Cost of conducting prescribed burns in the Great Plains

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INTRODUCTION

Fires set by Native Americans were historically important in the development of Great Plains vegetation and wildlife. As in the past, prescribed fire is still an important process needed for managing the lands of the Great Plains. Prescribed fire has been found to be significantly cheaper than herbicide and mechanical treatments for managing rangeland.

While there are numerous economic benefits to using prescribed fire, very little up-to-date work has been done on the actual cost of applying fire to the land. Treatment cost is important when making land management decisions, especially for treatments that will need to be repeated.

Many prescribed fire cost studies are from forested regions of the country and on public lands, which tend to have higher costs. For example, one recent study from the southeastern forests reported $31.92 per acre costs, while $26.30 per acre was reported from a public land prescribed fire cost summary.

METHODS

Prescribed burn professionals in the Great Plains were surveyed to ascertain their costs of burning and to identify factors that affected the cost.

RESULTS

The following information is from the Great Plains based on burns conducted from 2016-2020. The majority of the fuel types in this study were grasslands 72%, followed by forests 20%, and wetlands 6%. Burn costs in this study were reported by federal and state agencies, nongovernmental organizations and private landowners. The agencies had the largest range in costs, which would be expected. Over half (52%) of the people reporting were private landowner members of a prescribed burn association (PBA) and 62% reported they conducted the burn themselves. Cost share funds from an agency was used to support burning 32% of the time by landowners. The average age of those reporting was just over 55 years old. Written burn plans were used by 92% of the respondents.

Figure 1. Rangeland prescribed fire costs have been less well documented despite the frequency of prescribed burning in grasslands.

Average reported cost was $11.37/acre, and average burn size was 257 acres. Costs were broken down into six categories (Table 1). Firebreak construction was the single highest reported cost at 38% of the total. Mowed firebreaks were the most frequently used type of firebreak (Table 2).

Labor averaged about 29% of the total cost, followed by 15% for fuel, 10% for food, 3% for contractors, and 6% for other costs.
Benefits of PBA membership were revealed, with members reporting an average savings of $5.50/acre, or about 48% of average burn costs (Table 1). The equipment and labor sharing practices of PBAs can greatly reduce prescribed burning costs for its members.

Table 1. Average five-year per acre prescribed burning costs in the Southern Great Plains were calculated by category and PBA membership for an average burn unit size of 257 acres. Average cost/acre was $11.37. PBA members reported costs of about half the average ($5.87/acre), supporting reduced costs as a key benefit of PBA membership.

Component	Percent of Cost	Cost/Acre
Labor	28.67%	$3.26
Contractor	3.41%	$0.39
Fuel Provision	14.51%	$1.65
Food Provision	10.01%	$1.14
Firebreak Install	37.67%	$4.28
Other Costs	5.72%	$0.65
Average Total cost/acre		**$11.37**
48% Discount for PBA Membership		-$5.50
Average Total cost/acre PBA Member		**$5.87**

CONSIDERATIONS AND MANAGEMENT IMPLICATIONS

Size of the burn unit affected costs/acre, with a 1% increase in burn unit size reducing costs/acre by 1%. This relationship between burn unit size and cost/acre held true for burn units up to 5,000 acres.

For example: A landowner is planning to burn 160 acres or a quarter section, at a potential cost of $2,400.00 or $15.00/acre. If the landowner either owned or convinced the adjoining neighbors to burn the other three quarters of the 640-acre section there would be a significant decrease in cost due to the economy of scale.

The largest cost is firebreaks, for 160-acre quarter section there is 2 miles of firebreak, but if the entire 640-acre section was burned one would only need 4 miles of firebreak. So, burn acres would increase by 75%, while firebreak distance only increased by 50%. This is a significant reduction in total burn cost. Fuel cost would also only increase 50%, while labor, food, and other costs would only increase about 25% each.

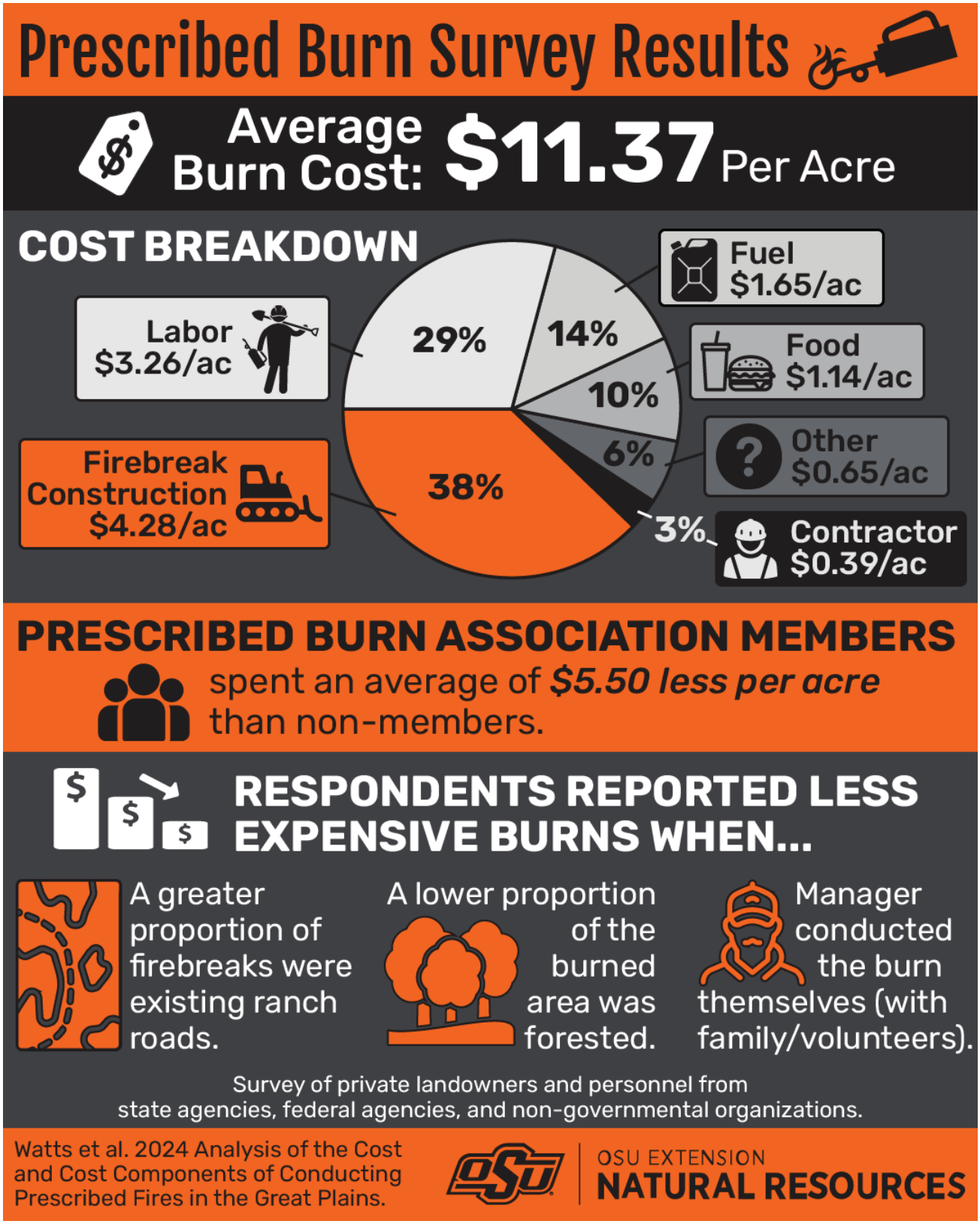
Now the 160-acre burn that was going to cost $2,400 or $15/acre is 75% larger will only cost at total of $3,312.00 or $5.18/acre to conduct (see Table 2). Also, remember that if a landowner is a PBA member the cost could also be reduced up to 48%. This shows the importance of scale of economics when planning prescribed burns in the Great Plains, along with all the other added benefits, such as reduction of woody plants and increased stocker cattle gains.

Table 2. Mowed lines and existing roads were the most frequently used firebreaks.

Firebreak Type	Respondent Use
Mowed	38%
Existing Roads	21%
Disked	18%
Dozed/Bladed	13%
Natural Barriers	12%

Table 3. Increasing burn unit acres can significantly reduce the cost of conducting a prescribed burn due to economies of scale.

	160 Acres		640 Acres	
Component	Percent of Cost	Cost	Percent Increase in Cost	Cost
Firebreak Install	38%	$912	50%	$1368
Labor	29%	$696	25%	$870
Fuel Provision	15%	$336	50%	$504
Food Provision	10%	$240	25%	$300
Other Costs	9%	$216	25%	$270
Total cost/Burn Unit		**$2400**		**$3312**
Total cost/acre		**$10**		**$5.18**



Adapted from:
Watts, M, Russell A, Adhifari S, Weir J, Joshi O. 2024. Analysis of the cost and cost components of conducting prescribed fires in the Great Plains. Rangeland Ecology and Management 92:146-153.

Credits:
John Weir: Figure 1, Tables 1, 2, 3
Allison Thompson: infographic

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