

## Methods - Sampling

During the summer of 2001, eight treatment areas were sampled with a total of thirty-three sites sampled on three subsections (see Figures 1 & 2: GIS Maps) of the Fishlake National Forest. Treatments ranged in age from one to seven years old. Two areas (ten sites) had regeneration that resulted from lightning-ignited wildfires, four areas (thirteen sites) were clearcut or logged for aspen restoration and then the remaining slash was piled and burned, one area (two sites) was logged and the remaining slash left as natural exclosures, and one area (two sites) was clearcut and then burned a year later to remove the remaining subalpine fir (see Table 1). Sampling was completed during July through October 2001. The number of mil-acre plots sampled in each site ranged from nine to twenty-one and totaled 473 plots.

Figure 1 - Fishlake National Forest Subsections and Vicinity

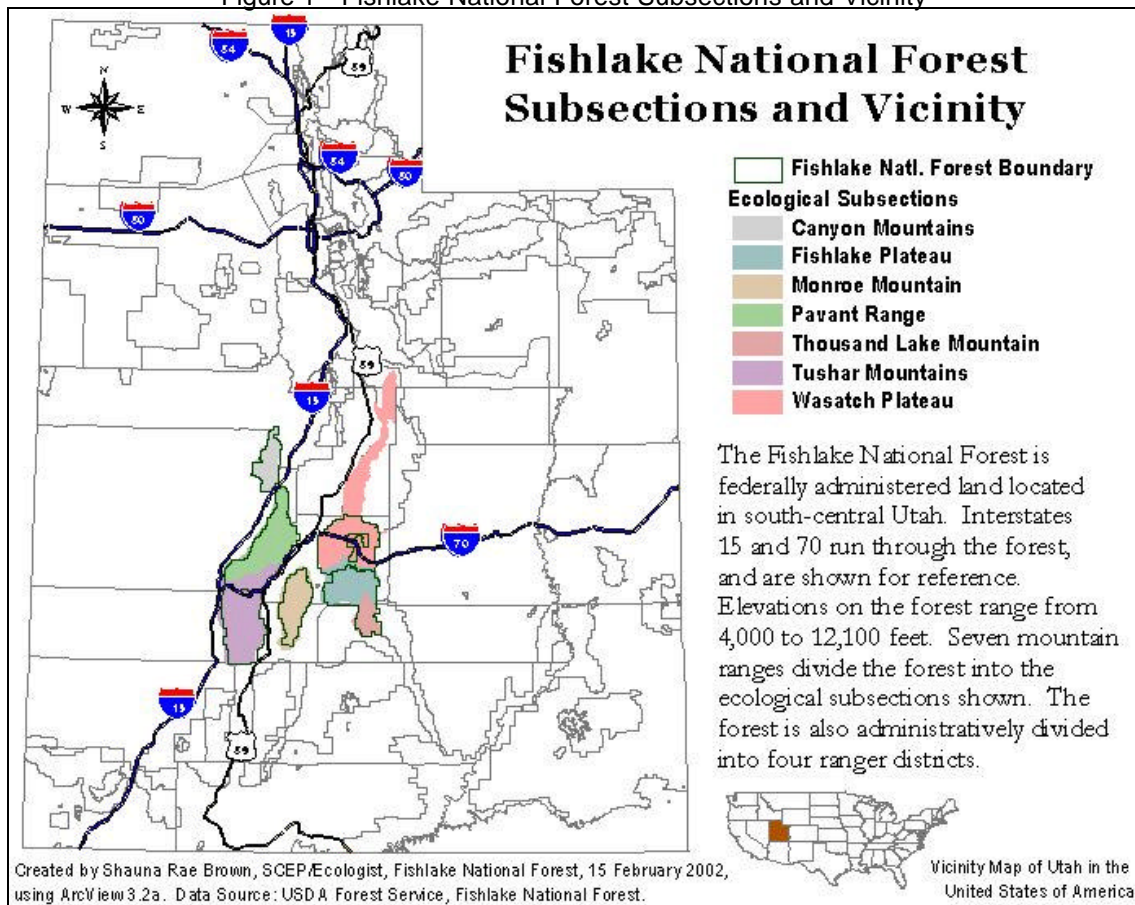


Figure 2 - Aspen Regeneration Sites Sampled

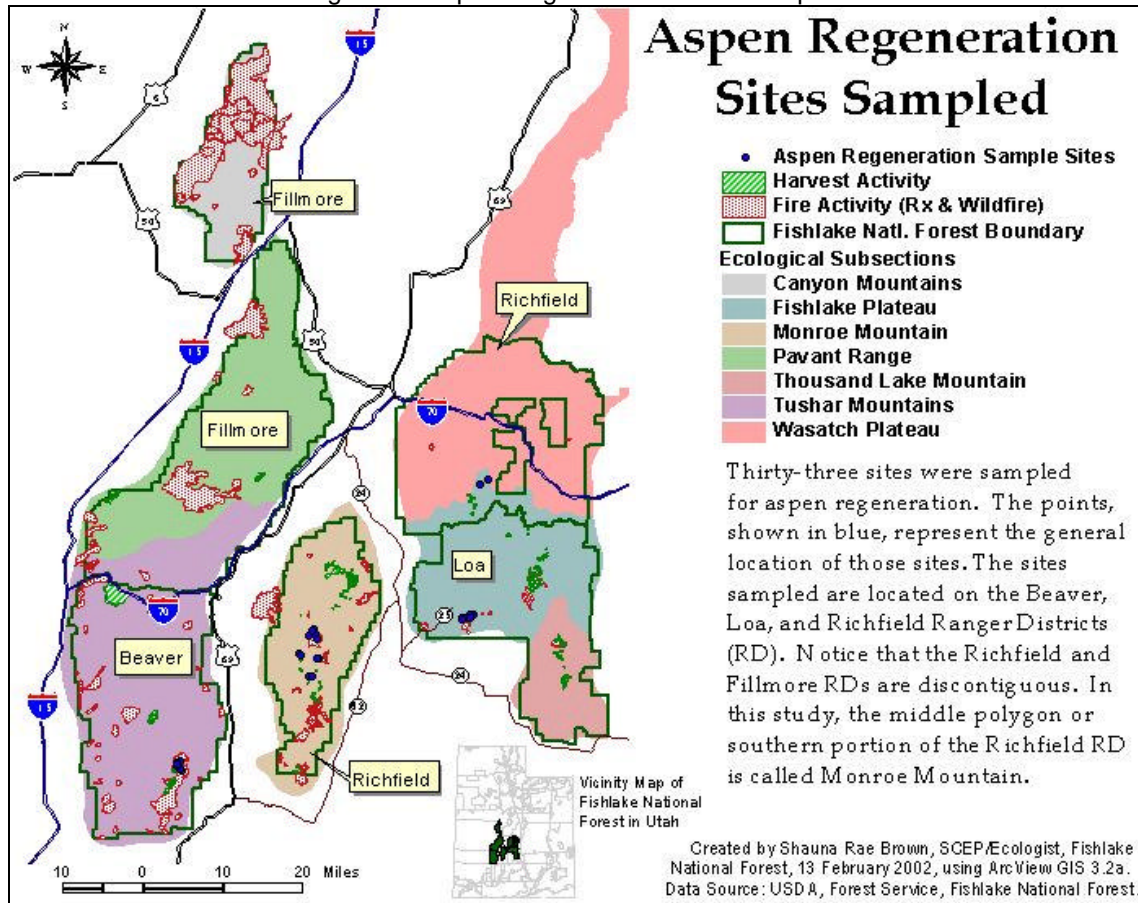


Table 1 - Treatment Area Descriptions				
Treatment Area	Area ID	Forest Subsection	Treatment	Sites Sampled
Briggs Hollow	BH	Fishlake Plateau	Clearcut with slash piled, then burned	8
Burnt Flat	BF	Monroe Mountain	Aspen harvest (clearcut)	3
Dry Creek	DC	Monroe Mountain	Clearcut with slash left in piles	2
Farnsworth	F	Fishlake Plateau	Aspen harvest with slash piled, then burned	2
Oldroyd Fire	OF	Monroe Mountain	Wildfire	6
Oldroyd Private Property	OPP	Monroe Mountain		
<ul style="list-style-type: none"> <li>• Conifer Harvest</li> <li>• Aspen Harvest</li> </ul>			Selective Conifer Harvest Clearcut Aspen Harvest	1 1
Pole Creek Fire		Tushar Mountains		
<ul style="list-style-type: none"> <li>• Grindstone Flat</li> </ul>	GF		Wildfire and wildlife & cattle exclosures	3
<ul style="list-style-type: none"> <li>• Rigger Park</li> </ul>	RP		Wildfire only	1
<ul style="list-style-type: none"> <li>• Rigger Park Harvest</li> </ul>	RPH		Wildfire and salvage harvest	4
White Ledge	WL	Monroe Mountain	Clearcut and entire site burned	2

For each treatment area or site, an initial randomly determined starting point was located by throwing a large nine-inch nail tied with flagging (plot selector) into the treatment area. To randomly determine the transect's direction, a watch with a secondhand was looked at and whatever direction the needle pointed became the direction of travel for the remainder of plots in that site. To help in maintaining a generally linear direction of travel, a landmark in the distance that matched the direction of the watch's secondhand was used for sighting the direction of throws.

The plot selector was thrown with the thrower’s back to the landmark so that the next plot could not be chosen, thus maintaining random plot selection. This was done for each plot. In the meantime, the remaining team members watched where the plot selector landed, to ease in finding it. In situations where one person sampled the site, the thrower sighted on the chosen landmark, closed their eyes, threw the nail as hard as possible, and then opened their eyes when the nail was released so that the location of the nail would be known.

At the point of the plot-selector, a survey pin was pushed into the ground to mark the plot’s center. The plot’s contents of ramets (suckers) were sampled using a 5-foot (152.4 cm) length of ¾-inch (1.9 cm) PVC pipe marked with a radius of 113.5 cm (approx. 3 ft. 9 in.) to mark a 0.001-acre circular plot. All ramets falling within the circle were counted and tallied according to combinations of size class and damage code (see Tables 2 and 3). Ramets that fell on the line of the radius were not counted as being in the plot. Only ramets whose base was fully in the plot were tallied.

Size Class	Measurement
1	0-46 cm (0-1.5 ft.) tall
2	46-137 cm (1.5 - 4.5 ft.) tall
3	137 cm (4.5 ft.) tall - 2.5 cm (1.0”) d.b.h.
4	d.b.h. > 2.5 cm (1.0 inch)
d.b.h.= diameter at breast height (4.5 feet off the ground on the uphill side of the tree.	

0 - No Damage	6 - Stem Wound
1 - Browsing	7 - Dead Leader
2 - Branches Stripped	8 - Mortality
3 - Basal Stem Wound	9 - Insects
4 - Frost	10 - Snow Break
5 - Disease	11 - Rodents

See Appendix B for descriptions and photographs of the various damage types encountered during data collection.

To easily place ramets in their appropriate size class, the measuring pole was also marked for the heights of size classes 1, 2 and 3. Team members would then call out a series of numbers

in a set order so that data could be easily recorded. For example, 1-1-3 would be understood to mean three ramets in size class one with browsing damage, and three dots would be placed on the line for size-class 1 with damage-code 1 (see Figure 3). Upon tallying the last ramet for the plot, the tallest ramet in each size class was measured for height and leader growth and then aged by counting growth rings along the main stem and/or branches of ramets. Also, some additional plot observations were made, including the presence of animal sign (scat or tracks), sagebrush or conifers, and visual estimates of percent bare soil in each plot.

Figure 3 - Sample Data Sheet

SuckerForm2.doc

Aspen Regeneration Studies: Sucker Data Form					Date	
Site Name <i>Briggs Hollow #5 outside</i>			Plot Size & Plot Radius 0.001 acre / 113.5 cm		Date <i>July 18, 2011</i>	
Site ID # <i>M</i>		GPS Location <i>38° 21.91' N 111° 41.62' W</i>			Page <i>1</i> of <i>5</i>	
% Slope <i>20%</i>		Aspect <i>90°</i>		Elevation <i>9804ft</i>		
Recorder & Group Members: <i>Brandon, Lyn, BJ</i>					Directions to Site:	
					Notes:	

Plot Number	Size Class	Damage Code	Stems per plot	Height (cm)	Age (years)	Leader Growth (cm)	Plot Notes
1	0	1	6				15-20% soil cover
	9/1			15cm	1yr	15cm	
4	1	1	13				0% bare soil
	1	0	22				
	1	6	2				
	1	0	9				
	1	4	2				
	1	4	3				
	9/1			40cm	2	14cm	
7	1	0	17				15% bare soil
	1	1	5				
	1	6	2				
	1	6	16				
	1	4	8				
	9/1			24	1	24	
10	1	4	9				10% bare soil
	1	0	16				
	1	1	14				
	9/1			27	1	27	

Damage Codes		Definitions	Size Classes
0 = No Damage	6 = Stem Wound	Height = biggest in that size class	Measure to the top most bud
1 = Browsing	7 = Dead Leader	Leader = main stem (the year's growth)	1 = 0 - 46 cm (0 - 1.5 ft)
2 = Branches Stripped	8 = Mortality	d.b.h. = diameter at breast height	2 = 46 - 137 cm (1.5 - 4.5 ft)
3 = Basal Stem wound	9 = Insects	(4.5 ft up on the uphill side of the tree)	3 = >137 cm - 2.5 cm d.b.h.
4 = Frost	10 = Snow Break		4 = >2.5 cm (>1.0") d.b.h.
5 = Disease	11 = Rodents	5 ft = 152.4 cm	9 = End of plot

**Notes:** describe % bare soil per plot; presences of animals, animal scat, conifers or sage and their size; # of understory forb species; aspen suckers found mostly in natural enclosures like sagebrush; soil has low or high amount of organic matter...

See Appendix A for a blank data sheet.

For each site, GPS (global positioning system) location, elevation, percent slope and aspect data were collected. These data would later be used to plot the points on a GIS-generated map. Since plot selection was randomized, GPS coordinates serve only as a general location of the areas sampled. Fishlake National Forest maintains a GIS database containing orthographic (topographic) overlays, soil-type polygons, polygons showing some of the Forest's aspen treatment areas, wildland fire boundaries, and grazing allotment boundaries. These data would later be used in the analysis and display of the aspen regeneration data collected.

All collected data were input into a commercially available computer spreadsheet (MS Excel) to facilitate various calculations such as average number of stems per acre (both overall and divided into size classes), mean and median ages of stems per site, mean height of the tallest stems, percent no-damage, and percent animal damage.

The number of stems per acre was calculated using the following formula: ((total live stems per site)/(number of plots sampled per site))\*(the reciprocal of the plot size), or

$$\frac{\text{total live stems per site}}{\text{number of plots sampled per site}} \times \text{the reciprocal of the plot size}$$

For example, one site might yield 38,200 live stems per acre = (764 stems/20 plots) x (1/0.001 acre plot). Only live stems (all damage codes except #8, mortality) were used to calculate stems per acre.

Percent no-damage for a site was determined by totaling the number of stems with frost damage or no damage, dividing that number by the total number of stems in that site, then multiplying that fraction by 100. Similarly, the percentage of animal damage on a site involved summing the number of stems with damage codes 1, 2, and 3, then dividing by the total number of stems in that site, and multiplying by 100. These two percentages usually accounted for the majority of damage codes noted in a site.