other equipment and people.

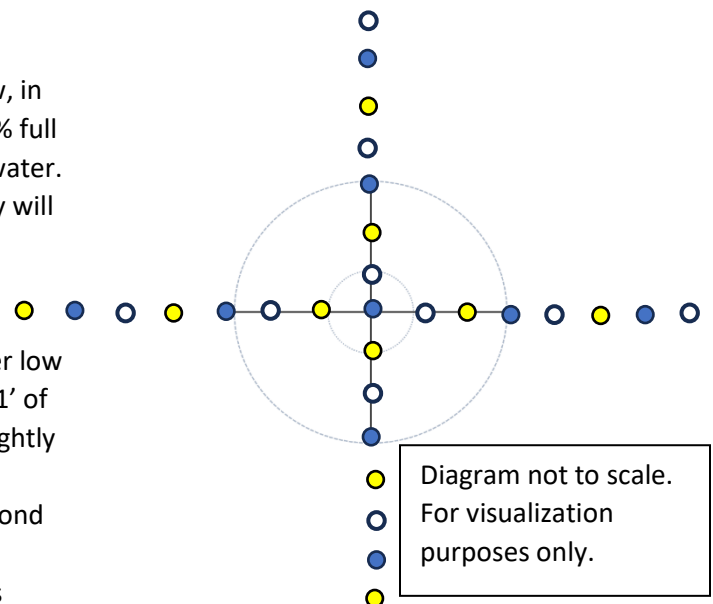
*NOTE: Whiteboard should be placed approx. 6-10 feet from photographer.

*NOTE: If photo is significantly obscured, take an additional photo in the opposite direction on transect and make note of this. (ex: if the 0' S-N photo is significantly obstructed, take an additional photo from the 74.4' end facing N-S)



Wild Bees

1. Record if bee traps were deployed. If not, draw a slash through bee monitoring table on data sheet.
2. Mark the time that traps were set out and the time they are picked up. Aim to leave traps for 4-6 hours (if more, that's OK).
 - *NOTE: Start time = when all pantraps have been set.
 - End time = when all pantraps have been collected.
3. Estimate wind speed at time of deployment and retrieval (see page 16 for reference).
4. Hang blue vane trap near the center of plot #5 (only one blue vane trap per 9 plot grid). Fill the vane trap with approximately 3 inches of soapy water.
 - *NOTE: Do not hang trap over 6' high.
 - *NOTE: When hanging trap in tree, keep trap towards the edge and not buried in the center of tree's growth.
5. Lay one pantrap at plot center, and seven pantraps, alternating blue, white, and yellow, in each cardinal direction. Fill each pantrap 95% full (approx. 0.5' from top of cup) of the soapy water.
 - *NOTE: Make sure traps are seated so they will not tip over.
 - *NOTE: There will be two pantraps placed near plot center (15 N/S and 15 E/W)
 - *NOTE: Do not place pantrap directly under low canopy cover. Ensure pantrap has at least 1' of overhead clearance. It's OK if pantrap is slightly offset from transect line.
6. Place traps ~30' apart. Traps will extend beyond the 1/10th acre circular plot.
 - *NOTE: Measure how many of your strides equal 30 feet. Use your stride count to place pantraps.
7. En route back to plot center, record all blooming plants within 5' on either side of the pantrap transect.
 - a. Photograph one plant of each blooming species for plant ID (see page 15 for photo tips). Take multiple photos of the flowering plant if the species is unknown.
 - b. Use the Seek application, Wildflowers application, or other resources to ID flower.
 - c. If the flower cannot be identified in the field, record the species as an unknown following the Unknown Species naming convention (see page 15) and document it normally. Using a genus code is ok if the plant is not identified to species.
 - d. Estimate abundance of blooming flowers for each species (1-10, 11-50, 51-100, 100+). Flower abundance estimate should account for all flowers visible from the pantrap transect.
8. When pantraps are harvested, each color is stored separately.
 - a. Use tea strainer to separate bees from soapy liquid, combining all bees from each color into three different strainers (one for blue, one for white, one for yellow).



*NOTE: Place all bycatch (everything captured in pantrap, including non-bees) in color appropriate Whirl-pak. NOTIFY MONITORING LEAD IF ANY NON-INSECT IS CAPTURED IN PANTRAP.

- b. Double check all pantraps were collected – start and end with 30.
9. Place bees in Whirl-pak, using fingers, to move bees from strainer to color separated Whirl-pak.
 - a. In each bag, place a small paper label, written in PENCIL that indicates: the name of the site, the date, last names of crew members, color of pantrap (blue, white, yellow) and length of time pantraps were out (e.g.: 9am-3pm or 0900-1500).

*NOTE: Blue vane trap contents should be stored in separate Whirl-pak.

- b. Slowly pour 95% ETOH down sides of Whirl-pak until all contents are submerged.
10. Store filled Whirl-paks in sealable Tupperware to contain leakage.
 - *NOTE: Store Tupperware in cool place (ideally cooler or fridge).

Coarse Woody Debris

1. Estimate coarse woody fuel tonnage using the provided pictures (see page 24). Record one of three tonnage categories: <3 tons/acre is recorded as a 1, 3-10 tons/acre is recorded as a 2, >10 tons/acre is recorded as a 3.

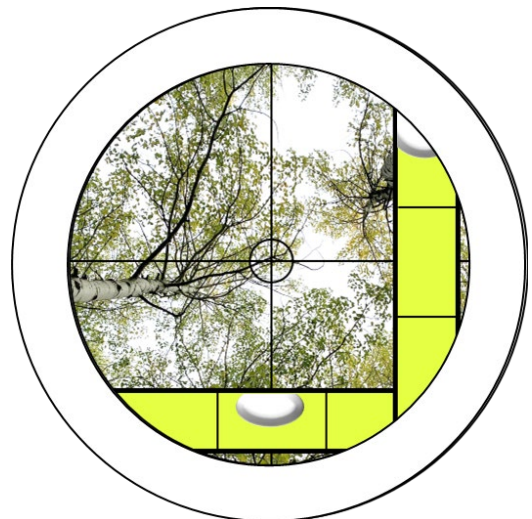
*NOTE: Consider downed woody debris (≥ 3 " diameter) both inside and outside the plot (all that you can see; selection should characterize the entire stand). Stumps should be counted as coarse woody debris.

Canopy Cover

1. Use the densitometer and point intercept method to record presence/absence of canopy cover every 7ft along the transect.
2. If canopy is present, record the tree species, canopy class (as compared to the stand; see page 12 for reference), and location along the transect.
 - *NOTE: If no canopy is present, record a 0.
 - *NOTE: Record only the first/lowest "hit" at each location, and document the canopy class.
3. Repeat on the second transect.

How to use a densitometer for canopy:

Holding the densitometer at eye level directly over the point on the tape, look through the short end of the tool. Hold the densitometer so that the crosshairs fall inside the small circle and levels indicate that the device is pointed directly upward. If the crosshairs "hit" any tree canopy, record the tree species and location.



Shrub Cover

1. Starting at 0' on one of the transects, use the line-intercept method to record living shrubs along each transect. Dead shrubs should not be counted as cover. Determine the height class by the highest point of transect intersect. Measure and record:
 - a. Species

- i. Use appropriate USDA plant database standard four-letter code.
- b. Height class code (decimal feet)
 - i. 1 = 0.5-1.9'; 2 = 2.0-3.9'; 4 = $\geq 4.0'$
- c. Start and end points in decimal feet (see diagram below).

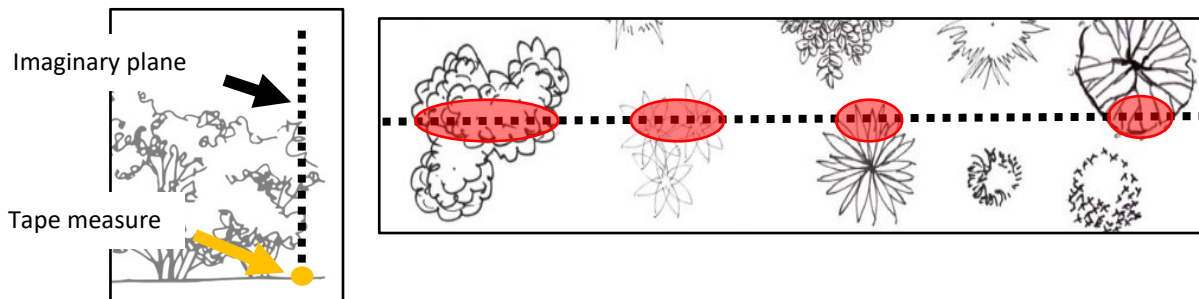
*NOTE: If a gap of more than 6 inches exists for a single shrub, record the shrub as two different shrubs.

*NOTE: The minimum length of shrub cover is 0.1 feet. Shrubs that cover less than 0.1 feet of the transect (ex: single inflorescence or a couple of leaves) should not be counted.

*NOTE: There may be overlap between shrubs of different species and shrubs of the same species that have different height classes. There may NOT be overlap between shrubs of the same species within the same height class (e.g. if two Gambel oak shrubs occupy the same space and are both height class 2, count them as one shrub).

*NOTE: Gambel oak (QUGA) counts as both a shrub and a tree and should be recorded as both if applicable. QUGA with a DRC less than 1" should be counted as a shrub. QUGA with a DRC greater than or equal to 1" should be counted as a tree and disregarded in shrub cover.

2. Repeat for the second transect.



Quadrats

Four 10.8ft² (1m²) quadrats are located with the outside edge 5' from the end of the transect, and the transect line bisecting the middle of the quadrat (as indicated in the diagram).

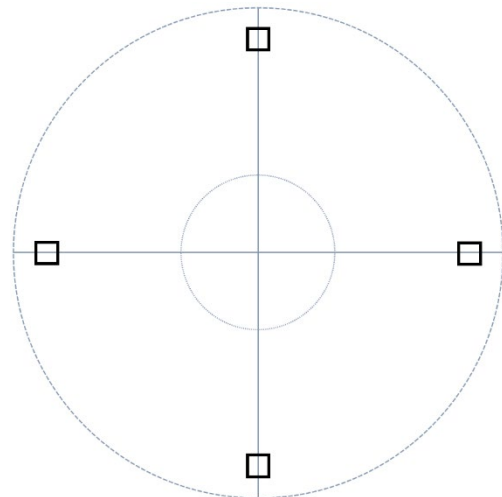
For ocular vegetation estimates, record each class to the nearest 1%. The total percentage of all categories should add to 100%.

Ground cover

Estimate percentage of graminoid, forb, shrub, tree (living and dead stems), bare soil, woody debris, rock (> 1/8" diameter), moss/lichen (growing only on soil surface, not other substrates), litter, and cacti coverage (see page 17). Must total 100%.

*NOTE: for plants, this will **not** include branches and leaves – only record what is touching the ground (i.e. the basal area of stems)

*NOTE: Cow pies count as litter.



Woody Debris

Estimate fine woody debris (1hr, 10hr, and 100hr) in each 10.8 ft² quadrat, 5 feet from the end of each transect, using the provided picture guides in the appendix (pages 21-23). Identify the fuel load that matches the picture for each size class and record the value (recorded in tons/acre) to two decimal places.

*NOTE: Pine needles and pine cones are litter, not woody debris

*NOTE: A single piece of woody debris which has two or more size classes (e.g. a tapering stick) should be mentally split into appropriate size classes.

*NOTE: This is an assessment of **above ground** fuels – you do not need to dig up the quadrat area.

Photos

Take an aerial photo of each quadrat.

1. Take a photo directly above the center of the quadrat, with the camera pointed straight down (a slight amount of angle is ok). Hold the camera as flat as possible and be sure to capture all four corners of the quadrat in the photo. Position the phone to take the photo in the landscape orientation.
2. Upload photos to Survey123.

Subplot

Regeneration

All saplings and seedlings are measured within the 1/100th acre (11.8' radius), circular fixed-area subplot.

1. Start due north and move clockwise, working from plot center out (like spokes on a bike wheel), collect data for all regeneration in the subplot. Measure and record:

a. Saplings (trees 1.0-4.9" DBH or 1.0-2.9" DRC).

i. Record tree species using appropriate USDA plant database standard four-letter code (see page 20).

ii. Record size class

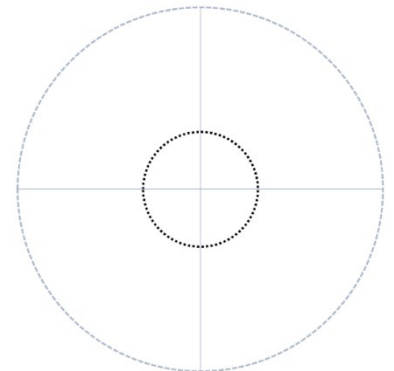
- DBH: 1 = 1.0-2.9"; 2 = 3.0-4.9"
- DRC: 1 = 1.0-1.9"; 2 = 2.0-2.9"

b. Seedlings (< 1" DBH or DRC and ≥ 0.5' tall)

i. Record tree species using appropriate USDA plant database standard four-letter code (see page 20).

*NOTE: QUGA with a DRC less than 1" should be counted as a shrub. QUGA should never be recorded as a seedling.

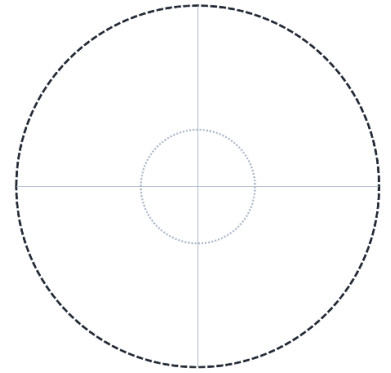
ii. Record height class (1 = 0.5-1.9'; 2 = 2.0-3.9'; 4 = ≥ 4.0')



Overstory Plot

All trees $\geq 5''$ DBH or $\geq 3''$ DRC¹, depending on species, are measured within the 1/10th acre circular fixed-area plot.

1. Start due north and move clockwise, working from plot center out (like spokes on a bike wheel), and collect data for all living and dead overstory trees ($\geq 5''$ DBH or $\geq 3''$ DRC) in the plot. Number the trees as they are encountered in the clockwise pattern. If trees line up directly along the 'spoke' line, count the tree(s) closer to plot center first.
 - *NOTE: Trees on plot edge are considered IN if the **center** of the tree at ground level is 37.2' or less from plot center.
2. Measure and record:
 - Tree species using appropriate USDA plant database standard four-letter code (see Appendix)
 - DBH in inches (see page 11), rounded DOWN to one decimal – or –
 - DRC in inches for every qualifying stem (see page 11), rounded down to one decimal
 - *NOTE: Juniper, Pinyon, and Oak trees are measured using DRC. All other species are measured by DBH.
 - Record if the tree is Live or Dead (snag). A tree is considered dead if it has no living foliage present.
3. Use a laser hypsometer to measure tree height of **three** codominant trees (select 3 average large trees within the plot, see page 12).
 - a. Record measurements and indicate on data sheet which trees were measured. (There will only be three cells filled out in the Height column on the data sheet. Leave the other cells blank)
4. Measure crown base height (CBH) of the **three** codominant large trees ($\geq 5''$ DBH or $\geq 3''$ DRC) with lowest canopy height (see page 12). (There will only be three cells filled out in the CBH column on the data sheet. Leave the other cells blank)



¹ DRC is based on a calculation of stem diameter and number of stems, therefore there are different cutoffs measurements for trees with one stem versus multiple. These calculations will be done after data is uploaded to a computer.

DBH Guide:

Take DBH measurements 4.5 feet above the ground. Make sure that your DBH tape is level and do not stand on top of any logs/debris.

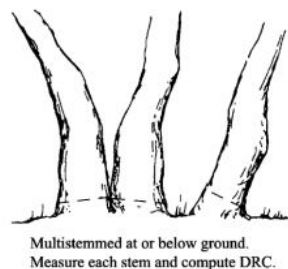
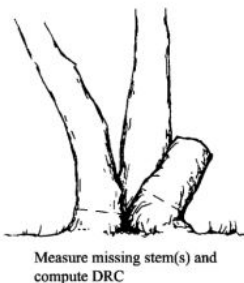
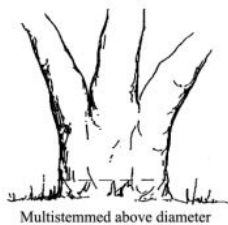
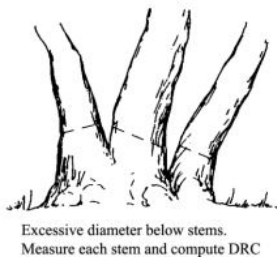
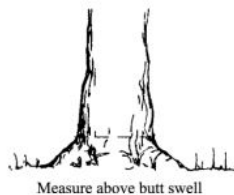
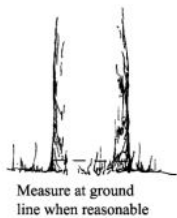
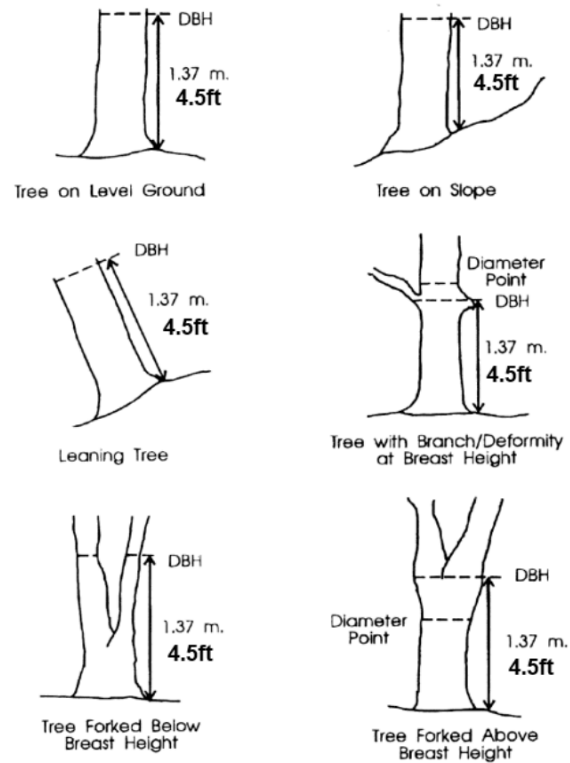
If the tree is on a slope, always take DBH 4.5' from the base of the **upslope** side of the tree.

If the tree is leaning measure 4.5' parallel to the stem of the tree.

If the tree has branches or deformities at 4.5' measure the diameter of the tree directly above the deformity. Note the deformity and record the height of your measurement.

If the tree is forked **below** 4.5' count the resulting stems as two separate trees. Note the fork.

If the tree is forked **above** 4.5' measure the highest **representative** diameter on the stem. i.e. measure beneath any swelling due to the fork.

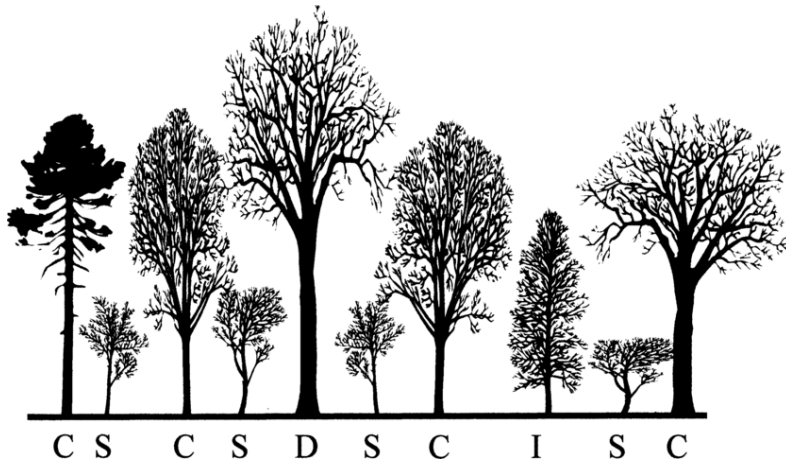


DRC Guide:

Take DRC measurements at the root collar or the natural ground line, whichever is higher. Make sure your DBH tape is level.

DRC measured trees often have multiple stems. A stem generally grows in an upright position and contributes the main structural support of a tree crown. **If a DRC species has only one stem, the stem must be ≥ 3" DRC to be recorded. If a DRC species has multiple stems, record stems ≥ 1.5" diameter and at least 1' long.**

DRC measured trees with stems clumped together, with a unified crown, and appearing from the same origin are counted as one tree.



Classifications:

D-dominant

C-codominant

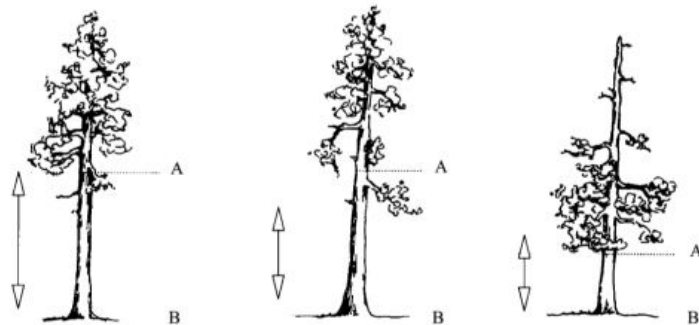
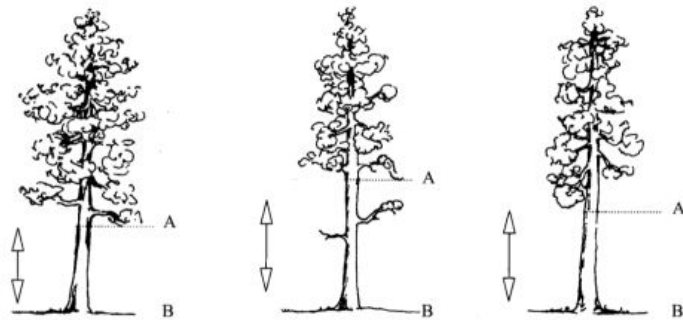
I-intermediate

S-suppressed

Crown class is a qualitative measure of a tree’s position in the canopy relative to its neighbors. The upper canopy of a forest is composed of dominant and codominant trees (D&C). Upper canopy trees have well- developed crowns that receive direct sunlight from above and partly on the side. Intermediate and suppressed trees (I&S) form the lower canopy.

Crown base height is the lowest height above the ground on an individual tree to the point where the canopy could sufficiently fuel a fire vertically. Crown base height is represented by:

- * Lowest branches and foliage that span more than 90° around the trunk
- * Lowest branches that extend from two separate but adjacent points
- * If the lowest branches extend from two separate and opposite points



Measure the height from the base of the tree on the uphill side (B) to the base (A) of the live crown. Base of the live crown is the lowest branch whorl with live branches in at least two quadrants exclusive of epicormic branching and of whorls not continuous with the main crown.

Invasives

1. Estimate percent cover of priority species by quadrant (0 = 0%, 1 = 1-10%, 2 = 11-20%, 3 = 21-30%, 4 = 31+%)

*NOTE: Priority species include Bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsus*), and cheatgrass (*Bromus tectorum*) (see page 18-19 for reference).

*NOTE: If another invasive plant species has significant coverage within the plot, estimate coverage and document via photograph and plant name (if known).

2. Upload the following photos to Survey123:
 - a. Close-up photo of invasive plant for ID verification (see page 15 for photo tips).
 - b. Photo that represents the extent of invasion.

Disturbance

Record presence/absence in each quadrant

- Soil disturbance:
 - Wheel tracks or depressions
 - Erosion (the movement of soil by water and wind)
 - Fire (ash)
- Grazing (cow pies or hoof prints)

Appendix

Photo Examples and Tips

Plot Photos

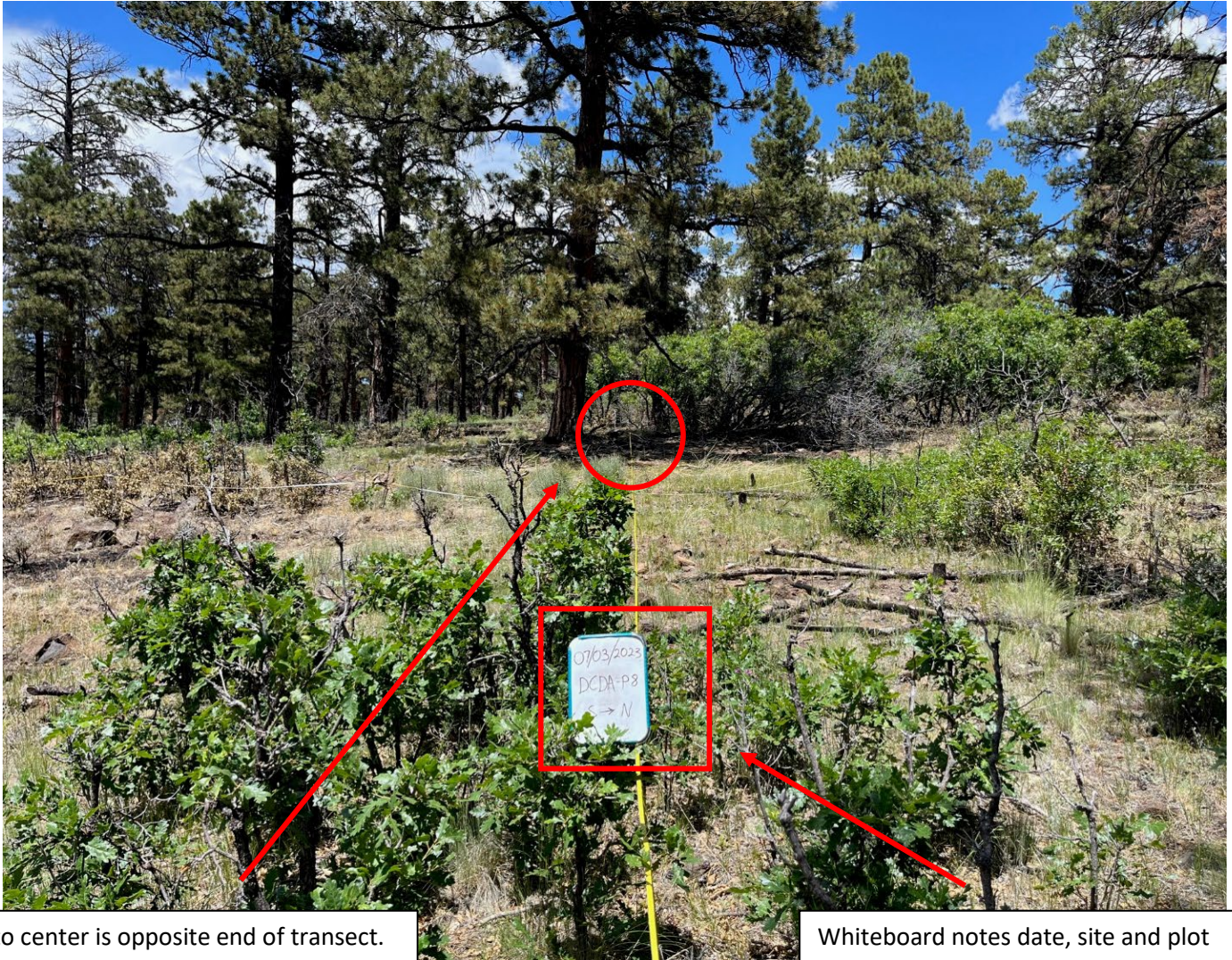


Photo center is opposite end of transect.
With tape measure dividing photo in half.

Whiteboard notes date, site and plot number, and direction of photo.
Whiteboard propped up at picture center, approx. 6-10ft from photographer.

Plant Identification Photos

1. Take a close-up photo of the flower if present. Attempt to capture all flowering parts (including sepals, petals, stamen, and pistil). Include your hand in the photo - this is useful because it provides a sense of scale for the flower and can help focus the picture.
2. A photo of the underside of the flower may also be useful. This can be useful in determining the number or orientation of bracts (helpful for flowers in the Asteraceae family) and for looking for hairs and or glands.
3. Take a photo of the branching structure of the stem. Attempt to capture a representative section of the stem which shows leaf orientation and surface details such as hairiness. If possible, make sure to have at least one leaf in this photo and have the leaf be in focus. The leaf shape, venation and surface can be useful ID clues.
4. Take a scaled back picture which captures the entire plant. Try to capture the plant's overall form. This includes the branching structure and plant base (woody or not, and how it interacts with the ground). Include a common item next to the plant for scale (i.e., chapstick tube, GPS unit, mechanical pencil).

Unknown Plant Naming Convention

All unknown plants recorded on plot should be given an unknown plant code. This unknown code should be unique to that specific species and can be used on later plots if that same species is encountered again. Unknown codes are split by structural group (Forbs, Shrubs, Trees) and go in numerical order. Begin with 001 and continue numerically for each unknown. It is ok to skip numbers, but there should never be the same unknown code given to two separate plants. Unknown codes should be recorded on an Unknown Tracker sheet which should be kept with crews in the field. When entering data, enter the unknown code along with all the known plant codes. When the plant has been identified, the codes can be switched in Excel.

1. Unknown plants should be identified in the field if possible. Take approximately 3 minutes to identify a plant (utilize any guides or apps available) in the field, and if you do not ID the plant in that time, take photos of the plant and record it on the data sheet with an unknown code.
2. Forbs only identified to genus, such as *Erigeron* sp. or *Lupinus* sp., can be recorded using a genus code and do not need to be recorded as an unknown plant. All shrubs need to be identified to species or be given an unknown code.
3. Flowering plants recorded as part of the bee transect protocol should be documented within the Bee Survey 123 Form.
4. Unknown plants which you believe may be an invasive species of concern (thistles, or other potentially noxious weeds) should be photo documented in the invasives section on the Forest Plot Photos Survey 123 Form.

Naming Convention:

Forb: F001











Shrub: S001

Tree: T001

Wind Speed Estimation (Beaufort Scale)

#	Speed	Visual Clues and Damage Effects
0	Calm	Calm wind. Smoke rises vertically with little if any drift.
1	1 to 3 mph	Direction of wind shown by smoke drift, not by wind vanes. Little if any movement with flags. Wind barely moves tree leaves.
2	4 to 7 mph	Wind felt on face. Leaves rustle and small twigs move. Ordinary wind vanes move.
3	8 to 12 mph	Leaves and small twigs in constant motion. Wind blows up dry leaves from the ground. Flags are extended out.
4	13 to 18 mph	Wind moves small branches. Wind raises dust and loose paper from the ground and drives them along.
5	19 to 24 mph	Large branches and small trees in leaf begin to sway. Crested wavelets form on inland lakes and large rivers.
6	25 to 31 mph	Large branches in continuous motion. Whistling sounds heard in overhead or nearby power and telephone lines. Umbrellas used with difficulty.
7	32 to 38 mph	Whole trees in motion. Inconvenience felt when walking against the wind.
8	39 to 46 mph	Wind breaks twigs and small branches. Wind generally impedes walking.
9	47 to 54 mph	Structural damage occurs, such as chimney covers, roofing tiles blown off, and television antennas damaged. Ground is littered with many small twigs and broken branches.
10	55 to 63 mph	Considerable structural damage occurs, especially on roofs. Small trees may be blown over and uprooted.
11	64 to 75 mph	Widespread damage occurs. Larger trees blown over and uprooted.
12	over 75 mph	Severe and extensive damage. Roofs can be peeled off. Windows broken. Trees uprooted. RVs and small mobile homes overturned. Moving automobiles can be pushed off the roadways.

Vegetation Functional Groups

 <p>Graminoid = G Grasses and grass like plants such as sedges and rushes. Sedges have edges on their stem. Rushes are round stemmed. And grasses have jointed stems down to the ground.</p>	 <p>Forb = F Any non-woody flowering plant that is not a grass. Forbs are broad-leaved, non-woody plants with net like veins in the leaves. Stems die back to the base of the plant each year.</p>
 <p>Shrub = S A woody plant which is smaller than a tree and has several main stems arising at or near the ground. Aboveground stems remain alive during the winter.</p>	 <p>Tree = T A woody perennial plant, typically having a single stem or trunk bearing lateral branches at some distance from the ground.</p>
 <p>Bare Soil = B An area of ground that is bare and has no plants growing on it.</p>	 <p>Woody Debris = W Large sticks. Typically material from trees or shrubs like branches and roots.</p>
 <p>Rock = R Must be >5mm diameter (about the size of a pencil eraser)</p>	 <p>Moss/Lichen = M An often green colored organism that can be found growing on rocks and trees.</p>
 <p>Litter = L Leaves, pine cones, pine needles, dead plant materials, sticks. A decomposing material, but recognizable leaves and other debris that form a layer on top of the soil.</p>	 <p>Cacti = C A succulent plant with a thick, fleshy stem that typically bears spines, lacks leaves, and may have brilliantly colored flowers.</p>

Invasive Plant Species Identification

See also, Native Plant Society of New Mexico Native Thistle Identification Guide and New Mexico State University Noxious and Troublesome Weeds of New Mexico booklet.

Musk thistle / *Carduus nutans*



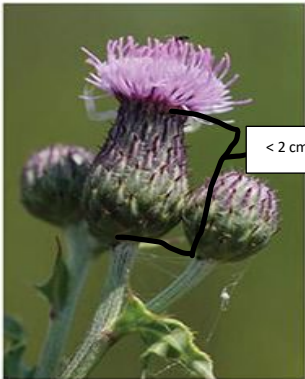
- Vertical spiny leaves along the stem.
- Upper surface of the basal leaves is glabrous (no hairs), underside of leaves have a hairy mid-vein.
- Upper stem is tomentose (covered in dense white hairs).
- Phyllaries (scale-like points surrounding the flower) are wide and turn purple with age.

Bull thistle / *Cirsium vulgare*



- Vertical spiny leaves along the stem.
- Phyllaries (scale-like points surrounding the flower) are skinny and remain green with age.
- Upper surface of leaves have short white hairs.
- Stem is very hairy.

Canada thistle / *Cirsium arvense*



- No vertical leaves along the stem.
- The upper sides of the leaves have no hair.
- The involucre (all of the phyllaries together) is less than 2cm tall.
- Phyllaries have VERY short spines on the tip.

Cheatgrass / *Bromus tectorum*



Common mullein / *Verbascum thapsus*



Rosette leaves are large (up to 50 cm long) and hairy.

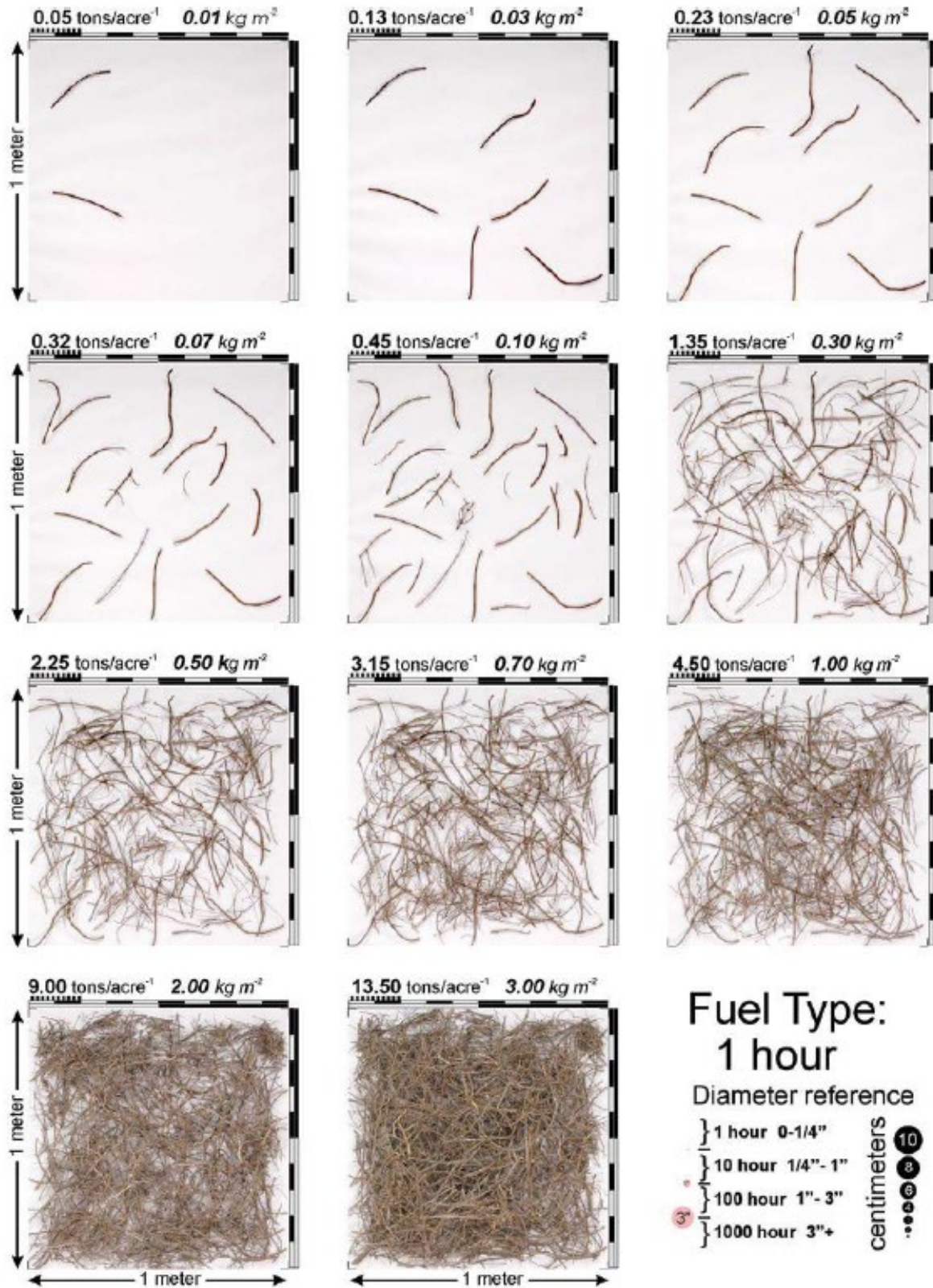
A tall, pole-like stem ends in a dense spike of yellow flowers.

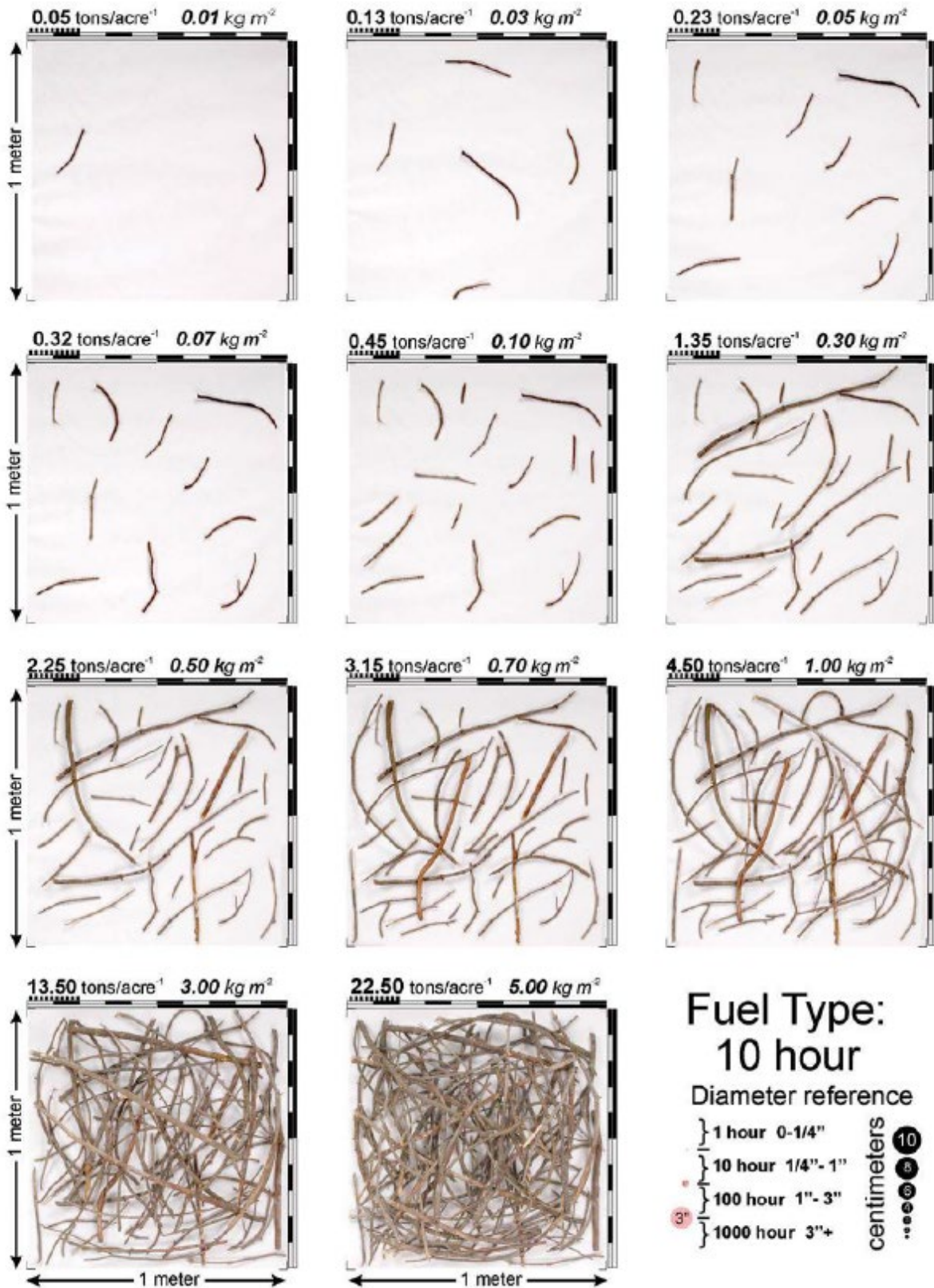


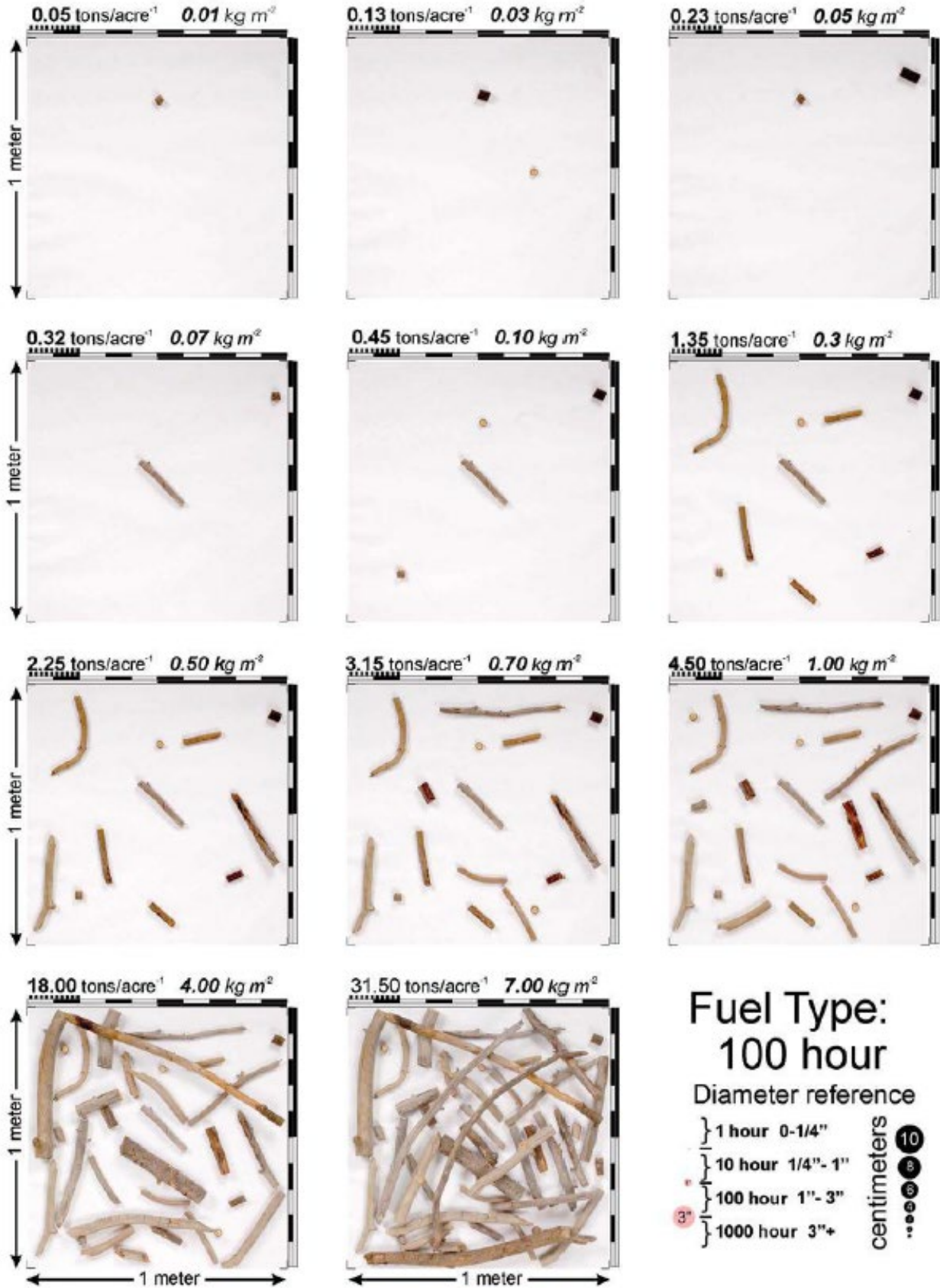
Tree Species Codes

Code	Scientific Name	Common Name
ABCO	<i>Abies concolor</i>	White fir
ABLA	<i>Abies lasiocarpa</i>	Subalpine fire
ACNE2	<i>Acer negundo</i>	boxelder
CELE3	<i>Cercocarpus ledifolius</i>	Curleaf mtn. mahogany
CEMO2	<i>Cercocarpus montanus</i>	Birchleaf/alderleaf mtn. mahogany
GLTR	<i>Gleditsia triacanthos</i>	honeylocust
JUMO	<i>Juniperus monosperma</i>	Oneseed juniper
JUSC2	<i>Juniperus scopulorum</i>	Rocky mtn. juniper
PICO	<i>Pinus contorta</i>	Lodgepole pine
PIED	<i>Pinus edulis</i>	Twoneedle pinyon
PIEN	<i>Picea engelmannii</i>	Engelmann spruce
PIFL2	<i>Pinus flexilis</i>	Limber pine
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine
PIPU	<i>Picea pungens</i>	Blue spruce
PIST3	<i>Pinus strobiformis</i>	Southwestern white pine
POAC5	<i>Populus acuminata</i>	Lanceleaf cottonwood
POAN3	<i>Populus angustifolia</i>	Narrowleaf cottonwood
PODEW	<i>Populus deltoides</i>	Rio Grande cottonwood
POFR2	<i>Populus fremontii</i>	Fremont cottonwood
POTR5	<i>Populus tremuloides</i>	Quaking aspen
PREM	<i>Prunus emarginata</i>	Bitter cherry
PSME	<i>Pseudotsuga menziesii</i>	Douglas fir
RONE	<i>Robinia neomexicana</i>	New Mexico locust
ROPS	<i>Robinia pseudoacacia</i>	Black locust
HARDWD		Unknown hardwood
CONIFR		Unknown conifer
UNKSPP		Unknown species

Photoload Fuel Estimate Guide









< 3 Tons/ Acre

1.80 tons acre⁻¹ 0.40 kg m⁻² Total log length: 18 feet



1.80 tons acre⁻¹ 0.40 kg m⁻² Total log length: 6 ft



3 – 10 Tons/ Acre

6.75 tons acre⁻¹ 1.50 kg m⁻² Total log length: 66 ft



6.75 tons acre⁻¹ 1.50 kg m⁻² Total log length: 24 ft



>10 Tons/ Acre

11.25 tons acre⁻¹ 2.50 kg m⁻² Total log length: 110 ft



11.25 tons acre⁻¹ 2.50 kg m⁻² Total log length: 40 ft

