

Bryce Canyon National Park Aspen Sampling Procedures

Data Collection

Standardized field methods using a uniform measurement layout (Figure 2) were applied at each aspen sample location within BRCA. These procedures, slightly altered here to accommodate Park specifics, are derived from previous works which have been peer-reviewed and published elsewhere (Rogers 2017; Rogers 2022; Rogers and McAvoy 2018).

Location/Stand Description:

Plot# & Date: record the appropriate plot number for the location, plus date data is collected.

GPS & Photo ID: Record X & Y GPS coordinates and elevation using UTM datums at the west end of transect 1 (Plot Center) and take a digital photo facing N, E, S, W. and record the Photo ID on the data sheet denoted by plot number (this may be recorded automatically within the data recorder).

Stand (aspen) layers: Visually look through the 1 ha stand and describe the number of distinct vertical layers of aspen (record 1,2,3, or 4). The canopy is one layer, the short regeneration another, and the medium recruitment a third. On some stands there are no obvious layers, as they become continuously blended in a complex vertical profile. Stands with more than 3 distinct layers should be recorded as “4”.

Estimate overall visual Stand Condition using the following scale. Key indicators include: aspen mortality, condition/amount of regeneration and recruitment, level of browsing.

Guidelines for estimation include:

Good (all 3 requirements met): Minimal overstory mortality and stem disease present (<5%); several aspen layers (>2) visually identifiable; browsing impacts on regeneration uncommon (<25%).

Moderate: stands not fitting into categories 1 or 3.

Poor (any 2 of 3 requirements met): Overstory mortality and/or stem cankers common (>25%); visual aspen layering absent or minimal (1–2 layers only); browsing impacts clearly evident (>50%) on regeneration.

Aspen Cover Estimate: Establish two 30 × 2-meter belt transects perpendicular (E–W; N–S) to each other (with 5 m gap) between belt transect edges. Ensure transects will not intersect edge of stand (this should be accomplished in the pre-field/study design phase) by further adjusting along cardinal directions by 5 m intervals. This survey always uses a compass declination of 0° (check your compass before beginning).

Along both transects, visually estimate live aspen foliage above 2 meters height by using the crown estimation device at 5-meter intervals along the transect (total of 14 cover estimate points).

Record cover of aspen (only) as absent (0) or present (1) using the densitometer (ignore tall shrubs & conifers).

A total of 14 locations should be recorded; 7 each on the two transects.

Disturbance: (record the number)

1 = No notable disturbance

2 = Partial cutting (stumps present)

3 = Intensive cutting (>50% trees cut)

4 = Other mechanical alterations (for any purpose—explain)

5 = Fire, light (some remaining live trees, but ample tree scorching)

6 = Fire, mixed severity (many dead trees, some live, scorching)

7 = Fire, high severity (most/all trees killed, heavy scorching)

8 = Grazing, light (signs of cattle present; trespass on NPS land)

9 = Grazing, heavy (intense grazing impacts, signs; trespass on NPS lands)

10 = Other notable disturbance (describe in plot-level notes)

Plot Notes: Note any unusual items that may affect the entire sample area which may not be picked up by other data items (e.g., trees <8 cm are forming the upper canopy; aspen mostly competing with oak, juniper, tall shrubs, or other uncommon species; fresh dead elk carrion found near transects).

Understory Cover: Record the dominant understory cover by functional plant group: 1= grass; 2= forb; 3= shrub; 4= young trees; 5= other (make plot note); 6=fairly even mix of understory

Oystershell Scale Present (0=none, 1=present)

Oystershell Scale Severity (1= trace [<10% aspen stems]; 2=common [10–20% stems]; 3=subdominant [20–50% stems]; 4=dominant [>50 stems].

Canopy/Mature Tree Tally:

Count all mature (Class 5–7) stems by dbh classes (5=8–15 cm, 6=15–25 cm, 7= >25 cm), dead/live (0,1), species codes (below)

Species codes: aspen (as); subalpine fir (sf); white fir (wf); Douglas fir (df); ponderosa pine (pp); limber pine (lp); Rocky Mtn. juniper (rmj); Utah juniper (uj); Gambel oak (go)

Regeneration and Recruitment Count (Tree Tally):

Within each belt transect, count all live regeneration (Class 1 = 0–0.5 m; Class 2 = >0.5–1 m; Class 3 = >1–2 m ht.) and all recruitment (Class 4 > 2 m ht. < 8 cm dbh) of aspen and conifer stems.

For regeneration (Class 1–3), note presence of any browse in upper/outer 15 cm (i.e., terminal leader and twigs) for each distinct aspen stem/clump. Record total stems browsed.

For recruitment (Class 4), count live stems by species. Note species.

Note: Multiple stems arising from the same point near the base should be counted as a single stem. In cases where either regeneration or recruitment arise from the base of a mature tree (Class 3) count the smaller stem classes as a separate stem. Do not count separate classes when unified clumps contain regeneration and recruitment; defer to the tallest stem for the class code.

Fecal Counts (Deer, Elk, Cattle):

For each species count pies or pellet groups within 30×2 m belt transects.

Pellet groups are defined as those consisting of > 3 pellets (Bunnefeld, et al. 2006).

After counting group disperse pellets/pies by kicking them apart and/or removing them from the sample transect area.

Stand Size/Mapping:

From the plot center walk due north until the obvious end of the aspen stand (mature tree crown drip line), termination of regeneration/recruitment stems, or the next aspen stems (any size) are > 30 m from grouped aspen. A single stem (any size) between 10 and 30 m from the previous stand edge should not extend the stand boundary.

Begin the data recorder polygon mapping program. Set boundary/polygon mapping resolution to 5 m. Set a marker flag at the starting point to make it easy to relocate.

Walk in a clockwise direction (i.e., E, S, W, N, E to starting point) using the 30 m rule described above. On the recorder's left side should be non-aspen vegetation-dominant types until they reach the starting point again.

Where an aspen stand is excessively large, dangerous obstacles occur (e.g., cliff, ravine, very steep slope, huge log, threatening beast, etc.) use the projection function in the data recorder.

Record the final aspen stand size in hectares and store the stand boundary polygon/map in the data recorder file with the associated plot number (this may be done automatically?).