PRESCRIBED BURNING COST RECOVERY ANALYSIS ON NONINDUSTRIAL PRIVATE FORESTLAND IN NORTH CAROLINA

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ABSTRACT

A statewide internal analysis of prescribed burning costs was conducted by the North Carolina Division of Forest Resources (NCDFR) in 2008 to examine the regional differences of site preparation and silvicultural burning costs, and to determine which components were most responsible for losses or gains. This study analyzed actual costs for 90 site preparation (2,559 acres) and 76 silvicultural burns (3,932 acres) conducted across North Carolina in 2008.

Summary statistics revealed that NCDFR incurred a net loss/acre statewide on both types of prescribed burning. Silvicultural prescribed burns resulted in a smaller loss (-$7/acre) than site preparation burning (-$11/acre). Losses resulting from construction and patrolling fire lines were higher for site preparation burns (-$425/mile) than for silvicultural burns (-$317/mile). Recommendations were sent to agency administrators to revise rates to recover expenses while continuing to provide prescribed burning services at the lowest-possible cost to nonindustrial private forest nonindustrial private forest (NIPF) landowners

Keywords: prescribed burning, site preparation, silvicultural burning, cost recovery analysis, NIPF landowners.

INTRODUCTION

Prescribed burning is a cost effective silvicultural treatment for NIPF landowners to improve forest health conditions, control non-native invasive (NNI) species, enhance wildlife habitat, and restore forest functions (Lotti 1960, Dubois 1995). In the recent past, government agencies and forest industry were responsible for most prescribed burning. Low cost prescribed burning was conducted for a variety of purposes. However, the low rates that were charged didn't always capture the actual prescribed burning costs. New requests and interest in prescribed burning have increased the demand for prescribed burning. Private burning contractors are often willing to meet this new demand provided they can profitably recover costs of burning- while remaining competitive to agency pricing.

In North Carolina, the State's Division of Forest Resources (NCDFR) internal policy allows for a burning charge sufficient to cover agency costs while encouraging participation by private contractors. With the exception of frequent regional costs data published in the Forest Farmer magazine and subsequent manuals; very few research papers document prescribed burning costs (Dubois et. al. 2001, Vasievich 1981, Cleaves 1997). The purpose of this study is to share prescribed burning cost information for use and consideration by practitioners, government agencies, and natural resource management organizations. Timely evaluation and identification of the key components influencing NCDFR's prescribed burning cost should allow for proper rate structures and profitable burning by independent contractors.

METHODS

Data for this study was collected from 166 NCDFR forestation job reports from 13 district headquarters located in 3 administrative units that correspond to the mountain, piedmont, and coastal plain physiographical regions. Cost data from 90 site preparation burns (2,559 acres) and 76 silvicultural burns (3,932 acres) were analyzed. Job report information included personnel labor costs, vehicle costs for transport and support, and fuel costs. Personnel hourly labor rates were calculated from a midpoint salary level by position and adding related indirect benefit costs. Equipment expenses included fire suppression rate schedule for trucks, hauling units, crawler tractors, and support vehicles. A tractor plow costs were calculated from tachometer hour rate specific to the tractor type/ size reported on the fire job report.

Prescribed burning costs were summarized in two ways: 1) the total cost, and 2) the fireline construction total cost (which included patrolling cost). Prescribed burning income was calculated from invoices, job reports, and signed contracts with current rates for prescribed burning by physiographical region, acre/size class, minimum acreage charge, type of prescribed burn, and equipment rate per mile used for fireline construction plus any surcharge or overhead fees. A $100 per burn surcharge was applied when equipment was used for line patrolling. The profit or loss per acre was derived by subtracting burn expenses from income generated. Further analysis was conducted across prescribed burning type and physiographical region. For this

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study, silvicultural burning includes any in-stand burning for the purpose of forest health, habitat improvement, and fuel mitigation.

RESULTS AND DISCUSSION

SITE PREPARATION BURNING

Average site preparation burning costs ($36.51) were nearly double those costs/acre of silvicultural burns ($19.87) statewide (Tables 1 and 3). The mean site preparation burning costs/acre were higher for the mountain region at $61.90 compared to $31.57 for the piedmont region and $16.07 for the coastal plain region (Table 1). Personnel labor costs were greatest in the mountain region averaging(12.99 hours/acre), whereas piedmont mean labor hours/acre were 1.28, and 0.58 for the mountain regions respectively (Table1). Higher personnel labor costs for the mountains were likely a result of topographical constraints on equipment, excessive number of personnel on smaller burn units, and training new personnel. Site preparation burning resulted in a (-$10.91) loss per acre statewide. Only the coastal plain region operated at a profit/acre of $5.48 while piedmont and the mountain regions had losses of (-$6.80) and (-$31.41) respectively (Table 1). The mountain region site preparation burning loss/acre was nearly triple the statewide average. Additional analysis for site preparation burns in the mountain region showed a mean loss/acre of (-$34.78) for tracts less than 40 acres, and (-$117.01) for tracts that were less than 20 acres. Unit size was shown to have a great influence on per acre cost.

SILVICULTURAL BURNING

Silvicultural burning resulted in lower mean costs/acre than site preparation burning, yet still resulted in a (-$7.25) loss/acre. The mean labor hours/acre was highest in the mountain region (8.13) and declined greatly for the, piedmont(1.06hours/acre) and coastal plain(0.62 hours/acre) regions (Table 3). The mean labor hours/acre for silvicultural burning statewide was 3.78 hours compared with 4.95 hours for site preparation burning. The mean silvicultural burning costs/acre was greatest in the mountain region, $35.98 compared to $16.01 for the piedmont and $7.63 for the coastal plain region (Table 3). Similarly, only the coastal plain region was profitable ($9.88/acre) while piedmont and the mountain regions had losses of (-$6.13) and (-$25.50), respectively (Table 3).

FIRELINE CONSTRUCTION AND PATROLLING

Analysis of total fireline costs/mile was conducted by examining line construction costs and patrolling costs, separately and in combination. Statewide, fireline construction and patrolling costs resulted in a loss/mile for all of the fireline components for site preparation and silvicultural burning. The total mean cost/mile of fireline installment was $746.60 for site preparation burning and $582.44 for silvicultural burning. The total cost of fireline construction resulted in a loss/mile (-$424.60) for site preparation and (-$317.48) for silvicultural burning when averaged across the state.

Total fireline construction costs/mile was similar for site preparation and silvicultural prescribed burning at $513.26/mile. Statewide patrolling costs were highest for site preparation burning, averaging $140.76 costs/mile while silvicultural patrolling costs were much less($36.51/mile). Line construction and patrolling costs were generally lower for the mountain region largely due to the reliance on personnel rather than more costly heavy equipment.

The total line construction and patrolling costs for site preparation burning were very similar for both the piedmont and coastal plain regions (Table 2). The piedmont region has the highest mean costs/mile of fireline for site preparation burning at $861.80/mile resulting in the highest loss/mile of fireline installation (-$526.70/mile) for all three regions. This loss/mile of fireline installment for site preparation was approximately twice the amount reported for the mountain region at (-$260.20). This is the result of a greater total miles of fireline installed during site preparation burning in the piedmont and a higher number of hours patrolling firelines with heavy equipment. Patrolling accounted for approximately 41% of the total equipment tachometer hours for both the coastal plain and piedmont regions for site preparation burning.

The piedmont region has the highest mean costs/mile for total fireline costs for silvicultural burning at $672.42/mile resulting in the highest loss/mile for total fireline installation (-$401.30/mile) for all three regions (Table 4). Mountain and coastal plain regions were able to conduct line patrolling during silvicultural burning without a loss per mile, while the piedmont region lost $64.51/mile. The total fireline costs for silvicultural burning in the piedmont region was approximately twice the costs for the other two regions.

CONCLUSIONS

The coastal plain region was the only geographical region able to conduct prescribed burning without a net loss/acre. Our analysis indicated that the current burning rate structure failed to recover operating costs statewide. Armed with this new information, NCDFR administrators were able to institute a simplified burning rate schedule that appropriately recovered costs. Regional equipment rates for fireline construction are currently based on actual equipment tachometer hours of operation and no longer billed by the mile. This allows for the recovery of the equipment operating costs for fireline construction and patrolling. Line patrolling by heavy equipment had a deleterious impact on fireline cost effectiveness even with a surcharge in place.

Fireline construction rates did not recover the actual operating costs of equipment used when billed by the mile.

Fireline construction and patrolling costs were significant component of site preparation and silvicultural burning. Heavy equipment patrolling led to higher losses/mile especially when not monitored to minimize costs. Other equipment alternatives should be considered for use when patrolling, especially on less intensive silvicultural burning. Diligent fire managers need to properly plan personnel staffing to conduct the prescribed burns safely and cost effectively, while training new personnel. Prescribed burning costs and charging rates should be periodically reviewed to assess real costs and recovery charges. This will facilitate private burning contractor competition without the specter of subsidized agency cost overruns.

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Table 1—Personnel labor summary for site preparation burning in NC by geographic region

	Coastal Plain	Piedmont	Mountains	Statewide
Total # burns	17	44	29	90
Total acres burned	879	1191.5	489	2559.5
Mean acres/burn	51.7	27.1	16.9	28.43
Mean labor hrs/ac	0.58	1.28	12.99	4.95
Mean income/ac	21.55	24.77	30.49	25.60
Mean costs/ac	16.07	31.57	61.90	36.51
Profit/loss per acre	5.48	-6.80	-31.41	-10.91

Table 2—Fireline summary statistics for site preparation burning in NC by geographic region

	Coastal Plain	Piedmont	Mountains	Statewide
		Line construction		
Mean cost/mile	609.78	656.08	556.03	513.26
Profit/loss per mile	-410	-416	-286	-372
		Line patrolling		
Hrs. patrolling	33.5	99.2	15.5	148
Mean costs/mile	168.11	196.98	44.20	140.76
Profit/loss per mile	-78.96	-99.32	26.67	-54.57
		Total Fireline		
Total miles fireline	17.5	43	30	90.5
Mean income/mile	290.90	335.10	340	321.90
Mean cost/mile	777.90	861.80	600.20	746.60
Profit/loss per mile	-487.00	-526.70	-260.20	-424.60

Table 3—Personnel labor summary for silvicultural burning in NC by geographic region

	Coastal Plain	Piedmont	Mountains	Statewide
Total # of burns	21	34	21	76
Total acres burned	1829	1493	610	3932
Mean acres/burn	87	44	29	51.7
Mean labor hrs/ac	0.62	1.06	8.13	3.78
Mean income/ac	8.75	9.87	10.48	12.62
Mean costs/ac	7.63	16.01	35.98	19.87
Profit/loss per acre	9.88	-6.13	-25.50	-7.25

Table 4—Fireline summary statistics for silvicultural burning in NC by geographic region

	Coastal Plain	Piedmont	Mountains	Statewide
		Line construction		
Mean cost/mile	504.85	532.94	487.23	513.26
Profit/loss per mile	-333	-331	-228	-304
		Line patrolling		
Hrs. patrolling	9	51	8	68
Mean costs/mile	38.32	139.46	38.28	87.18
Profit/loss per mile	28.35	-64.51	28.39	-13.10
		Total Fireline		
Total miles fireline	18	31.50	18	67.50
Mean income/mile	325.56	271.11	325.55	282.96
Mean cost/mile	525.55	672.42	525.55	600.44
Profit/loss per mile	-200	-401.3	-199.9	-317.48