Forest Fuel Reduction Survey Analysis: Forest Administrators

by

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March 2006

Louisiana Forest Products Development Center
Working Paper # 73

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ABSTRACT

Recent wild fires in various states have led foresters/firefighters/land managers to seriously investigate and execute the methods required to carry out a successful fuel reduction project. A survey was mailed to target these types of individuals nationwide. The analysis resulted in classifying mechanical and burn only operations based on the nature of projects

INTRODUCTION

Because of the resurging problem with wildfires, foresters and other land managers in nearly every state have begun forest operations wherein fuel reduction is a primary management objective. Literature on this wave of activity, begun mostly since 2000, is just now becoming common. To obtain a better concept of the extent and nature of forest fuel reduction activities in the nation, a survey of foresters and similar administrators was conducted.

Through the results of the survey, it was anticipated that a better overview of the topic can be obtained. Currently, there are several reports on specific fuel reduction projects (Hungry Creek Project by Lasaux et.al , Brown Darby Fuel Reduction Project, Grandview Ridge by Lewis et.al, Applegate Fire Plan Project and others) and summary publications on commercial mechanical equipment available for fuel reduction activities (Windell and Bradshaw 2000; Ryans and Cormier 1994). There is a need for a publication that provides an overview of the localities, types and effects of recent and current fuel reduction activities. Such a publication will increase the general knowledge about fuel reduction projects, provide a basis for mutual contacts, and reduce duplication of effort.

Fuel Reduction Survey

A survey of Forest Administrators/Fire Chiefs and other administrators who would probably over see fuel reduction projects was conducted in 2004. For each state, information was gathered to determine the best contacts for forest fuel reduction projects. The information was gathered through web sites, email, and through direct telephone contact. All persons contacted were employees of public agencies, especially the U.S. Forest Service and the state forestry agencies. Over 600 individuals were contacted.

Questionnaire

The questions were designed to address a fuel reduction project which had been completed lately or was in progress. Some questions asked about the project details such as the area treated, topography, type of machines used, and cost or revenue to treat an acre. Other questions were of a more general nature, such as fuel reduction awareness among communities and local citizens' actions. Contact information of the respondent was asked, but the information may be made available only if the respondent agrees to it. The last section of questionnaire addresses the demographics of the respondent; this information will be useful in the future in assessing demographic changes in the profession.

Verification of the Questionnaire

The questionnaire was reviewed by several personnel knowledgeable in this particular field, and changes were made accordingly. The first questionnaires were sent to a random sample of thirty addressees. They were asked to critique the questionnaires. Changes were made accordingly before the other addressees were contacted, but the changes were very minor.

Mailing

Post cards were mailed to the addressees to create awareness of the survey and its importance. A week later the survey was mailed to them. A reminder post card was mailed one week later. A second mailing was done after 3 weeks to the non respondents. There is a body of literature that suggests that people who do not respond to survey have characteristics similar to those who respond to second mailing. Responses to the two mailings were kept segregated.

Survey Results

Approximately 197 people responded to the survey out of the 681 mails outs. Responses to first mail out were 20 % and to the second mail out was 12%, the net response rate being 31 %. Respondents were 84% male and 16% females with age range 25-66. Among these about 20% had some college education, 57% were college graduates and 17% had graduate degrees. Their primary occupations were District Rangers, FMO, Foresters and Firefighters. Among the respondents, about 65% were employed with the USDA, 18% were with US BLM and the remaining 14% were with state forestry agencies. The results from the respondents were classified in to two groups the first being mechanical fuel reduction projects, where machinery were used to carry out the complete operation, the other was classified as prescribed burn projects only, where the entire fuel reduction was carried out with a controlled burn .

Mechanical Operations

Approximately 151 projects were categorized as mechanical operations, as they used techniques such as hand piling, forestry mulchers or logging equipments followed by a burn. The majority of the projects were carried out on government owned lands which were in the wildland-urban interface area. The topography for the majority of the projects was moderate, which had a gradient between 10-35 %. Fig. 1 indicates the fuel conditions based on the projects, heavy ladder fuel and dense small dia conifer stands dominate the conditions in the bar chart. The number of acres for these projects ranged from a minimum of 5 acres/project to a max of 12,325 acres/project. The projected time for completion ranged from a single day to 2,555 days using a mean of 5.5 (SD=8.3) administrative personnel and a mean of 21.6 (SD=31) operational personnel.

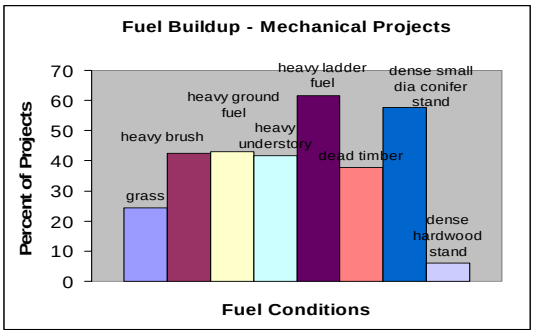

Figure 1

Cost /revenue:

Responses indicated that some projects were carried out based on the funds from grants by USFS and other agencies. Some projects cost and revenue went to the government. Other projects

indicated the use of firewood to landowners. In general, the cost to land owner was $ 390 (SD=574) and the revenue to the land owner was $ 108 (SD=350). Also majority of the projects had some of the products marketed for logs, paper chips and landscape mulch (Fig 2)

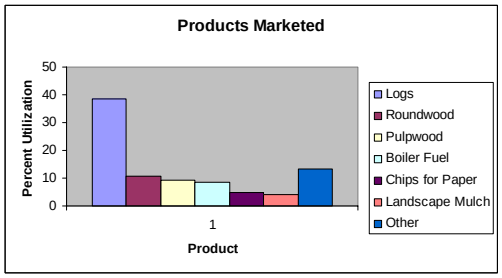

Figure 2

Fuel Reduction Machinery:
Chain saws, skidders, in-woods chippers and feller bunchers were among the popular machinery (Fig 3). The machines classified under category other were dozers, skyline cable yarders and helicopters.

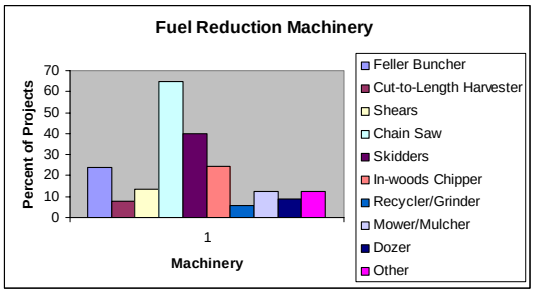

Figure 3

Time before pretreatment:
To get a concept of the perceived effectiveness of the fuel reduction treatments, we asked the respondents to estimate the amount of time until the treatment will need to be repeated. Majority of the projects carried out were estimated that it would take more than 7 years to do the same kind of fuel reduction work carried out. A few projects were classified to take about 2-7 years and less than 5% required no treatment at all.

Problems associated with operations:
Administrative, cost finding market for the materials were the top three problems which were ranked high based on the projects. Weather conditions also play an important role for any given project as illustrated (Fig 4). Some of the common problems found under the category other were related to computer problems, social acceptance, social values, limited work force, NEPA, contractors who did not assess the area's before bidding, land owner concerns, litigations environmental concerns and no funds after the site was treated.

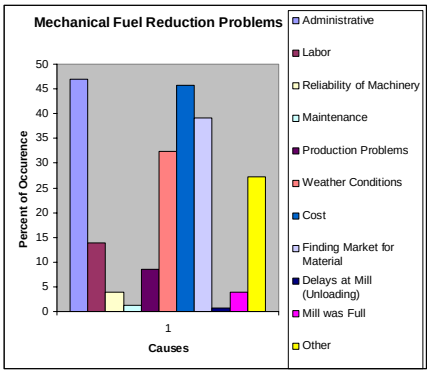

Figure 4

Burn only operations:

About 46 projects were categorized as burn only operations where prescribed burn was the major operation carried out to reduce the fuel build up.

The majority of the projects were carried out on government owned lands which were in the wildland-urban interface area. The topography for the majority of the projects was moderate, which had a gradient of 10-35 %. Fig 5 indicates the fuel conditions based on the projects, heavy ground fuel conditions with grass and heavy brush dominate the conditions in the bar chart. The number of acres for these projects ranged from a minimum of 5 acres/project to a max of 46000 acres/project. The projected time for completion ranged from a single day to 62 days with a mean of 4.13 administrative personnel and a mean of 22.95 operational personnel.

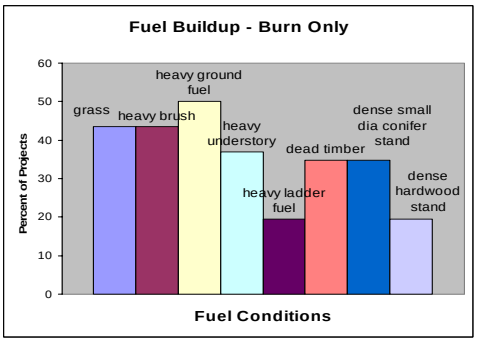

Figure 5

Cost:

The cost to run the burn operation per acre had a mean of $ 104.86 with min and max ranging from 0 to 1000 dollars per acre. 5 % reported a cost of $ 0 per acre, but no information was available whether a project was carried out free of cost to the land owner or whether some of the projects were actually funded by other agencies.

Prescribed Burn Machinery:

Chain saws were used in majority of the projects and the common equipments listed under the category other were helicopters. drip torches, trucks, ATV's and dozers.

Time before retreatment:

Majority of the projects did require to be treated again based on the geographic locations, the time frame (Fig 6) varied from 2 – 7 years before any kind of treatment was necessary. A few projects which accounted for less than 5 % required no treatment at all.

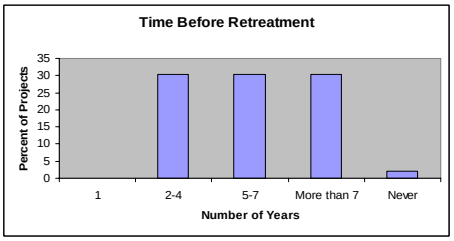

Figure 6

Problems associated with operations:
Weather conditions seemed to play a very important role which had a major effect on almost 70 % of the projects and the remaining dominating categories were due to administrative and other to name a few. Common problems under category "other" were due to smoke management, politics, funding, public understanding, tourist trade impacted and NEPA.

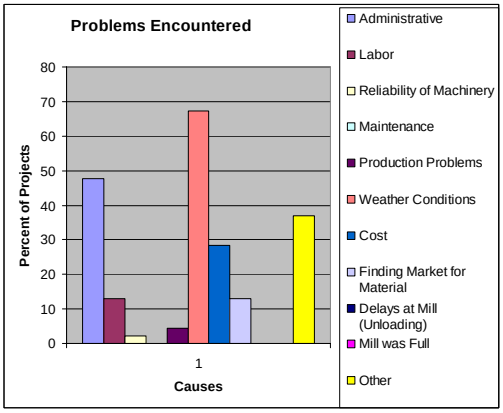

Figure 7

Combined Analysis:
This section of the survey was to seek answers to general questions whether the project was through mechanical operation or prescribed burn only operation. Typical questions included if projects can be carried out with available equipment or if there was a need to design a totally new machine, 72 % of the respondents felt that projects can be carried out with existing machines and some of the existing machines can be modified to suit the conditions. A few respondents felt newer designs were necessary as conventional machinery could not be really used in steep slopes, compact chippers which can be cabled to the work site were necessary at very steep conditions and compact machines that can keep tree spacing with out damaging them.

Educational awareness among citizens and their active involvement in fuel reduction programs play a significant role in any given situation. A few questions were targeted on awareness programs available to citizens, steps they can take to contribute to fuel reduction programs with a probable use of existing agricultural machines than investing on special machinery.
Approximately 59 % of the respondents indicated that there were educational programs, including, Firewise Programs, Firesafe council, awareness programs promoted through schools and public meetings. 55% indicated that there was substantial citizen involvement on fuel reduction projects, much of those were from land owners adjacent to forest lands.
A few comments from the forest administrators to citizens stressed on the importance of landowners to take the initiative and create defensible space around their homes and property. Possible grants through the Firewise and Fire Safe programs to execute fuel reduction around their homes and community and the advantages of state sponsored programs. Ask local firefighters or forest service personnel about what can be done to protect their homes.

About 32 % indicated that there was reluctance on the part of landowners to allow fuel reduction machinery on their property. Some comments included that they didn't want trees cut or land disturbed because of invasion of privacy, damage to residual vegetation, effects on wildlife, dust and erosion.
Approximately 33 % of the respondents had come across reports relating to fuel reduction and the most common were from National Fire Plan Operations Reporting System, NFPORS (www.NFPORS.gov), Forest Service Fuel Reduction Reports and National Fire Plan website. (NFP)

DISCUSSION

Although the intention of this survey was to describe mechanical fuel reduction operations, many of the respondents described fuel reduction operations wherein only prescribed burning was conducted. A comparison of the two types of operations turned out to be interesting.

A comparison of the types of fuel reduction operations by fuel buildup type revealed that the mechanical operations (Fig 1) tended to be used more where there are conditions of heavy ladder fuels and dense small-diameter conifer stands. By contrast, burn-only operations (Fig 5) tended to be used more commonly where grass and heavy ground fuels were common.
The mechanical and burn-only operations contrasted dramatically in size. Burn-only operations were three times larger, and yet they were performed in a small fraction of the time (Table 1).

Table 1

	Mechanical		Burn-Only	
	Acres	Days	Acres	Days
Mean	1,396	248	3,180	12
Min	5	1	5	1
Max	12,325	2,555	46,000	62

While mechanical operations often had a revenue stream to offset costs to landowner, the revenues were not sufficient to overcome the costs (on average Table 2). Most of the really costly mechanical operations (over $1,000 per acre) had very little offsetting revenues (often less than $100 per acre).

Table 2

	Mechanical		Burn-Only	
	Revenue	Cost	Revenue	Cost
Mean	$108 (n=28)	$390 (n=100)		$105 (n=36)
Min	0 (n=101)	0 (n=48)		0 (n=9)
Max	$3,000	$4,000		$1,000

CONCLUSION

This survey represents an over view of the important factors involved in carrying out a mechanical operations and burn only operations based on the type of operation which is necessary. A comparison between any mechanical operations or any burn only operations is difficult as projects are unique based on the fuel conditions , topography, man power , machinery used, funds available etc. Based on the responses it was decided to separate mechanical reductions and burn only operations to better understand these operations.

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Survey on Forest Fuel Reduction

Form: Foresters/Fire Chiefs/Administrators, etc.

Section I

1. Have you worked on a fuel reduction project? (Please circle only one).

    1. NO
    2. YES ⟶

    If YES, how many projects have you worked on? _____

Please answer the following questions with respect to **the latest project** carried out or in progress.

If you are not knowledgeable about any projects, please go to Question 11 on Page 2.

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1. Project Name: _____

2. State where project took/is taking place _____

3. County/Parish where project took/is taking place_____

4. Approximate Location _____ (E.g. 20 Miles NE of Baton Rouge)

5. The project area was (is):--(Please circle one response).

    1. Government owned land
    2. Private industrial land
    3. Non-Industrial Private land

6. The project area was (is):--(Please circle one response).

    1. Strictly Rural
    2. Wildland-urban interface
    3. Other (please specify)_____

7. Describe the fuel build up and topography in this project. *(Please check all that apply)*

a. Fuel Buildup:	b. Topography:
____ grass	_____flat (< 10%)
____ heavy brush	_____moderate (10-35 %)
____ heavy ground fuel	_____steep(> 35 %)
____ heavy understory	
____ heavy ladder fuel	
____ dead timber	
____ dense small diameter conifer stand	
____ dense hardwood stand	

c. Additional description:

8. Please *estimate* the number of treated acres in this project when completed_____.

9. Projected time required to carry out the complete operation: Operational days: _____

10. How many persons were required to conduct the project?

a. Administrative ____ (*Number of personnel substantially involved)*

b. Operational ____ (*Number of personnel substantially involved, including contractors & employees)*

11. Please estimate the cost and revenue to treat per acre?

a. Cost to land owner, please indicate cost in $_____/ acre.

b. Revenue to land owner, please indicate revenue in $_____ / acre.

c. Free, any comments _____

12. What types of machinery were (are) used? (Please indicate only operational equipment, do not include spare equipment*)*

Machinery	**Quantity**
Feller Bunchers	
Cut-to-Length-Harvesters	
Shears	
Chain Saws	
Skidders.	
In-woods Chipper.	

Machinery	**Quantity**	**Make**	**Model**	**Year**
Recycler/Grinder				
Mower/Mulcher				
Mower/Mulcher				

Other →

13. Please estimate the fuel residue that will be/was marketed or left on the site.

    a. _____ (%) Marketed

    b. _____ (%) Left on Site

    If Marketed: (*Please check all applicable categories and if known indicate the revenue in dollars)*

    ___ Logs typical revenue $_____/ ton.
    ___ Roundwood typical revenue $_____/ ton.
    ___ Pulpwood typical revenue $_____/ ton.
    ___ Boiler Fuel typical revenue $_____/ ton.
    ___ Chips for paper typical revenue $_____/ ton.
    ___ Landscape Mulch typical revenue $_____/ ton.
    ___ Other._____ typical revenue $_____/ ton.

    If left on Site:

    ____ Gathered & burned
    ____ Left as is
    ____ Scattered

14. After the site has been treated, estimate the time period for re-treatment. (Please circle one response).

    a. Never
    b. 1 Year
    c. 2-4 Years
    d. 5-7 Years
    e. More than 7 years

15. Do you think fuel reduction projects can be carried out with existing machines available in the market? (Please circle one response).

    a. Yes
    b. No → If NO, can you suggest modifications to existing machines?

    _____
    _____
    _____

16. Is there a need for the design of a totally new machine for fuel reduction? (Please circle one response).

    a. Yes → If YES, can you suggest new designs?
    b. No

    _____

_____

_____

17. What were the major problems you have encountered in carrying out a fuel reduction project? *(Check all that apply)*

_____ Administrative
_____ Labor
_____ Reliability of Machinery
_____ Maintenance
_____ Production problems
_____Weather conditions
_____ Cost
_____ Finding markets for material
_____ Delays at the mill due to unloading
_____ Mill was full (Quotas)
_____ Other (Please specify)_____

18. Are you aware of educational programs in your state (or region) to promote awareness on forest fuel reduction? (Please circle one response).

a. Yes
b. No
c. Don't Know

d. If Yes, please briefly describe the program(s):

_____

_____

_____

19. Have you noticed any reluctance on the part of landowners to allow fuel reduction machinery on their property? (Please circle one response).

a. Yes
b. No

c. If Yes, please indicate reasons:

_____

_____

_____

20. Are there any fuel reduction projects in your state/region, which have substantial citizen involvement? (Please circle one response).

a. Yes
b. No
c. Don't Know

d. If Yes, please identify or describe:

_____

_____

_____

21. What steps can be taken by citizens to carry out fuel reduction projects (If different from above)?

22. Do you believe that agricultural tractors with special attachments be used to keep a neighborhood risk free from fires? (Please circle one response).

a. Yes
b. No
c. Don't Know

d. If YES, please name a few machines or attachments.
1._____

2._____

3._____

23. Are you aware of any fuel reduction project reports? (Please circle one response).

a. Yes
b. No

c. If Yes: Please name the reports.
1._____

2._____

3._____

4._____

24. If you would like to receive a FREE copy of our report from this study, please indicate your contact details, (or attach your business card).

Name : _____

Title: _____

Company:_____

Address: _____

City/Town: _____

State / Zip: _____

Phone: _____

Fax: _____

Email: _____

In our report, we plan to have a list of people knowledgeable of fuel reduction projects/topics. We also plan to post this report on our website. Do you wish to have your name and contact information included in the list? (please circle one)

1. Yes 2. No

25. Please provide the contact information of contractors in your area who specialize in fuel reduction jobs so that we may contact them to participate in this study.

Name:_____ Phone :_____

Name:_____ Phone :_____

Name:_____ Phone :_____

SECTION II
PLEASE TELL US MORE ABOUT YOURSELF.

If you feel uncomfortable answering the questions in this section please complete the first part of the survey and return it. This information will be kept completely confidential to the extent allowed by law and only summary results will be reported in study results.

1. Gender: _____ Female, _____ Male.

2. Your age:
   a. ___ < 25 years.
   b. ___ 26 -35 years
   c. ___ 36-45 years.
   d. ___ 46-55 years.
   e. ___ 56-65 years.
   f. ___ > 65 years.

3. Your ethnic group:
   a. ____Caucasian b. ___Asian or Pacific Islander c. ____ African-American
   d.____Hispanic e. ___ Native American (Indian, Eskimo) f. ____ other

4. Education Details :
   a.____Some High School or less
   b.____ High School Graduate or equivalent
   c.____ Some College
   d.____ College Graduate (B.A. /B.S.)
   e.____ Graduate degree (M.S./PhD.)

5. Please indicate the type of area you currently reside,
   a. ___ Very Large City (1,000,000 or more)
   b. ___ Large City (250,000 to 999,999 population)
   c. ___ Medium-sized City (50,000 to 250,000 population).
   d. ___ Small city (10,000 to 50,000 population)
   e. ___ Very Small City, Town, or village (2,500 to 9,999 population)
   f. ___ In a Rural area (population less than 2,500)
   g. ___ Not Sure.

6. What is your primary occupation? _____

7. Who is your primary employer?
   a. ____ USDA Forest Service
   b. ____ U.S. BLM
   c. ____ Other federal government
   d. ____ State forestry agency
   e. ____ Other state agency
   f. ____ Local government
   g. ____ Industry
   h. ____ Self Employed
   i. ____ Other_____

End of Survey

*Please return this survey by enclosing it in the **postage paid envelope**. Your valuable response will be an input to our study. Thank you for your time and sharing your knowledge in completing this survey.*

If you have any questions regarding this survey please contact Corniels de Hoop, Associate Professor or Amith.H.Reddy, Grad Research Assistant, School Of Renewable Natural Resources, LSU AgCenter, Baton Rouge, LA 70803-6202, Ph: (225) 578 4242, (225) 578 3819, Fax: (225) 578 4251, email: fuel@lsu.edu