YOUNG STAND THINNING AND DIVERSITY STUDY: 10-YEAR POST-TREATMENT SUMMARY REPORT

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Introduction

The data from the 2006 measurement season were entered into a database (2006 YSTDS database.zip - enclosed). After error checking, we calculated summary information for comparison with earlier measurements made in 1997, 1999, and 2001. The purpose of this work was not a complete analysis of the data or preparation of a manuscript, but to provide basic information for management and for assessment of study conditions and trends. In most tables and figures, the 2006 summary statistics are presented in conjunction with earlier data to facilitate assessment of trends. Because of limited availability of funding, interpretation of the data and discussion of the results are not included here. However, we hope to add these at a future time.

Summary statistics

Mean values of each treatment unit were calculated by averaging the plot means, with the exception of the LG treatment unit. A weighted average of sub-treatment means was used to calculate the LG treatment unit means. Weights for each sub-treatment were based on the proportion of areas in each sub-treatment to total treatment areas (Davis et al. 2007).

Measurement of the overstory cover includes all live foliage, any part of tree bole, limbs, and/or snags with DBH > 5 cm. Any trees/shrubs < 5 cm DBH were ignored (however, this was sometimes impossible).

Abbreviations used:

Block:
CR=Cougar Reservoir (Block 1)
MC=Mill Creek (Block 2)
CF=Christy Flats (Block 3)
SC=Sidewalk Creek (Block 4)

Treatment:
C=control (~650 TPH)
HT=heavy (~125 TPH)
LT=light (~250-300 TPH)
LG=light with gaps (~250-300 TPH with 0.2 ha gaps every 2 ha)

Note:

[FS118x] refers to the data file used.

For more details about methodology of field measurements and data summary refer to the YSTDS field manual created by Gary Rost (2006) and M.S. thesis written by Liane Beggs (2005).

Overstory

Overstory summary statistics were calculated using Liane Davis' SAS codes for comparison with the 1997, 1999, and 2001 data. Summaries include: DBH, basal area, trees per hectare, conifer and hardwood mortality, and overstory cover.

Table 1: Mean DBH (cm) for all trees ≥ 8cm DBH in post-treatment years 1, 3, 5, and 10. [FS1181]

Block	Treatment	1997	1999	2001	2006
CR	C	24.3	25.8	26.8	28.5
CR	HT	31.1	31.6	32.5	33.1
CR	LT	29.0	30.7	31.8	33.7
CR	LG	29.8	31.3	32.2	31.9
MC	C	26.8	28.7	29.9	31.4
MC	HT	26.9	27.8	28.5	30.3
MC	LT	27.8	28.9	29.6	30.9
MC	LG	26.9	27.5	27.9	28.4
CF	C	25.5	27.2	29.1	30.3
CF	HT	35.2	36.6	38.7	40.6
CF	LT	32.8	34.6	37.0	41.1
CF	LG	32.6	35.2	37.2	39.9
SC	C	22.5	23.2	24.0	25.0
SC	HT	26.6	25.6	24.5	22.8
SC	LT	28.4	29.4	30.5	31.8
SC	LG	26.9	26.7	26.9	26.9

Table 2: Mean basal area (m^2/ha) for all trees ≥ 8cm DBH in post-treatment years 1, 3, 5, and 10. [FS1181]

Block	Treatment	1997	1999	2001	2006
CR	C	39.8	45.0	47.2	51.4
CR	HT	13.2	15.7	17.5	22.3
CR	LT	24.6	27.6	29.6	35.6
CR	LG	17.6	20.5	22.9	27.3
MC	C	46.7	50.3	52.5	56.3
MC	HT	21.1	23.2	24.9	25.0
MC	LT	31.5	33.7	35.6	35.3
MC	LG	27.0	29.7	29.4	30.0
CF	C	53.2	55.1	56.4	61.6
CF	HT	14.4	15.4	16.8	20.7
CF	LT	20.8	21.9	23.5	27.8
CF	LG	19.1	20.2	21.9	25.6
SC	C	38.7	39.7	41.0	41.5
SC	HT	11.8	13.3	14.6	17.6
SC	LT	20.4	22.0	23.4	25.4
SC	LG	15.4	16.8	18.0	19.4

Table 3: Mean trees per hectare for all trees ≥ 8cm DBH in post-treatment years 1, 3, 5, and 10. [FS1181]

Block	Treatment	1997	1999	2001	2006
CR	C	752.6	741.3	723.0	696.5
CR	HT	150.8	165.4	171.5	199.2
CR	LT	312.3	311.9	308.8	327.3
CR	LG	220.9	228.9	236.6	265.8
MC	C	655.2	613.6	593.6	588.8
MC	HT	283.0	289.6	292.2	304.3
MC	LT	414.7	408.3	408.0	425.3
MC	LG	345.5	357.3	326.5	378.2
CF	C	869.1	790.9	717.4	723.9
CF	HT	132.7	130.7	128.7	139.3
CF	LT	206.7	197.9	188.3	185.4
CF	LG	197.7	183.5	178.0	179.6
SC	C	791.8	770.6	747.1	732.9
SC	HT	165.4	190.8	216.2	287.7
SC	LT	277.3	279.3	276.0	290.0
SC	LG	224.7	240.9	244.3	267.3

Table 4: Conifer and hardwood (≥ 5cm DBH) % mortality by block and treatment. Data was collected in 2006, ten years post-treatment. [FS1181FULL]

Block	Treatment	Conifer (%)	Hardwood (%)
CR	C	4.0171	10.6383
CR	HT	0.3115	0
CR	LT	1.1317	0
CR	LG	1.5603	1.0638
MC	C	2.2115	4.023
MC	HT	1.2613	4.7782
MC	LT	0.479	0.8818
MC	LG	1.2797	0.3839
CF	C	4.5045	33.3333
CF	HT	0.905	0
CF	LT	1.5385	2.9851
CF	LG	0	4.7619
SC	C	1.363	2.5
SC	HT	0	0
SC	LT	0.9302	0
SC	LG	0.3995	0.5435

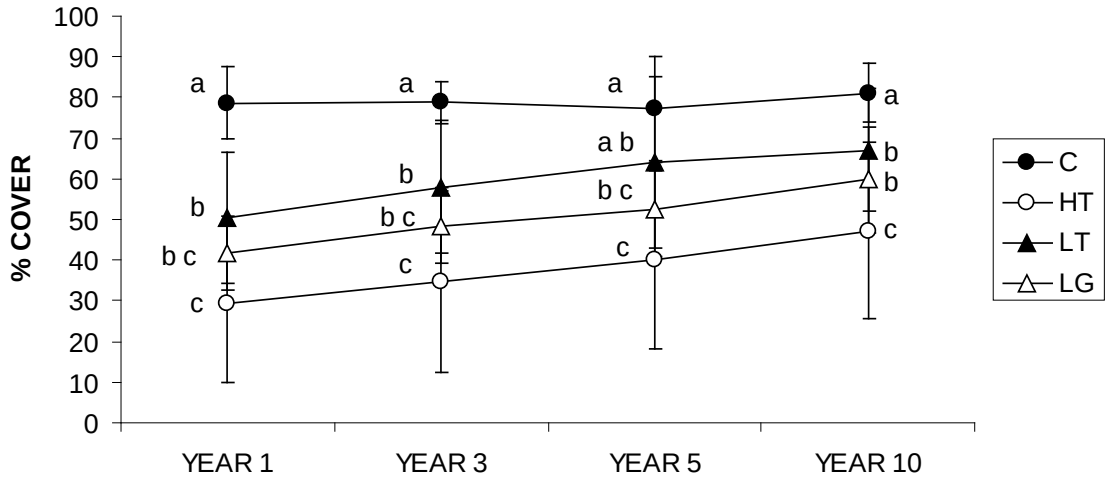


Figure 1: Overstory cover (%) by year (includes 95% confidence intervals). Letters indicate significant differences among treatments (treatments with the same letter do not differ at $P \leq 0.05$ level). [FS1185]

Table 5: Mean percent overstory cover in post-treatment years 1, 3, 5, and 10. [FS1185]

Block	Treatment	1997	1999	2001	2006
CR	C	82.0	83.3	88.8	85.3
CR	HT	24.7	36.6	37.4	51.0
CR	LT	49.5	61.8	71.8	73.4
CR	LG	39.8	46.9	54.9	60.0
MC	C	82.3	76.3	76.0	84.5
MC	HT	45.5	53.7	59.7	62.4
MC	LT	61.9	68.0	75.4	77.4
MC	LG	49.8	57.0	61.5	71.1
CF	C	79.2	79.3	71.0	79.9
CF	HT	16.5	21.9	27.0	29.6
CF	LT	36.9	43.9	46.1	56.4
CF	LG	36.2	44.2	45.1	53.8
SC	C	70.4	76.7	73.1	76.0
SC	HT	30.8	26.7	36.2	45.7
SC	LT	53.3	58.4	63.1	61.8
SC	LG	41.7	45.6	48.5	54.2

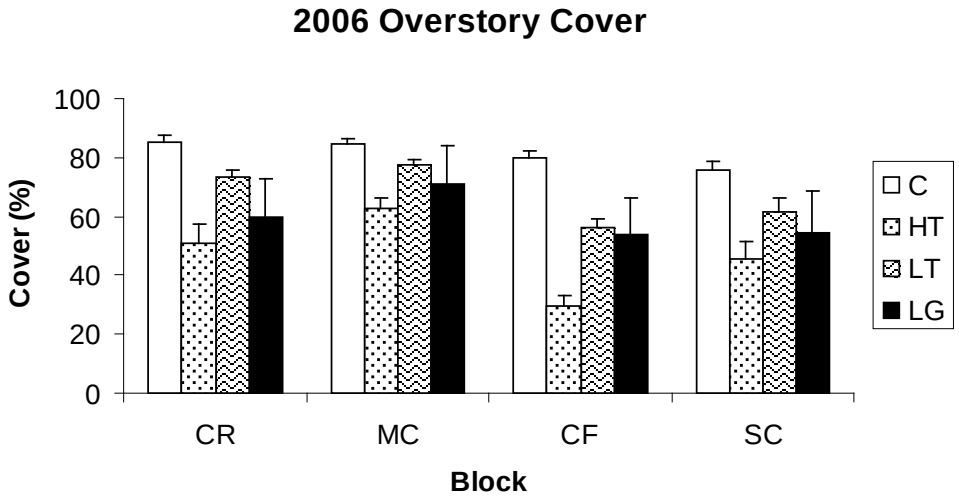


Figure 2: Ten-year post-treatment mean percent overstory cover by block (includes standard error bars). [FS1185]

Understory

Understory summary statistics were calculated using Liane Davis' SAS codes for comparison with the 1997, 1999, and 2001 data. Summaries include: seedling and sapling density, percent cover, and frequency.

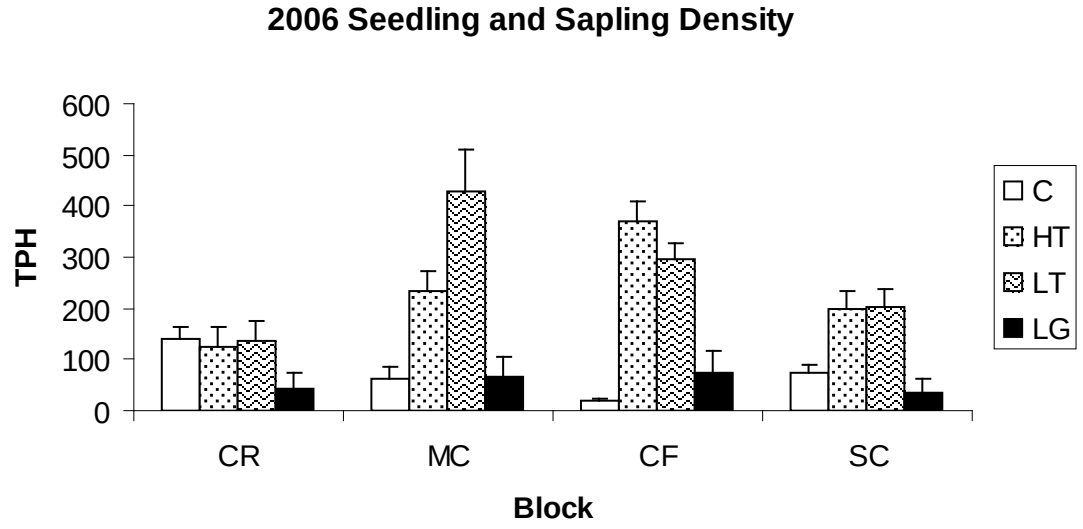
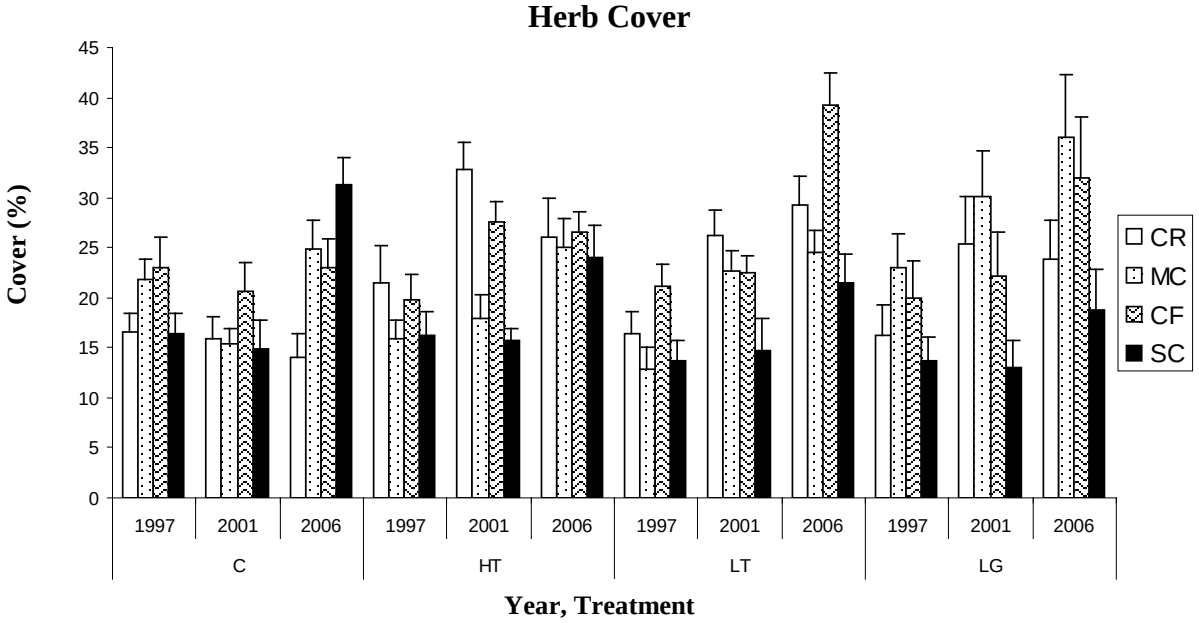


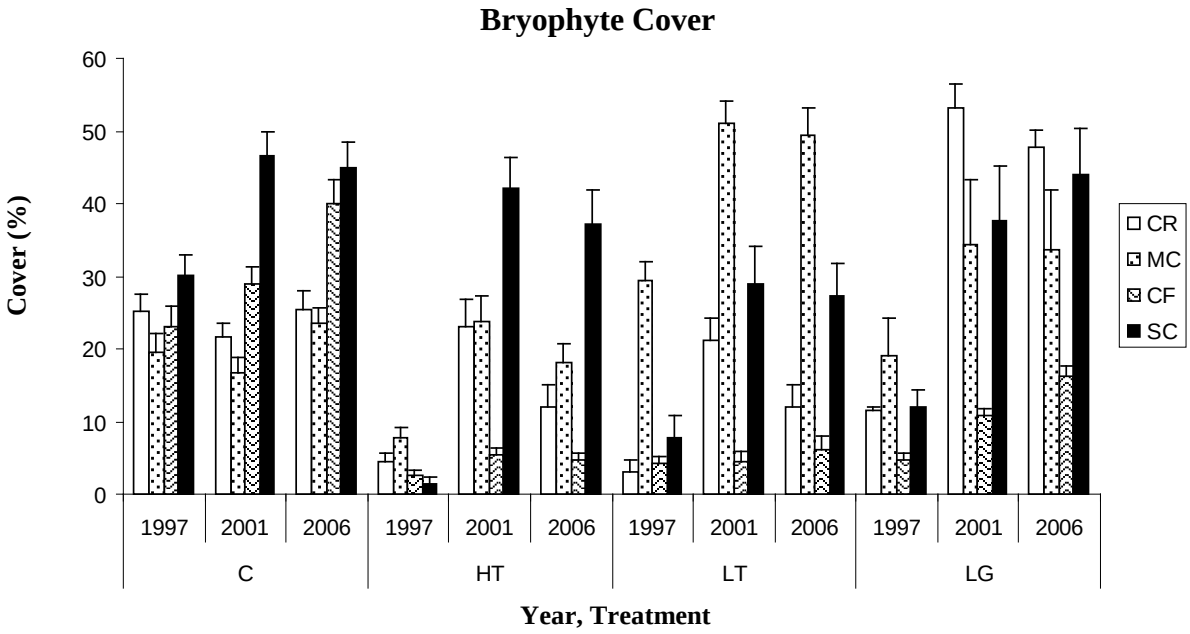
Figure 3: Ten-year post-treatment mean seedling and sampling density (TPH) by block (includes standard error bars). [FS1186]

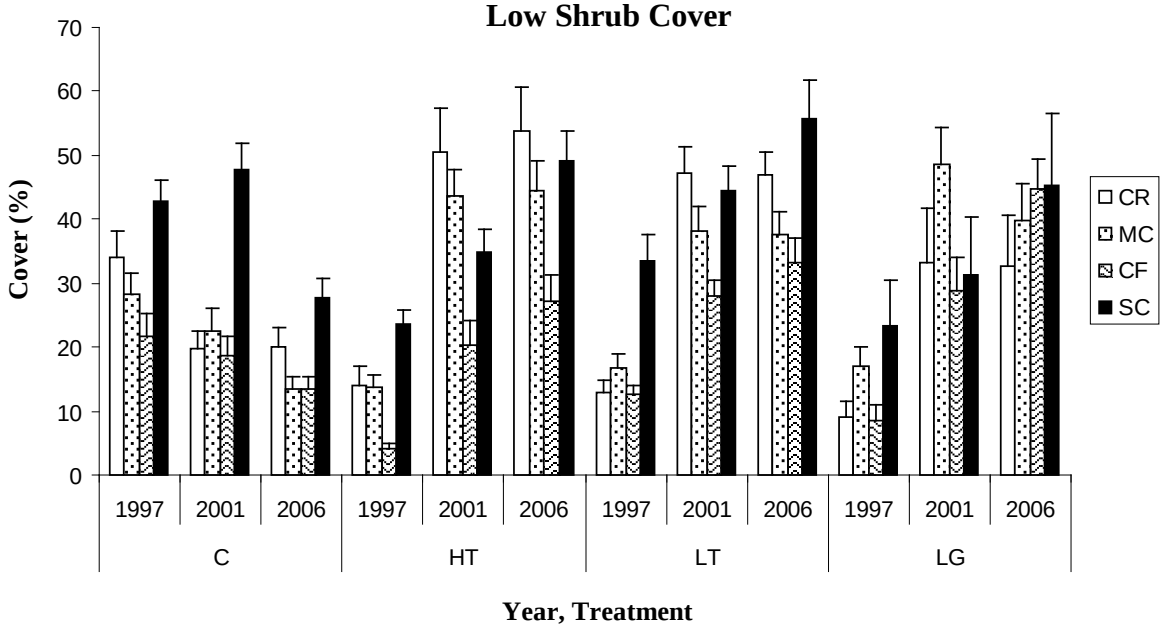
Table 6: Mean percent cover for herbs, bryophytes, low shrubs, and tall shrubs/small trees in post-treatment years 1, 3, 5, and 10. [FS1182 and FS1184].

Block	Treatment	1997	1999	2001	2006
HERBS					
CR	C	16.5	16.9	15.8	14.1
CR	HT	21.5	30.2	32.8	26.0
CR	LT	16.5	21.9	26.2	29.2
CR	LG	16.2	22.0	25.4	23.8
MC	C	21.8	19.2	15.5	24.8
MC	HT	16.0	19.1	17.9	25.0
MC	LT	12.9	20.1	22.7	24.6
MC	LG	23.0	25.3	30.1	36.0
CF	C	23.1	18.1	20.6	23.0
CF	HT	19.7	24.5	27.6	26.5
CF	LT	21.1	20.9	22.5	39.3
CF	LG	20.0	29.3	22.2	32.0
SC	C	16.4	11.7	14.9	31.2
SC	HT	16.2	20.5	15.7	24.0
SC	LT	13.7	15.7	14.8	21.4
SC	LG	13.7	16.6	13.1	18.7
BRYO					
CR	C	25.1	21.5	21.8	25.4
CR	HT	4.5	5.8	23.1	12.1
CR	LT	11.5	27.3	53.1	47.9
CR	LG	3.0	5.0	21.1	12.0
MC	C	19.5	16.7	16.8	23.5
MC	HT	7.8	11.7	23.7	18.1
MC	LT	19.0	20.8	34.4	33.6
MC	LG	29.5	24.6	51.0	49.3
CF	C	23.0	24.9	28.9	39.9
CF	HT	2.5	2.3	5.3	4.7
CF	LT	4.8	5.8	10.8	16.3
CF	LG	4.4	6.6	4.5	6.1
SC	C	30.2	36.3	46.5	44.9
SC	HT	1.4	21.9	42.2	37.3
SC	LT	12.0	25.3	37.7	43.9
SC	LG	7.7	26.6	29.0	27.3
LOWSHR					
CR	C	34.1	29.5	19.6	20.1
CR	HT	13.9	36.5	50.6	53.8
CR	LT	9.0	22.5	33.4	32.8
CR	LG	13.0	28.9	47.2	46.8
MC	C	28.4	23.1	22.6	13.5
MC	HT	13.8	37.0	43.7	44.6
MC	LT	16.9	30.6	48.5	39.9
MC	LG	16.8	25.3	38.0	37.6
CF	C	21.7	16.1	18.8	13.4
CF	HT	4.1	10.3	20.2	27.1
CF	LT	8.4	18.5	28.9	44.8

CF	LG	12.7	30.1	27.9	33.2
SC	C	42.7	35.7	47.8	27.6
SC	HT	23.6	34.1	34.8	49.0
SC	LT	23.3	33.1	31.2	45.4
SC	LG	33.6	39.8	44.6	55.7
TAL SHR/SM TREE					
CR	C	38.4	35.2	28.7	32.9
CR	HT	25.0	36.2	36.1	55.5
CR	LT	12.8	16.2	12.7	19.6
CR	LG	24.3	31.0	32.0	42.3
MC	C	42.8	44.9	42.2	47.3
MC	HT	21.3	32.2	33.0	43.7
MC	LT	13.4	20.8	21.4	30.4
MC	LG	14.2	22.5	30.1	31.3
CF	C	53.5	54.6	56.2	56.9
CF	HT	0.9	2.9	3.3	12.7
CF	LT	6.5	12.4	13.2	19.1
CF	LG	9.9	11.7	11.6	17.2
SC	C	39.8	46.0	48.4	45.8
SC	HT	27.4	36.3	27.4	37.9
SC	LT	20.6	31.3	28.6	39.4
SC	LG	15.0	16.2	16.0	21.2




Bryophyte Cover
Cover (%)
60
50
40
30
20
10
0
CR
MC
CF
SC
1997
2001
2006
C
HT
LT
LG
Year, Treatment


Low Shrub Cover
Cover (%)
70
60
50
40
30
20
10
0
CR
MC
CF
SC
1997
2001
2006
C
HT
LT
LG
Year, Treatment

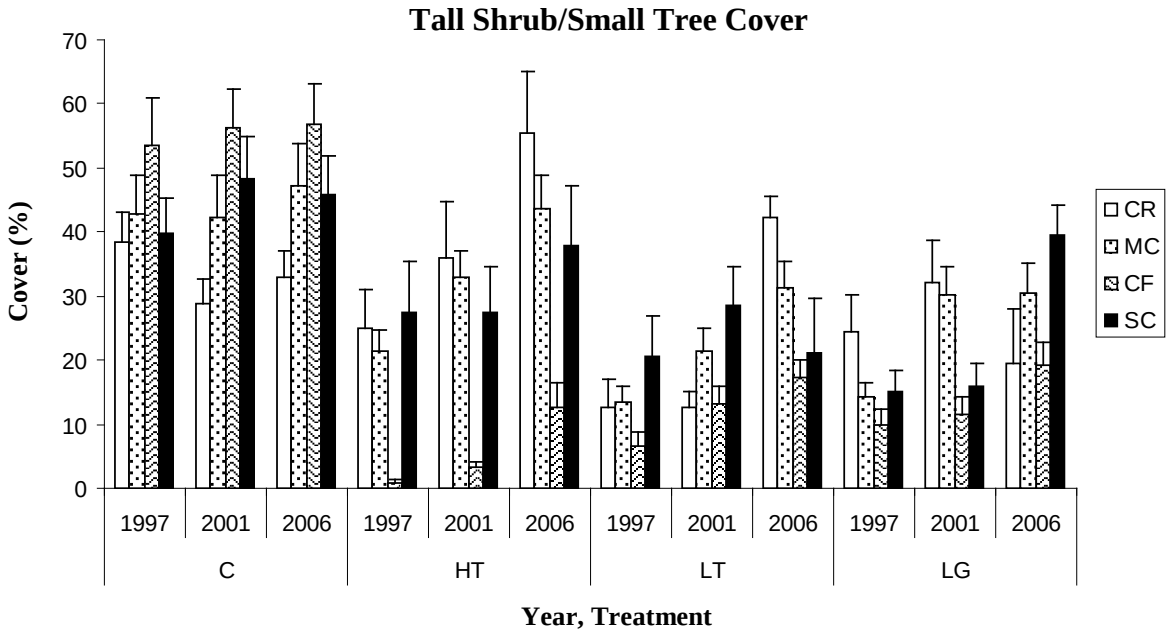


Figure 4: Mean percent cover for herbs, bryophytes, low shrubs, and tall shrubs/small trees in post-treatment years 1, 5, and 10. [FS1182 and FS1184].

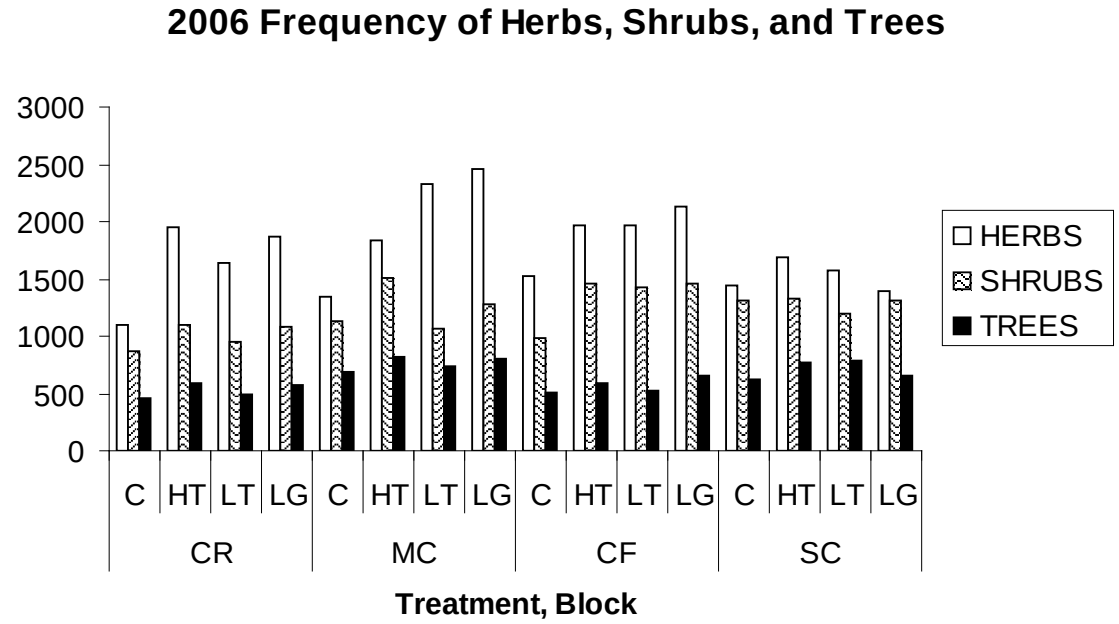


Figure 5: Frequency of herbs, shrubs, and trees 10-years post-treatment. [FS1183]

Chamerion angustifolium, *Goodyera oblongifolia*, and *Hypericum perforatum* are representative of indicator, old-growth associate, and weedy species, respectively.

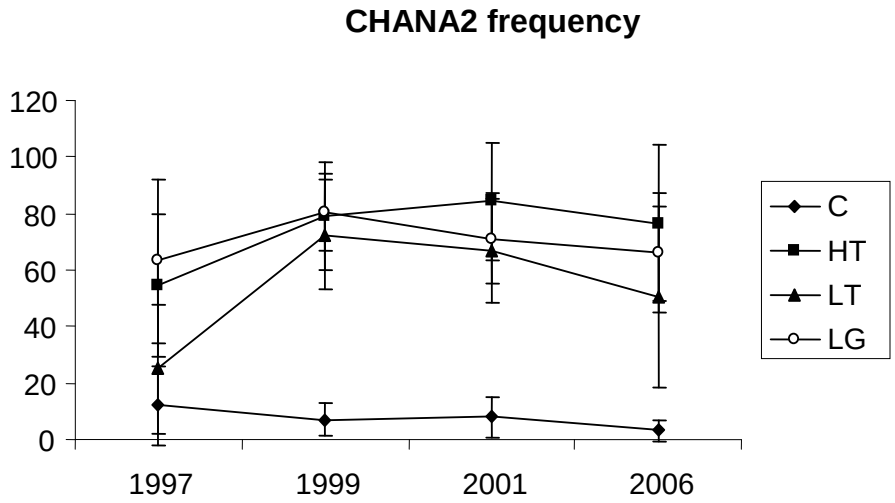


Figure 6: Frequency (includes standard deviation) of CHANA2 (*Chamerion angustifolium*; "fireweed") for post-treatment years 1, 3, 5, and 10. CHANA2 is considered an INDICATOR species. [FS1183]

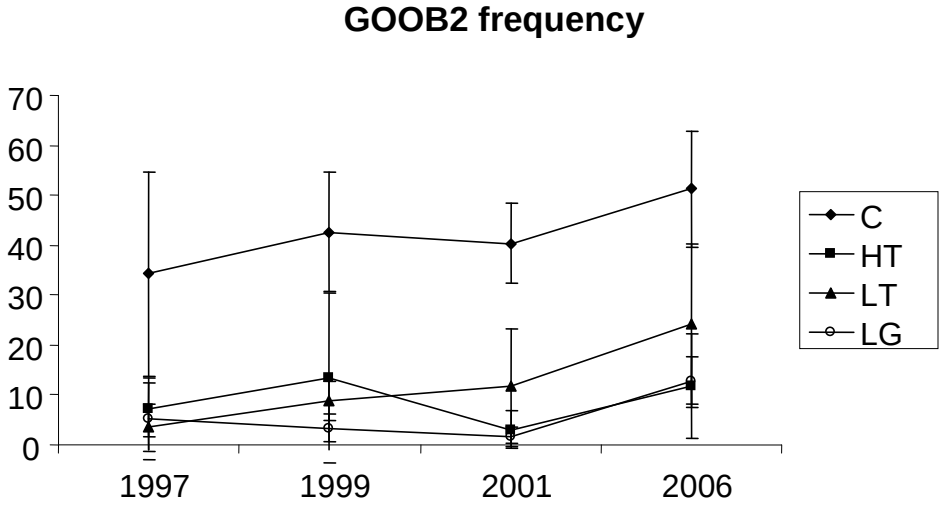


Figure 7: Frequency (includes standard deviation) of GOOB2 (*Goodyera oblongifolia*; "rattlesnake plantain") for post-treatment years 1, 3, 5, and 10. GOOB2 is considered an OLD GROWTH ASSOCIATE species. [FS1183]

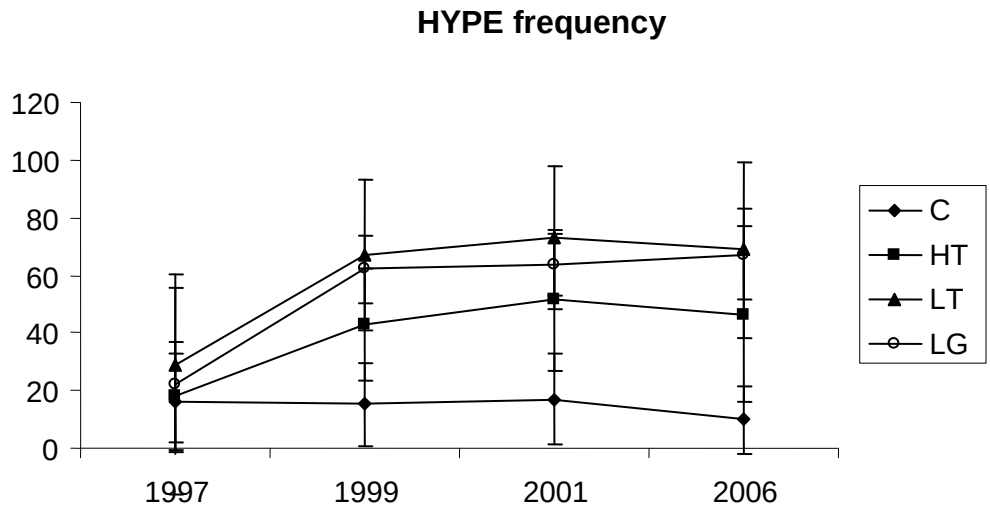


Figure 8: Frequency (includes standard deviation) of HYPE (*Hypericum perforatum*; "John's wort") for post-treatment years 1, 3, 5, and 10. HYPE is considered a WEEDY species. [FS1183]

References

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