

## Features of the Forest Canopy at Sierra Sooty Grouse Courtship Sites

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Basic features of the forest canopy were recorded at ten Sooty Grouse (*Dendragapus fuliginosus sierrae*) courtship (“hooting”) sites near Pinecrest, California, Stanislaus National Forest. The data were collected as part of a planned quantitative habitat model for Sierra Sooty Grouse. The focus of the present study was on large trees and canopy openings. An area of approximately 30 square miles was searched for grouse during peak hooting season (May 2006). All forest and terrain types present were searched. The locations of 49 individual hooting perch trees were recorded using GPS. Vegetation measurements were taken within 750 m x 750 m plots (0.56 sq. km / 139 acres) centered at clusters of hooting perch trees and in 50 m x 50 m (0.25 ha / 0.62 acre) plots centered at a random sample of individual perch trees.

The dominant tree species at hooting sites were red fir (*Abies magnifica*), white fir (*Abies concolor*), and Jeffrey pine (*Pinus jeffreyi*). Less frequent canopy species included lodgepole pine (*Pinus contorta*), sugar pine (*Pinus lambertiana*), mountain hemlock (*Tsuga mertensiana*) western white pine (*Pinus albicaulis*), and Sierra juniper (*Juniperus occidentalis*). Two of the ten hooting sites were dominated by firs alone. Six sites had Jeffrey pine as a significant co-dominant, and another two sites had lodgepole pine as a significant co-dominant.

The number of large trees at hooting sites is indicated in the table below:

		Number of large trees at 30 hooting sites (50 m x 50 m plots)		
		≥ 61 cm (24") dbh	≥ 76 cm (30") dbh	≥ 127 (50") dbh
Average:	/ 0.25 ha	13	8	1
	/ ha	52	32	4
	/ ac	21	13 *	1.6
Maximum:	/ 0.25 ha	27	16	4
	/ ha	108	64	16
	/ ac	44	26	6
Minimum:	/ 0.25 ha	3	1	0
	/ ha	12	4	0
	/ ac	5	1.6	0

\* Beardsley et al. (1999) consider large tree densities  $\geq 7$  trees / ac ( $> 30$ " dbh) to be indicative of old-growth in California red fir forest.

The diameters of large size-class trees ranged from 61 to 198 cm (24 - 78 in.) and averaged 87 cm (34 in.). The particular trees selected by male grouse for use as hooting perches averaged 97.9 cm (38.5 in.) diameter and ranged from 48.5 to 163.5 cm (19.1 - 64.4 in.) diameter. Only 4 (8 %) of the perch trees were smaller than CWHR large size-class (61 cm / 24"). Tree species most commonly used as hooting perches included Jeffrey pine (37 %), red fir (33 %), and white fir (22 %). In a few cases lodgepole pine (4 %) and sugar pine (4 %) were used.

Within the ten 0.75 sq. km study plots, forest canopy was delineated into areas of high, medium, and low density canopy cover (> 40 %, 10-40 %, and < 10 % canopy cover, respectively). The GIS diagrams attached to this report illustrate these cover density delineations in relation to hoot perch locations. Three of the hooting sites were dominated (> 50 % of the plot) by patches of dense forest canopy, with considerably less area of medium and low density canopy cover. The most densely forested plot was covered 88 % by dense canopy forest. Two sites were comprised primarily (> 50 %) of low density patches (forest openings or glades). The most sparsely forested plot was 60 % forest openings. Four hooting sites had approximately equal areas of high and low density canopy, along with lesser areas (14 - 25 %) of medium density canopy. A final site had significant areas (25 - 50 %) of all three cover classes. Hoot perches were typically located at or near sharp transitions, or edges, between canopy cover classes, as illustrated in the attached GIS diagrams.

The findings of this study indicate that Sooty Grouse hooting sites are located in open, mature, fir-dominated forest, where particularly large trees are present. Other types and ages of forest were searched in proportion to their occurrence, but no grouse were found hooting there. These findings largely contradict the prevailing beliefs that Sooty Grouse 1) are not closely associated with old forest and 2) generally benefit from timber harvest. The average number of trees >76 cm (>30") at hooting sites was well above the number considered to be indicative of old-growth forest (13 vs 7; Beardsley et al. 1999). This association with big trees warrants further investigation. The species' association with firs and pines is a reflection of the primary role these species in the grouse's diet. At the onset of hooting season conifer needles comprise nearly their entire diet. The species' association with the edges of canopy openings is probably related to the environmental requirements of their lek-like courtship and mating system. Forest openings provide high visibility, sprouting herbaceous plants (consumed in early spring), and patchy ground-level escape cover. The association with especially large trees may reflect an adaptation of males to enhance the broadcast range of their courtship songs. Large trees might also provide large patches of leafy cover for protection from raptorial predators while hooting.

Future, more in-depth analyses will address the variation observed in such variables as canopy openness and species composition, as well as assess the influences of terrain and harvest history on the structure and composition of hooting sites.

#### Legend for the attached GIS diagrams:

Large square: 750 m x 750 m (0.56 sq. km) study plot centered on a cluster of hooting perches.

Small squares: 50 m x 50 m plots centered on individual hooting perches (3 randomly-chosen perches / hooting area).

White dots: hooting perches (individual trees in which hooting grouse were detected).

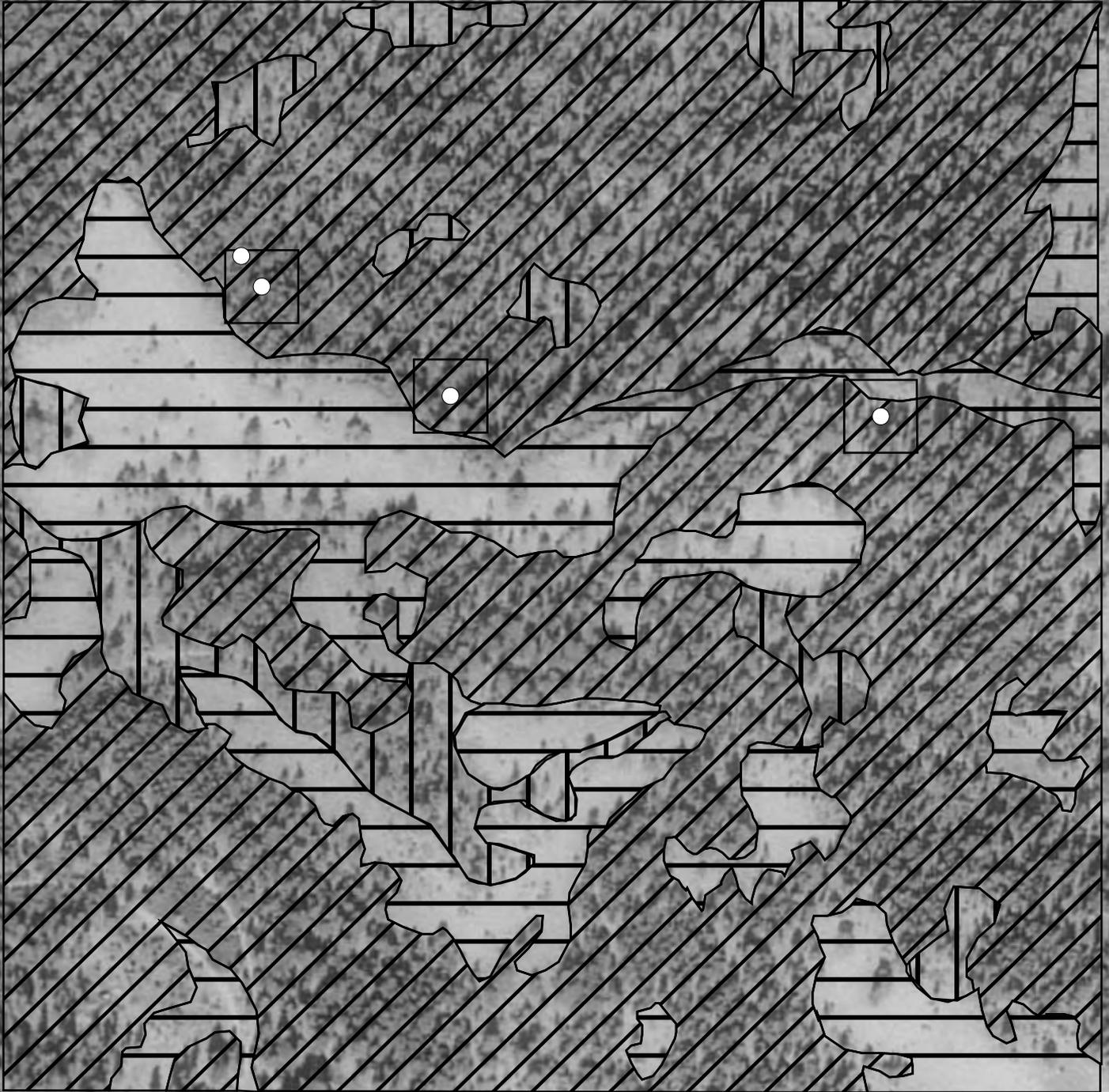
Horizontal hatching: Cover Class 1 (<10 % tree canopy cover).

Vertical hatching: Cover Class 2 (10 - 40 % tree canopy cover).

Diagonal hatching: Cover Class 3 (> 40% tree canopy cover).

# Area 1: Punch Bowl

Centered at N38:14:02 E119:57:39

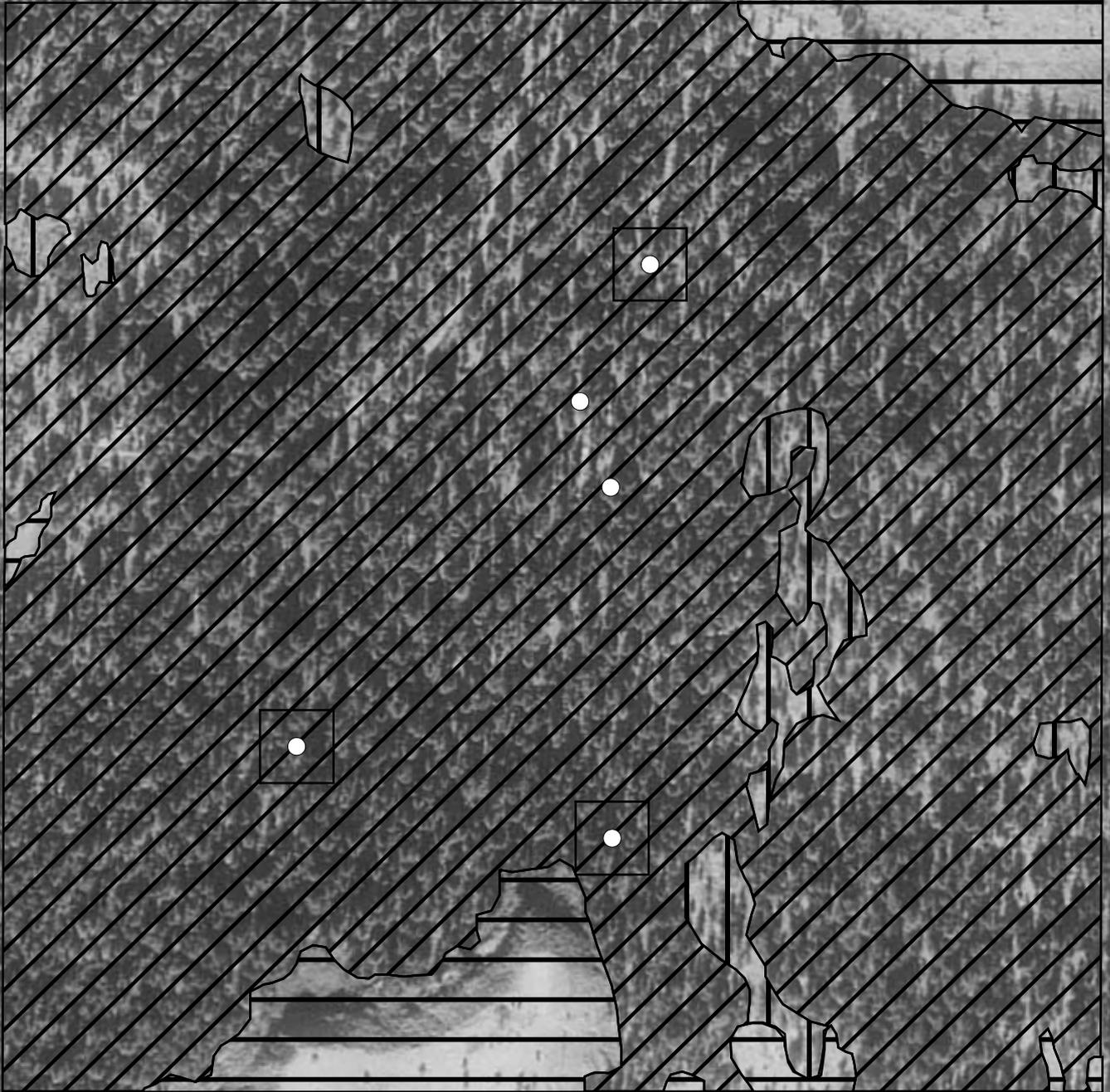


Cover Class Delineations

see text for details

# Area 2: Pike's Peak

Centered at N38:15:30 W119:58:06

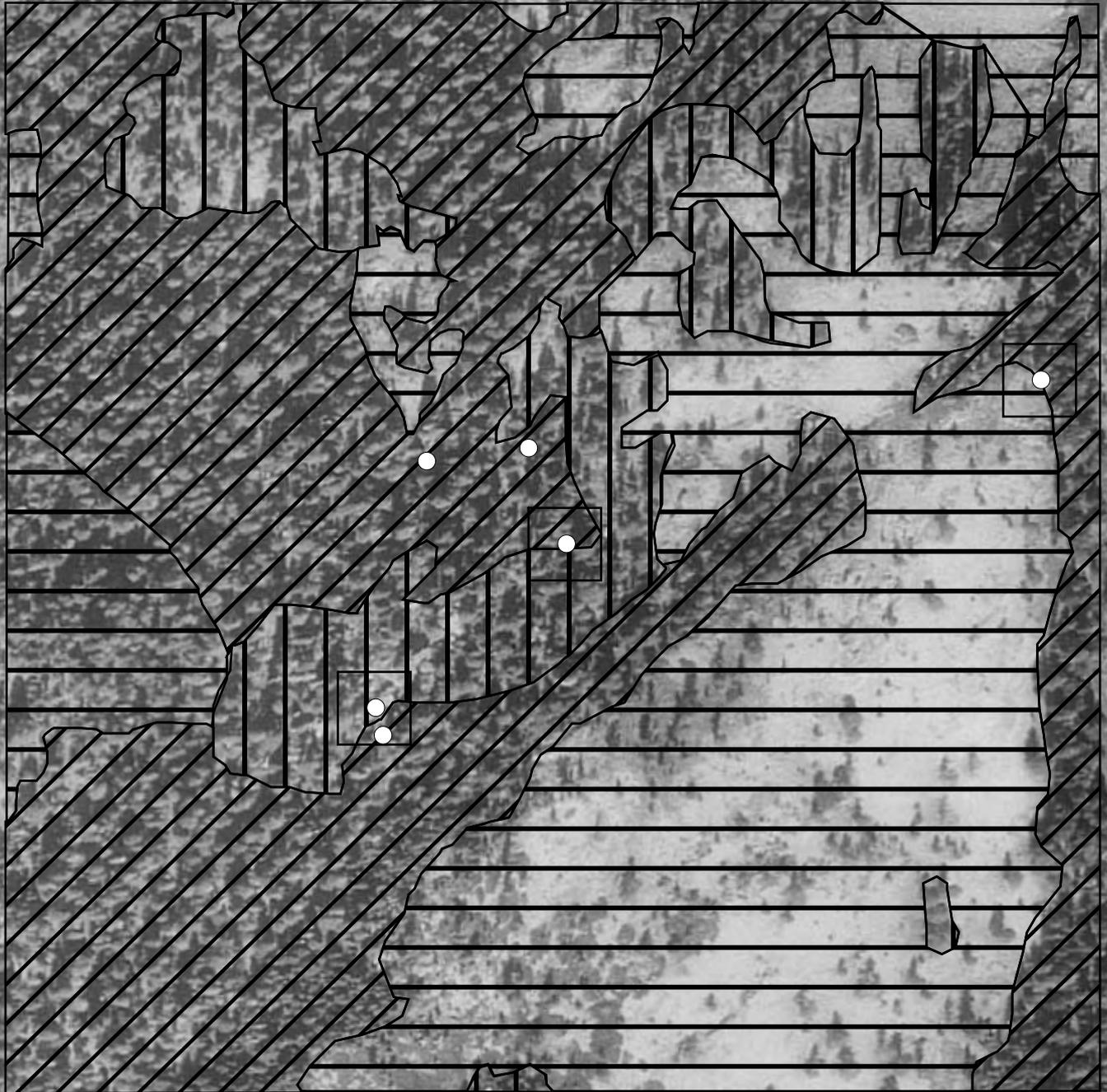


Cover Class Delineations

see text for details

# Area 3: Pinecrest Lookout

Centered at N38:13:17 E119:56:53

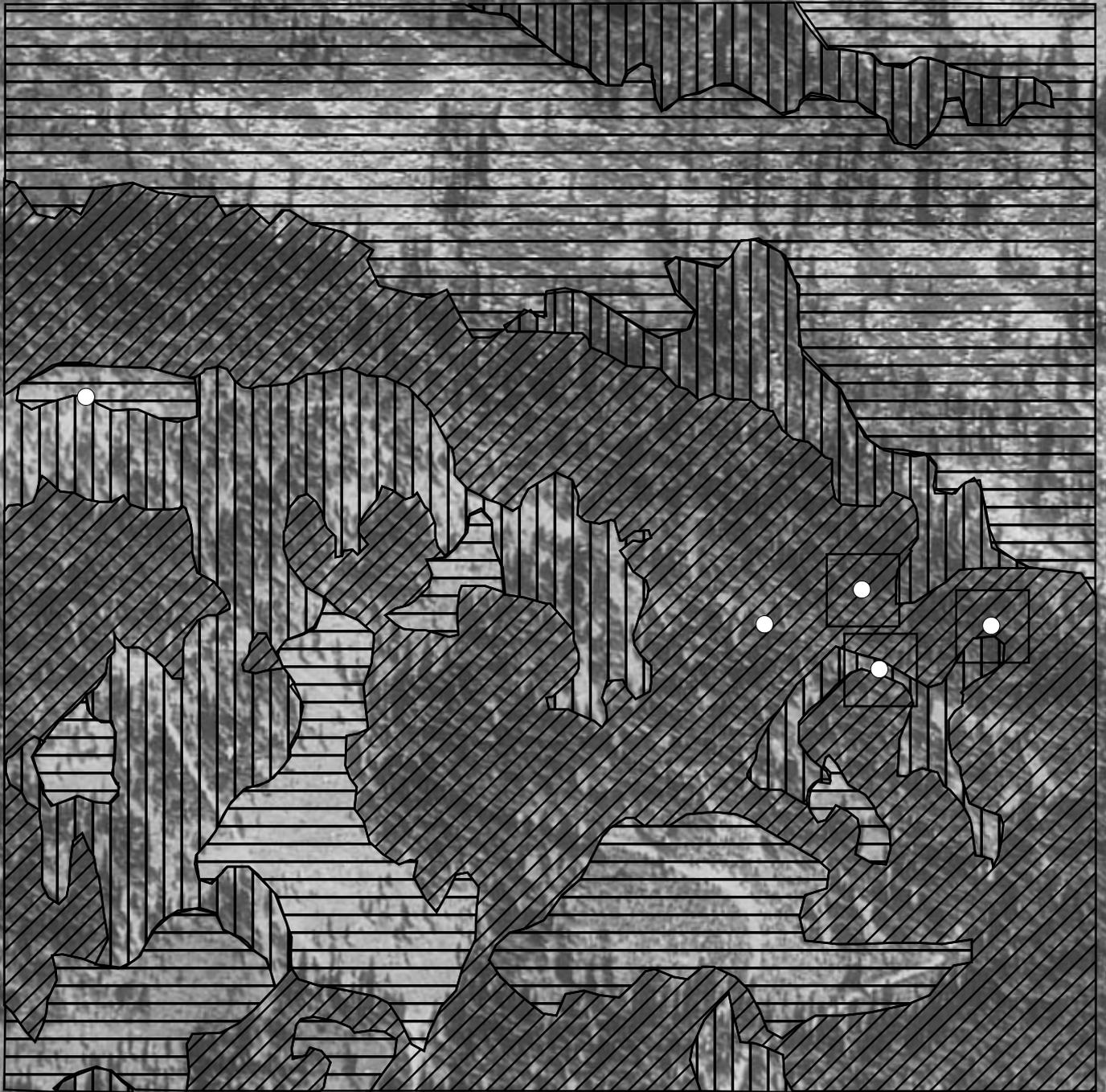


Cover Class Delineations

see text for details

# Area 4: Gooseberry

Centered at N38:11:55 E119:56:32

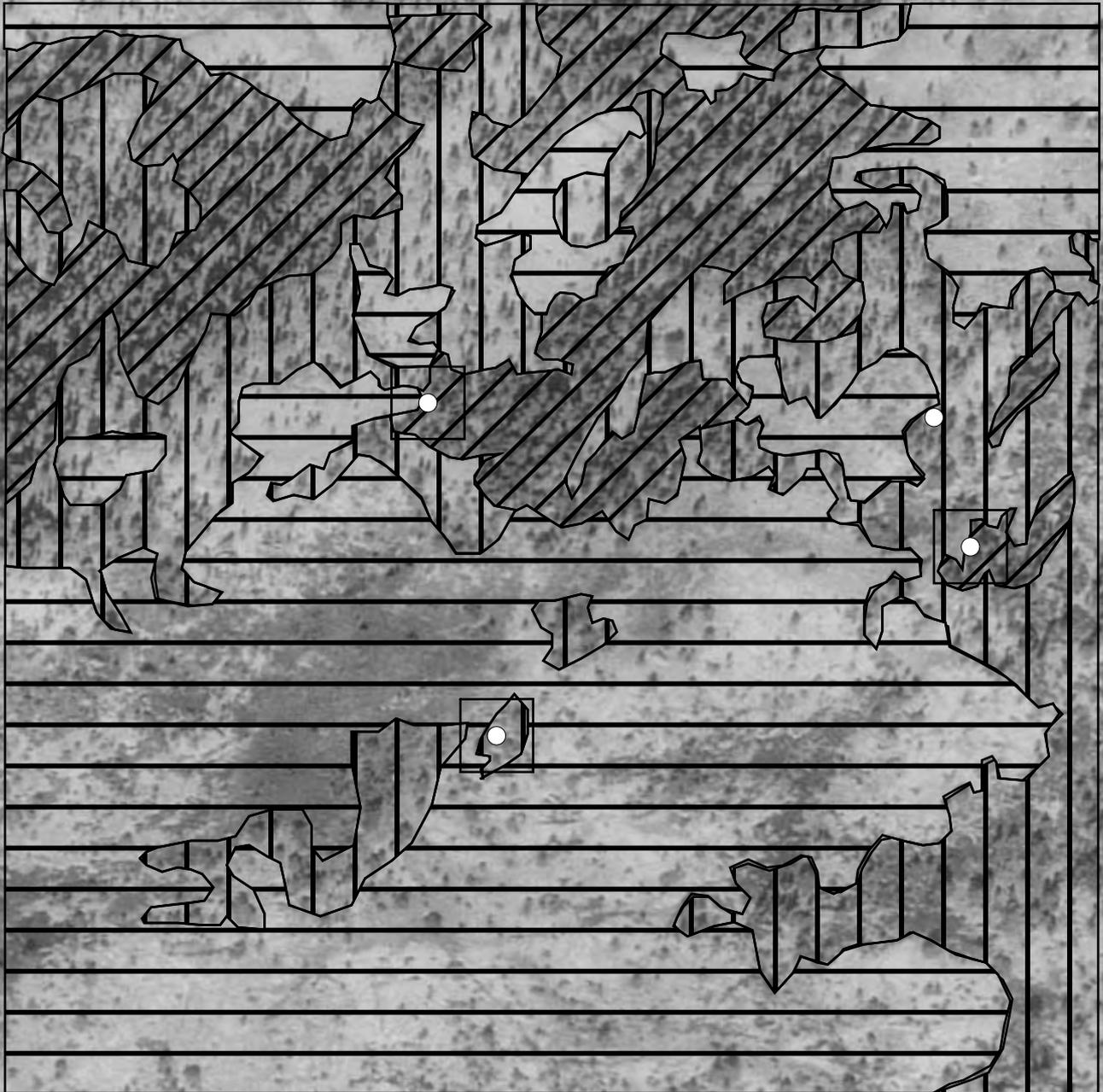


Cover Class Delineations

see text for details

# Area 5: Mad Hatter

Centered at N38:13:47 E119:53:49

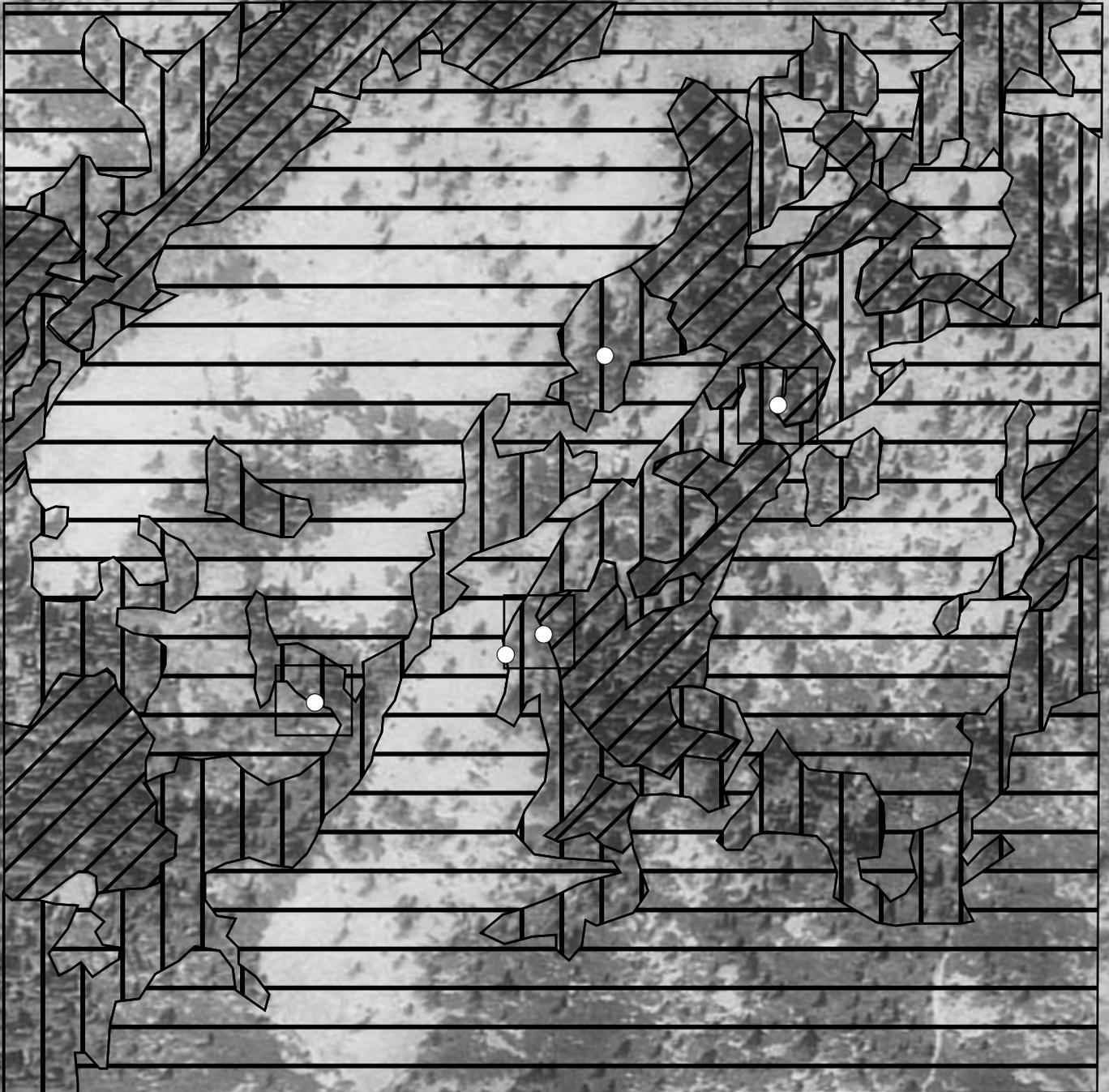


Cover Class Delineations

see text for details

# Area 6: Pinecrest Central

Centered at N38:13:01 E119:56:15

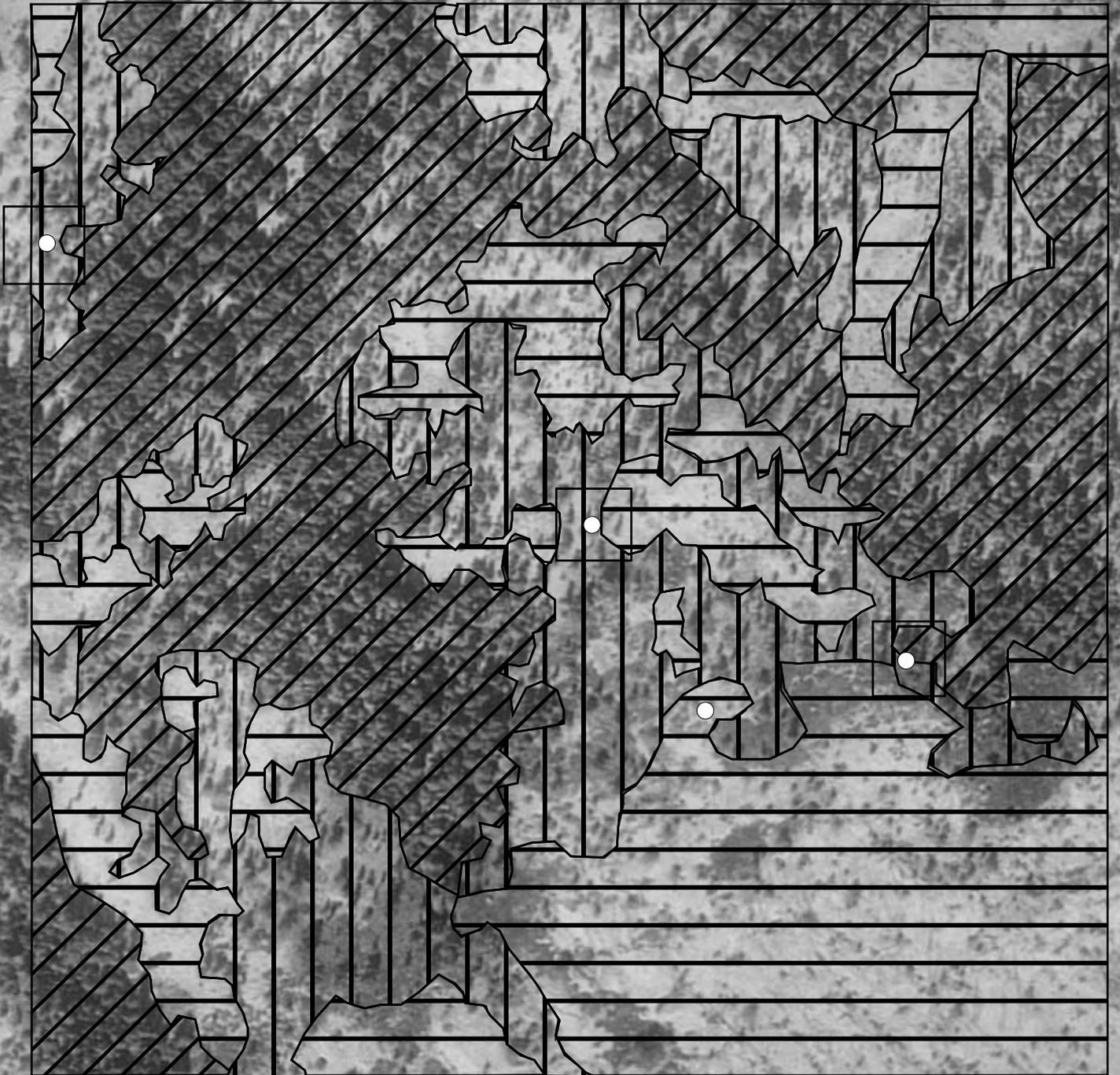


Cover Class Delineations

see text for details

# Area 7: Pinecrest Peak

Centered at N38:13:15 E119:56:15



Cover Class Delineations

see text for details

# Area 8: Bull Run

Centered at N38:15:29 E119:55:59

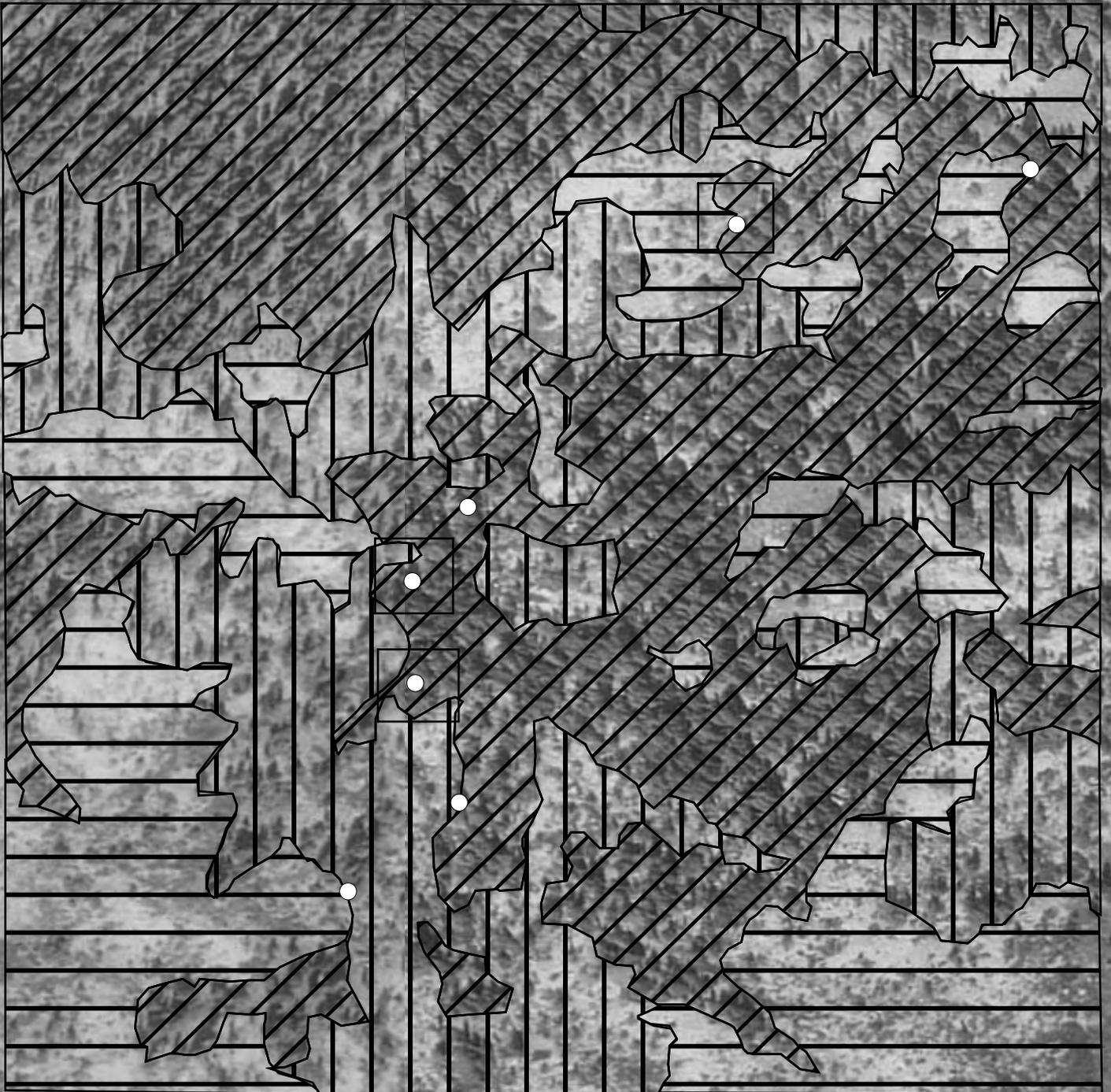


Cover Class Delineations

see text for details

# Area 9: Coyote Meadow

Centered at N38:13:48 E119:52:45



Cover Class Delineations

see text for details

# Area 10: Pinecrest Trailhead

Centered at N38:12:56 E119:56:52



Cover Class Delineations

see text for details