EFFECTS OF INTENSIVE PINE PLANTATION MANAGEMENT ON WILDLIFE HABITAT QUALITY IN SOUTHERN MISSISSIPPI

By

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Concerns that increased pine plantation management intensity may negatively impact wildlife habitat quality is a major issue to forest landowners. I evaluated effects of 5 pine plantation management regimes varying from low to high intensity on pine growth, vegetative community characteristics, deer habitat potential, and small mammal communities during years 1 and 2 post-treatment, on 4 timber industry stands in southern Mississippi. Pine growth generally increased with treatment intensity. Most vegetative characteristics were associated negatively with treatment intensity. Total forage value estimates indicated that the least-intensity treatment provided the most deer forage due to greater species richness and understory canopy cover. However, nutritional carrying capacity estimates indicated that a moderate-intensity treatment provided the most foraging potential due to increased biomass of greater-quality forages. Small mammals experienced limited impact. Quantifying relationships between pine plantation

management intensity and wildlife habitat quality will allow resource managers to make better informed land management decisions.

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But He knows the way I take; when He has tested me,

I shall come forth as gold.

– Job 23:10

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Let the reader understand that the MSU Thesis Guidelines required me throughout this thesis to write "I sampled," "I measured," etc.; in reality, this was an enormous, team effort by more people than I could ever thank in this short chapter.

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God Bless You All

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CHAPTER I

INTRODUCTION

Timber production is a major economic industry in the southeastern US and intensive management of pine plantations is common to maximize fiber production. Pine plantation acreage in the Southeast is expected to nearly double by 2030 (USDA 1988) with a near tripling of harvest yields by 2050 (Haynes 2002), thus implying necessity of overall management intensity. The trend of intensively managed pine plantations is primarily driven by financial considerations and concerns about future timber supplies (Sedjo and Botkin 1997).

Management strategies at stand initiation typically include use of mechanical and chemical site preparation, and herbicide tank mixes combined with post-planting herbaceous control applications are common to reduce the planting and canopy closure interval. As demands for timber products and the ability to quickly produce these products increases, stand rotations likely will become shorter (Borders and Bailey 1997) accompanied by an increase of overall management intensity.

A trade-off exists between maximizing timber yield and managing associated vegetation for wildlife. Loblolly pine (*Pinus taeda*) yields can be increased greater than five-fold in the southern US with site preparation herbicides (Glover and

Zutter 1993). However, increasing intensity of site preparation can reduce abundance and diversity of woody and herbaceous plant species depending on herbicide type (Miller et al. 1999), rate (Zutter and Zedaker 1988), proportion of the area receiving treatment (Schabenberger and Zedaker 1999), and additive effects of mechanical site preparation (Harrington and Edwards 1996).

The silvicultural goal of intensified pine management is to reduce vegetative competition with pine seedlings and to shorten the time between planting and canopy closure. Due to the importance of vegetative structure and composition on distribution and abundance of wildlife (Howell et al. 1996), total or near-total control of herbaceous and woody vegetation during site preparation, followed by herbaceous control treatments and more rapid pine canopy closure may affect negatively biodiversity and habitat quality for early-seral species.

Previous studies have compared wildlife habitat and community responses on chemically- and mechanically-prepared sites, and among various chemical treatments (Howell et al. 1996). Typically, early seral vegetative and wildlife communities do not differ between mechanically-prepared sites and those sites receiving a single herbicide treatment at stand initiation (Miller and Chapman 1995). Small mammal populations are generally robust to habitat manipulations (Bowman et al. 2001) and have been documented to recover to pre-treatment levels within 2 years following mechanical or chemical site preparation (Brooks et al. 1994, O'Connell and Miller 1994). Similarly, other studies have found enhanced habitat conditions, or limited short-term impacts of chemical site preparation on habitat conditions for game (McComb and Hurst 1987) and nongame species (Brooks et al. 1994).

Timber industries are operationally concerned with establishing pine plantations that maximize economic return from timber production. Much of the prior research concerning site preparation effectiveness on pine growth and the resulting vegetative communities that influence wildlife habitat potential was not approached from an operational standpoint (e.g., experimental plots <1 ha in size, treatments involving complete vegetation control for >2 years). Thus, their results, although providing valuable information, did not address industry operational expectations.

I established a gradient of 5 pine plantation management intensities on 4 timber industry stands in the Mississippi Lower Coastal Plain using varying levels of mechanical and chemical site preparation and herbaceous weed control. Treatment intensity ranged from "low" for treatment 1 to "high" for treatment 5, and were expected to develop distinct communities representing a gradient in vegetation management intensity and potential pine growth and wildlife habitat response.

The goal of my research was to quantify effects of 5 operational pine plantation management regimes on pine survival and growth (Chapter II), vegetation community characteristics and deer habitat quality (Chapter III), and small mammal community characteristics (Chapter IV). I sampled stands prior to treatment during 2001 and at years 1 and 2 post-treatment during 2002 and 2003. I hypothesized that treatment intensity would alter response variables and predicted pine growth response would be associated positively with treatment intensity and that vegetative characteristics, deer habitat quality, and small mammal community characteristics would be associated negatively with treatment intensity.

Quantifying relationships between pine plantation management intensity and the vegetative characteristics that affect wildlife populations and habitat quality will allow resource managers (e.g., industrial and non-industrial timber owners, state wildlife agencies) to make land management decisions that optimize timber production while giving consideration to socially important wildlife values.

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CHAPTER II

EFFECTS OF PLANTATION MANAGEMENT INTENSITY ON LOBLOLLY PINE (*PINUS TAEDA*) GROWTH IN MISSISSIPPI

Abstract

Management intensity of southeastern US pine plantations has increased markedly over past decades, with an emphasis on timber production. I established a comparison of five pine plantation management intensities in the Mississippi Lower Coastal Plain (LCP, $n = 4$), using a gradient of levels of mechanical and chemical site preparation and herbaceous weed control. Treatments varied from "low" for treatment 1 to "high" for treatment 5, and were expected to produce a gradient in vegetative and pine growth response. I monitored herbaceous and woody ground cover, woody stem density, pine survival, and pine growth during years one and two post-treatment (2002 and 2003). Herbaceous cover, woody cover, and woody stem density decreased as treatment intensity increased. Survival was less on treatment 5 and decreased slightly on all treatments during 2003. Pine height and diameter increased as treatment intensity increased, except for treatment 2 (i.e., no mechanical site preparation), indicating the importance of subsoiling and bedding in the LCP. After two growing seasons, a combination of mechanical and chemical site preparation followed by one or two years of broadcast herbaceous weed control maximized pine growth.

Introduction

Forest management practices in the South have changed in response to market conditions, the Sustainable Forestry Initiative, environmental issues, uncertainties about public land timber supplies, and increased global competition (Wigley 2000). Rather than a single herbicide application at stand initiation, future management regimes likely will include herbicide tank mixes prior to planting to eliminate woody competition, followed by one or two years of herbaceous release treatments during the first and second growing seasons after planting. Additionally, as production rates increase, stand rotations likely will become shorter (Borders and Bailey 1997).

Numerous studies have documented effects of herbaceous and woody control on pine growth. Herbaceous vegetation is the primary pine competitor early in stand development (Tiarks and Haywood 1986, Haywood and Tiarks 1990, Cain 1991), but control of herbaceous and woody components allows even greater pine growth (Pienaar et al. 1983, Bacon and Zedaker 1987, Miller et al. 1995). Additionally, the early pine growth advantage afforded by competition control often persists into later stand development stages (Pienaar et al. 1983, Glover and Zutter 1993).

Numerous site preparation methodologies are used by timber industries including mechanical and/or chemical treatments and may result in varying levels of competition control efficacy (Shiver and Martin 2002). Mechanical site preparation such as subsoiling improves pine survival and growth by increasing soil volume available to roots, thus increasing water and nutrient availability (Allen and Lein 1998). Bedding enhances survival and growth by consolidating topsoil and improving aeration in poorly drained areas (Smith et al. 1997). The combination of mechanical and chemical site preparation can be a more effective means of controlling competition than a single method used alone (Lauer et al. 1998), thus shortening the time required to meet silvicultural goals of site preparation.

Timber industries are operationally concerned with establishing pine plantations that maximize economic return from timber production. Much of the published research concerning site preparation effectiveness on pine growth was not approached from an operational standpoint (e.g., experimental plots <1 ha in size, treatments involving complete vegetation control for >2 years) and the results, although providing valuable information, did not address industry operational expectations.

The objectives of my research were to establish a gradient of operational pine plantation management intensities and quantify vegetative competition control and pine growth response along this gradient. I hypothesized that vegetative control and pine growth response would be altered by treatment intensity. I predicted that vegetative control would be associated negatively with treatment intensity and that pine growth would be associated positively with treatment intensity. The results of this research are a subset of a larger project investigating effects of intensive pine plantation management on wildlife habitat quality in the Mississippi Lower Coastal Plain.

Study areas and methods

The effects of five levels of pine plantation management intensity on vegetative control and pine growth were monitored on four tracts of land owned by timber industries in George, Lamar, and Perry counties in southern Mississippi. Vegetation on all stands was typical of the Mississippi Lower Coastal Plain (LCP, Pettry 1977). Stands were harvested during summer 2000–winter 2001, averaged 66 ha in size, and each was uniformly influenced by topography and drainages.

Soil associations were fairly consistent among the study sites. The McLaurin-Heidel-Prentiss association was common to two stands and was comprised of gently sloping, moderately well-drained, sandy and loamy soils. The McLaurin-Savannah-Susquehenna association, comprised of somewhat poorly drained, nearly level upland soils, occurred on one stand. The Prentiss-Rossella-Benndale association occurred on two stands and was characterized by loamy and fine sandy loam soils.

Management regimes (i.e., treatments) were selected to represent a range of operational intensities in timber industry stand establishment techniques. The regimes were expected to stimulate the development of distinct communities that represented a gradient in vegetation management intensity and potential pine growth response. Treatments were arranged in a randomized complete block design where each of the five treatments was assigned randomly to a ≥8-ha area within each of four stands. Management intensity, and thus expected pine growth impact, increased from "low" for treatment 1 to "high" for treatment 5.

Treatment 1 consisted of mechanical site preparation using a combination plow to subsoil, disk, and bed, pulled behind a bulldozer with a V-blade attached to the front to clear debris. A banded herbaceous control in year one was applied using 0.9 kg/ha of Oustar®.

Treatment 2 consisted of chemical site preparation using a mixture of 2.4 L/ha Chopper® Emulsifiable Concentrate, 5.3 L/ha Accord®, 5.3 L/ha Garlon 4, and 1% volume to volume ratio of Timberland 90 surfactant in a total spray solution of 93.6 L/ha.

A banded herbaceous control in year one was applied using 0.9 kg/ha of Oustar®. No mechanical site preparation occurred in Treatment 2.

Treatment 3 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A banded herbaceous control in year one was applied using 0.9 kg/ha of Oustar®.

Treatment 4 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A broadcast herbaceous control in year one was applied using 0.9 kg/ha of Oustar®.

Treatment 5 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A broadcast herbaceous control in years one and two was applied using 0.9 kg/ha of Oustar®.

All chemical site preparation treatments were applied during July–August 2001, and all mechanical site preparation was completed during September–December 2001. Year one herbaceous control applications were completed during March–April 2002 and year two herbaceous treatments were completed during March–May 2003.

Additional management characteristics were standardized across all treatment plots and blocks. Stands were planted during December 2001–January 2002. Pine tree seedlings were planted with 3.0 m between rows and 2.1 m between trees within a row, totaling 1,551 trees/ha. Each timber industry cooperator planted their own genetically-improved seedlings. Banded herbaceous control treatments were mechanically applied with a band width of 1.5 m, and broadcasted herbicide applications were applied aerially via helicopter. Stands were not burned. A broadcast fertilizer application of DAP at 280 kg/ha was applied to all treatments during April 2002.

All stands were intended to be machine planted to facilitate banding applications. However, two stands were hand planted due to greater debris loads remaining post-harvest. Banded herbaceous control was applied by hand on these two sites.

Woody stem density was evaluated pre-treatment (July 2001) and during years one and two post-treatment (June 2002 and June 2003). During 2001, density estimates of woody stems ≥0.5 m tall were obtained along five, randomly-located 30- x 2-m belted-transects within each treatment. During 2002 and 2003, estimates of woody stems ≥0.5 m tall within each treatment were obtained using 40, randomly-located 1-m^2 circular plots.

Vegetative communities were quantified during June 2002 and June 2003, years one and two post-treatment. Percentage ground cover of understory woody and herbaceous species was recorded using a modification of Canfield's (1941) line-intercept method within each treatment along 10, randomly-located 30-m transects. A 30-m buffer zone at treatment boundaries was excluded from sampling. Plants were identified by species and then categorized by forage type (i.e., herbaceous or woody).

Pine growth response was measured on each treatment plot to compare the effectiveness and competition control benefits of site preparation and herbaceous weed control treatments. One pine measurement plot (0.04-ha, 7 rows of 10 trees) was established within each treatment area. Height (m) and ground level diameter (mm) of seedlings were measured during June 2002, June 2003, and January 2004. Survival estimates were based on the 2002 and 2003 data whereas growth estimates were based on the 2002 and 2004 data.

I used a repeated-measures, mixed model analysis of variance to test for main effects of year and treatment and year × treatment interaction for woody stem density, woody canopy coverage, herbaceous canopy coverage, and pine survival, height, and diameter. I compared means among treatments ($n = 5$) and between years ($n = 2$) in SAS Proc MIXED (SAS Institute 2000). I treated stands (i.e., blocks, $n = 4$) as the random effect, years as the repeated effect, treatment × stand as the subject, and I chose a first order autoregressive covariance structure for the models because there was one time interval between sampling periods (Littell et al. 1996). I considered differences significant if $P < 0.05$. I compared means using Fisher's least significant difference with the LSMEANS PDIFF option (Littell et al. 1996). I tested normality and equal variance assumptions prior to each analysis. I square-root transformed variables with non-equal variances (Zar 1999). For ease of data interpretation, I presented actual means although I conducted analyses on transformed data.

Results

Site preparation reduced woody stem density (Table 2.1). The 3 dominant species detected prior to treatment were common persimmon (*Diospyros virginiana*), waxmyrtle (*Myrica cerifera*), and yaupon (*Ilex vomitoria*). There were no pre-existing differences in density of individual species and the total of all species among treatments ($F_{4,15} = 0.13$, $P = 0.974$). The site preparation treatments controlled all woody stems ≥0.5 m tall during the first growing season. The year effect was not consistent across all treatments for density of total species ($F_{4,27} = 4.82$, $P = 0.005$) and ranged from 1,625.0 trees/ha in treatment 1 to 0.0 trees/ha in treatment 5 during 2003. Density of yaupon ($F_{1,27} = 5.00$, $P = 0.034$) and other species ($F_{1,27} = 15.80$, $P \leq 0.001$) increased treatments during 2003.

Table 2.1. Woody stem density (trees/ha ≥0.5 m tall) for 5 pine plantation management regimes varying from low (1) to high (5) intensity at pre-treatment (July 2001) and at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment												
	1[b]		2[c]		3		4		5		*P*-value[d]		
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt[e]	Yr*trt
Pre-trt (2001)													
Common persimmon	675.0	149.8	283.3	96.8	591.7	162.0	233.3	50.4	158.3	54.7		0.169	
Wax myrtle	933.3	258.6	1,150.0	356.4	800.0	239.0	800.0	398.8	808.3	220.7		0.919	
Yaupon	391.7	100.6	658.3	219.1	525.0	188.2	400.0	107.7	408.3	144.3		0.993	
Other species	4,250.0	1,120.5	4,033.3	842.3	4,750.0	1,097.3	3,458.3	621.4	4,483.3	553.9		0.973	
Total	6,250.0	1,239.4	6,125.0	1,056.2	6,666.7	1,266.9	4,891.7	895.4	5,858.3	646.4		0.974	
Post-trt (2002)													
Common persimmon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1.000	0.014
Wax myrtle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1.000	0.036
Yaupon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.103	0.123
Other species	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1.000	0.062
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1.000	0.005
Post-trt (2003)													
Common persimmon	375.0 A[f]	168.7	0.0 B	0.0	62.5 B	62.5	62.5 B	62.5	0.0 B	0.0	0.008	≤0.001	
Wax myrtle	125.0 A	87.2	0.0 B	0.0	0.0 B	0.0	0.0 B	0.0	0.0 B	0.0	0.095	0.001	
Yaupon	125.0	87.2	187.5	105.4	0.0	0.0	0.0	0.0	0.0	0.0	0.034	0.103	
Other species	1,000.0	388.1	437.5	197.9	312.5	159.8	125.0	87.2	0.0	0.0	≤0.001	0.062	
Total	1,625.0 A	469.8	625.0 B	232.6	375.0 BC	168.7	187.5 BC	105.4	0.0 C	0.0	≤0.001	≤0.001	

[a] Actual means presented; analyses conducted on square-root transformed data.
[b] Within-treatment year effect ($P \leq 0.001$): *Diospyros virginiana*, *Myrica cerifera*, Total.
[c] Within-treatment year effect ($P < 0.05$): Total.
[d] Pre-treatment data analyzed for treatment effect only; post-treatment data analyzed for effects of year, treatment, and year x treatment interaction.
[e] When yr*trt interaction was significant, trt *P*-values represent within-year treatment effects.
[f] Means within rows followed by same letter do not differ ($\alpha=0.05$).

The year effect was not consistent among treatments for common persimmon ($F_{4,27}$ = 3.81, P = 0.014) and wax myrtle ($F_{4,27}$ = 3.00, P = 0.036). During 2003, common persimmon densities ranged from 375.0 trees/ha in treatment 1 to 0.0 trees/ha in treatments 2 and 5. Wax myrtle density increased during 2003 to 125.0 trees/ha in treatment 1 but remained at 0.0 trees/ha in all other treatments.

There was a year × treatment interaction for woody canopy coverage ($F_{4,27}$ = 3.82, P = 0.014) and herbaceous canopy cover ($F_{4,27}$ = 3.04, P = 0.034, Table 2.2). Woody coverage during the first growing season varied from a high of 19.5% in treatment 1 to lows of 2.8–3.5% in treatments 4 and 5. By the end of the second growing season, woody coverage showed a clear, negative association with treatment intensity, ranging from 71.0% in treatment 1 to 11.7% in treatment 5. During 2002, herbaceous coverage ranged from a high of 36.5% in treatment 2 to a lows of 2.5–3.4% in treatments 4 and 5. By the end of the second growing season, herbaceous cover was similar on treatments 1–4 with a high of 60.5% in treatment 2; treatment 5 had considerably less herbaceous cover at 17.3%.

Pine survival differed by year and treatment (Table 2.3). Survival decreased about 2% on all treatments during 2003 ($F_{1,27}$ = 4.62, P = 0.041). Survival varied among treatments ($F_{4,27}$ = 0.72, P = 0.038) averaging about 85% in treatments 1–4 and 73% in treatment 5.

There was a within-treatment year effect on height ($F_{4,27}$ = 8.81, $P \leq 0.001$) and diameter ($F_{4,27}$ = 9.56, $P \leq 0.001$) of pine trees (Table 2.3). There were no differences in pine height or diameter during 2002 indicating that all seedlings were of equivalent size when planted. However, a positive association between treatment intensity and pine

Table 2.2. Woody and herbaceous canopy coverage (%) for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment												
	1[b]		2[c]		3[c]		4[c]		5[d]		*P*-value		
Forage type	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt[e]	Yr*trt
Woody													
2002	19.5 A[f]	1.7	8.5 AB	1.5	8.8 AB	1.2	3.5 B	0.5	2.8 B	0.4		0.110	0.014
2003	71.0 A	5.1	35.5 B	3.1	53.9 C	4.7	41.5 BC	3.8	11.7 D	1.7	≤0.001	≤0.001	
Herbaceous													
2002	26.7 A	1.7	36.5 A	4.5	20.1 A	2.2	3.4 B	0.6	2.5 B	0.6		≤0.001	0.034
2003	50.6 A	1.9	60.5 A	3.4	48.8 A	3.1	48.8 A	3.3	17.3 B	1.9	≤0.001	≤0.001	

[a] Actual means presented; analyses conducted on square-root transformed data.

[b] Within-treatment year effect ($P < 0.01$): herbaceous; ($P \leq 0.001$): woody.

[c] Within-treatment year effect ($P \leq 0.001$): herbaceous, woody.

[d] Within-treatment year effect ($P < 0.10$): herbaceous.

[e] When yr*trt interaction was significant, trt *P*-values represent within-year treatment effects.

[f] Means within rows followed by same letter do not differ ($\alpha > 0.05$).

Table 2.3. Survival (%), height (m), and diameter (mm) of pine trees for 5 pine plantation management regimes varying from low (1) to high (5) intensity during the first and second growing seasons (June 2002 and June 2003) and the end of the second growing season (January 2004) in the Mississippi Lower Coastal Plain[a].

	Treatment										P-value		
	1[b]		2[b]		3[b]		4[b]		5[b]				
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt[c]	Yr*trt
Survival													
2002	84.3	8.4	86.4	5.5	88.2	5.4	87.1	6.9	74.6	11.4			
2003	84.3	8.4	85.7	5.6	85.4	4.4	86.1	6.7	71.4	9.6			
Combined	84.3 A[d]	5.5	86.1 A	3.6	86.8 A	3.3	86.6 A	4.5	73.0 B	6.9	0.041	0.038	0.585
Height													
2002	0.4	0.0	0.4	0.0	0.4	0.0	0.5	0.0	0.4	0.0		0.823	≤0.001
2004	2.1 A	0.0	1.8 B	0.0	2.2 A	0.0	2.5 C	0.0	2.5 C	0.0	≤0.001	≤0.001	
Diameter													
2002	7.4 A	0.2	6.2 A	0.1	7.5 A	0.2	8.2 A	0.2	7.5 A	0.2		0.543	≤0.001
2004	41.6 A	0.8	34.4 B	0.7	48.9 C	0.9	59.1 D	0.9	60.3 D	1.0	≤0.001	≤0.001	

[a] Actual means presented; analyses conducted on square root transformed data.

[b] Within-treatment year effect ($P \leq 0.001$): height and diameter.

[c] When yr*trt interaction was significant, trt P-values represent within-year treatment effects.

[d] Means within rows followed by same letter do not differ ($\alpha > 0.05$).

growth was evident by the end of the second growing season with trees in treatments 4 and 5 having greater heights and diameters than trees in all other treatments. Pine growth was greater in treatments receiving mechanical site preparation compared to the herbicide-only site preparation.

Discussion

A primary goal of site preparation is to reduce competing vegetation (Shiver and Martin 2002). Herbaceous vegetation was the most important component to control early in stand establishment due to its impact on pine survival and growth, and woody vegetation control is important from the standpoint of long-term yield limitation (Lauer et al. 1998). The chemical site preparation tank mixture was designed to target these vegetation components. The benefits from the negative associations between treatment intensity and herbaceous and woody canopy cover during the first growing season were evident in the positive associations with pine height and diameter by the end of the second growing season.

Removal of the hardwood vegetative component is important from the standpoint of a long-term pine growth advantage (Shiver et al. 1991, Harrington et al. 1998). The control of woody stems in all treatments during the first growing season, indicates that herbicides were not required for a short-term response. However, re-colonization of woody species was evident during the second growing season and treatment 1 had the greatest woody density increase because it did not receive an application of site preparation herbicides. Prior research also has documented relatively short-term effects (i.e., 2–3 growing seasons) of mechanical or chemical site preparation in combination with herbaceous weed control on vegetative communities (Blake et al. 1987, Keyser et al. 2003).

Identifying the cause of the pine survival decrease during year two was difficult due to high variability associated with loblolly seedling survival during the first year post-planting (Amateis et al. 1997). Sources of mortality during this period typically include seedling care at the nursery and planting site, length of seedling storage, planting crew quality, and first-year climatic conditions (Amateis et al. 1997). Pine survival was less on treatment 5, implying a treatment-related decrease. However, treatments 4 and 5 were operationally equivalent (i.e., treatment 5 had not received its second broadcast herbaceous control) when survival was measured. Two sites, with seedlings originating from the same source, had considerably less survival, 69 and 73%, compared to the other two stands with survival of 92 and 97%. Survival within treatment 5 was particularly low within the two lesser-survival stands. There were no topographic features on these two stands that would decrease survival (i.e., poorly drained areas) and rainfall was not above normal levels during the first growing season. Both of these stands were hand planted, thus survival decreases may be attributable to poor planting and/or poor seedling condition at the time of planting. Intensive management does not necessarily imply increased survival (South et al. 2001), although survival increases have been documented from mechanical site preparation followed by herbaceous weed control (Tiarks and Haywood 1986) as well as mechanical and chemical site preparation followed by herbaceous weed control (Yeiser et al. 2004).

The combination site preparation treatments resulted in a 1.2 fold increase in pine height and a 1.3 fold increase in pine diameter as compared to the mechanical only and chemical only treatments. Coupled with the fact that pine height and diameter was less in treatment 2, the importance of mechanical subsoiling and bedding in the Mississippi Lower Coastal Plain was evident, as supported by other studies on coastal sites (Amateis et al. 1997, Allen and Lein 1998, Lauer et al. 1998).

The lack of differences in pine growth between treatment 4, receiving one year of broadcast herbaceous control, and treatment 5, receiving two years of broadcast herbaceous control was noteworthy. These results indicated that multiple years of herbaceous weed control were not necessary to maximize growth after two growing seasons. Differences in pine growth could develop in subsequent years, as complete vegetation control for multiple years has proven to promote greater pine growth (Pienaar et al. 1983, Cain 1991, Miller et al. 1995, Borders and Bailey 1997). However, it is typically not operationally feasible for timber industries to broadcast vegetation control for multiple years due to high treatment costs, environmental concerns (Morrison and Meslow 1983), and wood quality concerns (Clark and Schmidtling 1989). Bacon and Zedaker (1987) reported that herbaceous weed control applied at the beginning of the second growing season provided the greatest release from competition, indicating that differences may become evident between treatments 4 and 5 during subsequent growing seasons.

Broadcast herbaceous control (i.e., treatments 4 and 5) promoted greater pine height and diameter growth indicating that complete herbaceous control was biologically more effective than banded control. Dougherty (1990) spot-sprayed 0.6-, 1.2-, 1.8-, and 2.4-m diameter circles around individual trees and reported that pine height and diameter increased significantly when competition was controlled ≥1.8-m around each tree.

Treatments that received banded herbaceous controls in this study had only 0.8 m treated on either side of the tree, which may not be enough growing space to produce a competitive advantage.

Conclusions

Timber industries in the Southeast are operationally concerned with establishing pine plantations that maximize timber production. Management regimes including the combination of mechanical and chemical site preparation promoted the greatest pine growth by controlling competing vegetation and providing soil amendments to improve root development and nutrient availability. Mechanical subsoiling and bedding were essential for increased pine growth and chemical control was essential for long-term control of woody species. Broadcast herbaceous applications more effectively controlled competing vegetation and promoted greater pine growth, although there were no differences between one and two years of broadcast herbaceous control. To maximize timber production in the Mississippi LCP, combination site preparation followed by one year of broadcast herbaceous weed control was the most effective management regime.

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CHAPTER III

EFFECTS OF INTENSIVE PINE PLANTATION MANAGEMENT ON VEGETATION COMMUNITY CHARACTERISTICS AND WHITE-TAILED DEER HABITAT QUALITY IN SOUTHERN MISSISSIPPI

Abstract

Pine management strategies typically include the use of mechanical and chemical site preparation, and herbicide tank mixes combined with post-planting herbaceous control applications are common to reduce the interval from planting to canopy closure. To address concerns that increased site preparation intensity may negatively impact vegetation communities important as white-tailed deer (*Odocoileus virginianus*) forage, I evaluated effects of 5 pine plantation management regimes varying from low to high intensity on vegetative community characteristics and deer habitat potential. I sampled during 2002 and 2003, years 1 and 2 post-treatment, on 4 timber industry stands in southern Mississippi. There was a clear, negative association between treatment intensity and vegetative characteristics of most forage types during 2002. These differences were reduced during 2003 as vegetation re-colonized. Total forage value estimates indicated that the least-intensity treatment provided the most deer forage due to greater species richness and understory canopy cover. However, nutritional carrying capacity estimates

indicated that a moderate-intensity treatment provided the most deer-days/ha of foraging potential due to increased biomass of greater-quality forages. Quantifying relationships between pine plantation management intensity and the vegetative characteristics affecting wildlife habitat potential will allow resource managers to make better informed land management decisions to satisfy economic return and wildlife habitat provision objectives.

Introduction

Timber production is a multi-billion dollar industry in the southeastern US with an increasing amount of fiber production resulting from intensively managed pine plantations. Pine plantation acreage in the Southeast is expected to nearly double by 2030 (USDA 1988) with a near tripling of harvest yields by 2050 (Haynes 2002). This trend of intensively managed pine plantations is primarily driven by financial considerations and concerns about future timber supplies (Sedjo and Botkin 1997).

Industrial forest management strategies change in response to silvicultural, economic, and social issues, and future strategies likely will include increased use of herbicides, fertilizers, and genetically improved planting stock (Wigley 2000). Rather than a single herbicide application at stand initiation, management strategies likely will include tank mixes of multiple herbicides prior to planting to eliminate crop tree competition, followed by one or more herbaceous release treatments. Additionally, stand rotations likely will become shorter as the demand for timber products and the ability to quickly produce these products increases (Borders and Bailey 1997).

A trade-off exists between timber yield maximization and management of associated vegetation for wildlife. Loblolly pine (*Pinus taeda*) yields can be increased greater than five-fold in the southern US with site preparation herbicides (Glover and Zutter 1993). However, increasing intensity of site preparation can reduce abundance and diversity of woody and herbaceous plant species depending on herbicide type (Miller et al. 1999), rate (Zutter and Zedaker 1988), proportion of the area receiving treatment (Schabenberger and Zedaker 1999), and the additive effects of mechanical site preparation (Harrington and Edwards 1996).

At previously researched application rates, single herbicide treatments generally had minor and temporary impacts on plant communities (Zutter and Zedaker 1988, Miller et al. 1999). Studies comparing white-tailed deer (*Odocoileus virginianus*) habitat responses on chemically- and mechanically-prepared sites generally agreed that deer forage production was reduced for one growing season following site preparation, peaked 2–3 growing seasons post-treatment, and declined until canopy closure (Hurst and Warren 1980, Felix et al. 1986, Scanlon and Sharik 1986, Johnson 1987). Thus, the interval between planting and canopy closure historically has provided adequate deer forage.

However, the silvicultural goal of intensified pine management is to reduce vegetative competition with pine seedlings and to shorten the time between planting and canopy closure. Due to the importance of vegetative structure and composition on the distribution and abundance of wildlife (Howell et al. 1996), total or near-total control of herbaceous and woody vegetation during site preparation, followed by herbaceous control treatments and more rapid canopy closure may negatively affect biodiversity and habitat quality for early-seral species.

The goal of my research was to quantify effects of 5 operational pine plantation management intensities on vegetation community characteristics and deer habitat quality. I evaluated deer habitat quality by comparing effects of these management regimes on deer forage production and nutritional carrying capacity during years 1 and 2 post-treatment. I hypothesized that vegetative characteristics and deer habitat quality would be altered by treatment intensity and predicted that these variables would decrease as treatment intensity increased. Quantifying relationships between pine plantation management intensity and the vegetative characteristics that affect wildlife populations and habitat quality will allow resource managers to make land management decisions that optimize timber production while giving consideration to socially important wildlife values.

Study areas and methods

The effects of 5 levels of pine plantation management intensity on vegetation communities and deer habitat quality were monitored on 4 industrial timber stands in George, Lamar, and Perry counties in southern Mississippi. Vegetation on these stands was typical of the Mississippi Lower Coastal Plain, a low fertility, acidic soils physiographic region referred to as the "piney woods" (Pettry 1977) due to the prevalence of longleaf (*P. palustris*), shortleaf (*P. echinata*), and loblolly pine. This region of Mississippi was chosen because of its history of intensive forestry. All stands were loblolly or slash (*P. elliottii*) pine plantations, harvested during summer 2000 – winter 2001, averaged 66 ha, and were influenced uniformly by soils, topography, and drainages.

Management regimes (i.e., treatments) were selected to represent a range of operational intensities in timber industry stand initiation techniques. The regimes were expected to stimulate the development of distinct communities that represented a gradient in vegetation management intensity and potential of deer habitat quality. Treatments were arranged in a randomized complete block design where each of 5 treatments was assigned randomly to a ≥8-ha area within each of 4 stands. Management intensity, and thus expected vegetative impact, increased from "low" for treatment 1 to "high" for treatment 5.

Treatment 1 consisted of mechanical site preparation using a combination plow to subsoil, disk, and bed, pulled behind a tractor with a V-blade attached to the front to clear debris. A banded herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®.

Treatment 2 consisted of chemical site preparation using a mixture of 2.4 L/ha Chopper® Emulsifiable Concentrate, 5.3 L/ha Accord®, 5.3 L/ha Garlon 4, and 1% volume to volume ratio of Timberland 90 surfactant in a total spray solution of 93.6 L/ha. A banded herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®. No mechanical preparation (i.e., bedding) occurred in Treatment 2.

Treatment 3 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A banded herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®.

Treatment 4 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A broadcast herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®.

Treatment 5 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A broadcast herbaceous control in years 1 and 2 was applied using 0.9 kg/ha of Oustar®.

All chemical site preparation was applied during July–August 2001, and all mechanical site preparation was completed during September–December 2001. Year 1 herbaceous control applications were completed during March–April 2002 and year 2 herbaceous applications were completed during March–May 2003. Stands were planted during December 2001–January 2002. Pine tree seedlings were planted with 3.0 m between rows and 2.1 m between trees within a row, totaling 1,551 trees/ha. Each timber industry cooperator planted their own genetically-improved seedlings. Banded herbaceous control treatments were applied mechanically with a band width of 1.5 m, and broadcasted herbicide applications were applied aerially via helicopter. Stands were not burned. A broadcast fertilizer application of DAP at 280 kg/ha was applied to all treatments during April 2002.

All stands were intended to be machine planted to facilitate banding applications. However, 2 stands were hand planted due to greater debris loads remaining after harvest. Banded herbaceous control was applied using a backpack sprayer on these 2 sites.

I quantified vegetative communities during June 2002 and June 2003, years 1 and 2 post-treatment. I determined species richness using 40, randomly located 1-m^2 circular hoops within each treatment. I recorded % coverage of understory herbaceous and woody species using a modification of Canfield's (1941) line-intercept method along 10, located randomly 30-m transects within each treatment. I identified plants by species and then grouped by forage type. I excluded from sampling a 30-m buffer zone at treatment boundaries.

To evaluate a treatment's ability to produce deer forage, I calculated a relative total forage value (TFV) by multiplying each species' understory cover (%) by its annual deer preference rating according to Warren and Hurst (1981) and supplemented by Miller and Miller (1999), similar to Jones et al. (1993). I summed TFV products to yield a single value for each experimental unit, which I then averaged to generate treatment means.

I estimated growing season production using fenced exclosures that restricted deer foraging. Within each treatment, I randomly allocated 20, 1-m^2 exclosures prior to each growing season and clipped them during July 2002 and July 2003. Clippings were sorted by species and separated into leaf biomass (e.g., leaves; portions of the plant potentially consumable by deer) and non-consumable biomass (e.g., stems; portions of the plant not potentially consumable by deer), placed in paper bags, dried in a forced-air oven at 60°C for 72 hours, and weighed to determine dry matter weight. I calculated mean production (kg/ha) by species using leaf biomass (Appendix C.5).

During July 2003, I collected leaf samples from biomass clippings for quality analysis. I dried leaf samples in a forced-air oven at 60°C for 72 hours then ground them in a Wiley mill to a particle size that would pass through a 2-mm screen. Duplicate samples were analyzed for nitrogen content to determine % crude protein (CP) using the Kjeldahl procedure (Helrich 1990) and *in vitro* dry matter disappearance to determine digestibility (Cherney et al. 1997). A preliminary analysis using 2 common species (*Andropogon virginicus* and *Euthamia temuifolia*) indicated no treatment differences ($P >$

0.05) in forage quality, so I compiled composite samples by species at the stand level (Appendix C.8).

I used the explicit nutritional constraints model (Hobbs and Swift 1985) to index treatment effects on nutritional carrying capacity by estimating deer-days of foraging capacity during the growing season. I calculated the leaf biomass (kg/ha) of moderately- and highly-preferred deer forages (Warren and Hurst 1981) that could be mixed to produce a mean diet quality of 12% CP, based on the observed % CP for each species. I then divided this amount by a dry matter intake of 1.36 kg/day to calculate growing season deer carrying capacity.

I used a repeated measures, mixed model analysis of variance to test for main effects of year and treatment and year × treatment interactions for species richness by forage type, understory cover (%) by forage type, TFV, and nutritional carrying capacity. I compared means among treatments ($n = 5$) and between years ($n = 2$) in SAS Proc MIXED (SAS Institute 2000). I treated stands (i.e., blocks, $n = 4$) as the random effect, years as the repeated effect, and treatment × stand as the subject. I chose a first order autoregressive covariance structure for the models because there was one time interval between sampling periods (Littell et al. 1996). I considered differences significant if $P < 0.05$. I compared means using Fisher's least significant difference with the LSMEANS PDIFF option (Littell et al. 1996).

I tested normality and equal variance assumptions prior to each analysis. Variables with non-equal variances were square-root transformed (Zar 1999). For ease of data interpretation, I presented actual means when analyses were conducted on square-root transformed data.

Results

Species richness within forage types generally declined as treatment intensity increased during 2002 although differences were less distinct during 2003 (Table 3.1). Grasslike ($F_{1,27} = 14.39$, $P \leq 0.001$) and vine ($F_{1,27} = 5.78$, $P = 0.023$) species richness increased on all treatments during 2003 except for treatment 5. Additionally, grasslike ($F_{4,27} = 2.99$, $P = 0.037$) and vine ($F_{4,27} = 7.87$, $P \leq 0.001$) species richness was affected by treatment, being greatest in treatment 1 and least in treatment 5. Grass ($F_{4,27} = 9.26$, $P \leq 0.001$) and woody ($F_{4,27} = 8.20$, $P \leq 0.001$) species richness generally decreased with increasing treatment intensity during 2002 though differences were less distinct during 2003. There was a year × treatment interaction in non-leguminous forbs ($F_{4,27} = 4.13$, $P = 0.010$) and total number of species ($F_{4,27} = 4.74$, $P = 0.005$) due to major increases in treatment 4 and minor increases in treatment 5 during 2003.

Understory cover (%) of all forage classes decreased with increasing treatment intensity during 2002 although differences were less distinct during 2003 as vegetation re-colonized (Table 3.2). Legume ($F_{1,27} = 15.79$, $P \leq 0.001$), non-leguminous forb ($F_{1,27} = 25.60$, $P \leq 0.001$), grass ($F_{1,27} = 20.43$, $P \leq 0.001$), grasslike ($F_{1,27} = 10.38$, $P = 0.003$), and woody ($F_{1,27} = 147.59$, $P \leq 0.001$) cover increased in all treatments during 2003. Cover increases in treatment 5 generally were less than in other treatments because it received a second year of herbaceous weed control. Non-leguminous forb ($F_{4,27} = 3.10$, $P = 0.032$), grass ($F_{4,27} = 4.10$, $P = 0.010$), and woody ($F_{4,27} = 5.37$, $P = 0.003$) cover decreased with increasing management intensity. There was a year × treatment interaction in cover for vine ($F_{4,27} = 2.77$, $P = 0.048$) and vegetation total ($F_{4,27} = 5.32$, $P = 0.003$). Cover for vine and vegetation total during 2003 increased consistently in

Table 3.1. Species richness by forage type for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment										P-value		
	1		2		3[b]		4[c]		5				
Forage type	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt[d]	Yr*trt
2002													
Fern	0.3	0.3	0	0	0.3	0.3	0	0	0	0		0.697	0.425
Forb (legume)	2.8	1.4	2.8	1.0	2.5	1.0	2.3	1.6	1.5	1.2		0.205	0.939
Forb (non-legume)	16.3 A	4.1	16.8 A	7.0	15.3 A	1.5	6.5 B	1.6	6.0 B	1.1		≤0.001	0.010
Grass	5.3	0.5	5.3	0.5	4.0	0.4	2.8	0.3	2.8	0.8		≤0.001	0.380
Grasslike	2.0	0.9	2.3	0.6	1.8	0.5	1.0	0.7	1.0	0.7		0.037	0.089
Vine	7.8	1.1	3.8	0.5	4.5	0.7	4.0	0.4	2.8	0.9		≤0.001	0.684
Woody	14.5	1.0	11.3	0.6	9.5	0.6	7.8	0.5	7.8	1.2		≤0.001	0.290
Total	48.8 A	4.7	42.2 AB	7.8	37.8 B	2.3	24.3 C	1.0	21.8 C	3.8		≤0.001	0.005
2003													
Fern	0.3	0.3	0.3	0.3	0.3	0.3	0	0	0	0	0.326	0.697	
Forb (legume)	3.3	1.7	3.5	1.4	4.0	1.7	3.0	1.5	1.8	1.2	0.072	0.205	
Forb (non-legume)	18.8 A	2.6	18.5 A	3.8	21.0 A	2.1	21.5 A	3.0	6.8 B	1.9	≤0.001	≤0.001	
Grass	5.0	0.4	5.5	1.6	5.0	0.4	5.3	1.0	3.0	0.8	0.141	≤0.001	
Grasslike	3.3	1.6	2.8	1.4	3.5	1.5	4.0	1.7	1.3	0.5	≤0.001	0.037	
Vine	9.8	1.0	5.8	1.3	6.3	1.3	5.8	1.3	2.8	1.1	0.023	≤0.001	
Woody	12.0	1.5	10.0	1.5	9.3	0.6	8.3	0.8	8.5	0.3	0.364	≤0.001	
Total	52.3 A	4.4	46.3 A	6.0	49.3 A	2.2	48.0 A	1.9	24.0 B	3.7	≤0.001	≤0.001	
Years combined													
Fern	0.3	0.2	0.1	0.1	0.3	0.2	0	0	0	0			
Forb (legume)	3.0	1.0	3.1	0.8	3.3	1.0	2.6	1.0	1.6	0.8			
Forb (non-legume)	17.5	2.3	17.6	3.7	18.1	1.6	14.0	3.2	6.4	1.0			
Grass	5.1 A	0.3	5.4 A	0.8	4.5 AB	0.3	4.0 B	0.7	2.9 C	0.5			
Grasslike	2.6 A	0.9	2.5 A	0.7	2.6 A	0.8	2.5 A	1.0	1.1 B	0.4			
Vine	8.8 A	0.8	4.8 B	0.7	5.4 B	0.7	4.9 B	0.7	2.8 C	0.7			
Woody	13.3 A	1.0	10.6 B	0.8	9.4 BC	0.4	8.0 C	0.4	8.1 C	0.6			
Total	50.5	3.0	44.1	4.6	43.5	2.6	36.0	4.5	22.9	2.5			

[a] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ ($P > 0.05$).
[b] Within-treatment year effect ($P < 0.05$): total.
[c] Within-treatment year effect ($P \leq 0.001$): forb, total.
[d] When yr*trt interaction was significant, trt P-values represent within-year treatment effects.

Table 3.2. Canopy coverage (%) by forage class for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment												
	1[b]		2[c]		3[d]		4[e]		5[f]		*P* -value		
Forage type	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Year	Trt[g]	Yr*trt
2002													
Fern	0.1	0.0	0.2	0.2	0.2	0.1	0	0	0	0		0.163	0.986
Forb (legume)	0.6	0.2	0.3	0.1	0.2	0.1	0.1	0.0	0.1	0.1		0.216	0.301
Forb (non-legume)	11.1	1.2	18.0	2.9	11.0	1.6	1.5	0.3	1.3	0.4		0.032	0.126
Grass	12.1	1.2	14.9	2.4	7.0	1.1	1.6	0.3	0.8	0.2		0.010	0.978
Grasslike	2.9	0.8	3.2	0.9	1.8	0.5	0.3	0.1	0.2	0.1		0.286	0.586
Vine	12.0	1.1	4.4	1.1	6.2	1.2	1.0	0.3	0.7	0.2		0.429	0.048
Woody	7.5	0.9	4.1	0.7	2.7	0.3	2.4	0.4	2.1	0.4		0.003	0.095
Vegetation total	46.2 A	2.7	45.0 A	5.6	28.9 A	2.6	6.9 B	0.9	5.3 B	0.7		≤0.001	0.003
2003													
Fern	0	0	0.2	0.2	0.2	0.2	0	0	0	0	0.936	0.163	
Forb (legume)	1.5	0.4	0.8	0.3	1.4	0.3	2.2	0.5	0.6	0.2	≤0.001	0.216	
Forb (non-legume)	20.4	2.4	26.6	3.4	25.0	3.1	25.3	2.3	6.3	1.8	≤0.001	0.032	
Grass	22.7	1.9	22.9	2.5	16.5	1.8	13.0	1.4	9.0	1.1	≤0.001	0.010	
Grasslike	6.0	1.3	10.0	2.3	5.6	1.2	8.3	1.8	1.4	0.6	0.003	0.286	
Vine	48.6 A	3.6	20.7 B	2.7	38.9 AC	4.8	25.4 BC	3.1	3.4 D	1.0	≤0.001	≤0.001	
Woody	22.4	2.1	14.8	1.5	15.0	1.8	16.1	1.7	8.3	1.0	≤0.001	0.003	
Vegetation total	121.5 A	5.0	96.1 AB	4.3	102.7 AB	4.4	90.4 B	2.9	29.0 C	2.8	≤0.001	≤0.001	
Years combined													
Fern	0.0	0.0	0.2	0.1	0.2	0.1	0	0	0	0			
Forb (legume)	1.0	0.2	0.5	0.1	0.8	0.2	1.2	0.3	0.3	0.1			
Forb (non-legume)	15.8 A	1.4	22.3 A	2.3	18.0 A	1.9	13.4 AB	1.8	3.8 B	1.0			
Grass	17.4 A	1.3	18.9 A	1.8	11.8 AB	1.2	7.3 B	1.0	4.9 B	0.7			
Grasslike	4.5	0.8	6.6	1.3	3.7	0.7	4.3	1.0	0.8	0.3			
Vine	30.3	2.8	12.5	1.7	22.5	3.1	13.2	2.1	2.0	0.5			
Woody	15.0 A	1.4	9.4 B	1.0	8.8 B	1.1	9.3 B	1.1	5.2 B	0.6			
Vegetation total	83.9	5.1	70.5	4.5	65.8	4.9	48.6	4.9	17.2	2.0			

[a] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ ($P > 0.05$).

[b] Within-treatment year effect ($P \leq 0.001$): vine, vegetation total.

[c] Within-treatment year effect ($P \leq 0.001$): vegetation total; ($P < 0.05$): vine.

[d] Within-treatment year effect ($P \leq 0.001$): vine, vegetation total.

[e] Within-treatment year effect ($P \leq 0.001$): vegetation total; ($P < 0.01$): vine.

[f] Within-treatment year effect ($P < 0.01$): vegetation total.

[g] When yr*trt interaction was significant, trt *P* -values represent within-year treatment effects.

treatments 1, 2, and 3; the interaction was caused by massive increases in treatment 4 coupled with minor increases in treatment 5.

Total forage value decreased clearly with increasing treatment intensity during 2002 (Table 3.3). During 2003, treatments separated into distinct categories of high (treatment 1), moderate (treatments 2, 3, and 4), and low (treatment 5) habitat quality based on TFV. There was a TFV year × treatment interaction ($F_{4,27} = 6.11$, $P = 0.001$) due to major increases during 2003 in treatments 3 and 4, and only minor increases in treatment 5.

Carrying capacity estimates were affected by treatment ($F_{4,27} = 3.06$, $P = 0.033$) and ranged from 2 deer-days/ha in treatment 5 to 20 deer-days/ha in treatment 3 (Table 3.4). During both years, the moderately-intensive treatments 2 and 3 had the greatest nutritional carrying capacity.

Discussion

Silvicultural goals of site preparation are to decrease vegetative competition with crop trees, manage logging debris, improve soil conditions, and facilitate seedling planting (Shiver and Martin 2002); thus, I expected to have differences in vegetative characteristics as treatment intensity increased, particularly during the first growing season. The focus of my investigation was how quickly vegetation in treatments "recovered" and how that translated into deer forage quality.

The negative association between treatment intensity and species richness and understory cover (%) of most major forage classes during 2002 indicated that the range of pine plantation management intensities provided a full range of vegetative responses. Prior studies have shown that varying intensities of mechanical site preparation with

Table 3.3. White-tailed deer total forage value (TFV)[a] for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[b].

	Treatment												
	1[c]		2[c]		3[c]		4[c]		5[c]		*P*-value		
TFV	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt[d]	Yr*trt
2002	113.5 A	16.2	107.3 A	54.6	72.0 AB	16.9	15.2 B	1.8	11.1 B	1.9		0.003	0.001
2003	309.2 A	32.9	209.3 B	33.7	252.1 B	43.8	214.5 B	14.4	57.7 C	22.8	≤0.001	≤0.001	

[a] TFV = a species' understory cover (%) multiplied by its white-tailed deer annual preference rating (Warren and Hurst 1981).

[b] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ ($P>0.05$).

[c] Within-treatment year effect ($P \leq 0.001$).

[d] When yr*trt interaction was significant, trt *P*-values represent within-year treatment effects.

Table 3.4. White-tailed deer growing season carrying-capacity estimates (deer-days/ha) of preferred deer forages[a] combined for a mean diet quality of 12% crude protein, assuming 1.36 kg/day dry weight consumption, for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (July 2002 and July 2003) in the Mississippi Lower Coastal Plain.

	Treatment												
	1		2		3		4		5		*P*-value		
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002	3	2	11	6	4	2	3	3	0	0			
2003	2	1	24	17	35	17	10	7	3	3			
Combined	3 A	1	17 B	9	20 B	10	7 AB	4	2 A	2	0.079	0.033	0.453

[a] Annual preference rating of 3, moderate use; 4, high use (Warren and Hurst 1981).

(Copeland 1989) or without (Stransky et al. 1986) herbaceous weed control produced distinct vegetation communities one year post-treatment. Additionally, stands that received mechanical site preparation followed by broadcast herbaceous control had less species richness and produced less deer forage than areas that received banded herbaceous control (Blake et al. 1987).

Increased species richness and canopy cover of all major forage types during 2003 was due to vegetative re-colonization. These results agreed with previous studies reporting relatively short-term effects (i.e., 2–3 growing seasons) on vegetative communities from mechanical or chemical site preparation in combination with herbaceous weed control (Blake et al. 1987, Keyser et al. 2003). Increases in non-leguminous forbs and legumes in treatments 3 and 4 were noteworthy because these highly-digestible forages were high in protein (Vangilder et al. 1982) and preferred by deer (Warren and Hurst 1981, Miller and Miller 1999).

Of particular interest were the vegetative responses in treatment 4. After receiving combination site preparation and one year of complete herbaceous control, species richness had recovered to the point that there were no differences between treatment 4 and the less intensive treatments 1, 2, and 3. Vegetative cover (%) also had recovered equivalently to treatments 2 and 3. These results indicated that an intensive pine plantation management regime such as treatment 4 could still provide comparable species richness and vegetative cover to lesser intensity management regimes within 2 growing seasons post-treatment.

I assumed that the TFV and nutritional constraints model (Hobbs and Swift 1985) accurately indexed mean forage values and carrying capacity in treatment areas. While the choice of values for deer preference ratings, CP diet level, and dry matter intake rate may be debatable, the relative comparisons of carrying capacity (Edwards et al. 2004) and TFV levels among management regimes should be valid.

Studies have documented that low to moderately intensive mechanical site preparation maximized deer forage production early in stand development (Locascio et al. 1990, 1991). Total forage value results supported these findings in that TFV generally decreased as treatment intensity increased. Based on the literature and my results, one might assume that there was a negative relationship between deer habitat quality and management intensity; however, few researchers have investigated overall forage quality associated with these management regimes.

Total forage value and nutritional carrying capacity estimates in combination provided a more complete picture of deer habitat conditions rather than if each analysis was viewed independently. The least intensity treatment provided the greatest TFV during both growing seasons because treatment 1 had the greatest species richness and vegetative cover. However, carrying capacity estimates revealed that treatment 1 provided equivalent foraging potential to treatment 5, which received 2 years of complete herbaceous control. Having an abundance of vegetation does not necessarily ensure that adequate forage quality is available.

Increased biomass of greater-quality forages may influence overall habitat quality (Miller et al. 1995). The greater species richness and total biomass of forbs and legumes on treatment 3 during 2003 allowed it to provide the most deer-days of foraging potential. Other studies have similarly documented increased forb production following mechanical site preparation alone (Stransky et al. 1986, Johnson 1987) or combined with herbaceous control (Blake et al. 1987), and following cessation of herbaceous control (Zutter and Miller 1998, Miller et al. 2003).

In my study, overall biomass was not an adequate predictor of nutritional carrying capacity; treatments expressed different carrying capacities in spite of equivalent overall biomass. Deer selected forest clearings with intermediate biomass that was of higher quality (Stewart et al. 2000) and areas with more biomass of higher-quality forages (Bechwith 1964). Treatment 3 expressed the highest protein-based carrying capacity due to increased biomass of high-quality forbs; therefore it was possible that stands receiving management regimes similar to treatment 3 might have realized more deer use during the second growing season.

Assumptions of the nutritional carrying capacity model were similar to Edwards et al. (2004) and include a reasonable diet level for comparison purposes. I based estimates on a mean diet quality level of 12% CP because CP requirements for adult body maintenance range from 4–12% (Holter et al. 1979, Asleson et al. 1996). Crude protein requirements of 16% CP have been reported as optimal for antler growth (French et al. 1956, Magruder et al. 1957) although 10% was reported as adequate (Asleson et al. 1996). A dry matter intake of 1.36 kg/day was assumed, as has been reported for white-tailed deer (French et al. 1956, Fowler et al. 1967).

Interestingly, many forages sampled were of lesser quality than the same species grown in Mississippi's Blackland Prairie physiographic region (Edwards et al. 2004). Forage quality is related to soil quality (Laycock and Price 1970) and the Mississippi Lower Coastal Plain is typified by poor habitat quality, resulting in smaller deer body and antler sizes (Strickland and Demarais 2000). Of the 64 plant species I sampled for quality analyses, only 7 had ≥12% CP. Therefore, carrying-capacity estimates associated with these treatments could be greater in different soil resource regions.

Carrying capacity was estimated during the spring–summer growing season and included warm-season annuals and perennials. Growth of cool-season annuals during autumn and winter were not included in these estimates; thus fall–winter carrying capacity would be additive to our estimates. Additionally, deer diet selection changes seasonally with forage availability and quality (Demarais et al. 2000). Browse is a major component of deer diets throughout the year (Thill 1984, Thill et al. 1990), particularly during winter (Blair et al. 1977, 1983) when forbs and legumes become less abundant. Browse forage quality, however, is typically less than forbs (Vangilder et al. 1982). We did not include woody stems in our carrying-capacity estimates, although they may have been used by deer during the winter.

Management Implications

Forest management strategies at stand initiation designed to reduce vegetative competition with pine trees may not always result in a "barren wasteland" that precludes integrated forest and wildlife management. As management intensity increases, the period between planting and canopy closure has been shown to decrease due to accelerated pine growth (Miller et al. 1995), potentially reducing amount of time that wildlife habitat is provided. Although the period between planting and canopy closure may be briefer when managed intensively, it may provide greater quality habitat than a longer period under a low-intensity management regime characterized by greater plant biomass of lesser-quality forages. My results indicated that, at least during the second growing season, a moderately-intensive management regime such as treatment 3 provided the most deer foraging potential. Additional research should be conducted for year 3 post-treatment through pine canopy closure to provide a more complete management evaluation.

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CHAPTER IV

EFFECTS OF INTENSIVE PINE PLANTATION MANAGEMENT ON SMALL MAMMAL COMMUNITIES IN SOUTHERN MISSISSIPPI

Abstract

Management intensity of southern US pine plantations has increased over past decades and concerns have arisen regarding small mammal community response to stand initiation management regimes. I established a gradient of 5 pine plantation management intensities on timber industry stands (n = 4) in the Mississippi Lower Coastal Plain using varying levels of mechanical and chemical site preparation and herbaceous weed control. Treatments represented a range of operational intensities, varying from "low" for treatment 1 to "high" for treatment 5, and were expected to develop distinct communities representing a gradient in vegetation management intensity and small mammal community response. Species richness increased between years and was greater on treatments using a single method of site preparation than in treatments involving combinations of mechanical and chemical site preparation. Mean number of small mammals captured increased between years and generally was not affected by treatment. Overall, there were minimal treatment effects on small mammal communities during the 2 years following stand establishment.

Introduction

As management intensity of pine (*Pinus* spp.) forests in the southeastern US increased in area (USDA 1988) and harvest yield (Haynes 2002), concerns have arisen that increasing management intensity may impact negatively plant and animal communities. Due to the importance of vegetative structure and composition on the distribution and abundance of wildlife (Howell et al. 1996), total or near-total control of herbaceous and woody vegetation during site preparation, followed by herbaceous control treatments and more rapid canopy closure may affect negatively biodiversity and habitat quality for early-seral species, such as small mammals.

Forest management strategies at stand initiation involving mechanical or single herbicide applications typically have minor and temporary impacts on plant communities (Zutter and Zedaker 1988, Miller et al. 1999); however, increasing intensity of site preparation can reduce abundance and diversity of woody and herbaceous plant species depending on herbicide type (Miller et al. 1999), rate (Zutter and Zedaker 1988), proportion of the area receiving treatment (Schabenberger and Zedaker 1999), and the additive effects of mechanical site preparation (Harrington and Edwards 1996). Small mammal community characteristics often are related directly to the structure and composition of plant communities (Langley and Shure 1980) and changes in plant communities typically are followed by changes in small mammal communities (Perkins 1973, Atkeson and Johnson 1979) with species-specific responses based on habitat preferences (Lautenschlager 1993, Morrison and Meslow 1983).

Studies have documented small mammal microhabitat preferences within pine stands (Mengak and Guynn 2003), differing community responses at various stand development stages (Atkeson and Johnson 1979) and in naturally- vs. artificially-regenerated pine stands (Mengak et al. 1989), and effects of mechanical and chemical site preparation (Brooks et al. 1994, O'Connell and Miller 1994, Santillo et al. 1989). However, little research has been conducted on small mammal community responses to various levels of pine plantation management intensity incorporating intensive site preparation and herbaceous weed control applications.

The goal of this research was to quantify effects of 5 operational pine plantation management intensities on small mammal community characteristics. I evaluated species richness and abundance during years 1 and 2 post-treatment. I hypothesized that small mammal community characteristics would be altered by treatment intensity and predicted that these variables would decrease as treatment intensity increased.

Study areas and methods

The effects of 5 levels of pine plantation management intensity were monitored on 4 industrial timber stands in George, Lamar, and Perry counties in southern Mississippi. Vegetation on all stands was typical of the Lower Coastal Plain, a region typified by low fertility, acidic soils referred to as the "piney woods" (Pettry 1977) due to the prevalence of longleaf (*P. palustris*), shortleaf (*P. echinata*), and loblolly pine. All stands were loblolly or slash (*P. elliottii*) pine plantations, harvested during summer 2000 – winter 2001, averaged 66 ha, and were influenced uniformly by soils, topography, and drainages.

Management regimes (i.e., treatments) were selected to represent a range of operational intensities in timber industry stand initiation techniques. The regimes were expected to stimulate the development of distinct communities that represented a gradient in vegetation management intensity and potential of small mammal habitat. Treatments were arranged in a randomized complete block design where each of 5 treatments was assigned randomly to a ≥8-ha area within each of 4 stands. Management intensity, and thus expected vegetative impact, increased from "low" for treatment 1 to "high" for treatment 5.

Treatment 1 consisted of mechanical site preparation using a combination plow to subsoil, disk, and bed, pulled behind a tractor with a V-blade attached to the front to clear debris. A banded herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®.

Treatment 2 consisted of chemical site preparation using a mixture of 2.4 L/ha Chopper® Emulsifiable Concentrate, 5.3 L/ha Accord®, 5.3 L/ha Garlon 4, and 1% volume to volume ratio of Timberland 90 surfactant in a total spray solution of 93.6 L/ha. A banded herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®. No mechanical preparation (i.e., bedding) occurred in Treatment 2.

Treatment 3 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A banded herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®.

Treatment 4 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A broadcast herbaceous control in year 1 was applied using 0.9 kg/ha of Oustar®.

Treatment 5 consisted of mechanical (same as treatment 1) and chemical site preparation (same as treatment 2). A broadcast herbaceous control in years 1 and 2 was applied using 0.9 kg/ha of Oustar®.

All chemical site preparation was applied during July–August 2001, and all mechanical site preparation was completed during September–December 2001. Year 1 herbaceous control applications were completed during March–April 2002 and year 2 herbaceous applications were completed during March–May 2003. Stands were planted during December 2001–January 2002. Pine tree seedlings were planted with 3.0 m between rows and 2.1 m between trees within a row, totaling 1,551 trees/ha. Each timber industry cooperator planted their own genetically-improved seedlings. Banded herbaceous control treatments were applied mechanically with a band width of 1.5 m, and broadcasted herbicide applications were applied aerially via helicopter. Stands were not burned. A broadcast fertilizer application of DAP at 280 kg/ha was applied to all treatments during April 2002.

All stands were intended to be machine planted to facilitate banding applications. However, 2 stands were hand planted due to greater debris loads remaining after harvest. Banded herbaceous control was applied by using a backpack sprayer on these 2 sites.

Small mammals were sampled by removal trapping during February 2002 and February 2003. I established a 10 × 10 trapping grid (i.e., 100 trap stations) centered within each treatment located >50 m from treatment boundaries. I located trap stations 10 m apart and placed one Victor® rat trap and one Victor® mouse trap at each station, baited with peanut butter. I sampled the 5 treatments within each stand (i.e., 5 trapping grids) simultaneously for 5 consecutive nights.

I labeled trapped mammals by stand and treatment, froze them at my field research station, and transported them to Mississippi State University (MSU) where they were thawed and identified by species. Trapping and handling procedures were approved by the MSU Institutional Animal Care and Use Committee as Project 00-059. I determined mean species richness and used the minimum number known alive to index abundance.

I used a repeated measures, mixed model analysis of variance to test for the main effects of year and treatment and year × treatment interactions for species richness and abundance of small mammals. I compared means among treatments ($n = 5$) and between years ($n = 2$) in SAS Proc MIXED (SAS Institute 2000). I treated stands (i.e., blocks, $n = 4$) as the random effect, years as the repeated effect, the subject was treatment × stand, and I chose a first order autoregressive covariance structure for the models because there was one time interval between sampling periods (Littell et al. 1996). I considered differences significant if $P < 0.05$. I compared means using Fisher's least significant difference with the LSMEANS PDIFF option (Littell et al. 1996).

Results

I caught 1,269 small mammals during 40,000 trap nights. Captures increased from 317 during 2002 to 952 during 2003. I captured 5 species each year: southern short-tailed shrew (*Blarina carolinensis*), wood rat (*Neotoma floridana*), white-footed mouse (*Peromyscus leucopus*), Fulvous harvest mouse (*Reithrodontomys fulvescens*), and hispid cotton rat (*Sigmodon hispidus*).

Pine plantation management intensity impacted small mammal species richness (Table 4.1). There was a year effect ($F_{1,27} = 77.49$, $P \leq 0.001$) as number of species nearly doubled on all treatments during 2003. Species richness was affected by treatment ($F_{4,27} = 5.15$, $P = 0.003$) and declined generally with increasing treatment intensity during

Table 4.1. Small mammal species richness for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (February 2002 and February 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment										*P*-value		
	1		2		3		4		5				
Species richness	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002	2.5	0.5	2.3	0.5	1.5	0.3	1.3	0.3	1.3	0.3			
2003	4.0	0.4	4.5	0.3	3.3	0.3	3.0	0.4	3.3	0.3			
Years combined	3.3 A	0.4	3.4 A	0.5	2.4 B	0.4	2.1 B	0.4	2.3 B	0.4	≤0.001	0.003	0.829

[a] Means within rows followed by same letter do not differ ($P>0.05$).

2002. Species richness was greater on the low intensity treatments (i.e., treatments 1 and 2) and ranged from a high of 3.4 in treatment 2 to a low of 2.1 in treatment 4.

Treatment effects on small mammal abundance were minimal (Table 4.2). There was a year effect on *Blarina carolinensis* ($F_{1,27} = 8.24$, $P = 0.008$), *Peromyscus leucopus* ($F_{1,27} = 9.14$, $P = 0.005$), *Reithrodontomys fulvescens* ($F_{1,27} = 19.96$, $P \leq 0.001$), and total captured ($F_{1,27} = 46.96$, $P \leq 0.001$) as abundance increased in all treatments during 2003. There was a year × treatment interaction in *Sigmodon hispidus* ($F_{4,27} = 3.32$, $P = 0.025$) due to large increases during 2003 in treatments 1, 2, and 3 and minor increases in treatments 4 and 5.

Discussion

Mengak and Guynn (2003) proposed that intensive silvicultural management of pine plantations, including herbaceous control, would impact negatively small mammals. I did not sample small mammals prior to treatment application but can infer from prior research an initial population reduction (Santillo et al. 1989, Brooks et al. 1994). Small mammal populations are generally robust to habitat manipulations (Bowman et al. 2001) and have been documented to recover to pre-treatment levels within 2 years following mechanical or chemical site preparation (Brooks et al. 1994, O'Connell and Miller 1994).

Differences among treatments in small mammal community characteristics were minimal during years 1 and 2 post-treatment. Vegetative communities were altered by treatment intensity thus differences in the associated small mammal communities were expected. However, prior research involving less intensive management regimes supported my results. Species diversity was similar between mechanically- and chemically-prepared areas 2 years following treatment (O'Connell and Miller 1994).

Table 4.2. Mean number of small mammals captured for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (February 2002 and February 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment										*P*-value		
	1[b]		2[c]		3		4		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002													
Blarina carolinensis	0.3	0.3	0.3	0.3	0	0	0	0	0	0		0.223	0.398
Neotoma floridana	0.5	0.3	0.5	0.5	0.3	0.3	0	0	0	0		0.425	0.862
Peromyscus leucopus	13.8	1.5	13.3	3.6	16.3	4.6	13.3	3.3	17.8	4.5		0.334	0.813
Reithrodontomys fulvescens	0.5	0.3	0.5	0.5	0	0	0	0	0	0		0.461	0.735
Sigmodon hispidus	0.8	0.8	0.8	0.5	0.3	0.3	0.3	0.3	0.3	0.3		1.000	0.025
Total	15.8	1.8	15.3	2.9	16.8	4.6	13.5	3.2	18.0	4.5		0.214	0.097
2003													
Blarina carolinensis	2.3	1.3	1.3	0.3	0.3	0.3	1.0	1.0	0.3	0.3	0.008	0.223	
Neotoma floridana	0.8	0.5	0.8	0.5	0.3	0.3	0.5	0.5	0.8	0.8	0.132	0.425	
Peromyscus leucopus	19.3	6.2	19.0	8.1	30.3	6.9	19.0	4.3	25.8	4.3	0.005	0.334	
Reithrodontomys fulvescens	5.0	2.0	4.8	0.9	4.0	2.1	5.0	2.9	1.5	0.9	≤0.001	0.461	
Sigmodon hispidus	43.3 A	14.0	25.0 B	10.9	15.0 BC	5.2	7.3 C	3.8	6.0 C	2.8	≤0.001	≤0.001	
Total	70.5	9.7	50.8	14.2	49.8	10.9	32.8	10.7	34.3	7.8	≤0.001	0.214	

[a] Means within rows followed by same letter do not differ ($P > 0.05$).

[b] Within-treatment year effect ($P \leq 0.001$): *Sigmodon hispidus*.

[c] Within-treatment year effect ($P < 0.01$): *Sigmodon hispidus*.

Minimal treatment effects on small mammal abundance from 3 types of chemical site preparation were reported by Brooks et al. (1994). O'Connell and Miller (1994) similarly reported greater capture rates in mechanically- vs. chemically-prepared areas during the second year post-treatment. However, the 70 small mammals I captured in treatment 1 did not differ statistically from the 50 captured in treatment 2.

Conclusions

Timber industries are operationally concerned with establishing pine plantations that maximize timber production. Concerns that pine plantation management intensity during stand initiation negatively affects small mammal communities needed to be addressed. I did not document effects of management intensity on pre-treatment small mammal communities but may infer that they were reduced following treatment. During years 1 and 2 post-treatment, small mammal populations within treated areas increased in species richness and abundance implying that populations rebounded following stand establishment. Management intensity generally did not impact small mammal abundance implying that management effects on vegetative communities and thus small mammal populations were short-lived.

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CHAPTER V

SYNTHESIS AND RECOMMENDATIONS

Timber industries are an important participant in southeastern land management, owning 14% of US forestland that provide 33% of the total harvest (Martin and Darr 1997). In 1999, over 350,000 ha were replanted by timber industries in the southern US (American Forest and Paper Association 2001), much of which received some type of site preparation during stand establishment. Thus, significant amounts of forestland are impacted annually by intensive forest management.

Compared to nonindustrial, private forest landowners (NIPFs), timber industries own and manage fewer ha (American Forest and Paper Association 2001). However, they typically manage more intensively and have a greater impact on public perception of forestry practices. Although primarily concerned with fiber production, timber industries increasingly are cognizant of management-related environmental effects due to programs such as the Sustainable Forestry Initiative.

Pine plantations traditionally have provided valuable wildlife habitat (Allen et al. 1996) particularly for early-seral species. An area's habitat potential is not diminished when a mature forest is converted to a pine plantation; rather, it is altered to suit a different species assemblage (Allen et al. 1996) that is temporally dynamic throughout multiple stand development stages.

In my study, management intensity was related positively to pine growth response and inversely to wildlife habitat potential. The management regime most effective at maximizing pine growth during the second growing season was a combination site preparation followed by one year of broadcast herbaceous control. A less-intensive management regime, however, maximized deer foraging potential during the second growing season through a combination site preparation followed by a banded herbaceous control during year 1. Given that a timber company is going to manage in some fashion during stand establishment, they should strive to maximize timber production while giving consideration to socially important wildlife values. Based on my results during years 1 and 2 post-treatment, I recommend that timber companies with objectives to maximize timber production while providing wildlife habitat (e.g., one leasing land to hunting clubs enrolled in a deer management program) should manage stands similarly to treatment 3.

Further research is needed to document management effects on wildlife habitat quality through pine canopy closure. As management intensity increases, the period between and pine canopy closure has been shown to decrease due to accelerated pine growth (Miller et al. 1995), potentially reducing amount of time that wildlife habitat is provided. Resource managers need to know how each management regime impacts onset of canopy closure and, thus, management effects on habitat quality during this period.

The continuation study should monitor pine growth, vegetative characteristics, habitat quality, and small mammal communities for an additional 3–5 years. Additional analyses may be incorporated to provide a more complete management evaluation. Diversity and community similarity indices would provide information as to how community structure differs among treatments and whether or not treatments have promoted differing successional trajectories. An economic analysis projected through the pine rotation would provide valuable information to NIPFs interested in maximizing timber growth and wildlife habitat provision.

My study indicated that total forage value (TFV) was not an adequate predictor of deer habitat quality during the growing season from a nutritional standpoint. Total forage value was certainly easier and less expensive to estimate than nutritional carrying capacity and may provide a useful index for habitat comparison. The relationship between TFV and metrics including habitat quality should be monitored further.

The continuation study should consider refining the nutritional carrying-capacity estimates to reflect annual carrying capacities. My estimates were derived from plant leaves during mid-summer. Estimates derived from all potential browse (e.g., leaves and stems) and during all seasons would yield a more complete management evaluation. However, winter estimates would be difficult to obtain due to difficulty with plant species identification and determining how much of an individual plant is potential browse.

I conducted a post-hoc sample-size analysis and evaluated the number of plots necessary ($\alpha = 0.05$) to give a reasonable (± 10%) estimate of key vegetative variables (Gysel and Lyon 1980). Results based on my observed means and standard deviations from 10 plots (i.e., sub-samples) per experimental unit indicated that I needed a minimum of 21 plots to achieve the desired 10% accuracy level. However, I did observe statistical differences, indicating that my sampling protocol and experimental design were powerful enough to identify treatment effects.

Increased sampling intensity should increase accuracy and precision. I recommend that the continuation study consider increasing sample size to ≥20 plots per experimental unit, if logistically possible. As vegetative recolonization and pine canopy closure continues to increase, treatment differences will be more difficult to detect as vegetative characteristics become more similar. However, the experiment-wide error (i.e., variation) should also decrease as experimental units become more homogeneous, thus increasing the probability that treatment effects are quantitative.

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APPENDIX A

STUDY AREA MAPS

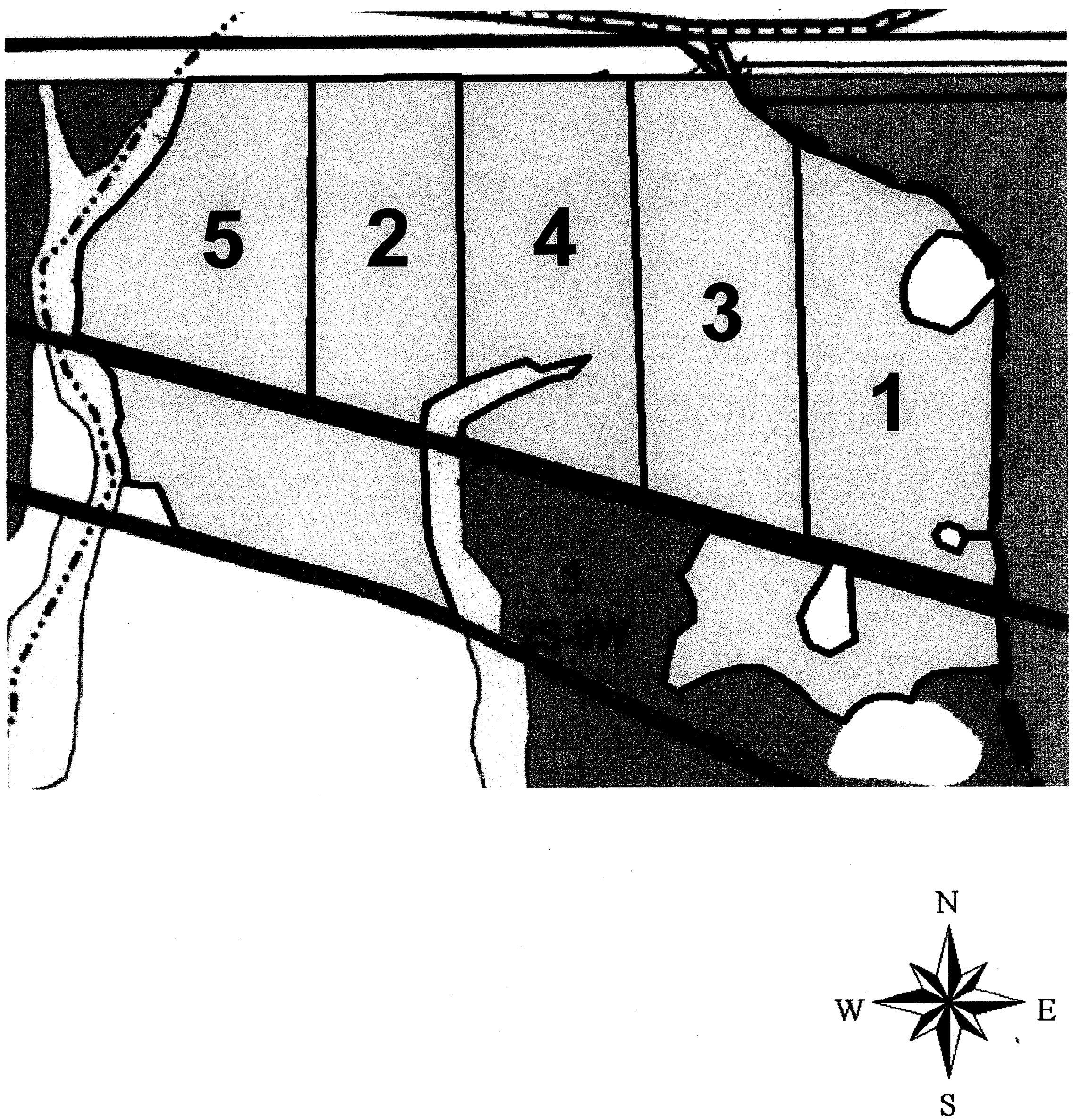


Figure A.1. Treatment allocation for 5 pine plantation management regimes varying from low (1) to high (5) intensity within a 74-ha stand located in Section 3, T2S R9W, in George County, MS, owned by Plum Creek Timber Company.

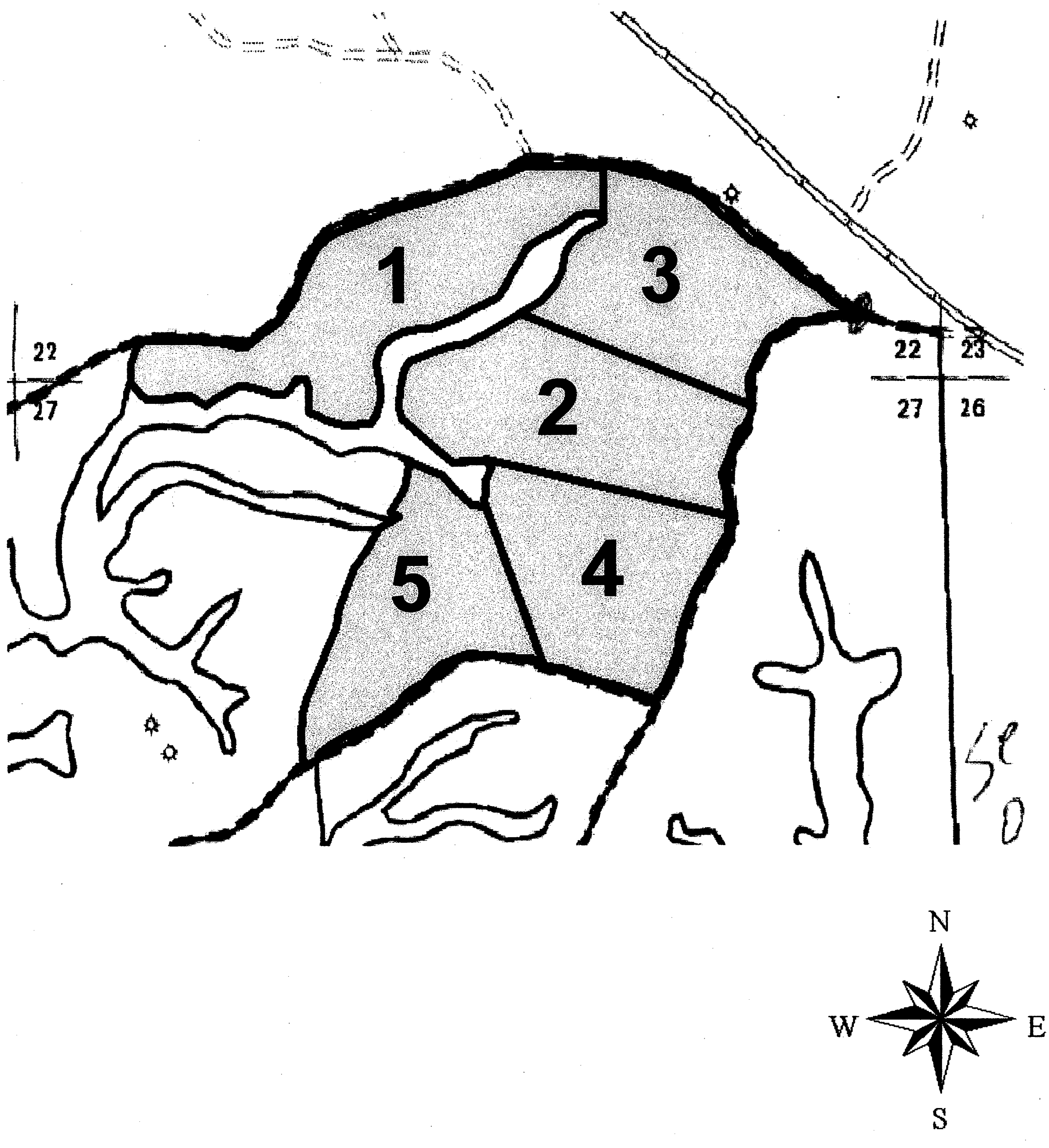
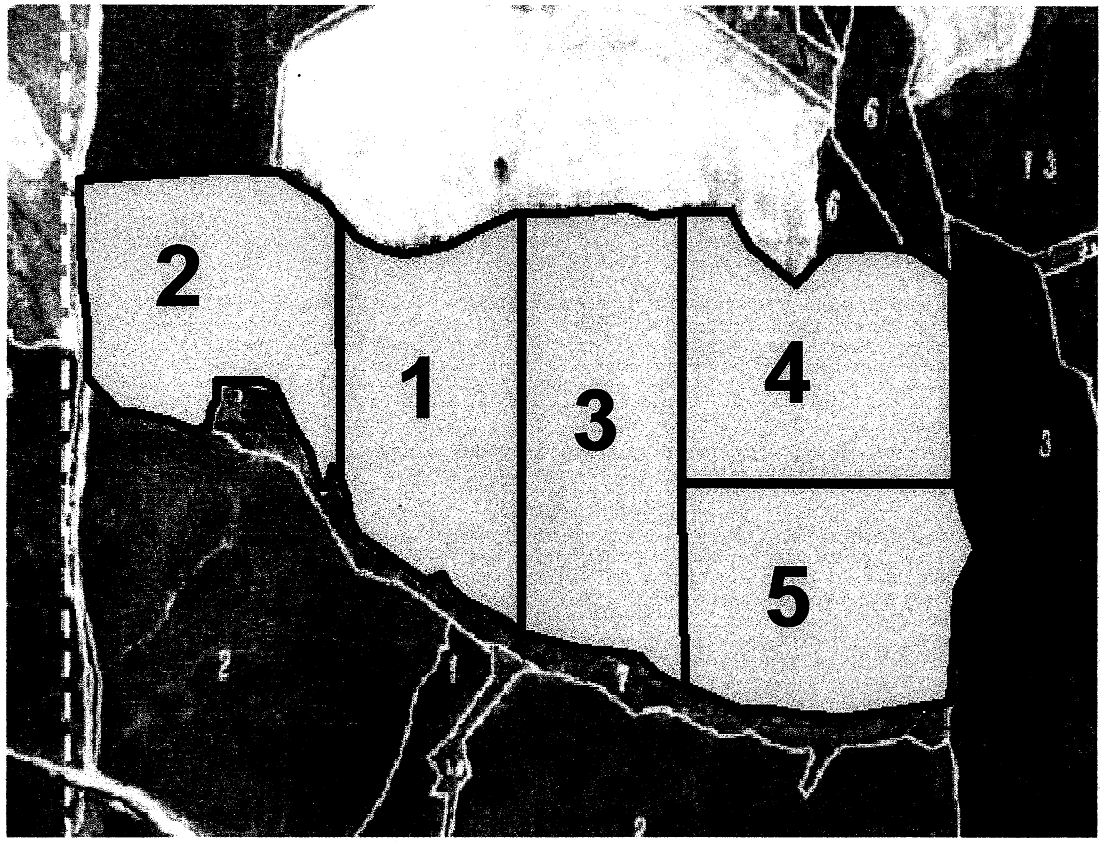


Figure A.2. Treatment allocation for 5 pine plantation management regimes varying from low (1) to high (5) intensity within a 76-ha stand located in Sections 22 and 27, T1N R16W, in Lamar County, MS, owned by Weyerhaeuser Company.



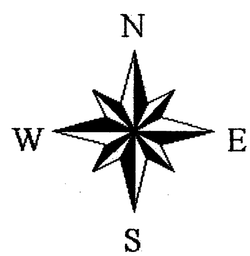


Figure A.3. Treatment allocation for 5 pine plantation management regimes varying from low (1) to high (5) intensity within a 50-ha stand located in Section 34, T4N R9W, in Perry County, MS, owned by Molpus Timberlands.

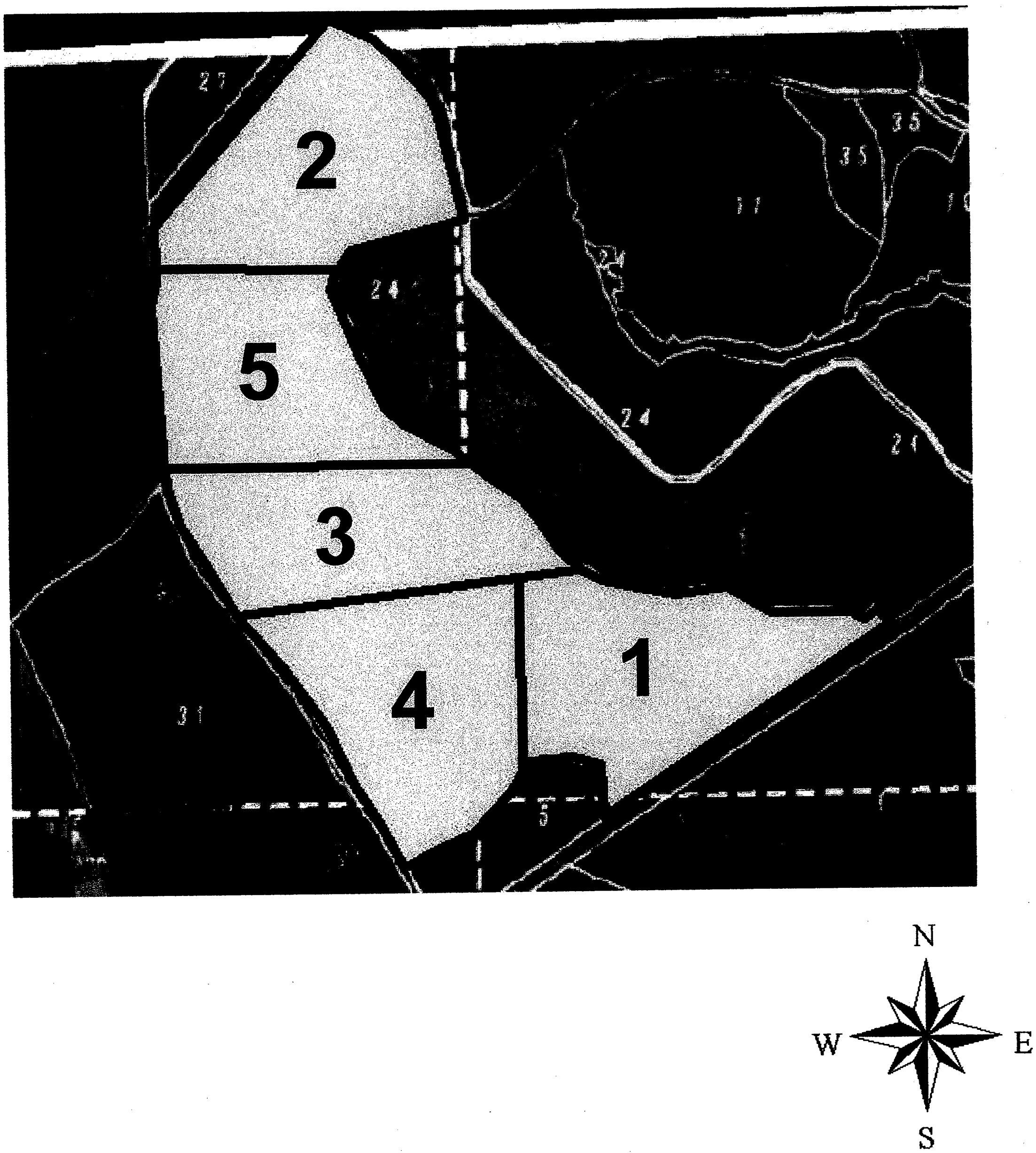


Figure A.4. Treatment allocation for 5 pine plantation management regimes varying from low (1) to high (5) intensity within a 63-ha stand located in Sections 27, 28, 33, and 34, T4N R9W, in Perry County, MS, owned by Molpus Timberlands.

APPENDIX B

SUPPLEMENTARY PRE-TREATMENT (2001) VEGETATIVE CHARACTERISTICS

Table B.1. Species richness by forage type for 5 pine plantation management regimes varying from low (1) to high (5) intensity at pre-treatment (July 2001) in the Mississippi Lower Coastal Plain.

	Treatment										*P*-value
	1		2		3		4		5		
Forage type	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Trt
Fern	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.5	0.944
Forb (legume)	2.5	1.7	2.8	1.2	2.8	0.9	2.5	1.2	4.0	2.3	0.696
Forb (non-legume)	9.3	3.2	9.8	3.3	9.5	2.8	9.3	3.3	11.0	3.9	0.581
Grass	5.0	1.1	5.8	0.3	6.3	0.8	5.5	1.0	5.0	1.1	0.603
Grasslike	0.5	0.3	0.5	0.3	0.3	0.3	0.5	0.3	0.5	0.3	0.956
Vine	9.0	0.4	7.8	1.5	6.8	1.0	6.5	0.9	8.5	0.5	0.297
Woody	15.8	3.3	15.0	1.9	16.0	3.3	15.5	3.4	16.0	2.4	0.980
Total	42.5	9.2	41.8	5.7	41.8	6.3	40.0	7.9	45.5	8.7	0.730

Table B.2. Canopy coverage (%) by forage type for 5 pine plantation management regimes varying from low (1) to high (5) intensity at pre-treatment (July 2001) in the Mississippi Lower Coastal Plain.

	Treatment										*P*-value
	1		2		3		4		5		
Forage type	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Trt
Fern	0.2	0.1	<0.1	<0.1	0.3	0.3	<0.1	<0.1	<0.1	<0.1	0.509
Forb	9.3	1.5	8.4	1.2	9.0	1.2	7.3	1.3	7.4	1.1	0.836
Grass	27.6	3.8	21.8	3.6	28.2	5.2	35.4	4.6	28.5	5.0	0.539
Grasslike	0.1	0.1	0.6	0.3	0.2	0.2	0.7	0.4	0.1	0.1	0.420
Legume	0.7	0.3	1.1	0.3	0.8	0.3	2.0	0.8	2.4	0.8	0.246
Vine	23.0	5.7	13.4	2.2	13.3	2.6	11.4	2.1	13.6	2.5	0.403
Woody	22.2	4.1	19.9	2.8	20.7	3.5	17.0	3.9	16.4	1.6	0.832
Vegetation total	83.2	8.4	65.1	5.8	72.7	8.3	73.8	6.2	68.5	4.8	0.603

Table B.3. Canopy coverage (%) by forage type and species for 5 pine plantation management regimes varying from low (1) to high (5) intensity at pre-treatment (July 2001) in the Mississippi Lower Coastal Plain[a].

	Treatment										*P*-value
	1		2		3		4		5		
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Trt
Fern											
Lygodium japonicum	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	
Osmunda regalis	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	
Pteridium aquilinum	0.1	0.1	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	
Forb (legume)											
Centrosema virginianum	<0.1	<0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	
Chamaecrista procumbens	<0.1	<0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.6	0.4	
Desmodium ciliare	0.4	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.3	0.2	
Desmodium nuttallii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	
Desmodium rotundifolium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.1	0.3	0.2	0.478
Desmodium tortuosum	<0.1	<0.1	0.0	0.0	0.2	0.1	1.0	0.6	0.4	0.4	
Indigofera caroliniana	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Lespedeza cuneata	<0.1	<0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	
Lespedeza repens	0.0	0.0	0.1	<0.1	0.1	<0.1	0.0	0.0	<0.1	<0.1	
Rhynchosia reniformis	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	
Stylosanthes biflora	<0.1	<0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.3	0.2	
Tephrosia virginiana	<0.1	<0.1	0.2	0.1	0.4	0.2	0.4	0.3	0.4	0.2	0.633
Forb (non-legume)											
Acalypha gracilens	<0.1	<0.1	0.8	0.4	<0.1	<0.1	0.5	0.5	0.7	0.4	
Agalinis spp.	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Ambrosia artemisiifolia	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	0.0	
Aster adnatus	0.0	0.0	0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.3	0.2	
Aster dumosus	0.5	0.2	1.5	0.5	1.0	0.3	2.1	0.8	0.9	0.3	0.392
Aster linariifolius	0.3	0.2	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Aster patens	<0.1	<0.1	0.6	0.4	0.0	0.0	0.4	0.4	<0.1	<0.1	
Carduus spinosissimus	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	

Table B.3. Continued.

Species	Treatment 1		Treatment 2		Treatment 3		Treatment 4		Treatment 5		*P*-value
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Trt
Coreopsis major	<0.1	<0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.2	0.1	
Croton capitatus	0.0	0.0	<0.1	<0.1	0.3	0.3	0.0	0.0	<0.1	<0.1	
Cynoctonum mitreola	0.1	<0.1	0.1	<0.1	0.0	0.0	0.0	0.0	0.2	<0.1	
Diodia teres	<0.1	<0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.4	0.2	
Diodia virginiana	<0.1	<0.1	0.0	0.0	0.4	0.3	<0.1	<0.1	<0.1	<0.1	
Elephantopus tomentosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
Erechtites hieracifolia	3.1	1.0	2.0	0.6	1.6	0.6	0.7	0.3	1.1	0.4	0.147
Eupatorium album	0.0	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Eupatorium capillifolium	2.3	0.8	0.9	0.3	2.9	0.8	1.1	0.3	1.2	0.3	0.213
Eupatorium compositifolium	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.0	0.0	
Eupatorium rotundifolium	0.2	<0.1	<0.1	<0.1	0.3	0.2	0.3	0.2	0.4	0.2	0.373
Eupatorium semiserratum	0.5	0.5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	
Eupatorium serotinum	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1	
Euphorbia corollata	<0.1	<0.1	0.3	0.2	0.2	0.2	<0.1	<0.1	0.2	0.1	
Euthamia temuifolia	0.0	0.0	0.0	0.0	0.2	0.1	<0.1	<0.1	0.0	0.0	
Heterotheca graminifolia	0.1	0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	0.2	<0.1	
Lechea villosa	0.0	0.0	0.0	0.0	0.4	0.3	0.0	0.0	0.0	0.0	
Liatris squarrosa	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Lobelia puberula	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	
Mimosa quadrivalvis	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.0	0.0	
Oldenlandia uniflora	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	
Oxalis dillenii	0.0	0.0	0.0	0.0	<0.1	<0.1	0.2	<0.1	0.0	0.0	
Oxalis stricta	<0.1	<0.1	0.2	0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	
Phytolacca americana	<0.1	<0.1	<0.1	<0.1	0.3	0.2	0.0	0.0	<0.1	<0.1	
Polygala nana	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Polypremum procumbens	1.1	0.6	1.0	0.4	0.1	0.1	0.0	0.0	0.3	0.3	
Pycnanthemum albescens	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.2	0.1	0.0	0.0	
Rhexia alifanus	0.0	0.0	0.0	0.0	0.2	0.2	<0.1	<0.1	0.0	0.0	

Table B.3. Continued.

	Treatment										P-value
	1		2		3		4		5		
Species	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Trt
Rhexia virginica	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	
Rudbeckia fulgida	0.1	0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	
Sabatia angularis	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Sanicula canadensis	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	
Scutellaria elliptica	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Scutellaria intergrifolia	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Solanum chenopodioides	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	
Solidago canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	
Solidago odora	0.1	<0.1	<0.1	<0.1	0.4	0.2	0.3	0.1	0.8	0.6	0.337
Solidago ulmifolia	<0.1	<0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.0	0.0	
Tragia urticifolia	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	
Verbena brasiliensis	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	
Grass											
Andropogon capillipes	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	
Andropogon virginicus	7.7 A	2.9	10.3 A	2.6	10.9 A	3.2	21.0 B	4.1	6.0 A	1.8	0.006
Aristida spp.	0.9	0.6	2.7	1.1	0.1	<0.1	0.2	0.1	1.9	1.4	0.382
Chasmanthium latifolium	7.7	3.6	<0.1	<0.1	4.4	2.6	0.0	0.0	5.9	3.8	
Chasmanthium sessiliflorum	<0.1	<0.1	0.2	0.2	0.7	0.4	<0.1	<0.1	0.0	0.0	
Dicanthelium aciculare	0.7	0.3	0.2	0.2	0.0	0.0	<0.1	<0.1	1.4	0.8	
Dicanthelium acuminatum	1.4	0.7	5.1	1.6	0.5	0.5	3.7	1.6	2.5	1.1	0.394
Dicanthelium commutatum	0.0	0.0	0.6	0.6	0.0	0.0	0.0	0.0	3.4	1.6	
Dicanthelium dichotomun	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	
Dicanthelium ovale	<0.1	<0.1	<0.1	<0.1	0.8	0.4	1.7	0.6	1.1	0.6	0.176
Dicanthelium portoricense	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	
Dicanthelium scoparium	1.8	1.3	<0.1	<0.1	3.4	1.5	0.4	0.3	0.0	0.0	
Dicanthelium sphaerocarpon	1.3	0.7	0.5	0.2	0.0	0.0	0.0	0.0	<0.1	<0.1	
Erianthus giganteus	1.2	0.7	0.5	0.3	0.0	0.0	1.0	0.6	0.2	0.1	
Imperata cylindrica	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	

Table B.3. Continued.

Species	Treatment 1 x̄	1 SE	2 x̄	2 SE	3 x̄	3 SE	4 x̄	4 SE	5 x̄	5 SE	P-value Trt
Panicum anceps	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	
Paspalum notatum	4.6	1.3	1.4	0.5	2.8	1.4	3.3	2.6	4.8	2.2	0.663
Paspalum plicatulum	0.0	0.0	0.0	0.0	<0.1	<0.1	0.2	0.2	0.0	0.0	
Schizachyrium scoparicum	<0.1	<0.1	0.0	0.0	3.5	2.1	3.6	1.8	1.2	1.1	
Grasslike											
Cyperus croceus	<0.1	<0.1	0.6	0.3	0.2	0.2	0.5	0.3	0.1	0.1	
Cyperus ovularis	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	
Rhynchospora inexpansa	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Vine											
Ampelopsis arborea	0.8	0.6	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1	
Berchemia scandens	0.2	0.2	<0.1	<0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1	
Campsis radicans	0.0	0.0	0.0	0.0	<0.1	<0.1	0.4	0.3	0.0	0.0	
Gelsemium sepervirens	<0.1	<0.1	0.1	0.1	<0.1	<0.1	0.2	0.1	0.4	0.2	
Lonicera japonica	0.2	0.1	1.0	0.7	0.3	0.3	0.1	0.1	<0.1	<0.1	
Mikiana scandens	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Parthenocissus quinquefolia	0.6	0.2	0.5	0.2	0.4	0.2	0.1	<0.1	0.2	<0.1	0.278
Passiflora lutea	0.3	0.1	0.6	0.2	0.2	0.1	<0.1	<0.1	0.3	0.1	0.455
Rubus argutus	2.3 A	0.6	1.6 A	0.5	6.6 B	1.3	3.6 A	0.9	1.8 A	0.4	0.015
Rubus flagellaris	0.2	0.2	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	
Rubus trivialis	4.5	1.7	4.5	1.3	2.3	1.3	2.4	1.5	2.4	0.8	0.387
Smilax bona-nox	<0.1	<0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	
Smilax glauca	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	
Smilax laurifolia	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.3	0.2	
Smilax rotundifolia	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1	
Smilax smallii	0.2	0.1	0.0	0.0	0.3	0.2	0.0	0.0	<0.1	<0.1	
Toxicodendron radicans	0.9	0.3	1.4	0.5	0.4	0.1	0.5	0.2	1.4	0.8	0.657
Toxicodendron toxicodendron	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.0	0.0	
Vitis aestivalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	

Table B.3. Continued.

	Treatment										P-value
	1		2		3		4		5		
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Trt
Vitis rotundifolia	12.4	4.9	2.9	1.3	2.4	0.9	3.9	1.3	6.4	2.3	0.367
Woody											
Acer rubrum	2.5	1.5	1.1	0.6	<0.1	<0.1	0.8	0.4	2.3	1.0	0.604
Aleurites fordii	1.6	0.8	0.3	0.2	2.1	0.8	0.4	0.3	1.2	0.5	0.247
Baccharis halimifolia	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	
Callicarpa americana	0.9	0.5	1.8	0.7	0.8	0.4	0.8	0.4	0.3	0.1	0.497
Carya carolinae-septentrionalis	0.3	0.3	0.2	0.1	0.0	0.0	0.3	0.2	0.0	0.0	
Carya tomentosa	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.2	
Castanea pumila	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	
Ceanothus americanus	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2	0.1	<0.1	<0.1	
Conyza canadensis	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Cornus drummondii	0.1	<0.1	0.0	0.0	0.4	0.3	2.3	1.3	0.0	0.0	
Cornus florida	0.9	0.8	0.4	0.3	0.7	0.6	0.6	0.6	0.6	0.2	
Crategus aestivalis	0.0	0.0	0.1	<0.1	0.4	0.2	0.0	0.0	0.0	0.0	
Cyrilla racemiflora	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	
Diospyros virginiana	1.9	0.5	0.9	0.3	1.0	0.4	0.5	0.2	0.8	0.3	0.118
Hypericum gentianoides	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.1	
Hypericum hypericoides	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	
Ilex decidua	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	
Ilex glabra	0.5	0.3	0.2	<0.1	1.1	0.4	0.2	0.1	0.3	0.1	0.323
Ilex opaca	<0.1	<0.1	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	
Ilex vomitoria	2.1	0.5	2.3	0.8	2.3	0.6	2.6	0.7	1.6	0.5	0.890
Ligustrum sinense	0.0	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Liquidambar styraciflua	1.7	1.2	1.3	0.6	1.6	1.1	1.4	0.7	0.4	0.2	0.735
Magnolia virginiana	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Myrica cerifera	0.9	0.3	1.5	0.5	1.2	0.5	1.5	0.8	0.9	0.2	0.883
Nyssa sylvatica	0.7	0.5	1.2	0.6	<0.1	<0.1	<0.1	<0.1	0.4	0.3	
Pinus palustris	0.0	0.0	0.0	0.0	<0.1	<0.1	0.2	0.1	0.0	0.0	

Table B.3. Continued.

	Treatment										
	1		2		3		4		5		*P*-value
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Trt
Pinus taeda	0.3	0.2	0.1	<0.1	0.3	0.2	0.2	<0.1	0.3	0.1	0.918
Prunus serotina	0.6	0.5	0.4	0.2	0.2	0.1	0.0	0.0	0.2	<0.1	
Quercus alba	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	
Quercus falcata	0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.6	0.3	
Quercus laurifolia	0.0	0.0	0.2	0.2	0.0	0.0	<0.1	<0.1	<0.1	<0.1	
Quercus marilandica	0.4	0.4	<0.1	<0.1	0.2	0.2	0.3	0.2	<0.1	<0.1	
Quercus nigra	1.8	1.2	2.6	1.0	0.4	0.2	0.4	0.3	1.7	1.0	0.660
Quercus pagodifolia	1.2	0.4	1.2	0.5	2.7	1.2	1.0	0.4	1.0	0.5	0.680
Quercus phellos	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	
Quercus stellata	0.2	0.2	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	
Rhus copallina	1.4	0.7	0.6	0.3	0.5	0.3	0.8	0.4	1.0	0.4	0.468
Robinia pseudo-acacia	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	
Sassafras albidum	0.0	0.0	0.4	0.4	0.0	0.0	0.1	0.1	0.0	0.0	
Toxicodendron vernix	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	
Vaccinium arboreum	0.5	0.3	1.1	0.4	2.3	0.7	0.6	0.2	0.5	0.2	0.100
Vaccinium darrowii	<0.1	<0.1	0.0	0.0	0.3	0.1	<0.1	<0.1	0.2	<0.1	
Vaccinium ellottii	0.5	0.2	0.6	0.3	<0.1	<0.1	0.3	0.2	0.2	0.2	
Vaccinium stamenium	0.4	0.2	0.4	0.2	1.2	0.4	0.7	0.3	1.1	0.4	0.633

[a] Canopy coverage (%) based on modified line-intercept method (Canfield 1941) from 5, randomly-allocated transects per trearment.

Table B.4. Frequency of occurrence (%)[a] by species for 5 pine plantation management regimes varying from low (1) to high (5) intensity at pre-treatment (June 2001) in the Mississippi Lower Coastal Plain.

	Treatment									
	1		2		3		4		5	
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Acalypha gracilens	0.2	0.2	4.8	2.3	0.7	0.5	2.0	2.0	4.5	2.7
Acer rubrum	6.0	3.3	2.2	0.9	0.7	0.4	3.3	1.5	6.7	2.7
Agalinis spp.	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aleurites fordii	6.5	3.3	1.5	0.7	8.2	2.9	1.5	1.0	5.7	2.3
Ambrosia artemisiifolia	0.2	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.3	0.3
Ampelopsis arborea	2.0	1.8	0.0	0.0	0.3	0.3	0.0	0.0	0.2	0.2
Andropogon capillipes	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0
Andropogon virginicus	22.2	6.7	33.5	7.1	24.0	6.5	49.0	6.3	27.0	6.1
Aristida spp.	3.2	1.8	11.2	4.2	0.7	0.5	5.7	4.5	6.0	3.8
Aster adnatus	0.0	0.0	1.7	0.8	1.0	0.4	0.3	0.2	2.2	1.1
Aster dumosus	3.7	1.8	8.5	3.4	5.3	1.5	9.7	3.1	5.0	1.6
Aster linariifolius	3.5	1.7	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Aster patens	0.5	0.3	3.8	1.8	0.0	0.0	1.0	1.0	1.0	0.6
Baccharis halimifolia	0.0	0.0	0.0	0.0	0.7	0.4	0.0	0.0	0.0	0.0
Bare ground	3.0	1.3	3.3	1.1	12.8	5.0	4.3	1.7	4.0	1.7
Berchemia scandens	1.2	0.7	1.0	0.7	1.0	0.8	0.0	0.0	0.5	0.4
Callicarpa americana	3.2	1.3	4.3	1.6	2.2	1.0	2.7	1.3	1.5	0.7
Campsis radicans	0.0	0.0	0.0	0.0	0.2	0.2	2.0	1.4	0.0	0.0
Carduus spinosissimus	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Carya carolinae-septentrionalis	0.7	0.7	0.7	0.5	0.0	0.0	0.3	0.2	0.0	0.0
Carya tomentosa	0.0	0.0	0.0	0.0	0.5	0.4	0.0	0.0	0.3	0.3
Castanea pumila	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Ceanothus americanus	0.2	0.2	0.7	0.7	0.7	0.5	0.5	0.4	0.3	0.3
Centrosema virginianum	0.3	0.3	0.3	0.3	0.0	0.0	0.5	0.4	0.0	0.0
Chamaecrista procumbens	0.5	0.4	2.5	1.2	0.0	0.0	0.0	0.0	2.8	1.8
Chasmanthium latifolium	12.8	5.5	0.3	0.2	8.7	4.7	0.0	0.0	9.5	5.2
Chasmanthium sessiliflorum	0.3	0.3	0.8	0.6	2.7	1.4	0.7	0.5	0.0	0.0

Table B.4. Continued.

	Treatment									
	1		2		3		4		5	
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Conyza canadensis	0.0	0.0	0.0	0.0	0.2	0.2	0.7	0.4	0.2	0.2
Coreopsis major	0.3	0.2	0.0	0.0	0.5	0.5	0.3	0.3	1.3	0.8
Cornus drummondii	0.3	0.2	0.0	0.0	1.5	0.9	4.2	2.6	0.0	0.0
Cornus florida	2.2	1.7	1.2	0.6	1.0	0.8	1.0	0.8	2.0	0.8
Crategus aestivalis	0.0	0.0	1.0	0.5	2.0	1.2	0.0	0.0	0.0	0.0
Croton capitatus	0.0	0.0	0.7	0.5	1.2	0.8	0.0	0.0	0.3	0.2
Cynoctonum mitreola	1.2	0.7	1.2	0.6	0.0	0.0	0.0	0.0	1.5	0.7
Cyperus croceus	0.2	0.2	3.5	1.5	1.3	1.3	3.5	1.8	1.0	0.7
Cyrilla racemiflora	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Debris	72.7	6.1	85.3	3.3	69.0	5.7	81.2	3.7	85.8	3.3
Desmodium ciliare	2.8	1.4	2.5	1.2	0.0	0.0	0.0	0.0	1.0	0.5
Desmodium nuttallii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Desmodium rotundifolium	0.7	0.4	1.0	0.5	0.5	0.4	1.7	0.6	1.7	0.8
Desmodium tortuosum	0.2	0.2	0.0	0.0	1.2	0.7	4.2	2.3	1.0	0.7
Dicanthelium aciculare	2.3	0.9	0.0	0.0	0.0	0.0	0.3	0.2	5.5	3.5
Dicanthelium acuminatum	7.0	2.8	20.3	4.6	2.5	2.3	11.3	4.4	10.7	4.3
Dicanthelium commutatum	0.0	0.0	2.0	1.7	0.0	0.0	0.0	0.0	13.0	6.0
Dicanthelium dichotomun	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Dicanthelium ovale	0.2	0.2	0.2	0.2	6.3	2.4	9.2	2.6	6.2	3.4
Dicanthelium portoricense	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Dicanthelium scoparium	3.7	2.5	0.3	0.2	8.2	3.2	1.2	0.7	0.3	0.3
Dicanthelium sphaerocarpon	6.5	3.1	6.0	2.8	0.0	0.0	0.0	0.0	0.2	0.2
Diodia teres	0.5	0.3	0.3	0.2	0.0	0.0	0.3	0.2	2.3	1.4
Diodia virginiana	0.2	0.2	0.0	0.0	1.5	0.9	0.2	0.2	0.2	0.2
Diospyros virginiana	5.7	1.8	2.8	0.9	3.5	1.1	1.7	0.6	2.7	1.0
Elephantopus tomentosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
Erechtites hieracifolia	11.7	3.2	8.8	2.5	7.3	2.8	3.3	1.1	5.8	1.5

Table B.4. Continued.

	Treatment									
	1		2		3		4		5	
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Erianthus giganteus	6.7	3.4	7.5	4.8	0.0	0.0	3.5	2.0	1.7	0.9
Eupatorium album	0.0	0.0	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Eupatorium capillifolium	11.5	3.1	6.5	1.7	15.3	4.5	10.5	2.7	9.2	1.9
Eupatorium compositifolium	1.2	0.6	0.7	0.4	0.8	0.5	1.3	0.7	0.0	0.0
Eupatorium rotundifolium	1.2	0.6	0.3	0.2	1.8	1.0	2.2	1.0	3.0	1.3
Eupatorium semiserratum	2.5	2.3	0.8	0.4	0.7	0.3	0.2	0.2	1.2	0.8
Eupatorium serotinum	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.7	0.5
Euphorbia corollata	0.7	0.4	1.7	0.8	1.5	0.8	0.8	0.7	1.7	1.1
Euthamia temuifolia	0.0	0.0	0.0	0.0	0.5	0.4	0.2	0.2	0.0	0.0
Gelsemium sepervirens	0.5	0.3	0.7	0.7	0.2	0.2	1.5	0.9	2.5	1.4
Heterotheca graminifolia	1.0	1.0	1.2	0.5	1.3	0.7	0.5	0.4	2.8	1.3
Hypericum hypericoides	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
Ilex decidua	0.2	0.2	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Ilex glabra	2.8	1.4	1.5	0.7	4.3	1.6	1.7	1.0	2.0	0.9
Ilex opaca	0.2	0.2	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Ilex vomitoria	6.8	1.5	7.8	2.5	6.5	1.7	8.3	1.9	5.8	1.6
Imperata cylindrica	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0
Indigofera caroliniana	0.0	0.0	0.0	0.0	0.3	0.2	0.5	0.4	0.8	0.7
Lechea villosa	0.0	0.0	0.0	0.0	1.8	1.1	0.0	0.0	0.0	0.0
Lespedeza cuneata	0.7	0.5	0.5	0.4	0.0	0.0	0.2	0.2	0.8	0.4
Lespedeza repens	0.0	0.0	2.0	1.0	0.7	0.4	0.0	0.0	0.2	0.2
Liatris squarrosa	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ligustrum sinense	0.0	0.0	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Liquidambar styraciflua	3.8	2.3	3.7	1.4	3.3	1.9	3.8	2.0	1.7	0.7
Lobelia puberula	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.4	0.0	0.0
Lonicera japonica	1.5	1.3	4.2	2.2	1.5	1.0	0.5	0.4	0.5	0.4
Lygodium japonicum	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Magnolia virginiana	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table B.4. Continued.

	Treatment									
	1		2		3		4		5	
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Mikiana scandens	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2
Mimosa quadrivalvis	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.7	0.0	0.0
Myrica cerifera	4.8	1.5	6.8	2.3	4.5	1.5	5.3	2.1	4.5	0.9
Nyssa sylvatica	3.3	2.5	4.2	1.7	0.2	0.2	0.2	0.2	2.8	1.3
Oldenlandia uniflora	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Osmunda regalis	0.0	0.0	0.2	0.2	0.0	0.0	0.3	0.3	0.2	0.2
Oxalis dillenii	0.0	0.0	0.0	0.0	0.2	0.2	1.7	0.9	0.0	0.0
Oxalis stricta	0.8	0.6	1.5	0.9	0.0	0.0	0.0	0.0	0.2	0.2
Panicum anceps	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.0	0.0
Parthenocissus quinquefolia	2.3	0.9	3.2	1.1	2.2	1.1	0.7	0.4	1.5	0.7
Paspalum notatum	13.7	3.5	5.3	1.8	7.0	2.7	6.3	4.7	9.5	4.2
Paspalum plicatulum	0.0	0.0	0.0	0.0	0.3	0.2	1.0	0.5	0.0	0.0
Passiflora lutea	2.8	1.2	6.7	2.3	1.2	0.8	0.2	0.2	4.5	1.7
Phytolacca americana	0.2	0.2	0.3	0.3	1.5	1.0	0.0	0.0	0.2	0.2
Pinus palustris	0.0	0.0	0.0	0.0	0.2	0.2	0.7	0.5	0.0	0.0
Pinus taeda	3.2	1.5	3.2	1.2	1.3	0.9	3.8	1.5	3.8	1.5
Polygala nana	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Polypremum procumbens	3.5	1.6	4.5	1.9	0.7	0.7	0.0	0.0	0.8	0.8
Prunus serotina	1.5	1.0	1.2	0.5	0.7	0.5	0.0	0.0	1.2	0.7
Pteridium aquilinum	1.0	1.0	0.0	0.0	1.0	0.8	0.0	0.0	0.0	0.0
Pycnanthemum albescens	0.3	0.3	0.0	0.0	0.2	0.2	0.7	0.4	0.0	0.0
Quercus falcata	0.5	0.5	0.2	0.2	0.3	0.3	0.5	0.3	2.3	1.2
Quercus laurifolia	0.0	0.0	0.5	0.5	0.0	0.0	0.2	0.2	0.2	0.2
Quercus marilandica	0.7	0.7	0.3	0.3	0.5	0.4	0.8	0.6	0.3	0.2
Quercus nigra	2.7	1.5	5.0	2.0	1.5	0.7	1.3	0.6	4.7	2.4
Quercus pagodifolia	3.0	1.1	3.8	1.7	5.3	2.2	3.0	1.2	4.5	2.0
Quercus phellos	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.6
Quercus stellata	0.2	0.2	0.2	0.2	0.0	0.0	0.2	0.2	0.0	0.0

Table B.4. Continued.

	Treatment									
	1		2		3		4		5	
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Rhexia alifanus	0.0	0.0	0.0	0.0	1.2	0.7	0.2	0.2	0.0	0.0
Rhexia virginica	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Rhus copallina	6.0	2.8	2.7	0.9	1.8	1.2	3.8	1.6	4.3	1.6
Rhynchosia reniformis	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Rhynchospora inexpansa	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Robinia pseudo-acacia	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Rubus argutus	10.7	2.2	8.0	1.5	26.3	4.2	16.3	3.8	9.7	1.4
Rubus flagellaris	0.8	0.8	1.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0
Rubus trivialis	16.3	5.4	22.7	5.3	6.7	3.0	6.2	2.9	16.2	4.7
Rudbeckia fulgida	0.7	0.7	0.2	0.2	0.0	0.0	0.5	0.3	0.3	0.3
Sabatia angularis	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Sanicula canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Sassafras albidum	0.0	0.0	1.7	1.7	0.0	0.0	0.7	0.5	0.0	0.0
Schizachyrium scoparicum	0.3	0.3	0.0	0.0	6.3	3.4	10.0	4.5	2.7	2.3
Scutellaria elliptica	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Scutellaria intergrifolia	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Smilax bona-nox	0.2	0.2	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0
Smilax glauca	0.2	0.2	1.3	0.6	0.2	0.2	1.3	0.7	0.5	0.4
Smilax laurifolia	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.7	0.5
Smilax rotundifolia	0.5	0.3	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.2
Smilax smallii	0.8	0.5	0.0	0.0	1.2	0.6	0.0	0.0	0.8	0.8
Solanum chenopodioides	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Solidago canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Solidago odora	1.0	0.6	0.7	0.4	2.5	1.4	3.0	1.1	4.0	3.2
Solidago ulmifolia	0.2	0.2	0.0	0.0	0.2	0.2	0.3	0.2	0.0	0.0
Standing debris	0.2	0.2	0.5	0.4	1.5	1.1	1.3	0.6	0.3	0.2
Stylosanthes biflora	0.5	0.5	0.0	0.0	0.5	0.3	1.2	0.7	3.7	1.7
Tephrosia virginiana	0.7	0.4	1.8	1.1	1.0	0.5	1.8	0.8	3.7	1.7

Table B.4. Continued.

	Treatment									
	1		2		3		4		5	
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Toxicodendron radicans	5.2	1.8	9.2	2.9	3.0	0.8	4.2	1.2	8.5	3.1
Toxicodendron toxicodendron	0.8	0.5	0.5	0.5	0.2	0.2	0.8	0.5	0.0	0.0
Toxicodendron vernix	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Tragia urticifolia	0.3	0.3	0.8	0.7	0.0	0.0	0.0	0.0	0.3	0.2
Vaccinium arboreum	1.3	0.5	5.2	1.8	6.0	1.8	2.8	1.1	4.3	1.6
Vaccinium darrowii	0.2	0.2	0.0	0.0	1.8	0.7	0.7	0.5	1.2	0.7
Vaccinium ellottii	2.5	1.3	4.0	1.8	0.0	0.0	1.3	1.0	0.8	0.7
Vaccinium stamenium	1.8	0.7	2.7	1.1	4.2	1.4	3.7	1.6	6.8	2.6
Verbena brasiliensis	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Vitis aestivalis	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.3	0.3
Vitis rotundifolia	19.7	5.6	5.7	2.2	5.7	1.9	13.2	3.9	13.0	4.2

[a] Frequency of occurrence = (no. of m with species) / (30 m per transect), n = 5 per treatment.

APPENDIX C

SUPPLEMENTARY POST-TREATMENT (JULY 2002 AND JULY 2003) VEGETATIVE CHARACTERISTICS

Table C.1. Canopy coverage (%) by forage type and species for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment												
	1[b]		2		3		4		5		*P*-value		
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002													
Fern													
Lygodium japonicum	<0.1	<0.1	0.2	0.2	0.0		0.0		0.0				
Osmunda regalis	0.0		0.0		0.0		0.0		0.0				
Pteridium aquilinum	<0.1	<0.1	0.0		0.2	<0.1	0.0		0.0				
Forb (legume)													
Centrosema virginianum	<0.1	<0.1	0.0		0.0		0.0		0.0				
Chamaecrista fasciculata	0.0		<0.1	<0.1	0.0		0.0		0.0				
Chamaecrista procumbens	0.0		<0.1	<0.1	0.0		0.0		0.0				
Desmodium ciliare	<0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1	<0.1	<0.1			
Desmodium nuttallii	0.0		0.0		0.0		0.0		0.0				
Desmodium rotundifolium	0.2	0.2	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Desmodium tortuosum	0.0		0.0		0.0		0.0		0.0				
Indigofera caroliniana	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Lespedeza capitata	<0.1	<0.1	0.0		0.0		0.0		0.0				
Lespedeza cuneata	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Lespedeza repens	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		0.121	0.187
Rhynchosia reniformis	0.0		0.0		0.0		0.0		<0.1	<0.1			
Tephrosia virginiana	<0.1	<0.1	0.0		0.0		0.0		0.0				
Forb (non-legume)													
Acalypha gracilens	0.4	0.1	1.5	0.5	0.7	0.2	<0.1	<0.1	<0.1	<0.1		0.524	0.531
Ambrosia artemisiifolia	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0			0.208	0.573
Aster adnatus	<0.1	<0.1	0.0		0.0		0.0		0.0				
Aster dumosus	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1			
Aster patens	0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Carduus spinosissimus	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Chrysopsis graminifolia	0.0		0.0		0.0		0.0		0.0				

Table C.1. Continued.

	Treatment										P-value		
	1		2		3		4		5				
Species	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
Cnidoscolus stimulosus	0.0		0.0		0.0		0.0		0.0				
Coreopsis major	0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Crotalaria sagittalis	<0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Croton capitatus	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1	<0.1	0.3	0.2			
Cynoctonum mitreola	0.0		0.0		0.0		0.0		0.0				
Diodia teres	0.3	0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Diodia virginiana	<0.1	<0.1	0.0		<0.1	<0.1	0.0		0.0				
Elephantopus tomentosus	0.0		<0.1	<0.1	0.0		0.0		0.0				
Erechtites hieracifolia	3.3 A	0.9	4.9 A	1.0	2.7 AB	0.7	0.3 B	0.1	0.2 B	<0.1		0.002	0.051
Erigeron strigosus	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Eupatorium album	0.3	0.1	0.5	0.2	0.1	<0.1	0.0		0.0				
Eupatorium capillifolium	2.2 A	0.5	4.4 A	0.8	3.1 A	0.6	0.3 A	<0.1	0.4 A	0.2		0.049	0.178
Eupatorium perfoliatum	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Eupatorium rotundifolium	<0.1	<0.1	0.0		0.0		0.0		0.0				
Eupatorium semiserratum	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Eupatorium serotinum	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Euphorbia corollata	0.8	0.3	0.2	0.1	0.6	0.2	0.2	0.1	0.2	<0.1		0.622	0.377
Euthamia temuifolia	0.9	0.2	2.0	0.6	0.8	0.3	<0.1	<0.1	<0.1	<0.1		0.050	0.353
Galium circaezans	0.0		<0.1	<0.1	0.0		<0.1	<0.1	0.0				
Galium pilosum	0.0		<0.1	<0.1	0.0		0.0		0.0				
Gnaphalium falcatum	<0.1	<0.1	0.6	0.2	0.5	0.1	0.0		0.0			0.252	0.342
Helianthus hirsutus	<0.1	<0.1	0.1	<0.1	0.0		0.0		0.0				
Heterotheca graminifolia	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Hibiscus aculeatus	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Hieracium gronovii	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Lactuca canadensis	0.0		<0.1	<0.1	0.0		0.0		0.0				
Lactuca floridana	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Lechea leggettii	0.0		0.0		<0.1	<0.1	0.0		<0.1	<0.1			
Lechea patula	0.0		0.0		0.0		0.0		0.0				

Table C.1. Continued.

Species	Treatment 1 x̄	1 SE	2 x̄	2 SE	3 x̄	3 SE	4 x̄	4 SE	5 x̄	5 SE	P-value Yr	P-value Trt	P-value Yr*trt
Lechea tenuifolia	0.0		0.0		0.0		0.0		0.0				
Lechea villosa	<0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Linum medium	0.0		0.0		<0.1	<0.1	0.0		0.0				
Ludwigia glandulosa	0.0		0.0		0.0		0.0		0.0				
Mecardonia acuminata	0.0		<0.1	<0.1	0.0		0.0		0.0				
Mimosa quadrivalvis	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Mitchella repens	0.0		0.0		0.0		0.0		0.0				
Oenothera biennis	0.0		0.0		0.0		0.0		0.0				
Oenothera fruticosa	0.0		0.0		0.0		0.0		0.0				
Oxalis dillenii	0.0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Oxalis stricta	<0.1	<0.1	0.7	0.4	0.4	0.2	<0.1	<0.1	0.0				
Phytolacca americana	0.2	<0.1	0.2	<0.1	0.4	0.2	<0.1	<0.1	<0.1	<0.1			
Plantago virginica	0.0		0.0		<0.1	<0.1	0.0		0.0				
Pluchea foetida	0.0		0.0		0.0		0.0		0.0				
Polygala nana	0.0		0.0		0.0		0.0		0.0				
Polygonum punctatum	<0.1	<0.1	0.0		0.0		0.0		0.0				
Polypremum procumbens	0.6	0.2	0.8	0.3	0.5	0.2	<0.1	<0.1	<0.1	<0.1		0.488	0.507
Prenanthes serpentaria	<0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Ptilimnium capillaceum	<0.1	<0.1	0.0		0.0		0.0		0.0				
Pycnanthemum incanum	0.2	0.1	0.4	0.2	0.1	<0.1	<0.1	<0.1	0.0				
Pyrrhopappus carolinanus	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Rhexia alifanus	<0.1	<0.1	0.0		0.0		0.0		0.0				
Rhexia mariana	<0.1	<0.1	0.0		0.0		0.0		0.0				
Rhexia virginica	<0.1	<0.1	0.0		0.0		0.0		0.0				
Rudbeckia hirta	<0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Sabatia campestris	0.0		0.0		<0.1	<0.1	0.0		0.0				
Scutellaria elliptica	0.0		0.0		0.0		0.0		0.0				
Scutellaria intergrifolia	0.0		<0.1	<0.1	0.0		0.0		0.0				
Solanum americanum	0.0		0.0		<0.1	<0.1	<0.1	<0.1	0.0				

Table C.1. Continued.

	Treatment										P-value		
	1		2		3		4		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Solanum carolinense	<0.1	<0.1	0.0		0.0		0.0		0.0				
Solidago canadensis	0.0		<0.1	<0.1	0.0		0.0		0.0			0.496	0.652
Solidago gigantea	<0.1	<0.1	0.0		<0.1	<0.1	0.0		0.0				
Solidago juncea	0.0		0.0		0.0		0.0		0.0				
Solidago rugosa	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Tragia urticifolia	0.0		0.0		0.0		0.0		0.0				
Viola affinis	0.0		0.0		<0.1	<0.1	0.0		0.0				
Viola lanceolata	0.4	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Viola palmata	0.0		0.0		0.0		<0.1	<0.1	0.0				
Grass													
Andropogon virginicus	3.7	0.6	5.2	1.2	1.4	0.3	0.9	0.2	0.6	0.2		0.057	0.400
Aristida spp.	0.2	<0.1	0.4	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		0.452	0.777
Chasmanthium sessiliflorum	<0.1	<0.1	0.4	0.2	0.0		0.0		<0.1	<0.1			
Dicanthelium aciculare	0.0		0.0		0.0		0.0		0.0				
Dicanthelium acuminatum	1.2	0.3	0.6	0.2	1.1	0.5	<0.1	<0.1	<0.1	<0.1		0.156	0.166
Dicanthelium commutatum	1.5 A	0.5	0.9 A	0.3	1.5 A	0.4	0.6 A	0.2	<0.1 A	<0.1		0.040	0.831
Dicanthelium leucothrix	0.1	<0.1	0.0		0.0		0.0		0.0				
Dicanthelium ovale	0.0		0.0		0.0		0.0		0.0				
Dicanthelium scoparium	1.4	0.6	6.2	2.0	2.5	0.9	0.0		<0.1	<0.1			
Dicanthelium sphaerocarpon	<0.1	<0.1	0.0		0.0		0.0		0.0				
Imperata cylindrica	3.9	1.3	0.9	0.9	0.5	0.5	0.0		<0.1	<0.1			
Panicum anceps	0.0		0.0		0.0		0.0		0.0				
Paspalum boscianum	0.0		<0.1	<0.1	0.0		0.0		0.0				
Paspalum notatum	0.0		<0.1	<0.1	0.0		0.0		0.0				
Paspalum plicatulum	0.0		0.0		0.0		0.0		0.0				
Paspalum setaceum	0.0		<0.1	<0.1	0.0		0.0		0.0				
Setaria pumilia	0.0		0.1	0.1	0.0		0.0		0.0				
Xyris spp.	<0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1	0.0				

Table C.1. Continued.

Species	Treatment 1 $\bar{x}$	1 SE	2 $\bar{x}$	2 SE	3 $\bar{x}$	3 SE	4 $\bar{x}$	4 SE	5 $\bar{x}$	5 SE	P-value Yr	Trt	Yr*trt
Grasslike													
Carex albolutescens	0.9	0.2	0.7	0.2	0.4	0.2	<0.1	<0.1	<0.1	<0.1		0.256	0.866
Carex lurida	0.0		0.0		0.0		0.0		0.0				
Cyperus filiculmis	0.0		0.0		0.0		0.0		0.0				
Cyperus ovularis	0.0		0.0		<0.1	<0.1	0.0		0.0				
Cyperus pseudovegetus	0.0		0.0		0.0		0.0		0.0				
Juncus marginatus	0.0		0.0		0.0		0.0		0.0				
Juncus polycephalus	0.0		0.0		0.0		0.0		0.0				
Juncus tenuis	0.9	0.2	1.2	0.5	1.3	0.4	0.2	<0.1	0.1	<0.1		0.394	0.307
Rhynchospora globularis	0.0		<0.1	<0.1	0.0		0.0		0.0			0.065	0.645
Rhynchospora inexpansa	1.0	0.5	0.4	0.2	<0.1	<0.1	0.0		0.0			0.854	0.837
Rhynchospora rariflora	0.0		0.8	0.4	0.0		<0.1	<0.1	0.1	<0.1			
Scirpus cyperinus	0.0		0.0		0.0		0.0		0.0				
Scleria ciliata	0.0		0.0		0.0		0.0		0.0				
Vine													
Berchemia scandens	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Bignonia capreolata	0.0		<0.1	<0.1	0.0		0.0		0.0				
Campsis radicans	0.9	0.5	0.0		0.1	0.1	<0.1	<0.1	0.0				
Gelsemium sepervirens	0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1	0.0				
Lonicera japonica	0.3	0.1	<0.1	<0.1	0.0		0.0		0.0				
Lonicera sempriverens	0.0		0.0		0.0		0.0		0.0				
Mikiana scandens	0.4	0.2	0.0		<0.1	<0.1	0.0		<0.1	<0.1			
Parthenocissus quinquefolia	0.4	0.1	0.0		<0.1	<0.1	0.0		<0.1	<0.1			
Passiflora lutea	0.0		0.0		0.0		0.0		0.0				
Rubus argutus	5.9 A	0.7	3.0 AB	0.8	3.0 AB	0.6	0.6 B	0.2	0.4 B	0.1		≤0.001	0.363
Rubus flagellaris	0.1 A	<0.1	0.0 A		0.0 A		0.0 A		0.0 A			0.040	0.102
Rubus trivialis	1.9	0.4	1.3	0.5	2.9	0.7	0.3	0.2	0.2	0.1		0.074	0.571
Smilax bona-nox	0.0		<0.1	<0.1	0.0		0.0		0.0				
Smilax glauca	0.1	<0.1	0.0		<0.1	<0.1	<0.1	<0.1	0.0				

Table C.1. Continued.

	Treatment										P-value		
	1		2		3		4		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Smilax laurifolia	0.0		0.0		0.0		0.0		0.0				
Smilax rotundifolia	<0.1	<0.1	0.0		0.0		0.0		0.0				
Toxicodendron radicans	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1			
Vitis aestivalis	0.0		0.0		0.0		0.0		0.0				
Vitis rotundifolia	<0.1	<0.1	0.0		<0.1	<0.1	0.0		0.0			0.543	0.002
Woody													
Acer rubrum	0.2	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Albizia julibrissin	0.0		<0.1	<0.1	0.0		0.0		<0.1	<0.1			
Aleurites fordii	0.2	<0.1	0.1	<0.1	0.6	0.2	0.4	0.2	0.5	0.2		0.470	0.626
Aralia spinosa	0.0		0.0		<0.1	<0.1	0.0		0.0				
Baccharis halimifolia	0.6	0.2	0.3	0.1	0.1	<0.1	0.2	0.2	<0.1	<0.1		0.557	0.927
Callicarpa americana	0.3	0.1	0.5	0.3	0.1	<0.1	0.2	<0.1	0.0			0.195	0.245
Carya tomentosa	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1			
Celtis laevigata	0.0		0.0		0.0		<0.1	<0.1	0.0				
Conyza canadensis	0.3	0.1	0.4	0.2	0.1	<0.1	0.0		0.0			0.142	0.803
Cornus florida	0.0		<0.1	<0.1	0.0		0.0		0.0				
Crataegus aestivalis	<0.1	<0.1	0.0		0.0		0.0		0.0				
Crataegus flava	0.0		<0.1	<0.1	0.0		0.0		0.0				
Crataegus marshallii	0.0		<0.1	<0.1	0.0		0.0		0.0				
Diospyros virginiana	0.5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Hypericum drummondii	0.0		0.0		<0.1	<0.1	0.0		0.0				
Hypericum gentianoides	<0.1	<0.1	0.2	<0.1	0.1	<0.1	0.0		0.0				
Hypericum hypericoides	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1		0.691	0.855
Hypericum mutilum	0.0		0.0		0.0		<0.1	<0.1	0.0				
Hypericum stragalum	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.0		0.0				
Ilex coriacea	<0.1	<0.1	0.3	0.2	0.0		0.0		0.0				
Ilex glabra	0.3	0.3	<0.1	<0.1	0.0		0.0		0.0				
Ilex vomitoria	0.4 A	0.1	0.4 A	0.1	<0.1 A	<0.1	<0.1 A	<0.1	0.3 A	0.3		0.039	0.043
Ligustrum sinense	0.2	0.1	0.0		0.0		0.0		0.0				

Table C.1. Continued.

	Treatment										P-value		
	1		2		3		4		5				
Species	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
Liquidambar styraciflua	0.3	0.1	0.2	0.1	0.0		0.0		0.0				
Magnolia virginiana	<0.1	<0.1	0.0		0.0		0.0		<0.1	<0.1			
Myrica cerifera	0.2 A	<0.1	<0.1 A	<0.1	<0.1 A	<0.1	0.1 A	<0.1	<0.1 A	<0.1		0.030	0.201
Pinus palustris	<0.1	<0.1	0.0		0.0		0.0		0.0				
Pinus taeda	0.7	0.1	0.9	0.1	0.8	0.2	1.0	0.1	0.8	0.1		0.343	0.682
Prunus angustifolia	0.0		0.0		0.0		0.0		0.0				
Prunus serotina	<0.1	<0.1	0.1	0.1	0.0		<0.1	<0.1	<0.1	<0.1			
Quercus falcata	0.0		0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Quercus marilandica	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Quercus nigra	0.1	<0.1	<0.1	<0.1	0.0		0.0		<0.1	<0.1			
Quercus pagodifolia	0.0		0.0		0.0		0.0		0.0				
Quercus phellos	0.0		0.0		0.0		0.0		0.0				
Quercus virginiana	<0.1	<0.1	0.0		<0.1	<0.1	0.0		0.0				
Rhus copallina	1.7	0.7	0.0		0.1	0.1	0.0		0.0				
Salix nigra	0.0		0.0		0.0		0.0		0.0				
Sambucus canadensis	0.0		0.0		0.0		0.0		0.0				
Sassafras albidum	<0.1	<0.1	0.0		0.0		0.0		0.0				
Vaccinium arboreum	0.8	0.2	0.0		0.0		0.0		<0.1	<0.1		0.096	0.181
Vaccinium ellottii	<0.1	<0.1	0.0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Vaccinium stamenium	<0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Other													
Bare ground	14.7	1.9	2.1	0.5	14.4	1.4	22.4	2.4	22.2	2.5			
Debris	44.0	1.9	58.7	4.0	58.9	2.7	70.9	2.3	72.4	2.4			
Standing debris	<0.1	<0.1	0.8	0.3	0.0		0.0		0.2	0.1			
2003													
Fern													
Lygodium japonicum	0.0		0.0		<0.1	<0.1	0.0		0.0				
Osmunda regalis	0.0		<0.1	<0.1	0.0		0.0		0.0				
Pteridium aquilinum	0.0		0.2	0.2	0.2	0.2	0.0		0.0				

Table C.1. Continued.

Species	Treatment 1 x̄	1 SE	2 x̄	2 SE	3 x̄	3 SE	4 x̄	4 SE	5 x̄	5 SE	P-value Yr	Trt	Yr*trt
Forb (legume)													
Centrosema virginianum	<0.1	<0.1	0.0		<0.1	<0.1	0.2	0.2	0.0				
Chamaecrista fasciculata	0.0		0.0		0.0		0.0		0.0				
Chamaecrista procumbens	0.0		0.0		0.0		0.0		0.0				
Desmodium ciliare	<0.1	<0.1	0.2	<0.1	0.1	<0.1	0.7	0.2	0.3	0.1			
Desmodium nuttallii	0.0		<0.1	<0.1	0.1	<0.1	0.0		0.0				
Desmodium rotundifolium	0.2	0.1	<0.1	<0.1	0.2	0.1	0.1	<0.1	0.0				
Desmodium tortuosum	0.3	0.2	0.2	0.1	<0.1	<0.1	0.5	0.2	0.1	0.1			
Indigofera caroliniana	<0.1	<0.1	<0.1	<0.1	0.0		0.1	<0.1	<0.1	<0.1			
Lespedeza capitata	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Lespedeza cuneata	0.4	0.2	<0.1	<0.1	0.1	<0.1	0.0		<0.1	<0.1			
Lespedeza repens	<0.1	<0.1	<0.1	<0.1	0.4	0.1	0.6	0.2	<0.1	<0.1	0.021	0.121	
Rhynchosia reniformis	0.0		0.0		0.0		0.0		0.0				
Tephrosia virginiana	0.0		0.0		0.0		0.0		0.0				
Forb (non-legume)													
Acalypha gracilens	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.157	0.524	
Ambrosia artemisiifolia	0.9	0.3	0.2	<0.1	0.8	0.3	0.2	<0.1	0.0		0.045	0.208	
Aster adnatus	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Aster dumosus	0.3	0.2	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.0				
Aster patens	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.0				
Carduus spinosissimus	<0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Chrysopsis graminifolia	0.1	<0.1	0.1	<0.1	0.0		<0.1	<0.1	<0.1	<0.1			
Cnidoscolus stimulosus	0.0		0.0		0.0		<0.1	<0.1	0.0				
Coreopsis major	0.0		0.0		0.0		0.0		0.0				
Crotalaria sagittalis	0.0		0.0		<0.1	<0.1	0.0		0.0				
Croton capitatus	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1			
Cynoctonum mitreola	0.0		0.0		0.0		0.1	0.1	0.0				
Diodia teres	0.2	<0.1	<0.1	<0.1	0.4	0.2	0.1	<0.1	<0.1	<0.1			
Diodia virginiana	0.4	0.1	0.4	0.2	0.2	<0.1	0.1	<0.1	<0.1	<0.1			

Table C.1. Continued.

Species	Treatment 1 x̄	SE	Treatment 2 x̄	SE	Treatment 3 x̄	SE	Treatment 4 x̄	SE	Treatment 5 x̄	SE	P-value Yr	Trt	Yr*trt
Elephantopus tomentosus	0.0		0.0		0.0		0.0		0.0				
Erechtites hieracifolia	2.7 AB	0.5	4.4 A	0.7	1.0 BC	0.2	3.8 A	0.9	<0.1 C	<0.1	0.821	0.002	
Erigeron strigosus	0.0		0.0		0.0		<0.1	<0.1	0.0				
Eupatorium album	0.5	0.2	0.3	0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1			
Eupatorium capillifolium	2.0 AC	0.5	10.5 B	1.6	6.1 AB	1.3	5.2 ABC	1.1	0.2 C	0.1	0.009	0.049	
Eupatorium perfoliatum	0.0		0.0		0.0		0.0		0.0				
Eupatorium rotundifolium	0.0		0.0		0.0		0.0		0.0				
Eupatorium semiserratum	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Eupatorium serotinum	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Euphorbia corollata	0.6	0.3	<0.1	<0.1	0.4	0.2	0.2	<0.1	0.5	0.2	0.442	0.622	
Euthamia temuifolia	5.2	1.0	2.9	0.6	5.5	1.0	3.2	0.6	0.3	0.1	0.003	0.050	
Galium circaezans	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.0				
Galium pilosum	0.0		0.0		0.0		0.0		0.0				
Gnaphalium falcatum	0.5	0.2	0.6	0.1	0.5	<0.1	0.7	0.1	<0.1	<0.1	0.132	0.252	
Helianthus hirsutus	0.0		0.0		0.0		0.0		0.0				
Heterotheca graminifolia	0.0		0.0		0.0		0.0		0.0				
Hibiscus aculeatus	0.2	0.2	0.0		0.0		0.0		0.0				
Hieracium gronovii	0.0		0.0		0.0		0.0		0.0				
Lactuca canadensis	0.1	<0.1	0.0		0.1	<0.1	<0.1	<0.1	0.0				
Lactuca floridana	0.0		0.0		0.0		0.0		0.0				
Lechea leggettii	0.0		0.0		0.0		0.0		0.0				
Lechea patula	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Lechea tenuifolia	0.2	0.1	<0.1	<0.1	0.0		0.0		0.0				
Lechea villosa	0.0		0.0		0.0		<0.1	<0.1	0.0				
Linum medium	0.0		0.0		0.0		0.0		0.0				
Ludwigia glandulosa	0.0		0.1	<0.1	0.0		0.0		0.0				
Mecardonia acuminata	0.2	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Mimosa quadrivalvis	0.2	0.2	0.0		<0.1	<0.1	0.6	0.4	<0.1	<0.1			
Mitchella repens	0.0		<0.1	<0.1	0.0		0.0		0.0				

Table C.1. Continued.

Species	Treatment 1 x̄	1 SE	2 x̄	2 SE	3 x̄	3 SE	4 x̄	4 SE	5 x̄	5 SE	P-value Yr	Trt	Yr*trt
Oenothera biennis	0.0		<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Oenothera fruticosa	0.0		0.0		0.0		<0.1	<0.1	0.0				
Oxalis dillenii	0.0		0.0		0.0		<0.1	<0.1	0.0				
Oxalis stricta	0.2	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1			
Phytolacca americana	<0.1	<0.1	0.2	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1			
Plantago virginica	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Pluchea foetida	0.0		0.0		<0.1	<0.1	0.0		0.0				
Polygala nana	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Polygonum punctatum	0.0		0.0		0.0		0.0		0.0				
Polypremum procumbens	2.1	0.5	2.6	0.8	3.2	0.9	6.6	1.2	3.8	1.4	0.003	0.488	
Prenanthes serpentaria	0.0		0.0		0.0		0.0		0.0				
Ptilimnium capillaceum	0.2	0.1	<0.1	<0.1	0.3	0.3	0.2	0.1	0.0				
Pycnanthemum incanum	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		0.0				
Pyrrhopappus carolinanus	0.0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Rhexia alifanus	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Rhexia mariana	0.0		<0.1	<0.1	0.0		0.0		0.0				
Rhexia virginica	0.0		0.0		0.0		0.0		0.0				
Rudbeckia hirta	0.3	0.3	0.0		0.0		0.1	<0.1	<0.1	<0.1			
Sabatia campestris	0.0		0.0		0.0		0.0		0.0				
Scutellaria elliptica	0.0		<0.1	<0.1	0.0		0.0		0.0				
Scutellaria intergrifolia	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1			
Solanum americanum	0.0		0.0		<0.1	<0.1	0.0		0.0				
Solanum carolinense	<0.1	<0.1	<0.1	<0.1	0.0		0.0		0.0				
Solidago canadensis	2.4	0.6	3.1	1.1	4.3	1.0	2.7	0.4	0.4	0.2	0.003	0.496	
Solidago gigantea	0.0		0.0		0.0		0.0		0.0				
Solidago juncea	<0.1	<0.1	0.0		0.0		0.0		0.0				
Solidago rugosa	0.0		0.0		0.0		0.0		0.0				
Tragia urticifolia	0.2	0.1	0.0		0.0		0.0		0.0				
Viola affinis	<0.1	<0.1	0.0		0.2	0.1	<0.1	<0.1	0.0				

Table C.1. Continued.

Species	Treatment 1 x̄	1 SE	2 x̄	2 SE	3 x̄	3 SE	4 x̄	4 SE	5 x̄	5 SE	P-value Yr	Trt	Yr*trt
Viola lanceolata	0.4	0.1	0.8	0.3	0.2	<0.1	0.3	0.1	0.3	0.1			
Viola palmata	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.0		0.0				
Grass													
Andropogon virginicus	14.7	2.0	12.6	1.7	6.1	1.1	4.5	0.7	7.4	1.2	≤0.001	0.057	
Aristida spp.	0.2	<0.1	1.9	0.6	0.7	0.2	1.2	0.5	0.6	0.3	0.049	0.452	
Chasmanthium sessiliflorum	0.1	<0.1	<0.1	<0.1	0.2	0.1	0.0		0.0				
Dicanthelium aciculare	0.3	0.2	<0.1	<0.1	0.0		0.5	0.2	<0.1	<0.1			
Dicanthelium acuminatum	2.4	0.5	5.2	1.4	7.1	1.1	4.7	1.0	0.9	0.2	≤0.001	0.156	
Dicanthelium commutatum	3.6 AC	1.1	1.3 AB	0.4	1.8 AB	0.4	1.7 AB	0.4	0.1 B	<0.1	0.212	0.040	
Dicanthelium leucothrix	0.0		0.0		0.0		0.0		0.0				
Dicanthelium ovale	0.0		0.0		<0.1	<0.1	0.0		0.0				
Dicanthelium scoparium	0.5	0.2	0.2	0.1	0.2	0.2	0.4	0.2	<0.1	<0.1			
Dicanthelium sphaerocarpon	0.0		0.0		0.0		0.0		0.0				
Imperata cylindrica	0.4	0.4	1.2	1.2	0.1	0.1	0.0		0.0				
Panicum anceps	0.0		0.0		<0.1	<0.1	0.0		0.0				
Paspalum boscianum	0.0		0.0		0.0		0.0		0.0				
Paspalum notatum	0.0		<0.1	<0.1	0.2	0.1	0.2	<0.1	0.0				
Paspalum plicatulum	0.4	0.2	0.3	0.1	0.0		<0.1	<0.1	0.0				
Paspalum setaceum	0.0		0.0		0.0		0.0		0.0				
Setaria pumilia	0.0		0.0		0.0		0.0		0.0				
Xyris spp.	<0.1	<0.1	0.0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Grasslike													
Carex albolutescens	0.6	0.3	1.6	0.6	0.5	0.2	0.4	0.2	<0.1	<0.1	0.549	0.256	
Carex lurida	0.0		0.5	0.5	0.0		<0.1	<0.1	0.0				
Cyperus filiculmis	0.0		0.0		0.0		<0.1	<0.1	0.0				
Cyperus ovularis	0.0		0.0		0.0		0.0		0.0				
Cyperus pseudovegetus	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0				
Juncus marginatus	<0.1	<0.1	2.0	0.7	0.2	0.1	1.1	0.3	0.0				
Juncus polycephalus	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.6	0.3	<0.1	<0.1			

Table C.1. Continued.

Species	Treatment 1		2		3		4		5		P-value		
	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
Juncus tenuis	0.0		0.7	0.3	<0.1	<0.1	0.2	0.1	0.0		0.016	0.394	
Rhynchospora globularis	3.0	0.6	3.7	0.9	3.0	0.8	3.3	0.7	0.2	<0.1	0.002	0.065	
Rhynchospora inexpansa	2.0	0.7	1.3	0.5	1.7	0.5	2.5	1.1	1.1	0.6	0.006	0.854	
Rhynchospora rariflora	0.0		0.0		0.0		0.0		0.0				
Scirpus cyperinus	0.2	0.2	0.0		0.0		0.0		0.0				
Scleria ciliata	0.0		0.0		<0.1	<0.1	0.0		0.0				
Vine													
Berchemia scandens	0.2	<0.1	0.0		<0.1	<0.1	<0.1	<0.1	0.0				
Bignonia capreolata	0.0		0.0		0.0		0.0		0.0				
Campsis radicans	0.3	0.2	0.0		1.3	0.9	<0.1	<0.1	0.0				
Gelsemium sepervirens	0.2	<0.1	0.3	0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1			
Lonicera japonica	1.1	0.6	0.2	0.1	<0.1	<0.1	0.1	0.1	0.0				
Lonicera sempriverens	0.0		0.3	0.3	0.0		0.0		0.0				
Mikiana scandens	0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.0				
Parthenocissus quinquefolia	2.0	0.7	0.2	0.2	0.3	0.1	0.2	0.1	0.0				
Passiflora lutea	0.0		0.0		<0.1	<0.1	0.0		0.0				
Rubus argutus	14.2 A	2.1	4.1 B	0.6	4.8 B	1.2	3.5 B	0.9	0.5 B	0.2	0.036	≤0.001	
Rubus flagellaris	6.4 A	1.6	1.2 A	0.5	1.8 A	0.7	0.7 A	0.2	0.0 A		0.012	0.040	
Rubus trivialis	16.6	3.1	14.0	2.9	30.3	5.1	19.3	3.4	2.5	0.8	0.002	0.074	
Smilax bona-nox	0.0		0.0		0.0		0.0		0.0				
Smilax glauca	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Smilax laurifolia	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1	0.0				
Smilax rotundifolia	0.0		0.0		0.0		0.0		0.0				
Toxicodendron radicans	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Vitis aestivalis	<0.1	<0.1	<0.1	<0.1	0.0		0.0		<0.1	<0.1			
Vitis rotundifolia	0.0 A		<0.1 B	<0.1	0.0 B		0.0 B		0.0 B		0.002	≤0.001	
Woody													
Acer rubrum	0.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Albizia julibrissin	0.3	0.1	<0.1	<0.1	<0.1	<0.1	0.9	0.4	<0.1	<0.1			

Table C.1. Continued.

	Treatment										P-value		
	1		2		3		4		5				
Species	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
Aleurites fordii	0.7	0.3	0.2	<0.1	2.0	0.8	0.7	0.4	0.5	0.2	0.201	0.470	
Aralia spinosa	0.0		0.0		<0.1	<0.1	0.0		0.0				
Baccharis halimifolia	1.7	0.6	1.5	0.4	1.2	0.3	1.1	0.3	0.4	0.2	0.008	0.557	
Callicarpa americana	3.0	0.7	1.7	0.5	2.1	0.5	2.2	0.6	0.4	0.1	≤0.001	0.195	
Carya tomentosa	0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1	<0.1	<0.1			
Celtis laevigata	0.0		0.0		0.0		0.0		0.0				
Conyza canadensis	0.7	0.2	0.3	0.1	0.5	0.2	0.1	<0.1	0.0		0.290	0.142	
Cornus florida	0.0		0.4	0.2	<0.1	<0.1	0.0		0.0				
Crataegus aestivalis	0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	0.1	0.0				
Crataegus flava	0.0		0.0		0.0		0.0		0.0				
Crataegus marshallii	0.0		0.0		0.0		0.0		0.0				
Diospyros virginiana	1.9	0.4	<0.1	<0.1	<0.1	<0.1	0.3	0.2	0.2	0.1			
Hypericum drummondii	0.0		0.0		0.0		0.0		0.0				
Hypericum gentianoides	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Hypericum hypericoides	1.3	0.4	1.1	0.3	1.5	0.4	1.8	0.4	0.8	0.3	≤0.001	0.691	
Hypericum mutilum	0.0		0.0		0.0		0.0		0.0				
Hypericum stragalum	0.0		0.0		0.0		0.0		0.0				
Ilex coriacea	0.0		0.0		0.0		0.0		0.0				
Ilex glabra	0.4	0.2	0.1	0.1	0.0		0.0		<0.1	<0.1			
Ilex vomitoria	0.5 A	0.1	1.6 B	0.5	0.2 A	<0.1	0.5 A	0.2	0.1 A	<0.1	0.015	0.039	
Ligustrum sinense	<0.1	<0.1	0.0		0.0		0.0		0.0				
Liquidambar styraciflua	1.6	0.6	0.6	0.2	<0.1	<0.1	0.0		<0.1	<0.1			
Magnolia virginiana	0.0		<0.1	<0.1	0.0		0.0		0.0				
Myrica cerifera	0.9 A	0.2	0.7 AC	0.2	0.2 BC	0.2	0.2 BC	0.1	0.1 B	<0.1	0.004	0.030	
Pinus palustris	<0.1	<0.1	0.2	0.1	0.0		<0.1	<0.1	0.0				
Pinus taeda	5.0	0.7	4.3	0.5	5.8	0.8	7.1	1.4	4.7	0.8	≤0.001	0.343	
Prunus angustifolia	<0.1	<0.1	0.0		0.2	0.1	0.0		0.0				
Prunus serotina	0.0		<0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1			
Quercus falcata	0.0		0.2	0.2	0.1	0.1	0.0		0.0				

Table C.1. Continued.

Species	Treatment										P-value		
	1		2		3		4		5				
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Quercus marilandica	0.2	<0.1	<0.1	<0.1	0.0		0.2	<0.1	<0.1	<0.1			
Quercus nigra	0.0		0.1	<0.1	<0.1	<0.1	0.0		<0.1	<0.1			
Quercus pagodifolia	<0.1	<0.1	0.3	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1			
Quercus phellos	0.3	0.1	<0.1	<0.1	0.0		0.0		<0.1	<0.1			
Quercus virginiana	0.0		0.0		0.0		0.1	0.1	0.0				
Rhus copallina	2.6	0.6	<0.1	<0.1	0.4	0.2	<0.1	<0.1	<0.1	<0.1			
Salix nigra	<0.1	<0.1	0.0		<0.1	<0.1	0.0		0.0				
Sambucus canadensis	0.0		0.0		0.3	0.2	0.1	<0.1	0.0				
Sassafras albidum	<0.1	<0.1	0.0		0.0		0.0		<0.1	<0.1			
Vaccinium arboreum	1.9	0.4	0.0		0.0		<0.1	<0.1	<0.1	<0.1	0.003	0.096	
Vaccinium ellottii	0.0		0.0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Vaccinium stamenium	0.0		0.0		0.0		<0.1	<0.1	0.0				
Other													
Bare ground	1.1	0.5	0.2	<0.1	1.7	0.6	5.7	1.2	6.9	1.5			
Debris	13.0	2.3	22.0	2.4	14.9	2.4	19.6	1.5	65.9	3.0			
Standing debris	0.0		0.0		0.0		0.0		0.0				

[a] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ ($P>0.05$).

[b] Within-treatment year effect ($P \leq 0.001$): *Vitis rotundifolia*.

Table C.2. Frequency of occurrence (%)[a] by species for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[b].

	Treatment										*P*-value		
	1[c]		2[d]		3[d]		4[e]		5				
Species	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
2002													
Acalypha gracilens	2.0	0.7	8.6	2.7	3.7	1.1	0.3	0.2	0.3	0.2		0.555	0.491
Acer rubrum	0.9	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Albizia julibrissin	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.2			
Aleurites fordii	1.5	0.5	1.1	0.4	2.8	0.9	2.2	0.8	2.7	0.9		0.534	0.621
Ambrosia artemisiifolia	0.8	0.3	0.4	0.2	0.3	0.3	0.0	0.0	0.0	0.0			
Andropogon virginicus	14.9	2.3	19.2	3.1	8.0	1.5	5.3	1.2	3.9	0.8		0.055	0.402
Aralia spinosa	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Aristida spp.	1.2	0.5	2.3	1.0	1.3	0.4	0.1	0.1	0.2	0.1		0.462	0.675
Aster adnatus	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Aster dumosus	1.4	0.6	0.8	0.3	0.2	0.1	0.0	0.0	0.1	0.1			
Aster patens	0.3	0.1	1.0	0.5	0.2	0.1	0.3	0.2	0.0	0.0			
Baccharis halimifolia	3.0	1.0	1.6	0.7	0.8	0.3	0.4	0.3	0.5	0.3		0.440	0.864
Bare ground	24.1 AB	2.8	5.4 B	1.1	25.2 A	2.4	33.3 A	3.6	31.9 A	3.7		0.008	0.146
Berchemia scandens	0.5	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0			
Callicarpa americana	1.3	0.4	1.8	0.8	0.8	0.3	0.8	0.3	0.0	0.0		0.218	0.382
Campsis radicans	3.5	1.7	0.0	0.0	0.3	0.3	0.1	0.1	0.0	0.0			
Carduus spinosissimus	0.3	0.1	0.3	0.2	0.4	0.2	0.0	0.0	0.0	0.0			
Carex albolutescens	4.9	1.0	3.5	1.0	1.8	0.6	0.4	0.2	0.2	0.2		0.159	0.727
Carex lurida	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Carya tomentosa	0.6	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1			
Celtis laevigata	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Centrosema virginianum	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Chamaecrista fasciculata	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Chamaecrista procumbens	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Chasmanthium sessiliflorum	0.2	0.1	1.7	0.8	0.0	0.0	0.0	0.0	0.1	0.1			
Chrysopsis graminifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

Species	Treatment 1[c]		2[d]		3[d]		4[e]		5		P-value		
	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Conyza canadensis	1.7	0.6	2.9	1.1	0.6	0.2	0.0	0.0	0.0	0.0		0.164	0.876
Coreopsis major	0.5	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Cornus florida	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Crataegus flava	0.0	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0			
Crataegus marshallii	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Crategus aestivalis	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Crotalaria sagittalis	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Croton capitatus	0.4	0.2	0.3	0.2	0.8	0.6	0.4	0.2	0.9	0.5			
Cynoctonum mitreola	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Cyperus filiculmis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Cyperus ovularis	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Cyperus pseudovegetus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Debris	75.3	3.2	86.1	3.0	85.8	2.0	86.5	2.3	86.0	2.1		0.322	≤0.001
Desmodium ciliare	0.6	0.3	0.2	0.1	0.0	0.0	0.2	0.1	0.2	0.1			
Desmodium nuttallii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Desmodium rotundifolium	0.3	0.3	1.0	0.5	0.7	0.3	0.5	0.3	0.3	0.3			
Desmodium tortuosum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium aciculare	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium acuminatum	6.2 AB	1.3	2.4 AB	0.7	5.3 A	1.5	0.8 AB	0.3	0.3 B	0.2		0.042	0.119
Dicanthelium commutatum	4.9 A	1.3	5.0 AB	1.1	9.9 A	1.8	4.3 A	1.5	0.8 B	0.3		0.027	0.504
Dicanthelium leucothrix	1.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium ovale	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium scoparium	5.5	2.0	14.9	4.3	8.0	2.6	0.0	0.0	0.1	0.1			
Dicanthelium sphaerocarpon	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Diodia teres	1.3	0.5	1.1	0.5	0.4	0.2	0.4	0.3	0.2	0.1			
Diodia virginiana	0.3	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Diospyros virginiana	2.2	0.5	0.3	0.2	0.3	0.3	0.4	0.2	0.2	0.1			

Table C.2. Continued.

Species	Treatment 1[c] $\bar{x}$	SE	2[d] $\bar{x}$	SE	3[d] $\bar{x}$	SE	4[e] $\bar{x}$	SE	5 $\bar{x}$	SE	P-value Yr	Trt	Yr*trt
Elephantopus tomentosus	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Erechtites hieracifolia	12.2 A	2.4	15.5 A	2.8	9.8 AB	2.0	1.5 B	0.4	0.9 B	0.5		0.009	0.019
Erigeron strigosus	0.0	0.0	0.5	0.3	0.1	0.1	0.0	0.0	0.0	0.0			
Eupatorium album	1.9	0.8	3.0	1.3	0.9	0.4	0.0	0.0	0.0	0.0			
Eupatorium capillifolium	11.3 AC	2.2	20.5 B	3.3	14.5 AB	2.7	1.5 AC	0.5	1.8 C	0.7		0.023	0.132
Eupatorium perfoliatum	0.3	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0			
Eupatorium rotundifolium	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium semiserratum	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0			
Eupatorium serotinum	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0			
Euphorbia corollata	4.0	1.3	1.3	0.5	3.4	1.4	1.2	0.6	0.9	0.4		0.699	0.473
Euthamia temuifolia	4.6 A	1.1	8.8 A	2.4	4.2 A	1.1	0.4 AB	0.3	0.2 B	0.1		0.017	0.396
Galium circaezans	0.0	0.0	0.4	0.2	0.0	0.0	0.1	0.1	0.0	0.0			
Galium pilosum	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0			
Gelsemium sepervirens	0.6	0.4	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0			
Gnaphalium falcatum	0.4	0.3	6.0	1.9	4.3	1.1	0.0	0.0	0.0	0.0		0.153	0.520
Helianthus hirsutus	0.4	0.3	0.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0			
Heterotheca graminifolia	0.6	0.3	0.8	0.4	0.1	0.1	0.0	0.0	0.0	0.0			
Hibiscus aculeatus	0.0	0.0	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.0			
Hieracium gronovii	0.0	0.0	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0			
Hypericum drummondii	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0			
Hypericum hypericoides	0.1	0.1	0.2	0.1	0.9	0.4	1.0	0.3	0.8	0.3		0.842	0.857
Hypericum mutilum	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0			
Hypericum stragalum	0.5	0.3	0.1	0.1	1.2	0.4	0.0	0.0	0.0	0.0			
Ilex coriacea	0.2	0.2	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex glabra	1.3	1.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex vomitoria	1.8 AB	0.5	1.8 B	0.4	0.3 A	0.2	0.5 A	0.3	0.6 A	0.3		0.016	0.402
Imperata cylindrica	9.9	3.1	2.1	2.0	1.2	1.2	0.0	0.0	0.3	0.3			
Indigofera caroliniana	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0			

Table C.2. Continued.

Species	Treatment 1[c]		2[d]		3[d]		4[e]		5		*P*-value		
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Juncus marginatus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus polycephalus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus tenuis	4.8	1.3	4.0	1.5	6.4	1.7	1.2	0.5	0.7	0.3		0.306	0.362
Lactuca canadensis	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Lactuca floridana	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0			
Lechea leggettii	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1			
Lechea patula	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lechea tenuifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lechea villosa	0.3	0.1	0.4	0.3	0.0	0.0	0.1	0.1	0.0	0.0			
Lespedeza capitata	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lespedeza cuneata	0.1	0.1	0.4	0.2	0.3	0.2	0.0	0.0	0.0	0.0			
Lespedeza repens	0.6	0.2	0.7	0.3	0.3	0.2	0.3	0.1	0.1	0.1		0.077	0.088
Ligustrum sinense	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Linum medium	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Liquidambar styraciflua	1.7	0.6	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0			
Lonicera japonica	1.3	0.6	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Lonicera sempriverens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ludwigia glandulosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lygodium japonicum	0.1	0.1	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0			
Magnolia virginiana	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
Mecardonia acuminata	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Mikiana scandens	1.6	0.9	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.1			
Mimosa quadrivalvis	0.3	0.2	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0			
Mitchella repens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Myrica cerifera	1.3	0.5	0.2	0.1	0.3	0.1	0.6	0.2	0.2	0.1			
Oenothera biennis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Oenothera fruticosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Osmunda regalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

Species	Treatment										*P*-value		
	1[c]		2[d]		3[d]		4[e]		5				
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Oxalis dillenii	0.0	0.0	0.4	0.3	0.5	0.2	0.2	0.1	0.0	0.0			
Oxalis stricta	0.3	0.1	3.3	1.4	2.1	0.8	0.2	0.2	0.0	0.0			
Panicum anceps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Parthenocissus quinquefolia	2.3	0.6	0.0	0.0	0.3	0.2	0.0	0.0	0.1	0.1			
Paspalum boscianum	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Paspalum notatum	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Paspalum plicatulum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Paspalum setaceum	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0			
Passiflora lutea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Phytolacca americana	1.3	0.4	1.3	0.4	2.1	0.6	0.4	0.3	0.3	0.2			
Pinus palustris	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Pinus taeda	2.9	0.5	6.3	0.7	3.8	0.7	4.4	0.5	3.7	0.6		0.617	0.657
Plantago virginica	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Pluchea foetida	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Polygala nana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Polygonum punctatum	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Polypremum procumbens	2.8	0.7	3.6	1.3	2.8	0.9	0.4	0.2	0.3	0.2		0.513	0.405
Prenanthes serpentaria	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Prunus angustifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Prunus serotina	0.3	0.2	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0			
Pteridium aquilinum	0.2	0.2	0.0	0.0	0.9	0.5	0.0	0.0	0.0	0.0			
Ptilimnium capillaceum	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Pycnanthemum incanum	1.1	0.5	1.7	0.6	0.4	0.2	0.3	0.1	0.0	0.0			
Pyrrhopappus carolinanus	0.4	0.2	0.5	0.3	0.3	0.2	0.0	0.0	0.0	0.0			
Quercus falcata	0.0	0.0	0.3	0.2	0.3	0.2	0.3	0.1	0.2	0.2			
Quercus laurifolia	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Quercus marilandica	0.8	0.4	0.2	0.2	0.1	0.1	0.3	0.2	0.3	0.1			
Quercus nigra	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1			

Table C.2. Continued.

Species	Treatment 1[c] $\bar{x}$	SE	2[d] $\bar{x}$	SE	3[d] $\bar{x}$	SE	4[e] $\bar{x}$	SE	5 $\bar{x}$	SE	P-value Yr	Trt	Yr*trt
Quercus phellos	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Quercus virginiana	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Rhexia alifanus	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia mariana	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia virginica	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhus copallina	5.0	1.9	0.0	0.0	0.7	0.5	0.0	0.0	0.0	0.0			
Rhynchosia reniformis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
Rhynchospora globularis	0.0	0.0	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0			
Rhynchospora inexpansa	2.2	0.9	1.3	0.7	0.2	0.1	0.0	0.0	0.0	0.0		0.860	0.792
Rhynchospora rariflora	0.0	0.0	2.5	1.4	0.0	0.0	0.8	0.4	0.5	0.4			
Rubus argutus	21.9 A	2.2	10.4 B	2.3	12.8 B	2.5	4.3 BC	1.2	2.3 C	0.6		≤0.001	0.929
Rubus flagellaris	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.098	0.152
Rubus trivialis	7.2 AB	1.6	6.0 AB	1.6	11.3 A	2.4	1.3 AB	0.6	1.3 B	0.6		0.049	0.677
Rudbeckia hirta	0.2	0.1	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Sabatia campestris	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0			
Salix nigra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sambucus canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sassafras albidum	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Scirpus cyperinus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria elliptica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria intergrifolia	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Setaria pumilia	0.0	0.0	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax bona-nox	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax glauca	1.0	0.4	0.0	0.0	0.3	0.2	0.3	0.2	0.0	0.0			
Smilax laurifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax rotundifolia	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solanum americanum	0.0	0.0	0.0	0.0	0.4	0.2	0.1	0.1	0.0	0.0			
Solanum carolinense	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

Species	Treatment 1[c]		2[d]		3[d]		4[e]		5		P-value		
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Solanum chenopodioides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago canadensis	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0		0.182	0.503
Solidago gigantea	0.1	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0			
Solidago juncea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago rugosa	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0			
Standing debris	0.2	0.1	3.0	0.8	0.0	0.0	0.0	0.0	0.5	0.3			
Strophostyles umbellata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Stylosanthes biflora	0.6	0.3	0.2	0.1	0.3	0.2	0.0	0.0	0.1	0.1			
Symplocos tinctoria	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Tephrosia virginiana	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Toxicodendron radicans	4.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
Tragia urticifolia	0.6	0.3	0.0	0.0	0.4	0.4	0.3	0.2	0.1	0.1			
Vaccinium arboreum	2.4	0.7	0.3	0.1	0.4	0.2	0.2	0.1	0.2	0.1		0.108	0.064
Vaccinium darrowii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vaccinium ellottii	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Vaccinium stamenium	0.3	0.3	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Verbena brasiliensis	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0			
Viola affinis	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Viola lanceolata	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0			
Viola palmata	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0			
Vitis aestivalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis rotundifolia	3.6 A	1.1	0.0 B	0.0	0.2 B	0.1	0.0 B	0.0	0.3 B	0.2		0.077	0.003
Wahlenbergia marginata	0.3	0.3	0.0	0.0	0.4	0.3	0.0	0.0	0.0	0.0			
Xyris spp.	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
2003													
Acalypha gracilens	0.1	0.1	0.3	0.2	0.2	0.1	0.4	0.2	1.7	0.4	0.181	0.555	
Acer rubrum	0.8	0.4	0.4	0.3	0.1	0.1	0.2	0.1	0.2	0.1			
Albizia julibrissin	0.7	0.3	0.5	0.2	0.2	0.1	3.8	1.4	0.3	0.2			

Table C.2. Continued.

Species	Treatment 1[c] $\bar{x}$	1[c] SE	2[d] $\bar{x}$	2[d] SE	3[d] $\bar{x}$	3[d] SE	4[e] $\bar{x}$	4[e] SE	5 $\bar{x}$	5 SE	*P*-value Yr	Trt	Yr*trt
Aleurites fordii	2.4	0.9	0.7	0.3	5.2	1.7	2.0	1.0	1.7	0.8	0.639	0.534	
Ambrosia artemisiifolia	4.3	1.4	1.0	0.3	2.8	1.0	1.8	0.8	0.0	0.0			
Andropogon virginicus	33.0	3.6	29.3	3.2	17.9	2.8	13.1	1.7	21.7	3.0	≤0.001	0.055	
Aralia spinosa	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Aristida spp.	0.6	0.3	5.3	1.7	2.9	1.0	3.2	1.2	1.5	0.7	0.062	0.462	
Aster adnatus	0.3	0.2	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0			
Aster dumosus	1.6	0.7	0.1	0.1	0.6	0.3	0.3	0.2	0.0	0.0			
Aster patens	0.2	0.1	0.3	0.2	0.1	0.1	0.7	0.5	0.0	0.0			
Baccharis halimifolia	4.8	1.5	4.8	1.2	3.6	0.9	2.7	0.8	1.3	0.7	0.006	0.440	
Bare ground	2.6 AB	1.1	0.4 B	0.3	3.7 A	1.1	12.8 A	2.4	11.8 A	2.4	≤0.001	0.008	
Berchemia scandens	1.0	0.4	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0			
Callicarpa americana	7.8	1.7	5.2	1.2	5.6	1.3	7.0	1.7	1.7	0.5	≤0.001	0.218	
Campsis radicans	1.2	0.7	0.0	0.0	2.4	1.6	0.3	0.3	0.0	0.0			
Carduus spinosissimus	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Carex albolutescens	2.1	1.1	4.5	1.7	2.2	0.7	1.5	0.5	0.2	0.1	0.934	0.159	
Carex lurida	0.0	0.0	0.6	0.6	0.0	0.0	0.1	0.1	0.0	0.0			
Carya tomentosa	0.2	0.1	0.3	0.3	0.0	0.0	0.2	0.2	0.1	0.1			
Celtis laevigata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Centrosema virginianum	0.1	0.1	0.0	0.0	0.1	0.1	0.3	0.3	0.0	0.0			
Chamaecrista fasciculata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Chamaecrista procumbens	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Chasmanthium sessiliflorum	0.3	0.2	0.2	0.2	0.9	0.5	0.0	0.0	0.0	0.0			
Chrysopsis graminifolia	0.5	0.3	0.5	0.3	0.0	0.0	0.1	0.1	0.2	0.2			
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Conyza canadensis	4.5	1.4	3.2	1.0	2.7	0.9	1.3	0.5	0.0	0.0	0.202	0.164	
Coreopsis major	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Cornus florida	0.0	0.0	1.0	0.3	0.1	0.1	0.0	0.0	0.0	0.0			
Crataegus flava	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

	Treatment										*P*-value		
	1[c]		2[d]		3[d]		4[e]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Crataegus marshallii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Crategus aestivalis	0.3	0.1	1.0	0.4	0.2	0.2	0.3	0.2	0.0	0.0			
Crotalaria sagittalis	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Croton capitatus	0.2	0.1	0.7	0.2	2.9	0.9	0.7	0.3	0.3	0.3			
Cynoctonum mitreola	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.0	0.0			
Cyperus filiculmis	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0			
Cyperus ovularis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Cyperus pseudovegetus	0.5	0.3	0.5	0.3	0.2	0.1	0.2	0.1	0.0	0.0			
Debris	28.8 A	3.4	48.8 B	3.9	38.4 AB	4.0	48.7 B	2.7	87.2 C	1.9	≤0.001	≤0.001	
Desmodium ciliare	0.4	0.2	0.8	0.3	0.6	0.3	2.9	1.0	1.3	0.5			
Desmodium nuttallii	0.0	0.0	0.4	0.2	0.4	0.3	0.0	0.0	0.0	0.0			
Desmodium rotundifolium	1.1	0.6	0.6	0.4	0.8	0.4	0.3	0.2	0.0	0.0			
Desmodium tortuosum	1.1	0.5	0.6	0.4	0.2	0.1	1.4	0.7	0.3	0.3			
Dicanthelium aciculare	1.3	0.9	0.3	0.2	0.0	0.0	3.1	1.2	0.3	0.1			
Dicanthelium acuminatum	10.3 AB	1.6	14.5 AB	2.6	25.0 A	2.9	14.9 AB	2.5	4.8 B	1.2	≤0.001	0.042	
Dicanthelium commutatum	11.2 A	2.7	4.2 AB	1.1	7.3 A	1.7	8.6 A	1.5	0.3 B	0.2	0.472	0.027	
Dicanthelium leucothrix	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium ovale	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0			
Dicanthelium scoparium	2.5	1.0	0.7	0.4	0.8	0.5	0.9	0.5	0.1	0.1			
Dicanthelium sphaerocarpon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Diodia teres	0.9	0.3	0.6	0.3	2.2	0.9	0.5	0.2	0.3	0.2			
Diodia virginiana	1.6	0.4	1.3	0.4	0.8	0.3	0.3	0.2	0.5	0.2			
Diospyros virginiana	6.3	1.2	0.3	0.2	0.2	0.1	0.9	0.6	0.6	0.4			
Elephantopus tomentosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Erechtites hieracifolia	12.6 AB	2.4	20.3 A	2.8	5.1 B	1.1	15.6 A	2.9	0.1 B	0.1	0.121	≤0.001	
Erigeron strigosus	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0			
Eupatorium album	2.8	0.8	1.8	0.7	1.1	0.3	0.2	0.1	0.1	0.1			
Eupatorium capillifolium	9.9 AC	2.0	32.3 B	4.1	17.8 AB	3.0	19.7 AC	3.3	1.1 C	0.5	0.030	0.023	

Table C.2. Continued.

Species	Treatment 1[c]		2[d]		3[d]		4[e]		5		*P*-value		
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Eupatorium perfoliatum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium rotundifolium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium semiserratum	0.0	0.0	0.6	0.4	0.3	0.2	0.0	0.0	0.0	0.0			
Eupatorium serotinum	0.6	0.2	1.0	0.4	0.5	0.3	0.5	0.2	0.3	0.2			
Euphorbia corollata	2.9	1.1	0.6	0.3	2.3	1.0	1.6	0.6	2.1	0.6	0.582	0.699	
Euthamia temuifolia	18.0 A	2.8	13.0 A	2.3	20.5 A	3.0	14.5 AB	2.5	1.4 B	0.6	0.002	0.017	
Galium circaezans	0.1	0.1	0.4	0.3	0.5	0.3	1.0	0.4	0.0	0.0			
Galium pilosum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Gelsemium sepervirens	1.1	0.4	1.5	0.6	0.3	0.3	1.3	0.4	0.3	0.2			
Gnaphalium falcatum	3.6	1.0	5.8	1.3	4.7	0.7	6.6	1.2	0.5	0.3	0.152	0.153	
Helianthus hirsutus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Heterotheca graminifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hibiscus aculeatus	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hieracium gronovii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hypericum drummondii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hypericum hypericoides	5.5	1.3	4.1	1.0	5.3	1.2	5.0	1.3	3.3	0.8	≤0.001	0.842	
Hypericum mutilum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hypericum stragalum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex coriacea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex glabra	1.3	0.6	0.7	0.6	0.0	0.0	0.0	0.0	0.3	0.3			
Ilex vomitoria	2.2 AB	0.6	4.4 B	1.2	1.2 A	0.3	1.7 A	0.4	0.7 A	0.3	0.030	0.016	
Imperata cylindrica	0.8	0.8	1.8	1.8	0.7	0.6	0.0	0.0	0.0	0.0			
Indigofera caroliniana	0.3	0.2	0.4	0.2	0.0	0.0	1.0	0.5	0.8	0.5			
Juncus marginatus	0.4	0.3	5.0	1.6	0.8	0.3	3.6	1.2	0.0	0.0			
Juncus polycephalus	0.3	0.3	0.7	0.4	0.7	0.4	1.7	0.8	0.3	0.2			
Juncus tenuis	0.0	0.0	1.7	0.7	0.3	0.2	0.7	0.4	0.0	0.0	0.011	0.306	
Lactuca canadensis	0.6	0.2	0.0	0.0	1.1	0.8	0.7	0.2	0.0	0.0			
Lactuca floridana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

Species	Treatment										*P*-value		
	1[c]		2[d]		3[d]		4[e]		5				
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Lechea leggettii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lechea patula	0.3	0.1	0.4	0.2	0.3	0.2	0.2	0.1	0.0	0.0			
Lechea tenuifolia	0.4	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Lechea villosa	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.0	0.0			
Lespedeza capitata	0.0	0.0	0.3	0.2	0.4	0.2	0.0	0.0	0.0	0.0			
Lespedeza cuneata	1.3	0.6	0.3	0.3	0.5	0.2	0.0	0.0	0.1	0.1			
Lespedeza repens	0.8	0.3	0.7	0.3	2.3	0.6	2.7	0.6	0.1	0.1	0.015	0.077	
Ligustrum sinense	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Linum medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Liquidambar styraciflua	3.6	1.0	1.5	0.6	0.2	0.2	0.0	0.0	0.1	0.1			
Lonicera japonica	3.3	1.5	0.8	0.4	0.6	0.3	0.3	0.3	0.0	0.0			
Lonicera sempriverens	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0			
Ludwigia glandulosa	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Lygodium japonicum	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Magnolia virginiana	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Mecardonia acuminata	1.1	0.6	0.5	0.3	0.8	0.3	0.2	0.1	0.4	0.2			
Mikiana scandens	0.4	0.2	0.2	0.2	0.2	0.1	0.4	0.2	0.0	0.0			
Mimosa quadrivalvis	0.7	0.4	0.0	0.0	0.3	0.2	1.3	0.9	0.3	0.3			
Mitchella repens	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Myrica cerifera	2.8	0.7	1.8	0.5	0.6	0.5	0.6	0.4	0.3	0.2			
Oenothera biennis	0.0	0.0	0.2	0.2	0.3	0.2	0.0	0.0	0.0	0.0			
Oenothera fruticosa	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0			
Osmunda regalis	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Oxalis dillenii	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Oxalis stricta	1.4	0.5	0.8	0.3	1.2	0.5	0.9	0.3	0.8	0.3			
Panicum anceps	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0			
Parthenocissus quinquefolia	5.5	1.5	0.4	0.3	0.8	0.4	0.7	0.3	0.0	0.0			
Paspalum boscianum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

	Treatment										*P*-value		
	1[c]		2[d]		3[d]		4[e]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Paspalum notatum	0.0	0.0	0.2	0.1	0.6	0.3	0.8	0.4	0.0	0.0			
Paspalum plicatulum	1.1	0.6	1.0	0.5	0.0	0.0	0.1	0.1	0.0	0.0			
Paspalum setaceum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Passiflora lutea	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Phytolacca americana	0.2	0.2	0.8	0.4	0.6	0.2	0.1	0.1	0.3	0.1			
Pinus palustris	0.2	0.1	0.5	0.4	0.0	0.0	0.1	0.1	0.0	0.0			
Pinus taeda	13.3	1.8	12.1	1.3	13.7	1.8	15.2	2.5	10.9	1.7	≤0.001	0.617	
Plantago virginica	0.1	0.1	0.5	0.2	0.3	0.3	0.3	0.1	0.1	0.1			
Pluchea foetida	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Polygala nana	0.4	0.2	0.2	0.2	0.3	0.1	0.3	0.2	0.1	0.1			
Polygonum punctatum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Polypremum procumbens	7.8	1.8	7.2	2.1	10.4	2.0	17.9	2.6	9.7	3.0	0.001	0.513	
Prenanthes serpentaria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Prunus angustifolia	0.1	0.1	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0			
Prunus serotina	0.0	0.0	0.2	0.2	0.3	0.2	0.0	0.0	0.3	0.3			
Pteridium aquilinum	0.0	0.0	0.6	0.6	1.1	1.1	0.0	0.0	0.0	0.0			
Ptilimnium capillaceum	0.5	0.3	0.1	0.1	1.1	0.7	0.6	0.5	0.0	0.0			
Pycnanthemum incanum	0.2	0.1	0.5	0.3	0.3	0.2	0.0	0.0	0.0	0.0			
Pyrrhopappus carolinanus	0.0	0.0	0.3	0.2	0.5	0.2	0.3	0.1	0.0	0.0			
Quercus falcata	0.0	0.0	0.5	0.4	0.3	0.2	0.0	0.0	0.0	0.0			
Quercus laurifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Quercus marilandica	0.5	0.2	0.2	0.1	0.0	0.0	0.6	0.2	0.2	0.1			
Quercus nigra	0.0	0.0	0.3	0.2	0.1	0.1	0.0	0.0	0.2	0.1			
Quercus phellos	0.6	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.1	0.1			
Quercus virginiana	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0			
Rhexia alifanus	0.2	0.1	0.2	0.1	0.1	0.1	0.3	0.1	0.0	0.0			
Rhexia mariana	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia virginica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

	Treatment												
	1[c]		2[d]		3[d]		4[e]		5		*P*-value		
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Rhus copallina	6.3	1.4	0.2	0.1	0.9	0.4	0.3	0.2	0.3	0.2			
Rhynchosia reniformis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhynchospora globularis	9.7	1.9	10.9	2.5	10.7	2.2	10.8	2.2	0.8	0.4			
Rhynchospora inexpansa	4.0	1.2	3.3	1.1	4.9	1.5	4.6	1.6	2.1	0.9	0.007	0.860	
Rhynchospora rariflora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rubus argutus	29.3 A	3.5	12.8 B	1.7	12.3 B	2.6	8.5 BC	2.0	2.2 C	0.7	0.410	≤0.001	
Rubus flagellaris	10.6	2.5	2.9	0.9	4.6	1.6	1.5	0.6	0.0	0.0	0.007	0.098	
Rubus trivialis	32.8 AB	5.5	28.8 AB	5.5	46.6 A	7.0	37.1 AB	5.9	8.3 B	2.0	0.001	0.049	
Rudbeckia hirta	0.7	0.6	0.0	0.0	0.0	0.0	0.4	0.3	0.2	0.2			
Sabatia campestris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Salix nigra	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Sambucus canadensis	0.0	0.0	0.0	0.0	0.4	0.3	0.2	0.1	0.0	0.0			
Sassafras albidum	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
Scirpus cyperinus	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria elliptica	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria intergrifolia	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1			
Setaria pumilia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax bona-nox	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax glauca	0.7	0.2	0.7	0.3	0.1	0.1	0.4	0.2	0.4	0.3			
Smilax laurifolia	0.5	0.3	0.1	0.1	0.9	0.4	0.8	0.4	0.0	0.0			
Smilax rotundifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solanum americanum	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0			
Solanum carolinense	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Solanum chenopodioides	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0			
Solidago canadensis	10.3	2.2	10.6	3.2	15.2	2.7	13.8	2.1	1.6	0.7	≤0.001	0.182	
Solidago gigantea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago juncea	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago rugosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.2. Continued.

	Treatment										*P*-value		
	1[c]		2[d]		3[d]		4[e]		5				
Species	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
Standing debris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Strophostyles umbellata	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Stylosanthes biflora	1.3	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.3	0.1			
Symplocos tinctoria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Tephrosia virginiana	0.3	0.3	0.0	0.0	1.0	0.4	0.2	0.1	0.0	0.0			
Toxicodendron radicans	6.6	1.3	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1			
Tragia urticifolia	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.2	0.1	0.1			
Vaccinium arboreum	1.8	0.6	2.6	0.8	0.9	0.4	1.3	0.5	1.4	0.5	0.005	0.108	
Vaccinium darrowii	0.8	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.1			
Vaccinium ellottii	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Vaccinium stamenium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
Verbena brasiliensis	0.3	0.3	0.8	0.6	0.8	0.5	0.0	0.0	0.0	0.0			
Viola affinis	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.0	0.0			
Viola lanceolata	0.3	0.2	0.0	0.0	0.7	0.3	0.2	0.1	0.1	0.1			
Viola palmata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis aestivalis	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.0	0.0			
Vitis rotundifolia	11.3 A	2.3	0.5 B	0.3	0.4 B	0.2	2.5 B	1.1	0.5 B	0.3	0.001	≤0.001	
Wahlenbergia marginata	0.0	0.0	0.7	0.4	1.3	0.5	1.7	0.6	0.7	0.3			
Xyris spp.	0.0	0.0	0.3	0.3	0.0	0.0	0.1	0.1	0.0	0.0			

[a] Frequency of occurrence = (no. of m with species) / (30 m per transect), $n = 10$ per treatment.

[b] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ ($P > 0.05$).

[c] Within-year treatment effect ($P \leq 0.001$): Debris, *Vitis rotundifolia*.

[d] Within-year treatment effect ($P \leq 0.001$): Debris.

[e] Within-year treatment effect ($P \leq 0.001$): Debris, *Erechtites hieracifolia*.

Table C.3. Percent coverage per section of Nudd's Density Board[a] for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (June 2002 and June 2003) in the Mississippi Lower Coastal Plain[b].

	Treatment															P-value		
	1[c]			2[d]			3[e]			4[e]			5[e]					
Height (m)	$\bar{x}$	LCL	UCL	$\bar{x}$	LCL	UCL	$\bar{x}$	LCL	UCL	$\bar{x}$	LCL	UCL	$\bar{x}$	LCL	UCL	Yr	Trt	Yr*trt
2002																		
0.0–0.3	65.4 A	60.4	70.3	61.8 A	53.4	69.9	47.9 B	42.7	53.1	31.6 C	27.9	35.4	30.5 C	26.3	34.9	≤0.001	≤0.001	0.014
0.3–0.6	37.2 A	31.7	42.9	33.9 A	24.7	43.8	17.4 B	12.8	22.6	8.0 C	5.5	10.9	7.5 C	4.8	10.8	≤0.001	≤0.001	0.010
0.6–0.9	10.0 A	6.6	14.1	14.1 AB	8.1	21.5	2.5 AC	1.2	4.4	0.9 C	0.3	1.7	1.7 C	0.7	3.3	≤0.001	0.007	0.013
0.9–1.2	1.8	0.7	3.4	4.8	2.1	8.5	0.5	0.1	1.3	0.1	0.0	0.3	0.5	0.1	1.3	≤0.001	0.108	0.087
1.2–1.5	0.5	0.1	1.2	1.6	0.4	3.4	0.1	0.0	0.3	0.0	0.0	0.1	0.3	0.0	0.8	≤0.001	0.358	0.113
1.5–1.8	0.3	0.0	0.8	0.7	0.1	1.9	0.1	0.0	0.3	0.0	0.0	0.0	0.1	0.0	0.5	≤0.001	0.490	0.143
2003																		
0.0–0.3	84.4 A	81.6	87.0	76.6 A	72.1	80.8	80.6 A	77.3	83.7	76.5 A	72.1	80.6	53.8 B	47.4	60.1	≤0.001	≤0.001	0.014
0.3–0.6	79.3 A	75.0	83.2	66.7 A	59.8	73.2	72.2 A	67.2	77.0	65.7 A	60.1	71.1	43.9 B	37.5	50.3	≤0.001	≤0.001	0.010
0.6–0.9	65.9 A	58.7	72.8	54.8 A	46.9	62.6	59.2 A	52.6	65.5	55.8 A	49.5	62.0	36.4 B	30.8	42.3	≤0.001	0.007	0.013
0.9–1.2	51.2	43.3	59.2	40.6	33.3	48.0	44.3	37.5	51.2	41.9	35.9	48.0	29.3	24.9	33.9	≤0.001	0.108	0.087
1.2–1.5	40.1	33.2	47.2	27.6	22.1	33.4	32.3	26.4	38.6	32.1	27.1	37.4	24.3	20.7	28.1	≤0.001	0.358	0.113
1.5–1.8	31.3	25.3	37.5	19.2	15.4	23.3	24.2	18.9	29.9	26.3	21.8	31.0	20.5	17.1	24.0	≤0.001	0.490	0.143

[a] Mean of readings in each cardinal direction at meters 15 and 22 on 10, randomly-allocated transects per treatment.

[b] Means and confidence limits are arcsine square-root back-transformed; means within rows followed by same letter not significantly different ($P > 0.05$).

[c] Within-treatment year effect ($P < 0.01$): 0.0–0.3; ($P \leq 0.001$): 0.3–0.6, 0.6–0.9.

[d] Within-treatment year effect ($P < 0.05$): 0.0–0.3; ($P \leq 0.001$): 0.3–0.6, 0.6–0.9.

[e] Within-treatment year effect ($P \leq 0.001$): 0.0–0.3, 0.3–0.6, 0.6–0.9.

Table C.4. Leaf biomass (dry weight, kg/ha)[a] by forage class for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (July 2002 and July 2003) in the Mississippi Lower Coastal Plain[b].

	Treatment												
	1[c]		2[d]		3[e]		4[f]		5[g]		*P* -value		
Forage type	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002													
Fern	0.0	0.0	0.0	0.0	23.6	23.6	0.0	0.0	0.0	0.0		0.409	0.471
Forb (legume)	3.7	1.7	1.7	0.3	5.5	3.0	1.0	0.3	0.4	0.2		0.070	0.059
Forb (non-legume)	255.3 A	42.0	423.5 A	64.4	366.5 A	55.5	15.0 B	7.1	39.8 B	16.9		≤0.001	0.007
Grass	235.2 A	38.9	212.7 AB	43.0	284.8 A	50.5	79.5 BC	27.6	37.8 C	11.9		0.009	0.529
Grasslike	49.4	30.4	63.9	19.6	62.3	22.9	9.4	4.9	20.8	11.4		0.107	0.248
Vine	156.2 A	27.0	63.5 B	12.8	91.6 AB	20.1	25.5 B	8.0	32.0 B	12.6		0.007	≤0.001
Woody	156.3 A	40.9	79.7 AB	25.0	33.6 B	10.7	25.1 B	9.0	24.1 B	12.4		0.233	0.003
Total	856.2 A	77.8	844.9 A	93.6	868.0 A	106.2	155.6 B	35.1	154.8 B	31.3		≤0.001	0.005
2003													
Fern	0.0	0.0	0.0	0.0	6.2	4.8	0.0	0.0	0.0	0.0	0.348	0.409	
Forb (legume)	1.8	1.2	4.9	2.1	9.4	4.3	20.3	7.8	3.7	2.2	0.010	0.070	
Forb (non-legume)	243.8 AB	32.0	403.1 A	47.6	471.9 A	45.8	483.2 A	48.4	169.6 B	36.8	0.004	0.013	
Grass	453.0 A	64.2	387.4 A	54.1	411.7 A	68.0	277.9 A	54.8	281.0 A	46.5	≤0.001	0.009	
Grasslike	80.1	34.4	223.4	64.2	184.4	58.7	202.1	45.7	3.9	3.4	0.023	0.107	
Vine	454.6 A	54.2	162.2 B	27.8	222.2 B	30.1	124.5 B	18.6	7.3 C	5.1	≤0.001	≤0.001	
Woody	127.7 A	25.1	73.9 A	18.1	119.4 A	31.6	125.2 A	30.6	81.4 A	26.1	≤0.001	0.233	
Total	1361.0 A	85.1	1254.9 A	87.7	1425.2 A	92.5	1233.1 A	84.5	546.9 B	60.0	≤0.001	0.001	

[a] Twenty exclosures per treatment were randomly allocated at the beginning and clipped at the end of each growing season.

[b] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ (P>0.05).

[c] Within-treatment year effect ($P \leq 0.001$): vine; (P<0.05): total.

[d] Within-treatment year effect ($P \leq 0.001$): vine; (P<0.05): total.

[e] Within-treatment year effect ($P \leq 0.001$): vine; (P<0.01): woody, total.

[f] Within-treatment year effect ($P \leq 0.001$): forb, vine, woody, total.

[g] Within-treatment year effect (P<0.01): total; (P<0.05): woody.

Table C.5. Leaf biomass (dry weight, kg/ha)[a] by forage class and species for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (July 2002 and July 2003) in the Mississippi Lower Coastal Plain[b].

	Treatment												
	1		2[c]		3[d]		4[e]		5		*P*-value		
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002													
Fern													
Osmunda regalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Pteridium aquilinum	0.0	0.0	0.0	0.0	23.3	23.3	0.0	0.0	0.0	0.0			
Forb (legume)													
Centrosema virginianum	1.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Chamaecrista fasciculata	<0.1	<0.1	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Desmodium ciliare	0.1	<0.1	0.2	0.1	1.4	1.3	0.2	0.1	0.0	0.0			
Desmodium rotundifolium	0.1	<0.1	0.1	<0.1	1.4	1.2	0.3	0.1	<0.1	<0.1			
Desmodium tortuosum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Indigofera caroliniana	0.1	<0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.1			
Lespedeza capitata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lespedeza cuneata	0.0	0.0	<0.1	<0.1	0.1	<0.1	0.0	0.0	0.0	0.0			
Lespedeza repens	0.5	0.2	0.8	0.2	0.6	0.2	0.2	0.1	0.0	0.0			
Rhynchosia reniformis	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.0	0.0			
Stylosanthes biflora	1.4	1.1	0.1	<0.1	1.5	1.4	<0.1	<0.1	<0.1	<0.1			
Tephrosia virginiana	<0.1	<0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0			
Forb (non-legume)													
Acalypha gracilens	0.6	0.2	32.9	11.2	18.9	6.9	0.4	0.2	0.0	0.0	0.170	0.418	0.493
Ambrosia artemisiifolia	1.6	1.4	2.6	2.6	<0.1	<0.1	0.1	<0.1	0.0	0.0			
Aster adnatus	<0.1	<0.1	1.7	1.6	1.5	1.5	0.0	0.0	0.0	0.0			
Aster dumosus	5.4	3.0	0.1	<0.1	0.1	<0.1	0.0	0.0	0.0	0.0			
Aster patens	0.0	0.0	<0.1	<0.1	6.8	6.7	0.0	0.0	0.0	0.0			
Carduus spinosissimus	<0.1	<0.1	2.1	2.1	5.4	3.1	0.0	0.0	0.0	0.0			
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Coreopsis major	0.0	0.0	0.0	0.0	1.1	1.1	0.0	0.0	0.0	0.0			
Crotalaria sagittalis	0.0	0.0	0.1	<0.1	5.4	4.6	0.0	0.0	0.0	0.0			

Table C.5. Continued.

Species	Treatment 1 x̄	1 SE	2[b] x̄	2[b] SE	3[c] x̄	3[c] SE	4[d] x̄	4[d] SE	5 x̄	5 SE	*P*-value Yr	Trt	Yr*trt
Croton capitatus	<0.1	<0.1	5.2	5.1	9.0	7.1	<0.1	<0.1	13.3	9.8			
Diodia teres	49.1	24.0	11.6	11.6	15.9	9.1	<0.1	<0.1	1.4	1.4			
Diodia virginiana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Erechtites hieracifolia	53.1 A	19.2	66.5 A	17.5	42.8 A	11.7	5.0 B	4.9	1.4 B	1.4	0.063	0.002	0.044
Erigeron strigosus	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0			
Eupatorium album	9.9	5.1	8.2	5.4	6.7	2.8	0.0	0.0	<0.1	<0.1			
Eupatorium capillifolium	53.1 AB	15.0	100.8 B	20.2	85.0 AB	18.0	7.1 A	3.9	3.1 A	2.1	0.002	0.021	0.043
Eupatorium perfoliatum	0.0	0.0	1.5	1.5	<0.1	<0.1	0.0	0.0	0.0	0.0			
Eupatorium rotundifolium	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium semiserratum	0.0	0.0	3.0	2.0	4.1	3.4	0.0	0.0	0.0	0.0			
Eupatorium serotinum	1.6	1.5	2.5	2.4	<0.1	<0.1	0.0	0.0	0.0	0.0			
Euphorbia corollata	0.2	0.1	2.7	1.9	3.5	2.1	0.1	<0.1	2.0	1.9			
Euthamia temuifolia	26.7	11.0	67.6	19.4	41.4	9.4	<0.1	<0.1	<0.1	<0.1	0.023	0.143	0.325
Galium circaezans	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.0	0.0	0.0	0.0			
Gnaphalium falcatum	0.4	0.2	59.1	15.3	13.3	5.9	0.0	0.0	0.0	0.0	0.338	0.350	0.361
Helianthus hirsutus	0.1	<0.1	2.3	2.3	1.6	1.5	0.0	0.0	0.0	0.0			
Heterotheca graminifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lactuca canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lactuca floridana	0.0	0.0	0.0	0.0	1.7	1.7	0.0	0.0	0.0	0.0			
Lechea patula	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Liatris squarrosa	8.6	8.6	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Linum medium	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ludwigia glandulosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Mecardonia acuminata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Mimosa quadrivalvis	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0			
Oenothera biennis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Oxalis dillenii	1.2	1.2	0.0	0.0	<0.1	<0.1	<0.1	<0.1	1.7	1.7			
Oxalis stricta	0.0	0.0	14.8	4.4	8.0	4.0	0.0	0.0	<0.1	<0.1			

Table C.5. Continued.

Species	Treatment 1 $\bar{x}$	1 SE	2[b] $\bar{x}$	2[b] SE	3[c] $\bar{x}$	3[c] SE	4[d] $\bar{x}$	4[d] SE	5 $\bar{x}$	5 SE	*P*-value Yr	Trt	Yr*trt
Phytolacca americana	0.0	0.0	4.4	4.2	1.1	1.0	1.8	1.7	16.5	13.4			
Plantago virginica	0.0	0.0	0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0			
Pluchea foetida	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Polygala nana	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Polypremum procumbens	35.3	16.4	13.0	4.9	63.2	29.1	<0.1	<0.1	<0.1	<0.1	0.005	0.063	0.328
Ptilimnium capillaceum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Pycnanthemum incanum	4.9	4.8	1.6	1.6	6.1	4.3	0.0	0.0	0.0	0.0			
Pyrrhopappus carolinanus	0.0	0.0	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia alifanus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia mariana	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia virginica	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rudbeckia hirta	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Sabatia campestris	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria intergrifolia	0.1	<0.1	0.0	0.0	1.2	1.2	0.0	0.0	0.0	0.0			
Solanum americanum	0.0	0.0	17.4	17.4	0.0	0.0	0.0	0.0	0.0	0.0			
Solanum carolinense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.004	0.067	0.397
Solidago gigantea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Tragia urticifolia	0.3	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Viola lanceolata	0.0	0.0	0.0	0.0	7.6	6.5	0.0	0.0	0.0	0.0			
Viola palmata	2.4	1.7	0.2	0.1	0.4	0.1	0.1	<0.1	0.0	0.0			
Wahlenbergia marginata	0.0	0.0	<0.1	<0.1	1.9	1.8	0.0	0.0	0.0	0.0			
Grass													
Andropogon virginicus	76.5	18.1	72.7	23.8	43.7	13.0	44.6	18.0	18.2	8.3	≤0.001	0.202	0.293
Aristida spp.	5.0	3.7	28.5	13.2	26.3	9.2	10.3	6.0	0.4	0.1	0.648	0.257	0.686
Chasmanthium sessiliflorum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium aciculare	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium acuminatum	118.3 A	28.2	31.4 AB	11.2	86.0 AB	25.6	21.1 B	16.1	4.5 B	3.0	0.003	0.036	0.007

Table C.5. Continued.

Species	Treatment 1 $\bar{x}$	SE	2^b $\bar{x}$	SE	3^c $\bar{x}$	SE	4^d $\bar{x}$	SE	5 $\bar{x}$	SE	*P*-value Yr	Trt	Yr*trt
Dicanthelium commutatum	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Dicanthelium ovale	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium scoparium	8.9 A	5.9	80.0 B	30.3	116.3 B	28.6	3.4 A	3.4	3.2 A	2.2	0.022	0.002	0.063
Dicanthelium sphaerocarpon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Digitaria ciliaris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Imperata cylindrica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Paspalum setaceum	24.2	12.0	0.0	0.0	0.0	0.0	0.2	<0.1	11.4	5.8			
Setaria pumilia	0.0	0.0	<0.1	<0.1	1.2	1.2	0.0	0.0	0.0	0.0			
Grasslike													
Carex albolutescens	10.0	6.4	11.7	5.4	3.6	2.4	4.3	2.5	5.9	4.5			
Cyperus ovularis	0.3	0.1	8.9	5.6	3.9	2.5	0.1	<0.1	3.3	3.1			
Juncus marginatus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus polycephalus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus tenuis	5.0	2.9	10.6	5.3	34.2	9.8	5.1	2.4	2.2	1.7	0.564	0.265	0.488
Rhynchospora inexpansa	34.1	29.2	32.7	16.9	<0.1	<0.1	0.0	0.0	9.5	9.5	0.008	0.122	0.472
Scirpus cyperinus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vine													
Berchemia scandens	<0.1	<0.1	0.0	0.0	0.0	0.0	0.1	<0.1	0.0	0.0			
Campsis radicans	20.4	9.3	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.0	0.0			
Gelsemium sepervirens	<0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	<0.1			
Lonicera japonica	0.0	0.0	4.3	3.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Mikiana scandens	0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Parthenocissus quinquefolia	3.8	3.7	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Rubus argutus	45.5 A	12.1	22.5 A	7.1	35.5 A	15.7	3.0 A	2.0	2.7 A	1.8	0.370	0.049	0.798
Rubus flagellaris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rubus trivialis	33.8	12.2	35.1	11.4	54.6	14.0	22.1	7.8	29.0	12.6	0.004	0.054	0.276
Smilax bona-nox	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax glauca	2.8	2.4	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1			

Table C.5. Continued.

	Treatment												
	1		2[b]		3[c]		4[d]		5		*P*-value		
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Smilax rotundifolia	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Toxicodendron radicans	12.3	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis aestivalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis rotundifolia	37.3	16.6	1.4	1.3	0.1	<0.1	0.0	0.0	<0.1	<0.1			
Woody													
Acer rubrum	0.3	0.1	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.0	0.0			
Albizia julibrissin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Aleurites fordii	12.3	8.2	1.5	1.3	11.3	8.2	5.0	3.4	12.3	7.9			
Aralia spinosa	0.0	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0			
Baccharis halimifolia	2.6	2.4	31.8	18.4	1.8	1.4	4.1	3.9	6.4	6.3			
Callicarpa americana	28.1	17.5	22.2	14.8	3.3	2.5	6.0	4.0	0.2	0.1	0.041	0.922	0.269
Carya tomentosa	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Ceanothus americanus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Conyza canadensis	0.0	0.0	2.2	2.0	2.1	1.9	0.0	0.0	1.2	1.2			
Cornus florida	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Crategus aestivalis	0.0	0.0	1.5	1.4	<0.1	<0.1	0.0	0.0	0.0	0.0			
Diospyros virginiana	20.8	11.8	0.0	0.0	5.1	3.8	3.9	3.7	<0.1	<0.1			
Hypericum drummondii	0.0	0.0	2.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0			
Hypericum gentianoides	2.3	2.2	1.9	1.9	3.0	2.1	0.0	0.0	<0.1	<0.1			
Hypericum hypericoides	2.0	1.8	1.7	1.5	0.4	0.1	0.4	0.1	3.1	2.0	0.015	0.077	0.281
Hypericum stragalum	0.2	<0.1	0.0	0.0	0.2	<0.1	5.3	3.1	0.3	<0.1			
Ilex glabra	24.0	24.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex opaca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Ilex vomitoria	3.3	3.2	2.3	2.1	0.0	0.0	<0.1	<0.1	0.1	0.1			
Ligustrum sinense	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Liquidambar styraciflua	5.7	5.6	<0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1			
Magnolia virginiana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Myrica cerifera	12.0	8.7	2.4	2.4	3.6	2.5	0.0	0.0	0.0	0.0			

Table C.5. Continued.

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Prunus angustifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Prunus serotina	18.9	18.9	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Quercus falcata	<0.1	<0.1	0.0	0.0	0.0	0.0	0.1	<0.1	0.0	0.0			
Quercus marilandica	0.0	0.0	6.0	5.9	0.0	0.0	0.0	0.0	<0.1	<0.1			
Quercus nigra	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Rhus copallina	21.1	9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Salix nigra	<0.1	<0.1	0.0	0.0	2.6	2.6	0.0	0.0	0.0	0.0			
Sambucus canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sassafras albidum	0.0	0.0	1.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0			
Vaccinium arboreum	0.2	0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1			
Vaccinium darrowii	1.2	1.2	0.0	0.0	0.1	<0.1	<0.1	<0.1	0.0	0.0			
Vaccinium ellottii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
2003													
Fern													
Osmunda regalis	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0			
Pteridium aquilinum	0.0	0.0	0.0	0.0	6.2	4.9	0.0	0.0	0.0	0.0			
Forb (legume)													
Centrosema virginianum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Chamaecrista fasciculata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Desmodium ciliare	0.0	0.0	0.0	0.0	<0.1	<0.1	6.0	5.8	3.4	2.2			
Desmodium rotundifolium	0.0	0.0	0.0	0.0	0.1	<0.1	9.0	4.6	0.1	<0.1			
Desmodium tortuosum	0.0	0.0	<0.1	<0.1	0.0	0.0	1.8	1.8	0.0	0.0			
Indigofera caroliniana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lespedeza capitata	1.2	1.2	<0.1	<0.1	2.9	2.9	0.0	0.0	0.0	0.0			
Lespedeza cuneata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lespedeza repens	0.3	0.2	4.5	2.1	1.7	1.0	3.3	2.3	<0.1	<0.1			
Rhynchosia reniformis	<0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Stylosanthes biflora	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0			

Table C.5. Continued.

Species	Treatment										P-value		
	1		2[b]		3[c]		4[d]		5				
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Tephrosia virginiana	<0.1	<0.1	0.2	0.1	3.0	2.7	<0.1	<0.1	0.1	<0.1			
Forb (non-legume)													
Acalypha gracilens	0.3	0.1	0.1	<0.1	<0.1	<0.1	1.3	1.1	0.4	0.2	0.170	0.418	0.493
Ambrosia artemisiifolia	1.2	1.1	2.8	2.4	<0.1	<0.1	<0.1	<0.1	0.0	0.0			
Aster adnatus	0.2	0.1	1.4	1.3	9.2	9.2	0.0	0.0	0.0	0.0			
Aster dumosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Aster patens	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Carduus spinosissimus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Coreopsis major	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Crotalaria sagittalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	2.9			
Croton capitatus	<0.1	<0.1	<0.1	<0.1	4.0	2.1	0.2	<0.1	0.1	<0.1			
Diodia teres	<0.1	<0.1	2.4	2.4	0.0	0.0	1.5	1.3	0.0	0.0			
Diodia virginiana	1.4	1.3	0.0	0.0	3.7	2.7	6.3	5.0	<0.1	<0.1			
Erechtites hieracifolia	14.0 AB	5.2	25.3 AB	11.9	3.2 AB	2.7	39.4 A	14.6	<0.1 B	<0.1	0.063	0.260	0.044
Erigeron strigosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium album	2.1	2.0	4.7	4.7	2.3	2.2	<0.1	<0.1	2.1	2.0			
Eupatorium capillifolium	43.8 AC	13.6	224.4 B	36.4	176.7 B	28.6	91.9 AB	20.1	7.8 C	5.5	0.002	0.021	0.043
Eupatorium perfoliatum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium rotundifolium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium semiserratum	7.0	4.9	1.5	1.5	31.6	13.0	10.9	6.6	0.0	0.0			
Eupatorium serotinum	8.7	4.8	4.0	2.8	4.0	2.9	2.7	2.5	2.9	2.7			
Euphorbia corollata	0.1	<0.1	0.2	<0.1	0.2	<0.1	<0.1	<0.1	0.3	0.1			
Euthamia temuifolia	86.8	17.8	59.1	13.9	57.5	12.6	89.8	22.2	7.7	4.0	0.023	0.143	0.325
Galium circaezans	0.0	0.0	0.0	0.0	0.1	<0.1	<0.1	<0.1	0.0	0.0			
Gnaphalium falcatum	15.1	14.4	0.4	0.2	2.2	1.5	0.9	0.2	0.0	0.0	0.338	0.350	0.361
Helianthus hirsutus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Heterotheca graminifolia	0.0	0.0	1.8	1.8	0.0	0.0	0.1	<0.1	0.0	0.0			

Table C.5. Continued.

Species	Treatment 1		Treatment 2[b]		Treatment 3[c]		Treatment 4[d]		Treatment 5		*P*-value		
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Lactuca canadensis	0.1	<0.1	0.0	0.0	<0.1	<0.1	0.1	<0.1	0.0	0.0			
Lactuca floridana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lechea patula	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Liatris squarrosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Linum medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ludwigia glandulosa	1.3	1.3	0.0	0.0	0.0	0.0	8.3	5.8	0.0	0.0			
Mecardonia acuminata	1.8	1.8	1.3	1.2	20.1	14.3	12.1	7.2	0.1	<0.1			
Mimosa quadrivalvis	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0			
Oenothera biennis	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Oxalis dillenii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Oxalis stricta	0.1	<0.1	0.2	0.1	0.0	0.0	0.2	0.1	<0.1	<0.1			
Phytolacca americana	<0.1	<0.1	7.3	7.2	12.6	10.0	<0.1	<0.1	<0.1	<0.1			
Plantago virginica	0.1	<0.1	0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0			
Pluchea foetida	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Polygala nana	0.1	<0.1	3.5	2.6	0.5	0.2	1.5	1.2	0.0	0.0			
Polypremum procumbens	40.1	12.3	43.0	13.7	94.3	18.9	152.1	28.4	133.1	29.5	0.005	0.063	0.328
Ptilimnium capillaceum	<0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Pycnanthemum incanum	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Pyrrhopappus carolinanus	1.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia alifanus	<0.1	<0.1	1.2	1.2	0.0	0.0	1.6	1.6	0.0	0.0			
Rhexia mariana	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0			
Rhexia virginica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rudbeckia hirta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sabatia campestris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria intergrifolia	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0			
Solanum americanum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solanum carolinense	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago canadensis	15.7	12.0	5.6	3.8	36.5	12.7	36.3	10.8	10.7	5.4	0.004	0.067	0.397

Table C.5. Continued.

Species	Treatment 1 x̄	SE	2[b] x̄	SE	3[c] x̄	SE	4[d] x̄	SE	5 x̄	SE	P-value Yr	Trt	Yr*trt
Solidago gigantea	2.0	2.0	7.3	5.3	9.6	7.8	0.0	0.0	0.0	0.0			
Tragia urticifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Viola lanceolata	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1			
Viola palmata	0.0	0.0	0.0	0.0	0.0	0.0	6.4	6.4	<0.1	<0.1			
Wahlenbergia marginata	<0.1	<0.1	5.3	5.3	0.0	0.0	18.8	8.6	<0.1	<0.1			
Grass													
Andropogon virginicus	286.6	48.3	183.3	33.9	122.8	29.9	85.6	25.0	214.5	40.6	≤0.001	0.202	0.293
Aristida spp.	0.0	0.0	32.4	16.1	55.6	46.6	41.5	23.8	44.1	22.3	0.648	0.257	0.686
Chasmanthium sessiliflorum	12.4	7.3	<0.1	<0.1	9.1	6.5	0.0	0.0	<0.1	<0.1			
Dicanthelium aciculare	4.0	4.0	<0.1	<0.1	30.7	11.1	9.2	9.0	0.1	<0.1			
Dicanthelium acuminatum	83.3 AC	25.2	109.2 AB	24.5	170.3 B	32.1	86.1 AC	23.3	2.7 C	2.3	0.003	0.003	0.007
Dicanthelium commutatum	1.9	1.8	<0.1	<0.1	6.1	3.3	21.7	11.4	0.5	0.2			
Dicanthelium ovale	0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.3	0.0	0.0			
Dicanthelium scoparium	15.9 A	9.7	38.7 A	21.2	4.6 A	4.5	<0.1 A	<0.1	<0.1 A	<0.1	0.022	0.002	0.063
Dicanthelium sphaerocarpon	0.0	0.0	0.0	0.0	0.0	0.0	12.9	10.0	0.0	0.0			
Digitaria ciliaris	48.9	17.5	0.0	0.0	17.8	10.9	17.5	17.5	18.8	11.3			
Imperata cylindrica	0.0	0.0	23.7	23.7	0.0	0.0	0.0	0.0	0.0	0.0			
Paspalum setaceum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Setaria pumilia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Grasslike													
Carex albolutescens	0.0	0.0	2.0	2.0	0.0	0.0	0.1	<0.1	0.0	0.0			
Cyperus ovularis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus marginatus	<0.1	<0.1	7.7	7.6	16.0	10.3	51.6	16.8	0.4	0.2			
Juncus polycephalus	0.0	0.0	2.8	2.8	0.0	0.0	13.4	5.7	<0.1	<0.1			
Juncus tenuis	0.3	0.2	8.7	8.5	105.6	52.6	56.7	19.4	0.0	0.0	0.564	0.265	0.488
Rhynchospora inexpansa	71.1	33.5	202.2	63.2	65.2	27.5	80.3	31.6	3.4	3.4	0.008	0.122	0.472
Scirpus cyperinus	8.6	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vine													

Table C.5. Continued.

Species	Treatment 1 $\bar{x}$	1 SE	2[b] $\bar{x}$	2[b] SE	3[c] $\bar{x}$	3[c] SE	4[d] $\bar{x}$	4[d] SE	5 $\bar{x}$	5 SE	*P*-value Yr	Trt	Yr*trt
Berchemia scandens	0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Campsis radicans	24.1	9.0	0.0	0.0	5.2	5.2	<0.1	<0.1	0.0	0.0			
Gelsemium sepervirens	6.9	4.9	<0.1	<0.1	<0.1	<0.1	2.3	2.1	<0.1	<0.1			
Lonicera japonica	2.6	2.4	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.7			
Mikiana scandens	0.0	0.0	0.0	0.0	0.1	<0.1	0.1	<0.1	0.0	0.0			
Parthenocissus quinquefolia	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0			
Rubus argutus	135.1 A	33.9	43.8 AB	16.4	28.9 B	12.2	28.6 B	12.1	0.1 B	<0.1	0.370	0.049	0.798
Rubus flagellaris	47.8	17.3	23.1	15.1	9.1	9.1	3.2	3.2	0.0	0.0			
Rubus trivialis	129.6	22.5	92.1	20.7	164.1	27.4	80.8	12.9	5.2	4.8	0.004	0.054	0.276
Smilax bona-nox	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax glauca	0.2	<0.1	0.0	0.0	17.4	11.6	9.2	5.5	<0.1	<0.1			
Smilax rotundifolia	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Toxicodendron radicans	27.7	8.6	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Vitis aestivalis	0.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis rotundifolia	80.4	22.3	0.1	<0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1			
Woody													
Acer rubrum	9.7	9.7	0.0	0.0	0.0	0.0	2.4	2.4	0.0	0.0			
Albizia julibrissin	0.1	<0.1	0.0	0.0	1.1	1.0	12.0	7.3	0.3	0.1			
Aleurites fordii	10.0	10.0	1.8	1.8	2.0	1.9	7.1	7.1	1.8	1.8			
Aralia spinosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Baccharis halimifolia	9.3	4.6	9.1	6.5	6.5	4.6	8.5	8.4	12.3	9.4			
Callicarpa americana	3.6	3.6	28.5	13.8	53.0	24.9	51.3	19.5	39.1	17.6	0.041	0.922	0.269
Carya tomentosa	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Ceanothus americanus	0.0	0.0	0.0	0.0	0.0	0.0	4.0	2.8	0.0	0.0			
Conyza canadensis	1.5	1.5	0.2	0.1	0.2	0.1	0.0	0.0	<0.1	<0.1			
Cornus florida	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Crategus aestivalis	0.0	0.0	1.9	1.9	0.0	0.0	0.0	0.0	0.0	0.0			
Diospyros virginiana	21.8	9.1	7.8	4.9	3.2	3.1	14.0	11.8	<0.1	<0.1			

Table C.5. Continued.

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Hypericum drummondii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hypericum gentianoides	0.2	0.1	0.0	0.0	0.0	0.0	5.1	3.8	0.1	<0.1			
Hypericum hypericoides	3.9	2.5	2.3	2.1	31.4	13.8	9.7	6.1	27.4	14.7	0.015	0.077	0.281
Hypericum stragalum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex glabra	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex opaca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex vomitoria	2.1	1.8	10.5	4.7	0.0	0.0	6.7	5.2	<0.1	<0.1			
Ligustrum sinense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Liquidambar styraciflua	9.8	7.1	<0.1	<0.1	13.6	13.6	0.0	0.0	<0.1	<0.1			
Magnolia virginiana	3.7	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Myrica cerifera	7.6	4.6	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0			
Prunus angustifolia	0.0	0.0	5.4	4.3	3.7	3.5	0.0	0.0	0.0	0.0			
Prunus serotina	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Quercus falcata	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Quercus marilandica	0.0	0.0	4.4	4.4	<0.1	<0.1	0.0	0.0	0.0	0.0			
Quercus nigra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhus copallina	26.4	10.3	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Salix nigra	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sambucus canadensis	5.3	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sassafras albidum	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0			
Vaccinium arboreum	12.5	12.3	0.0	0.0	3.4	2.4	4.2	2.9	0.0	0.0			
Vaccinium darrowii	<0.1	<0.1	0.0	0.0	2.5	2.4	0.0	0.0	<0.1	<0.1			
Vaccinium ellottii	0.0	0.0	1.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0			

[a] Twenty exclosures per treatment were randomly allocated at the beginning and clipped at the end of each growing season.

[b] Actual means presented; analyses conducted on square root transformed data; means within rows followed by same letter do not differ ($P > 0.05$).

[c] Within-treatment year effect ($P < 0.05$): *Erechtites hieracifolia, Eupatorium capillifolium, Dicanthelium acuminatum.*

[d] Within-treatment year effect ($P < 0.05$): *Erechtites hieracifolia, Eupatorium capillifolium*; ($P < 0.01$): *Dicanthelium acuminatum.*

[e] Within-treatment year effect ($P < 0.05$): *Dicanthelium acuminatum*; ($P < 0.01$): *Eupatorium capillifolium*.

Table C.6. Total biomass (dry weight, kg/ha)[a] by forage class for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (July 2002 and July 2003) in the Mississippi Lower Coastal Plain[b].

	Treatment												
	1[c]		2[d]		3[e]		4[f]		5[g]		*P*-value		
Forage type	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002													
Fern	0.0	0.0	0.0	0.0	23.6	23.6	0.0	0.0	0.0	0.0		0.398	0.537
Forb (legume)	7.2	3.2	3.7	0.7	10.3	5.4	2.2	0.7	0.8	0.4		0.087	0.056
Forb (non-legume)	492.4 A	86.1	851.0 A	131.8	667.2 A	90.3	32.0 B	15.8	92.1 B	39.1		≤0.001	0.003
Grass	235.2 A	38.9	212.7 A	43.0	284.8 A	50.5	79.5 B	27.6	37.8 B	11.9		0.009	0.529
Grasslike	49.4	30.4	63.9	19.6	62.3	22.9	9.4	4.9	20.8	11.4		0.107	0.247
Vine	282.4 A	50.1	110.4 B	22.3	157.2 B	34.6	45.9 B	13.7	50.2 B	18.9		0.009	≤0.001
Woody	276.8 A	73.6	149.0 AB	48.1	55.6 B	17.4	42.9 B	15.1	43.4 B	22.3		0.042	0.021
Total	1343.5 A	131.6	1390.6 A	159.1	1261.0 A	138.8	211.9 B	43.4	245.2 B	53.2		≤0.001	≤0.001
2003													
Fern	0.0	0.0	0.0	0.0	9.3	7.0	0.0	0.0	0.0	0.0	0.340	0.398	
Forb (legume)	4.0	3.0	9.1	3.9	17.3	7.8	36.3	13.8	6.9	3.9	0.008	0.087	
Forb (non-legume)	491.9 A	67.8	845.4 A	103.6	924.9 A	92.9	894.3 A	92.8	218.2 B	50.8	0.004	0.003	
Grass	453.0 A	64.2	387.4 A	54.1	411.7 A	68.0	277.9 A	54.8	281.0 A	46.5	≤0.001	0.009	
Grasslike	80.1	34.4	223.4	64.2	184.4	58.7	202.1	45.7	3.9	3.4	0.023	0.107	
Vine	918.6 A	109.8	348.5 B	60.5	454.1 B	65.2	246.5 B	38.4	13.7 C	9.1	≤0.001	≤0.001	
Woody	299.3	64.0	165.5	43.1	309.3	92.1	247.8	60.8	157.9	51.2	≤0.001	0.382	
Total	2247.0 A	146.4	1979.5 A	131.9	2311.0 A	158.6	1905.0 A	131.3	681.6 B	82.0	≤0.001	≤0.001	

[a] Twenty exclosures per treatment were randomly allocated at the beginning and clipped at the end of each growing season.

[b] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ ($P > 0.05$).

[c] Within-treatment year effect ($P \leq 0.001$): vine; ($P < 0.01$): total.

[d] Within-treatment year effect ($P < 0.05$): total; ($P \leq 0.001$): vine.

[e] Within-treatment year effect ($P \leq 0.001$): vine, woody, total.

[f] Within-treatment year effect ($P \leq 0.001$): forbs (non-legume), vine, woody, total.

[g] Within-treatment year effect ($P < 0.05$): woody; ($P < 0.01$): total.

Table C.7. Total biomass (dry weight, kg/ha) by forage class and species for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (July 2002 and July 2003) in the Mississippi Lower Coastal Plain[a].

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002													
Fern													
Osmunda regalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Pteridium aquilinum	0.0	0.0	0.0	0.0	23.9	23.9	0.0	0.0	0.0	0.0			
Forb (legume)													
Centrosema virginianum	2.5	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Chamaecrista fasciculata	0.1	0.1	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.1			
Desmodium ciliare	0.3	0.2	0.4	0.2	2.6	2.4	0.6	0.3	0.0	0.0			
Desmodium rotundifolium	0.3	0.2	0.3	0.2	2.6	2.3	0.6	0.3	0.1	0.1			
Desmodium tortuosum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Indigofera caroliniana	0.3	0.2	0.0	0.0	0.0	0.0	0.4	0.2	0.4	0.2			
Lespedeza capitata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lespedeza cuneata	0.0	0.0	0.1	0.1	0.3	0.2	0.0	0.0	0.0	0.0			
Lespedeza repens	0.9	0.4	1.5	0.5	1.2	0.4	0.3	0.2	0.0	0.0			
Rhynchosia reniformis	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0			
Stylosanthes biflora	2.8	2.1	0.3	0.2	2.9	2.7	0.1	0.1	0.1	0.1			
Tephrosia virginiana	0.1	0.1	0.5	0.3	0.5	0.3	0.0	0.0	0.0	0.0			
Forb (non-legume)													
Acalypha gracilens	1.2	0.4	60.9	20.9	34.0	12.1	0.7	0.3	0.0	0.0		0.414	0.485
Ambrosia artemisiifolia	2.8	2.4	4.4	4.4	0.1	0.1	0.3	0.2	0.0	0.0			
Aster adnatus	<0.1	<0.1	1.7	1.6	1.5	1.5	0.0	0.0	0.0	0.0			
Aster dumosus	5.4	3.0	0.1	<0.1	0.1	0.1	0.0	0.0	0.0	0.0			
Aster patens	0.0	0.0	<0.1	<0.1	6.9	6.8	0.0	0.0	0.0	0.0			
Carduus spinosissimus	<0.1	<0.1	3.1	3.1	7.4	4.3	0.0	0.0	0.0	0.0			
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Coreopsis major	0.0	0.0	0.0	0.0	2.3	2.3	0.0	0.0	0.0	0.0			
Crotalaria sagittalis	0.0	0.0	0.3	0.2	14.3	12.5	0.0	0.0	0.0	0.0			

Table C.7. Continued.

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Croton capitatus	0.1	<0.1	9.3	9.2	16.9	13.2	<0.1	<0.1	31.3	23.5			
Diodia teres	90.3	44.4	20.5	20.3	34.3	20.0	0.2	0.1	2.8	2.8			
Diodia virginiana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Erechtites hieracifolia	127.5 A	46.6	158.2 A	43.8	88.6 A	23.0	11.9 B	11.8	2.8 B	2.7		0.002	0.046
Erigeron strigosus	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Eupatorium album	19.1	10.1	23.7	15.7	13.1	5.4	0.0	0.0	<0.1	<0.1			
Eupatorium capillifolium	119.2 AB	36.9	240.1 A	53.4	199.3 A	41.2	14.4 B	8.0	6.3 B	4.2		0.073	0.047
Eupatorium perfoliatum	0.0	0.0	2.8	2.7	0.1	0.1	0.0	0.0	0.0	0.0			
Eupatorium rotundifolium	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium semiserratum	0.0	0.0	5.3	3.6	7.0	5.7	0.0	0.0	0.0	0.0			
Eupatorium serotinum	3.3	3.1	5.0	4.9	0.1	0.1	0.0	0.0	0.0	0.0			
Euphorbia corollata	0.4	0.2	5.9	4.0	7.9	5.0	0.2	0.1	5.6	5.4			
Euthamia temuifolia	62.4	24.9	141.7	38.9	97.0	22.3	0.2	0.1	<0.1	<0.1		0.152	0.368
Galium circaezans	0.1	0.1	<0.1	<0.1	0.2	0.1	0.0	0.0	0.0	0.0			
Gnaphalium falcatum	0.4	0.2	59.1	15.3	13.6	6.0	0.0	0.0	0.0	0.0		0.350	0.361
Helianthus hirsutus	0.2	0.2	4.4	4.4	3.1	2.9	0.0	0.0	0.0	0.0			
Heterotheca graminifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lactuca canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lactuca floridana	0.0	0.0	0.0	0.0	4.8	4.8	0.0	0.0	0.0	0.0			
Lechea patula	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Liatris squarrosa	8.6	8.6	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Linum medium	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ludwigia glandulosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Mecardonia acuminata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Mimosa quadrivalvis	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Oenothera biennis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Oxalis dillenii	2.5	2.4	0.0	0.0	<0.1	<0.1	<0.1	<0.1	4.5	4.5			
Oxalis stricta	0.0	0.0	32.7	11.9	17.2	8.9	0.0	0.0	0.1	0.1			

Table C.7. Continued.

	Treatment										P-value		
	1		2[b]		3[c]		4[d]		5				
Species	x̄	SE	x̄	SE	x̄	SE	x̄	SE	x̄	SE	Yr	Trt	Yr*trt
Phytolacca americana	0.0	0.0	12.6	12.3	1.7	1.5	3.5	3.5	38.2	30.5			
Plantago virginica	0.0	0.0	0.1	<0.1	0.1	0.1	0.0	0.0	0.0	0.0			
Pluchea foetida	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Polygala nana	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Polypremum procumbens	35.3	16.4	13.0	4.9	64.8	29.8	<0.1	<0.1	<0.1	<0.1		0.063	0.328
Ptilimnium capillaceum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Pycnanthemum incanum	9.4	9.1	2.9	2.9	11.2	7.9	0.0	0.0	0.0	0.0			
Pyrrhopappus carolinanus	0.0	0.0	2.6	2.6	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia alifanus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia mariana	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia virginica	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rudbeckia hirta	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Sabatia campestris	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria intergrifolia	0.3	0.2	0.0	0.0	2.5	2.5	0.0	0.0	0.0	0.0			
Solanum americanum	0.0	0.0	39.3	39.3	0.0	0.0	0.0	0.0	0.0	0.0			
Solanum carolinense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.052	0.392
Solidago gigantea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Tragia urticifolia	0.5	0.2	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1			
Viola lanceolata	0.0	0.0	0.0	0.0	7.8	6.7	0.0	0.0	0.0	0.0			
Viola palmata	2.4	1.7	0.2	0.1	0.4	0.1	0.1	<0.1	0.0	0.0			
Wahlenbergia marginata	0.0	0.0	<0.1	<0.1	1.9	1.8	0.0	0.0	0.0	0.0			
Grass													
Andropogon virginicus	76.5	18.1	72.7	23.8	44.8	13.3	44.6	18.0	18.2	8.3		0.202	0.293
Aristida spp.	5.0	3.7	28.5	13.2	26.9	9.4	10.3	6.0	0.4	0.1		0.257	0.686
Chasmanthium sessiliflorum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium aciculare	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium acuminatum	118.3 A	28.2	31.4 AB	11.2	86.0 AB	25.6	21.1 B	16.1	4.5 B	3.0		0.011	0.007

Table C.7. Continued.

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Dicanthelium commutatum	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1			
Dicanthelium ovale	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Dicanthelium scoparium	8.9 A	5.9	80.0 B	30.3	116.3 B	28.6	3.4 A	3.4	3.2 A	2.2		0.002	0.063
Dicanthelium sphaerocarpon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Digitaria ciliaris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Imperata cylindrica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Paspalum setaceum	24.2	12.0	0.0	0.0	0.0	0.0	0.2	<0.1	11.4	5.8			
Setaria pumilia	0.0	0.0	<0.1	<0.1	1.2	1.2	0.0	0.0	0.0	0.0			
Grasslike													
Carex albolutescens	10.0	6.4	11.7	5.4	3.7	2.5	4.3	2.5	5.9	4.5			
Cyperus ovularis	0.3	0.1	8.9	5.6	4.0	2.6	0.1	<0.1	3.3	3.1			
Juncus marginatus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus polycephalus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus tenuis	5.0	2.9	10.6	5.3	35.1	10.0	5.1	2.4	2.2	1.7		0.265	0.488
Rhynchospora inexpansa	34.1	29.2	32.7	16.9	<0.1	<0.1	0.0	0.0	9.5	9.5		0.122	0.472
Scirpus cyperinus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vine													
Berchemia scandens	0.1	0.1	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0			
Campsis radicans	37.6	17.4	0.0	0.0	0.2	0.1	<0.1	<0.1	0.0	0.0			
Gelsemium sepervirens	0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	0.2	0.1			
Lonicera japonica	0.0	0.0	8.3	5.8	0.0	0.0	0.0	0.0	0.1	0.1			
Mikiana scandens	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Parthenocissus quinquefolia	6.7	6.6	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Rubus argutus	87.4	23.3	37.5	11.6	63.1	27.7	5.6	3.7	4.9	3.2		0.051	0.773
Rubus flagellaris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rubus trivialis	59.2	22.0	62.0	20.2	95.4	24.7	39.4	13.4	44.6	18.8		0.063	0.312
Smilax bona-nox	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax glauca	5.2	4.1	0.2	0.2	0.2	0.2	0.4	0.2	0.3	0.2			

Table C.7. Continued.

Species	Treatment										P-value		
	1		2[b]		3[c]		4[d]		5				
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Smilax rotundifolia	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Toxicodendron radicans	21.1	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis aestivalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis rotundifolia	64.5	28.7	2.3	2.1	0.2	0.1	0.0	0.0	0.1	0.1			
Woody													
Acer rubrum	0.6	0.3	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0			
Albizia julibrissin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Aleurites fordii	20.7	13.7	2.8	2.5	18.1	13.1	8.0	5.5	19.8	12.5			
Aralia spinosa	0.0	0.0	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0			
Baccharis halimifolia	5.5	5.1	64.9	37.9	3.6	2.8	9.0	8.5	13.1	12.8			
Callicarpa americana	45.5	29.2	41.6	26.3	5.0	3.9	9.3	6.0	0.5	0.2		0.892	0.316
Carya tomentosa	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Ceanothus americanus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Conyza canadensis	0.0	0.0	4.9	4.6	4.1	3.7	0.0	0.0	2.6	2.6			
Cornus florida	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Crategus aestivalis	0.0	0.0	3.3	3.2	0.2	0.2	0.0	0.0	0.0	0.0			
Diospyros virginiana	40.7	26.9	0.0	0.0	8.6	6.3	6.5	6.1	0.2	0.1			
Hypericum drummondii	0.0	0.0	2.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0			
Hypericum gentianoides	2.3	2.2	1.9	1.9	3.1	2.1	0.0	0.0	<0.1	<0.1			
Hypericum hypericoides	3.6	3.2	3.3	2.8	0.9	0.3	1.0	0.3	5.7	3.5		0.064	0.293
Hypericum stragalum	0.3	0.2	0.0	0.0	0.5	0.2	8.3	4.9	0.6	0.2			
Ilex glabra	42.0	41.9	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex opaca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
Ilex vomitoria	7.6	7.3	5.1	4.5	0.0	0.0	0.2	0.2	0.3	0.2			
Ligustrum sinense	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Liquidambar styraciflua	10.7	10.4	<0.1	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1			
Magnolia virginiana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Myrica cerifera	24.1	18.1	4.1	4.1	6.3	4.4	0.0	0.0	0.0	0.0			

Table C.7. Continued.

Species	Treatment 1 x̄	1 SE	2[b] x̄	2[b] SE	3[c] x̄	3[c] SE	4[d] x̄	4[d] SE	5 x̄	5 SE	P-value Yr	Trt	Yr*trt
Prunus angustifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Prunus serotina	34.5	34.5	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Quercus falcata	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0			
Quercus marilandica	0.0	0.0	8.2	8.0	0.0	0.0	0.0	0.0	0.2	0.1			
Quercus nigra	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Rhus copallina	32.8	14.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Salix nigra	0.1	0.1	0.0	0.0	5.1	5.0	0.0	0.0	0.0	0.0			
Sambucus canadensis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sassafras albidum	0.0	0.0	3.4	3.4	0.0	0.0	0.0	0.0	0.0	0.0			
Vaccinium arboreum	0.4	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1			
Vaccinium darrowii	2.3	2.1	0.0	0.0	0.3	0.2	0.2	0.2	0.0	0.0			
Vaccinium ellottii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
2003													
Fern													
Osmunda regalis	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Pteridium aquilinum	0.0	0.0	0.0	0.0	9.0	6.9	0.0	0.0	0.0	0.0			
Forb (legume)													
Centrosema virginianum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Chamaecrista fasciculata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Desmodium ciliare	0.0	0.0	0.0	0.0	0.1	0.1	10.8	10.3	6.2	3.9			
Desmodium rotundifolium	0.0	0.0	0.0	0.0	0.3	0.2	15.5	7.9	0.3	0.2			
Desmodium tortuosum	0.0	0.0	0.1	0.1	0.0	0.0	3.4	3.4	0.0	0.0			
Indigofera caroliniana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lespedeza capitata	2.9	2.9	0.2	0.2	5.5	5.5	0.0	0.0	0.0	0.0			
Lespedeza cuneata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lespedeza repens	0.7	0.3	8.3	3.9	3.3	2.0	6.4	4.3	0.2	0.2			
Rhynchosia reniformis	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Stylosanthes biflora	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			

Table C.7. Continued.

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Tephrosia virginiana	0.1	0.1	0.5	0.3	4.9	4.2	0.1	0.1	0.3	0.2			
Forb (non-legume)													
Acalypha gracilens	0.6	0.3	0.3	0.2	0.1	0.1	2.7	2.2	0.9	0.3	0.168	0.414	
Ambrosia artemisiifolia	2.4	2.2	6.5	5.7	0.1	0.1	0.1	0.1	0.0	0.0			
Aster adnatus	0.2	0.1	1.4	1.3	9.0	9.0	0.0	0.0	0.0	0.0			
Aster dumosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Aster patens	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Carduus spinosissimus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Cnidoscolus stimulosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Coreopsis major	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Crotalaria sagittalis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	4.9			
Croton capitatus	0.1	<0.1	0.1	<0.1	8.8	4.1	0.4	0.2	0.3	0.1			
Diodia teres	<0.1	<0.1	4.7	4.7	0.0	0.0	3.3	2.7	0.0	0.0			
Diodia virginiana	2.7	2.7	0.0	0.0	6.6	4.8	13.5	10.2	0.1	<0.1			
Erechtites hieracifolia	29.2	10.7	61.3	30.1	6.1	5.0	86.0	31.3	0.2	<0.1	0.060	0.286	
Erigeron strigosus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium album	4.4	4.3	9.7	9.7	4.7	4.5	0.2	0.1	3.7	3.4			
Eupatorium capillifolium	108.8 A	34.3	507.8 B	83.3	412.3 B	66.2	224.2 AB	46.6	16.1 A	11.6	0.002	0.005	
Eupatorium perfoliatum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium rotundifolium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Eupatorium semiserratum	14.7	10.4	2.9	2.9	60.9	25.0	22.2	13.7	0.0	0.0			
Eupatorium serotinum	18.2	9.6	8.5	6.1	6.8	4.8	7.2	7.0	6.1	5.6			
Euphorbia corollata	0.2	0.1	0.3	0.2	0.3	0.2	0.1	0.1	0.6	0.3			
Euthamia temuifolia	199.6	40.7	141.1	33.2	135.1	30.2	219.4	55.7	19.8	10.1	0.022	0.152	
Galium circaezans	0.0	0.0	0.0	0.0	0.1	<0.1	<0.1	<0.1	0.0	0.0			
Gnaphalium falcatum	15.1	14.4	0.4	0.2	2.1	1.5	0.9	0.2	0.0	0.0	0.338	0.350	
Helianthus hirsutus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Heterotheca graminifolia	0.0	0.0	1.8	1.8	0.0	0.0	0.1	<0.1	0.0	0.0			

Table C.7. Continued.

Species	Treatment 1		Treatment 2[b]		Treatment 3[c]		Treatment 4[d]		Treatment 5		P-value		
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Lactuca canadensis	0.3	0.2	0.0	0.0	0.1	0.1	0.3	0.2	0.0	0.0			
Lactuca floridana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Lechea patula	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Liatris squarrosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Linum medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ludwigia glandulosa	2.6	2.6	0.0	0.0	0.0	0.0	13.4	9.4	0.0	0.0			
Mecardonia acuminata	3.8	3.6	2.5	2.3	37.1	26.4	23.2	13.7	0.2	0.2			
Mimosa quadrivalvis	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Oenothera biennis	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Oxalis dillenii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Oxalis stricta	0.2	0.2	0.5	0.2	0.0	0.0	0.5	0.2	0.1	0.1			
Phytolacca americana	<0.1	<0.1	17.0	17.0	32.5	27.5	0.1	<0.1	<0.1	<0.1			
Plantago virginica	0.1	<0.1	0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0			
Pluchea foetida	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Polygala nana	0.1	<0.1	3.5	2.6	0.4	0.2	1.5	1.2	0.0	0.0			
Polypremum procumbens	40.1	12.3	43.0	13.7	92.0	18.5	152.1	28.4	133.1	29.5	0.005	0.063	
Ptilimnium capillaceum	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Pycnanthemum incanum	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0			
Pyrrhopappus carolinanus	4.6	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhexia alifanus	0.1	0.1	2.5	2.5	0.0	0.0	3.8	3.8	0.0	0.0			
Rhexia mariana	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Rhexia virginica	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rudbeckia hirta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sabatia campestris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Scutellaria intergrifolia	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0			
Solanum americanum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solanum carolinense	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Solidago canadensis	39.2	31.6	10.7	7.4	73.6	25.8	93.5	27.8	29.8	15.1	0.004	0.052	

Table C.7. Continued.

	Treatment										P-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Solidago gigantea	3.9	3.9	13.0	9.6	22.3	19.1	0.0	0.0	0.0	0.0			
Tragia urticifolia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Viola lanceolata	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1			
Viola palmata	0.0	0.0	0.0	0.0	0.0	0.0	6.4	6.4	<0.1	<0.1			
Wahlenbergia marginata	<0.1	<0.1	5.3	5.3	0.0	0.0	18.8	8.6	<0.1	<0.1			
Grass													
Andropogon virginicus	286.6	48.3	183.3	33.9	132.6	29.9	85.6	25.0	214.5	40.6	≤0.001	0.202	
Aristida spp.	0.0	0.0	32.4	16.1	54.2	45.4	41.5	23.8	44.1	22.3	0.648	0.257	
Chasmanthium sessiliflorum	12.4	7.3	<0.1	<0.1	8.9	6.3	0.0	0.0	<0.1	<0.1			
Dicanthelium aciculare	4.0	4.0	<0.1	<0.1	33.0	11.2	9.2	9.0	0.1	<0.1			
Dicanthelium acuminatum	83.3	25.2	109.2	24.5	175.9	31.8	86.1	23.3	2.7	2.3	0.003	0.011	
Dicanthelium commutatum	1.9	1.8	<0.1	<0.1	6.0	3.2	21.7	11.4	0.5	0.2			
Dicanthelium ovale	0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.3	0.0	0.0			
Dicanthelium scoparium	15.9	9.7	38.7	21.2	4.5	4.4	<0.1	<0.1	<0.1	<0.1	0.022	0.002	
Dicanthelium sphaerocarpon	0.0	0.0	0.0	0.0	0.0	0.0	12.9	10.0	0.0	0.0			
Digitaria ciliaris	48.9	17.5	0.0	0.0	17.3	10.6	17.5	17.5	18.8	11.3			
Imperata cylindrica	0.0	0.0	23.7	23.7	0.0	0.0	0.0	0.0	0.0	0.0			
Paspalum setaceum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Setaria pumilia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Grasslike													
Carex albolutescens	0.0	0.0	2.0	2.0	0.0	0.0	0.1	<0.1	0.0	0.0			
Cyperus ovularis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Juncus marginatus	<0.1	<0.1	7.7	7.6	15.6	10.0	51.6	16.8	0.4	0.2			
Juncus polycephalus	0.0	0.0	2.8	2.8	0.0	0.0	13.4	5.7	<0.1	<0.1			
Juncus tenuis	0.3	0.2	8.7	8.5	103.0	51.3	56.7	19.4	0.0	0.0	0.564	0.265	
Rhynchospora inexpansa	71.1	33.5	202.2	63.2	63.6	26.9	80.3	31.6	3.4	3.4	0.008	0.122	
Scirpus cyperinus	8.6	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.7. Continued.

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Vine													
Berchemia scandens	0.3	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Campsis radicans	46.8	17.1	0.0	0.0	10.7	10.7	<0.1	<0.1	0.0	0.0			
Gelsemium sepervirens	13.8	9.7	0.1	<0.1	<0.1	<0.1	4.3	3.8	0.3	0.1			
Lonicera japonica	6.6	6.4	0.0	0.0	0.0	0.0	0.0	0.0	3.6	3.6			
Mikiana scandens	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.2	0.0	0.0			
Parthenocissus quinquefolia	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0			
Rubus argutus	291.2	73.2	90.2	34.4	65.8	28.2	60.4	25.0	0.3	0.2	0.290	0.051	
Rubus flagellaris	104.5	39.6	42.5	28.0	23.6	23.5	6.4	6.4	0.0	0.0			
Rubus trivialis	244.9	42.3	208.9	49.0	314.8	55.2	154.7	24.9	9.3	8.4	0.003	0.063	
Smilax bona-nox	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Smilax glauca	0.4	0.2	0.0	0.0	34.0	22.1	20.0	12.3	0.1	0.1			
Smilax rotundifolia	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0			
Toxicodendron radicans	50.6	15.6	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Vitis aestivalis	0.0	0.0	6.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0			
Vitis rotundifolia	159.0	44.1	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1			
Woody													
Acer rubrum	24.9	24.7	0.0	0.0	0.0	0.0	4.4	4.4	0.0	0.0			
Albizia julibrissin	0.2	0.2	0.0	0.0	2.2	2.0	26.2	17.2	0.5	0.2			
Aleurites fordii	20.3	20.2	3.0	3.0	4.8	4.4	10.9	10.8	5.4	5.4			
Aralia spinosa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Baccharis halimifolia	20.8	10.4	22.5	16.9	13.0	9.2	17.2	17.1	26.2	19.6			
Callicarpa americana	6.1	6.0	70.1	34.1	163.2	81.7	95.7	36.8	81.0	36.3	0.033	0.892	
Carya tomentosa	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Ceanothus americanus	0.0	0.0	0.0	0.0	0.0	0.0	7.1	5.0	0.0	0.0			
Conyza canadensis	3.2	3.2	0.3	0.2	0.3	0.2	0.0	0.0	0.1	0.1			
Cornus florida	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Crategus aestivalis	0.0	0.0	4.3	4.3	0.0	0.0	0.0	0.0	0.0	0.0			

Table C.7. Continued.

	Treatment										*P*-value		
	1		2[b]		3[c]		4[d]		5				
Species	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
Diospyros virginiana	54.4	27.7	12.6	7.6	6.7	6.5	30.5	26.3	0.2	0.1			
Hypericum drummondii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hypericum gentianoides	0.2	0.1	0.0	0.0	0.0	0.0	5.1	3.8	0.1	0.1			
Hypericum hypericoides	8.4	5.2	5.0	4.5	67.1	28.8	20.8	12.7	43.8	23.0	0.019	0.064	
Hypericum stragalum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex glabra	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex opaca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Ilex vomitoria	5.9	5.2	22.9	10.3	0.0	0.0	19.5	15.1	0.2	0.2			
Ligustrum sinense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Liquidambar styraciflua	19.6	14.8	<0.1	<0.1	28.9	28.9	0.0	0.0	<0.1	<0.1			
Magnolia virginiana	8.3	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Myrica cerifera	13.9	8.5	0.2	0.2	0.0	0.0	0.2	0.2	0.0	0.0			
Prunus angustifolia	0.0	0.0	13.3	10.5	8.9	8.6	0.0	0.0	0.0	0.0			
Prunus serotina	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Quercus falcata	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1			
Quercus marilandica	0.0	0.0	6.4	6.4	0.2	0.1	0.0	0.0	0.0	0.0			
Quercus nigra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Rhus copallina	58.2	23.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0			
Salix nigra	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sambucus canadensis	15.6	15.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sassafras albidum	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0	0.0			
Vaccinium arboreum	38.9	38.6	0.0	0.0	7.9	5.5	10.1	6.9	0.0	0.0			
Vaccinium darrowii	0.2	0.2	0.0	0.0	4.8	4.7	0.0	0.0	0.2	0.2			
Vaccinium ellottii	0.0	0.0	4.7	4.7	0.0	0.0	0.0	0.0	0.0	0.0			

[a] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ ($P > 0.05$).

[b] Within-treatment year effect ($P < 0.05$): *Erechtites hieracifolia*, *Eupatorium capillifolium*.

[c] Within-treatment year effect ($P < 0.05$): *Erechtites hieracifolia*, *Eupatorium capillifolium*.

[d] Within-treatment year effect ($P < 0.01$): *Eupatorium capillifolium*.

Table C.8. White-tailed deer annual preference rating[a], crude protein (%), and in vitro digestibility (%) by species[b] for 5 pine plantation management regimes varying from low (1) to high (5) intensity at year 2 post-treatment (July 2003) in the Mississippi Lower Coastal Plain.

		Crude protein		Digestibility	
Species	Rating	x̄	SE	x̄	SE
Albizia julibrissin	1	13.4		33.0	
Aleurites fordii	1	7.9	0.4	54.3	0.9
Ambrosia artemisiifolia	4	14.3	0.2	67.6	1.4
Andropogon virginicus	1	4.5	0.2	27.0	1.7
Aristida spp.	1	3.2	0.2	30.2	3.4
Aster adnatus	3	5.1		27.7	
Baccharis halimifolia	3	7.3	0.0	47.0	1.2
Callicarpa americana	4	7.3	0.7	43.6	2.5
Campsis radicans	4	8.0	0.6	37.5	7.8
Chasmanthium sessiliflorum	3	3.6		32.2	
Crotalaria sagittalis	2	13.5		50.6	
Croton capitatus	2	9.7		21.5	
Desmodium ciliare	4	12.7		29.4	
Desmodium rotundifolium	1	11.5		14.4	
Dicanthelium aciculare	1	6.1	0.5	33.5	4.2
Dicanthelium acuminatum	1	4.6	0.3	37.0	1.2
Dicanthelium commutatum	2	5.0	0.4	46.2	2.3
Dicanthelium ovale	1	4.7		31.7	
Dicanthelium scoparium	3	4.0	0.5	28.6	4.3
Dicanthelium sphaerocarpon	2	8.2		45.5	
Digitaria ciliaris		4.5	0.1	48.2	2.7
Diodia virginiana	4	7.4	0.2	43.5	7.7
Diospyros virginiana	2	8.1	1.1	26.9	2.4
Erechtites hieracifolia	3	10.6	2.1	56.0	2.8
Eupatorium album	3	8.8		54.8	
Eupatorium capillifolium	2	10.5	0.5	51.8	2.2
Eupatorium semiserratum	2	10.6		53.6	
Eupatorium serotinum	4	8.0	0.4	54.8	3.1
Euthamia temuifolia	2	10.2	0.4	52.6	4.1
Gelsemium sempervirens	2	6.2	0.1	73.2	1.3
Hypericum gentianoides	4	3.4		21.4	
Hypericum hypericoides	4	6.5	0.0	24.2	0.6
Ilex vomitoria	4	5.0		69.1	
Imperata cylindrica	1	3.4		31.6	
Juncus marginatus	1	4.9		25.3	
Juncus polycephalus	1	4.5		22.2	
Juncus tenuis	1	4.7	0.3	20.9	3.9
Lespedeza repens	4	12.9		36.8	
Liquidambar styraciflua	1	6.5	0.4	30.4	0.6
Ludwigia glandulosa	4	7.0		37.9	
Mecardonia acuminata	2	6.0	0.2	77.4	4.0

Table C.8. Continued.

		Crude protein		Digestibility	
Species		$\bar{x}$	SE	$\bar{x}$	SE
Myrica cerifera	1	7.6		57.1	
Phytolacca americana	4	17.3	0.5	65.2	4.8
Polypremum procumbens	3	5.3	0.6	40.1	2.1
Prunus angustifolia	2	7.6		57.0	
Pteridium aquilinum	1	7.5		19.5	
Quercus falcata	2	8.3		27.8	
Quercus marilandica	1	7.2		20.0	
Rhus copallina	2	9.4	0.2	31.4	0.1
Rhynchospora inexpansa	1	3.7	0.7	12.9	0.0
Rubus argutus	4	7.2	0.4	34.7	1.2
Rubus flagellaris	3	8.2	0.2	29.1	4.0
Rubus trivialis	3	7.2	0.3	45.2	1.4
Sambucus canadensis	3	6.9		45.8	
Scirpus cyperinus	1	3.1		11.9	
Smilax glauca	4	11.3		66.4	
Solidago canadensis	4	10.1	0.8	60.4	1.1
Solidago gigantea	4	9.1	1.7	64.4	5.9
Tephrosia virginiana	3	14.9		39.7	
Vaccinium arboreum	4	5.4		36.4	
Viola palmata	2	6.8		56.1	
Vitis aestivalis	2	8.1		26.6	
Vitis rotundifolia	4	6.9	0.5	44.7	2.5
Wahlenbergia marginata		5.4	0.1	35.7	0.4

[a] 1 = seldom eaten, 2 = low use, 3 = moderate use, 4 = high use (Warren and Hurst 1981, supplemented by Miller and Miller 1999).

[b] Samples pooled at stand level.

Table C.9. Digestible protein (dry weight, kg/ha)[a] by white-tailed deer annual preference rating[b] for 5 pine plantation management regimes varying from low (1) to high (5) intensity at years 1 and 2 post-treatment (July 2002 and July 2003) in the Mississippi Lower Coastal Plain[c].

	Treatment										*P*-value		
	1		2		3		4		5				
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	Yr	Trt	Yr*trt
2002													
Rating 3[b]	4.3 AB	0.8	6.6 A	1.0	7.7 A	1.3	1.2 B	0.4	1.5 B	0.5	≤0.001	≤0.001	0.075
Rating 4	4.9	1.0	2.1	0.5	1.9	0.8	0.4	0.1	0.6	0.3	≤0.001	0.065	0.490
2003													
Rating 3[b]	10.2 A	1.1	7.4 AB	1.1	10.2 A	1.3	7.9 A	0.9	3.4 B	0.6	≤0.001	≤0.001	0.075
Rating 4	10.4	2.1	4.2	0.9	5.8	1.1	5.1	1.0	1.6	0.4	≤0.001	0.065	0.490

[a] Twenty exclosures per treatment were randomly allocated at the beginning and clipped at the end of each growing season.

[b] Annual preference rating of 3, moderate use; 4, high use (Warren and Hurst 1981).

[c] Actual means presented; analyses conducted on square-root transformed data; means within rows followed by same letter do not differ (*P*>0.05).