

A STUDY OF WILDLAND FIRE COMMUNICATIONS IN THE UNITED STATES

A Thesis

Presented in Partial Fulfillment of the Requirements for

the Degree Master of Science in the

Graduate School of The Ohio State University

By

Kevin P. Clute, B.E.S.

The Ohio State University
2000

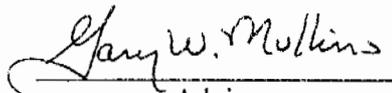
Approved by

Master's Examination Committee:

Dr. Gary W. Mullins, Adviser

Dr. Emmalou Norland

Dr. David M. Hix



Adviser

School of Natural Resources

*Copyright by
Kevin P. Clute
2000*

ABSTRACT

For those natural resource management organizations charged with communicating about wildland fire, the public's perception of the risks associated with fire and its deeply-rooted belief that 'fire is bad' poses an immense communications challenge.

This study explores the current state of wildland fire communications in the United States from the perspective of wildland fire communicators. At the outset, it seeks to identify the knowledge, attitudes, skills, and backgrounds of a population of natural resource professionals with wildland fire communication responsibilities. It then queries both the opportunities and barriers they perceive in the course of conducting their day-to-day responsibilities. Utilizing this information as background, the usefulness of the National Wildfire Coordinating Group's wildland fire message themes is explored.

The data for the project were obtained from 321 responses to a 13-page questionnaire completed by natural resources professionals working in governmental and non-governmental organizations. The questionnaire was developed utilizing the results of an e-mail administered Delphi instrument and needs assessment of thirteen wildland fire communicators. It also drew upon relevant themes identified in the literature. Concepts of social marketing were used as a reporting framework in the data analysis phase.

Results of both the Delphi process and questionnaire showed that respondents have a relatively high perception of their knowledge and skills with respect to the organization for which they work, its mission or mandate, and its role in the wildland fire management. Respondents' lowest perceived knowledge and skill levels related to communications activities, such as identifying target audiences, developing communication plans and products, and using evaluative feedback. Generally, participants perceived more opportunities than barriers to their wildland fire

communication efforts. Significant barriers identified were the lack of sufficient resources and inadequate planning to meet future needs.

Recognizing that the public has limited knowledge of wildland fire, the need for improved and better coordinated messaging – highlighting that wildland fire provides substantial benefits – was stressed. Respondents also preferred a single national wildland fire message with regionally focused and developed subcomponents.

ACKNOWLEDGMENTS

I would like to extend my sincere appreciation to the three distinguished members of my thesis committee – Dr. Gary W. Mullins, Dr. Emmalou Norland, and Dr. David M. Hix – for their support, encouragement, guidance, and patience. Each one in his or her own way made positive contributions to this project.

My thanks also go to my graduate student colleagues at The Ohio State University School of Natural Resources for their assistance, helpful suggestions, and constructive criticism – specifically to Sunita Hilton and Brad Welch for helping to prepare the advance mailings; to Laura Anderson, Claudia Figueiredo, Cindy Somers-Griffin, Kate Wiltz, and Gina Zwerling for their valued input on questionnaire construction; and, to Kye-Joong Cho, Sara Keller, and Danielle Ross for assisting with the preparation of the hundreds of questionnaires.

I would also like to extend my thanks to the School of Natural Resources and the GradRoots MiniGrant Committee for their financial support of this research project.

To my family – Peter, Bev, and Craig Clute – and to Lee Pauzé, for their love and support, I am very grateful.

Finally, I would like to thank all the anonymous wildland fire communicators who took time out of their busy schedules to provide the information upon which this project was based. Without their participation this undertaking would not have been possible.

VITA

- 1975.....Born – Syracuse, New York
- 1998.....Bachelor of Environmental Studies (Geography)
University of Waterloo
Waterloo, Ontario
- 1998 – 2000Graduate Teaching Associate
and Graduate Research Associate
The Ohio State University
Columbus, Ohio

PUBLICATIONS

- Clute, K.P. (2000). The perceptions and attitudes of wildland fire. *Wildland Fire Communicator's Guide*. Boise, ID: National Interagency Fire Center.
- Clute, K.P., G.W. Mullins, and P. Durland (2000). Communicating Wildland Fire: What Interpreters Need to Know. *National Interpreters Workshop 2000 Sourcebook*. Fort Collins, CO: National Association for Interpretation.
- Clute, K.P., and L.E. Anderson, and G.W. Mullins (2000). A National Survey of Communication Needs in Wildland Fire Management. *National Interpreters Workshop 2000 Sourcebook*. Fort Collins, CO: National Association for Interpretation.

FIELD OF STUDY

Major Field: Natural Resources

TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGMENTS	iv
VITA.....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES	ix
LIST OF FIGURES	xi
CHAPTER 1	1
INTRODUCTION	1
1.1 Study Context	1
1.2 Background	2
1.3 Recognition of Research Need	5
1.3.1 Government	5
1.3.2 Research Community	6
1.3.3 The Public.....	8
1.4 Study Purpose and Objectives.....	8
1.5 Assumption.....	9
CHAPTER 2.....	10
LITERATURE REVIEW	10
2.1 Wildland Fire and its Communication	10
2.1.1 Fire Suppression in the 20 th Century.....	10
2.1.2 The Negative Effects of Suppression and The Re-introduction of Fire	12
2.1.3 Wildland Fire Communicators	13
2.1.4 Public Knowledge, Attitudes, and Barriers.....	15
2.1.4.1 Public Knowledge and Attitudes Regarding Wildland Fire.....	15
2.1.4.2 Barriers to Wildland Fire Acceptance.....	20
2.2 Methodology Literature.....	21
2.2.1 The Delphi Method.....	21
2.2.1.1 Purpose	21
2.2.1.2 Implementation	22
2.2.1.3 Key Characteristics	22
2.2.1.4 Selection of Panel of Experts.....	23
2.2.1.5 Advantages of Delphi Use	24
2.2.2 Needs Assessment	24
2.2.2.1 Purpose	24
2.2.2.2 Key Characteristics	25
2.2.2.3 Implementation	26
2.2.3 Social Marketing.....	29
2.2.3.1 Purpose	29

2.2.3.2	History	29
2.2.3.3	Key Characteristics of Social Marketing	30
2.2.3.4	Implementation	33
2.2.4	Mail Surveys.....	36
2.3	Application	37
CHAPTER 3		38
METHODOLOGY		38
3.1	Introduction to the Research Design	38
3.2	Research Phase 1: The Delphi Method	38
3.2.1	Participant Selection	39
3.2.2	The Approach	41
3.2.3	Implementation.....	42
3.2.4	Data Analysis.....	44
3.3	Research Phase 2: The Quantitative Questionnaire.....	44
3.3.1	Participant Selection and Search Methods.....	44
3.3.2	Questionnaire Construction	46
3.3.3	Questionnaire Testing	47
3.3.4	Implementing the Questionnaire.....	49
3.3.5	Data Analysis.....	49
3.4	Methodological Limitations	51
3.5	Instrument Validity and Reliability	51
CHAPTER 4.....		53
RESULTS		53
4.1	Research Phase 1: The Delphi.....	53
4.1.1	Round 1	53
4.1.2	Round 2	57
4.1.3	Round 3	61
4.2	Research Phase 2: The Quantitative Questionnaire.....	64
4.2.1	Demographics.....	64
4.2.1.1	Gender.....	65
4.2.1.2	Age.....	65
4.2.1.3	Educational Background.....	65
4.2.1.4	Employment.....	66
4.2.1.5	Experience with Wildland Fire and its Communication	67
4.2.2	Perceived Knowledge	72
4.2.2.1	Overall Perceived Knowledge	73
4.2.2.2	Perceived Knowledge By Social Marketing Ps	74
4.2.2.3	Perceived Knowledge By Region	75
4.2.2.4	Perceived Knowledge By Organization	77
4.2.3	Attitudes	79
4.2.3.1	Overall Attitudes.....	79
4.2.3.2	Attitudes By Social Marketing Ps.....	81
4.2.3.3	Attitudes By Region.....	82
4.2.3.4	Attitudes By Organization	83
4.2.4	Perceived Skill.....	85
4.2.4.1	Overall Perceived Skill	85
4.2.4.2	Perceived Skill By Social Marketing Ps	86
4.2.4.3	Perceived Skill By Region.....	87
4.2.4.4	Perceived Skill By Organization.....	88

4.2.5	Barriers/Opportunities	90
4.2.5.1	Overall Barriers/Opportunities.....	90
4.2.5.2	Barriers/Opportunities By Social Marketing Ps.....	91
4.2.5.3	Barriers/Opportunities By Region	92
4.2.5.4	Barriers/Opportunities By Organization	93
4.2.6	Relationships	95
4.2.7	National Wildfire Coordinating Group Messages	96
CHAPTER 5		102
DISCUSSION		102
5.1	Discussion of Findings by Study Objectives.....	103
5.1.1	Objective 1.....	103
5.1.2	Objective 2.....	104
5.1.3	Objective 3.....	105
5.1.4	Objective 4.....	106
5.1.5	Objective 5.....	107
5.1.6	Objective 6.....	107
5.1.7	Objective 7.....	108
5.1.7.1	Producer.....	108
5.1.7.2	Purchasers.....	112
5.1.7.3	Product.....	113
5.1.7.4	Place.....	115
5.1.7.5	Price.....	116
5.1.7.6	Promotion	117
5.1.7.7	Probing.....	118
5.2	Research Methodology and Structure	119
5.3	Conclusions	120
5.4	Recommendations for Wildland Fire Organizations.....	121
5.5	Recommendations for Future Research.....	122
LITERATURE CITED		124
APPENDICES.....		134
	Appendix A: Glossary	135
	Appendix B: Invitation to Participate in Delphi.....	138
	Appendix C: Example of Delphi Round	140
	Appendix D: Invitation to Participate in Questionnaire Pilot Test.....	143
	Appendix E: Questionnaire Development Matrix	145
	Appendix F: Letter Accompanying Questionnaire.....	153
	Appendix G: Questionnaire.....	155
	Appendix H: Request to Complete Questionnaire	171
	Appendix I: Postcard Reminder to Complete Questionnaire	173
	Appendix J: Final Postcard Reminder to Complete Questionnaire.....	175
	Appendix K: Response Rate by State and Region	177
	Appendix L: Perceived Knowledge Ranked by Mean	179
	Appendix M: Attitudes Ranked by Mean.....	182
	Appendix N: Perceived Skills Ranked by Mean	185
	Appendix O: Barriers/Opportunities Ranked by Mean	188

LIST OF TABLES

Table 2.1: Characteristics of the Organization-Centered and the Customer-Centered Marketing Mindset	31
Table 2.2: Marketing Mnemonics	32
Table 3.1: Delphi Participants by State/District	40
Table 3.2: Delphi Participants by Organization	41
Table 3.3: Delphi Rounds and Topics	42
Table 3.4: Timeline for Delphi Implementation.....	43
Table 3.5: Questionnaire Construction Summary	48
Table 3.6: Correlation Descriptors from Davis (1971).....	50
Table 4.1: Respondents' Employers.....	66
Table 4.2: Respondents' Work with Wildland Fire by Organization.....	67
Table 4.3: Respondents' Work with Wildland Fire Work by Region	68
Table 4.4: Respondents' Work with Wildland Fire Communication by Organization	69
Table 4.5: Respondents' Work with Wildland Fire Communication By Region.....	69
Table 4.6: Respondents' Work with Wildland Fire and Wildland Fire Communication	70
Table 4.7: Respondents' Employment History	71
Table 4.8: Pearson Correlation of Respondents' Years of Service, Work with Wildland Fire, Work with Wildland Fire Communication, Work with Wildland Fire in Current Job, and Work with Wildland Fire Communication in Current Job.....	72
Table 4.9: Respondents' Five Areas of Greatest Perceived Knowledge	73
Table 4.10: Respondents' Five Areas of Least Perceived Knowledge.....	74
Table 4.11: Respondents' Perceived Knowledge About the Social Marketing Ps.....	75
Table 4.12: Regions – Adapted from U.S. Fish and Wildlife Service Regions	76
Table 4.13: Respondents' Perceived Knowledge About the Social Marketing Ps by Region	77
Table 4.14: Respondents' Perceived Knowledge About the Social Marketing Ps by Organization	78
Table 4.15: Respondents' Five Areas of Greatest Agreement	80

Table 4.16: Respondents' Five Areas of Least Agreement	81
Table 4.17: Respondents' Attitudes About the Social Marketing Ps	82
Table 4.18: Respondents' Attitudes About the Social Marketing Ps by Region.....	83
Table 4.19: Respondents' Attitudes About the Social Marketing Ps by Organization	84
Table 4.20: Respondents' Five Areas of Greatest Perceived Skill.....	85
Table 4.21: Respondents' Five Areas of Least Perceived Skill	86
Table 4.22: Respondents' Perceived Skill Based upon the Social Marketing Ps.....	87
Table 4.23: Respondents' Perceived Skill Involving the Social Marketing Ps by Region.....	88
Table 4.24: Respondents' Perceived Skill Involving the Social Marketing Ps by Organization ..	89
Table 4.25: Respondents' Five Greatest Opportunities for Wildland Fire Communication	90
Table 4.26: Respondents' Five Greatest Barriers to Wildland Fire Communication.....	91
Table 4.27: Respondents' Perceptions of Barriers and Opportunities Presented by the Social Marketing Ps	92
Table 4.28: Respondents' Perceptions of Barriers and Opportunities Presented by the Social Marketing Ps by Region.....	93
Table 4.29: Respondents' Perceptions of Barriers and Opportunities Presented by the Social Marketing Ps by Organization	94
Table 4.30: Pearson Correlation among Participants' Perception of Knowledge, Attitude, Skill, and Barrier/Opportunity	95
Table 4.31: Usefulness of National Wildfire Coordinating Group Message Themes.....	97
Table 4.32: Usefulness of National Wildfire Coordinating Group Message Themes by Region .	98
Table 4.33: Usefulness of National Wildfire Coordinating Group Message Themes by Organization.....	99
Table 4.34: Respondents' Preference for Employing National Wildfire Coordinating Group Message Themes	100
Table 4.35: Respondents' Preference for Employing National Wildfire Coordinating Group Message Themes by Region	101
Table 5.1: Time Spent Communicating About Wildland Fire by Position	109
Table 5.2: Array of Wildland Fire Communicators based upon Clute (2000) and Sanyal (1998)	110

LIST OF FIGURES

Figure 1.1: Wildland Fire Communications in the United States (Mullins and Clute, 1999)	2
Figure 2.1: The Levels of Need (Witkin and Altschuld, 1995)	26
Figure 2.2: The Social Marketing Process (Weinreich, 1999)	34

CHAPTER 1

INTRODUCTION

1.1 STUDY CONTEXT

To explore the communication challenges associated with wildland fire in the United States is a sizeable undertaking. For this reason, three distinct studies are planned to comprehensively explore wildland fire communications in the United States. Two are of these are currently underway at The Ohio State University School of Natural Resources with this being the first to be completed.

All three studies have the similar goal of ascertaining how wildland fire management organizations can better communicate wildland fire messages in such a manner as to meet societal needs, address community needs/concerns, gain public support, and comply with organizational mandates, all while utilizing the best science and technology available. However, each study begins by assessing a different stakeholder group (Figure 1.1) based upon Witkin and Altschuld's (1995) three levels of need discussed in Chapter 2 of this document. These groups are:

1. wildland fire communicators who spend a significant amount of time during their paid employment communicating messages to target audiences regarding wildland fire;
2. key management opinion leaders in natural resource organizations primarily responsible for the development of wildland fire management messages in the United States; and,
3. target audiences (or constituents) from across the country that may or may not receive the messages that are being sent regarding wildland fire.

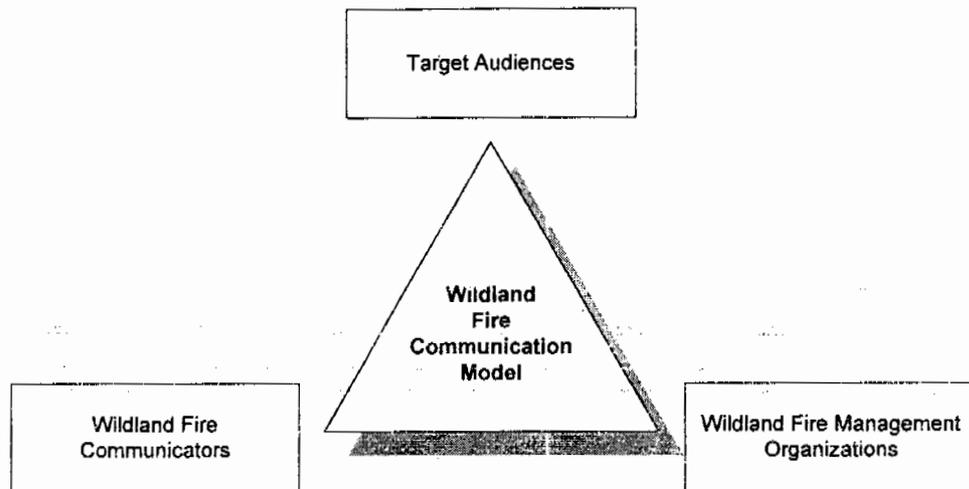


Figure 1.1: Wildland Fire Communications in the United States (Mullins and Clute, 1999)

Each of the projects is of sufficient size to stand alone as an independent initiative. Yet, the combination of the three research efforts within the same overall undertaking is intended to provide the perspective and depth of information necessary for an enhanced understanding of wildland fire communications in the United States.

The remainder of this document describes the first of the three studies. It explores the role of wildland fire communicators in the United States.

1.2 BACKGROUND

Wildland fire occurs naturally in most ecosystems in the United States, and its effects over millions of years have helped to shape these ecosystems. Before extensive human settlement in North America, wildland fire was a natural force that altered ecosystems, much like earthquakes, floods and hurricanes still do today. These disturbances helped to create the complex and diverse biological communities found in many areas of the United States.

However, for over one hundred years, human efforts to exclude, suppress, or change the burn intervals of wildland fire in the United States have become increasingly successful because of technological and communication advances, additional manpower, and greater coordination and allocation of resources. This enormous undertaking has dramatically changed the structure and composition of fire-dependent ecosystems, has increased the amount of combustible materials in many ecosystems, and, has under certain conditions lead to more intense, quicker moving and more destructive fires than historically have occurred (USDI & USDA, 1995; DeBano et al., 1998; Pyne, 1996).

In recent decades, more and more people have moved, and continue to move, into semi-rural or wildland/urban interface locations (Plevel, 2000). Those moving to such areas are often unaware of, or show little concern for, the fire-dependent ecosystem in which they now reside. This lack of understanding, when combined with the often unnaturally high volumes of combustible materials surrounding their homes, has created some very dangerous situations. In such areas, fires can burn more easily, with greater intensity, spread more rapidly, and generally pose a greater risk to residents, resource users, and the resource, per se.

To decrease this risk, fuel loads can be mechanically reduced, but the costs associated with such an approach are often prohibitive. Another alternative is the use of prescribed fire to mimic historically occurring, low-intensity, natural fires. Regardless which method is used, there is often controversy, in spite of the fact that, it is increasingly becoming recognized that in the absence of any action the “trends toward bigger and more costly wildfires continue to accelerate” (Terry, 1997, p.4).

In the United States natural resource management organizations, both public and private, have been entrusted with the responsibility of managing the nation’s ecosystems. The challenges faced by these organizations are often complex given large management areas, limited resources, and sometimes controversial management techniques. The latter is particularly the case with respect to wildland fire management. In order to reduce the risks from natural fuel buildup, the U.S. Department of the Interior and the U.S. Department of Agriculture, for example, are operating on the premise that “wildland fire, as a critical natural process, must be reintroduced

into the ecosystem” (USDI & USDA, 1995, p.iii). This is not an easy task for there are many barriers to such an endeavor – not the least of which is the attitude of the American public.

Americans have long held the deeply ingrained belief that “fire is bad” (Hall, 1972). This negative attitude may have developed because of human’s basic fear of the destructive nature of fire, particularly that which is out of control; the human desire to control the environment, and yet a recognition that often fire cannot be constrained; the concern of fire’s use around valued assets; the fear of fire’s effects upon aesthetics, air quality, and human health (Shelby and Speaker, 1990); the general lack of public understanding and limited firsthand exposure to wildland fire and its effects (Jacobson, 1999); the visual impact of the evening news with its thirty-second video clips of raging fires threatening people and property; the confusion over the effects of prescribed fires and wildland fires generally; and, the perception of conflicting wildland fire management messages of wildland fire prevention and wildland fire introduction.

In all likelihood it is a combination of all or most of these factors that has created America’s negative attitude towards wildland fire. This ‘fire is bad’ belief limits public acceptance of wildland fire activities (Hall, 1972; Jacobson, 1999). The need to address these attitudes and beliefs is what natural resource managers must face head-on if they are successfully to employ prescribed fire in America’s ecosystems.

Yaffee et al. (1996) found that one of the greatest obstacles to natural resource (ecosystem) management was one of “opposition” – “resistance from the general public” (p.31). Fazio and Gilbert (1986) remarked that the public is such an important part of natural resource management that the challenge is “90 percent managing the public and 10 percent managing the resource” (p.3). Similarly, DeBano et al. (1998) suggested that, in order to be effective in obtaining public support for fire management programs in the future, “educational efforts should be oriented to the local conditions and needs” (p.310). Given these realities, many natural resource management organizations are seeking to improve strategies for two-way communication with their audiences. It is hoped such efforts will aid in increasing public support for the reintroduction of wildland fire into fire-dependent ecosystems.

Wildland fire management organizations have entrusted selected individuals within their organizations with the responsibility of transferring wildland fire-related information between the organization and its audience(s). While these individuals often hold very different job titles, collectively they can be called 'wildland fire communicators'. Limited research has been conducted with regard to this group of individuals. The research reported herein seeks to address that deficiency.

1.3 RECOGNITION OF RESEARCH NEED

The need for enhanced communication in the field of wildland fire management has been recognized by a number of different stakeholder groups including federal government agencies, the research community, and the public.

1.3.1 GOVERNMENT

In a report issued in 1995, the U.S. Department of the Interior and U.S. Department of Agriculture stated that "federal agencies must place more emphasis on educating internal and external audiences about how and why we use and manage wildland fire" (USDI & USDA, 1995, p.iv). They commented that the "task before us -- reintroducing fire -- is both urgent and enormous. Conditions on millions of acres of wildlands increase the probability of large, intense fires beyond any scale yet witnessed. These severe fires will in turn increase the risk to humans, to property, and to the land upon which our social and economic well-being is so intimately intertwined" (USDI & USDA, 1995, p.10).

The report went on to recommend that federal agencies:

- "Establish an interdisciplinary team that includes all agencies, regulators, and other partners to design a consistent fire-role and -use message for decision-makers and the public. This message will:
 - Describe and clearly explain issues such as ecosystem condition, risk, consequences (including public health impacts), and costs in open dialogue with internal and external constituents.
 - Be designed to maximize open communications and reduce polarization among conflicting interests regarding the use of fire.

- Build on existing interagency efforts to develop and implement a strategic plan that educates the general public and agency personnel about the role of fire. As part of this effort, agencies will:
 - Develop and widely transmit a clear message about the important role of fire as a natural process and the risks and consequences of its use and exclusion.
 - Integrate this message into existing agency communication systems, agency and partner initiatives (such as forest health, ecosystem management, etc.), and all external outreach efforts, including television, magazines, newspapers, and public meetings.
 - Encourage, create and coordinate partnerships to achieve consistency in messages, build public trust, and obtain public opinion.
 - Develop mandatory national and regional interagency training programs to instill in all employees an understanding of the role of fire in natural systems” (USDI & USDA, 1995, p.12).

The Federal Wildland Fire Management Policy and Program Review: Implementation Action Plan, published May 23, 1996 by the U.S. Department of the Interior and U.S. Department of Agriculture, incorporated the two preceding recommendations as “action items” (USDI & USDA, 1996, p.34).

These action items clearly challenge the United State Department of Agriculture and Department of the Interior to develop long-term commitments to wildland fire communication, both internally and externally.

1.3.2 RESEARCH COMMUNITY

Individuals from the research community have also advocated the need for additional study of the communication challenges associated with wildland fire. In an early observation, Hall (1972) noted that “we have not tried very hard to assess the nature and significance of public feelings towards fire in an [sic] non-urban environment” (p.57). Hall (1972) reflected that “pertinent literature is indeed scarce” on public attitudes toward wildland fire management (p.57). In 1982, Omi and Laven (1982) suggested the “relationships between fire as an ecological process and public policy” as a research priority (p.13). Taylor and Daniel (1984) reported upon a study of public attitudes about wildland fire, observing that “relatively little research has directly assessed

public perceptions of fire and fire effects” (p.361). They echoed the views of Hall (1972), commenting that “public attitudes about fire policy, visitors’ perceptions of fire effects, and means of educating the public are clearly priority areas for research” (Taylor and Daniel, 1984 p.361). Fifteen years later Jacobson (1999) identified the “lack of a prescribed fire information program that is effective, coordinated and targeted to key audiences” (p.23) as a barrier to wildland fire acceptance.

Hall (1972) also suggested the need to “talk to the local ranger who probably has the best available understanding of the attitudes of people towards fire in his area” (p.61). He recommended that government decision-makers investigate the attitudes of the professionals who are actually involved in forest fire control, because “they are based on long experience and the practical realities of fire control” (p.61).

The need for enhanced communications with meaningful involvement of the public was highlighted by DeBano et al. (1998) who commented that “opportunities to use fire for beneficial purposes in the future are highly dependent on obtaining the necessary public support” (p.310). Manfredo et al. (1990) expressed the view that “policy-makers face major hurdles in establishing fire policies that will be approved by the majority of the public. This provides a challenge to managers as they focus their educational efforts on a better understanding of the effects of fire and fire policy” (p.23). Nielsen and Buchanan (1986) suggested that “up-front public education [concerning wildland fire] may save dollars and time” (p.9), while Terry (1997) concurred, observing that “wildfire prevention efforts also held down suppression costs” (p.5). More recently, Plevel (2000) pointed out that “wildland fires are destroying more homes and threatening more urban areas in the United States every year”(p.12).

Jacobson (1999) has summarized the situation, observing that “fire policy decisions have a strong social component. Public ignorance about the ecological role of fire in natural systems adds fuel to the conflict. Public communication campaigns could lead to greater public understanding and acceptance of prescribed fire and to more meaningful public participation in fire policy debates” (p.21).

1.3.3 THE PUBLIC

During this 1999-2000 study period there has been significant attention paid to, and interest in, wildland fire across the United States given events, in such places as Los Alamos, New Mexico, Mesa Verde National Park, Colorado and Hanford, Washington. Not since the Yellowstone fires during the summer of 1988 has wildland fire received so much national news attention. With this widespread interest in wildland fire, the importance of ensuring accurate, informed and timely communication could not have been more apparent.

This need was clearly recognized when, to address the public's concern about wildland fire management after a National Park Service's prescribed burn threatened Los Alamos, the Secretaries of the U.S. Department of the Interior and U.S. Department of Agriculture issued a news release to announce the imposition of a moratorium on prescribed wildland fire activities in the western United States (U.S. Department of the Interior, 2000).

1.4 STUDY PURPOSE AND OBJECTIVES

This research project describes and explains in the context of social marketing the current state of wildland fire communications in the United States from the perspective of natural resource professionals who are charged with communicating wildland fire information. Specifically, the research objectives are:

1. To describe communicators' perception of their knowledge of wildland fire communications,
2. To describe communicators' attitudes,
3. To describe communicators' perception of their skills,
4. To explore and describe communicators' perception of the barriers and opportunities for wildland fire communications,
5. To describe and explain the relationships among these factors,
6. To assess the usefulness of National Wildfire Coordinating Group (NWCG)-developed thematic messages, and
7. To interpret and explain the descriptive data collected using a social marketing framework.

1.5 ASSUMPTION

It is assumed that survey participants responded to questions in the study with sincerity, truthfulness, and to the best of their abilities.

CHAPTER 2

LITERATURE REVIEW

The study has drawn extensively on literature concerning wildland fire and its communications, as well as writings about various methodologies, which have relevance and have been employed in this research undertaking. These latter include:

- the Delphi method,
- needs assessment,
- social marketing, and
- mail surveys.

2.1 WILDLAND FIRE AND ITS COMMUNICATION

2.1.1 FIRE SUPPRESSION IN THE 20TH CENTURY

Wildland fire was a natural occurring part of most American ecosystems until the late 1800s. Gifford Pinchot, the first Chief of the Forest Service, wrote:

“I recall very well indeed how, in the early days of forest fires, they were considered simply and solely as acts of God, against which any opposition was hopeless and any attempt to control them not merely hopeless but childish. It was assumed that they came in the natural order of things, as inevitably as the seasons or the rising and setting of the sun.” (Pyne, 1997, p.8)

Over the years this perception of wildland fire in America began to change, and with it came new suppression efforts. When the *Transfer Act* of 1905 was passed in the United States shifting the responsibility for America’s forest reserves from the General Land Office, the newly-created Forest Service undertook to respond to the public’s demand to protect the forest resources from ‘destructive’ wildfires (Pyne, 1997). High profile wildfires and the deaths in 1910 of 78 firefighters served to increase demand for a national wildfire protection system.

With mandates of fire protection in the *Organic Act of 1897*, the *Fighting Forest Fires Supplemental Fund of 1908*, the *1911 Weeks Act*, and the *Clarke McNary Act of 1924*, the stage was being set for a full-scale assault on wildland fire in America. The establishment of the Civilian Conservation Corps (CCC) in 1933 provided the resources – human, mechanical and financial – that could be directed to fire suppression and control. In addition, “an experiment on a continental scale” – known as the “10 AM policy” – called for the “control of a fire by 10 AM on the morning following its report” (Pyne, 1997, p.22). It was this policy, adopted in 1935, that “committed the federal government to universal fire protection” (Pyne, 1997, p.22). Over the next three decades, the goal continued to be that of immediate fire suppression. These efforts received a significant boost with the return of surplus military equipment from overseas wars. Following the Korean War, for example, air tankers that could be used in firefighting were readily available for the first time.

During World War II, a government-initiated communications program was undertaken to encourage the public to be careful with its use of fire. With Smokey Bear as its spokesperson and icon, the initiative was intended to address the need of forest fire prevention should another military attack of the southern California coast occur. The Wartime Advertising Council developed the campaign using slogans such as ‘Careless Matches Aid the Axis’ and ‘Forest Fires Aid the Enemy: Crush Out Your Cigarette’ (Jacobson, 1999; USDA Forest Service, 1984). Over the nearly six decades since the development of what became known as the Smokey Bear campaign, Smokey and his message have become “one of the most successful and enduring public relations campaigns ever created” (Jacobson, 1999, p.19).

The Ad Council used “a myriad of public relations material to convey its famous message” (Jacobson, 1999 p.21). These included hats, t-shirts, key rings, comic books, billboards, signs, and most importantly television, radio, and print ads. Today there is even a website (www.smokey-only.com) devoted to such Smokey collectibles and memorabilia as alarm clocks, salt and pepper shakers, records, coloring books, lunch boxes, paper weights, bubble bath, cookie jars, banks, and – of course – ashtrays. The offensive against wildfire or undesirable fire has indelibly etched Smokey Bear’s fire prevention message, “Remember, Only You Can Prevent Forest Fires” in the minds of the American public. In fact, in one study 95 percent of people

surveyed could finish Smokey's message when researchers prompted with, "Remember, Only YOU ____" (USDA Forest Service, 1984). Jacobson (1999) reported that Smokey is one of the most recognized fictional characters in the United States. His image – with the ranger hat and holding a shovel – has become the symbol of fire prevention activities throughout the United States. There can be little question that Smokey's message and that of other fire prevention campaigns have had the desired result for, during the past twenty years, the number of human-ignited wildfires has dropped by 40 percent (USDA Forest Service, 1984; Jacobson, 1999).

2.1.2 THE NEGATIVE EFFECTS OF SUPPRESSION AND THE RE-INTRODUCTION OF FIRE

For many years the government policy of wildland fire exclusion and suppression was thought to be a correct one by scientists, natural resource managers, and the public (Taylor et al., 1986). Yet, even in the early years of fire suppression efforts, there were some groups – notably in California – that disagreed, believing the best policy to be one of "light burns" which would keep fuel levels low, keep the brush pruned, and reduce pests (Pyne, 1997, p.17). It was not until many years later, after fire suppression had virtually eliminated the benefits of these natural processes, that people began to notice the effects of fire exclusion. In 1963, a panel focusing on wildlife management for the National Park Service found that fire exclusion and suppression was having a negative impact upon ecosystems within the parks (Leopold et al., 1963). Fire exclusion and suppression had changed species composition and increased fuel loads.

In addition to disrupting many ecosystems, the exclusion of fire had also "compromised the prospect for future fire protection" (Pyne, 1997, p.1) by creating wildland with unnaturally high amounts of combustible fuel. Under the 'right' conditions, wildfires could now severely damage ecosystem integrity and place humans and their belongings in danger. Pyne (1997) referred to this as the "maldistribution of burning – too much wildfire, and too little controlled fire" (p.1).

Slowly, attitudes among the 'experts' began to change. Increased opposition to a 'suppression only' mindset developed to the extent that, in 1977, the Forest Service changed its "basic policy for dealing with fires on land administered by the USDA Forest Service...from control to management" (Taylor and Daniel, 1984, p.361). Recognition of the need to move away from fire suppression to fire management continued into the 1990s. In 1995, the Federal Wildland Fire

Management Policy and Program Review contributed to a shift in federal policy “from fire suppression to prescribed fire and redefined the national agenda from an obsession with the intermix fire to a program of restoration burning” (Pyne, 1997, p.41).

The transition from wildland fire exclusion/suppression to wildland fire management (including prescription) has taken place with limited regard for communication to the general public of the need for such change or its rationale. Nielsen and Buchanan (1986) have observed that “the public is largely uninformed about the ecological reasons for current fire management policies.” (p.2). They also pointed out that the implementation of fire management policies “which allow fires to burn conflicts with the extremely successful fire prevention campaigns of the past.” (p.3). Jacobson (1999) concurred, noting that “attempts to reeducate the public to embrace prescribed fire as a management tool have been less successful.” (p.19). The author remarked that, “The problem with Smoky Bear’s message was, ironically, its success. As our knowledge and understanding of the natural world expands, how do we modify such an effective and ingrained public relations message to better reflect reality? The concept that fire is essential and natural in many ecological systems may seem ludicrous to people raised on Smokey Bear” (p.21). Jacobson (1999) suggested that, “Where Smokey Bear delivered a simple and effective message with flair, prescribed fire education programs often lack appeal or are poorly coordinated. The ecological complexity of prescribed fire makes it even more critical to employ effective communication techniques” (p.23).

Today, if federal agencies such as the U.S. Department of Agriculture and U.S. Department of the Interior are committed to enhancing wildland fire communications as recommended in the Federal Wildland Fire Management Review (USDI & USDA, 1995), they and other organizations must increasingly rely on wildland fire communicators to ‘get the message out’.

2.1.3 WILDLAND FIRE COMMUNICATORS

In the structure of wildland fire communications, (Figure 1.1) wildland fire communicators serve as intermediaries between organizations which are responsible for message development and the public(s) to whom the message is directed. Their role is critical in both helping to develop and to deliver the message. In doing so, it is essential that they be knowledgeable about both the

organization for which they work and the public whom they serve. Over the years, the need to examine the characteristics and responsibilities of those who serve in one form or another as fire communicators has occasionally been identified. Hall (1972), for example, as noted earlier, suggested talking “to the local ranger who probably has the best available understanding of the attitudes of people towards fire in his area” (p.61). He also suggested that the “attitudes of the professionals who are actually involved in forest fire control are important, because they are based on long experience and the practical realities” (p.61).

Yet, in spite of the extensive research conducted on fire-related topics, limited work has been done on issues related to fire communications. In the former category are studies such as those conducted by Barney (1979) who looked at Forest Service managers’ views of wildland fire research needs in the western United States and Agee (1981) who studied the fire research needs in national park system areas of Oregon and Washington. Similarly, Pinedo et al. (1995), as part of a strategic planning exercise, worked with 43 fire research, development, or technology transfer staff members with the Canadian Forest Service to identify their perceptions of current and future fire research needs.

On many occasions, researchers have used managers’ perceptions as a basis for exploring issues, planning for the future, or making recommendations for change. These studies have addressed a wide variety of subjects, including wilderness attitudes (Hendee and Pyle, 1971; Peterson, 1971; Wiita, 1998), recreational uses and their impacts (Bieber, 1978; Buscher, 1979; Tobin, 1979), recreation management (Ratcliffe, 1988), recreational products (Danforth, 1989), visitors and their behavior (Slover, 1979; Humpherys, 1991; Johnson, 1994), campground service demands (Ashton-Sabrie, 1993), natural resource law enforcement (Kluwe, 1987), forest roads (Moustsinas, 1976; Downing and Clark, 1979), off-road vehicle use (Mitchell, 1976; Propst, 1976), recreational horse use (Ford, 1982; Shew et al., 1986), forest health (Billings, 2000), wildlife rehabilitation (Siemer, 1993), and wildlife management (Phillips, 1994).

A few studies have focused more directly on wildland fire communication related topics. One undertaken by Kaage (1988) explored and documented prescribed fire managers’ perceptions of the worth of certain informational resources, with the goal of finding ways to improve the dissemination of such information by resource managers. In a particularly significant study,

Sanyal (1998) explored the views of over 300 wildland fire managers working in fire prevention, education and communications about their perceptions of the National Wildfire Coordinating Group's communication products. He found that only about 40% of respondents had heard of the organization's Fire Prevention, Education, and Communication Working Team (NWCG-PECWT). Furthermore, the majority of respondents were 'not aware of' most PECWT products, such as bibliographies, videos and brochures. Sanyal also reported that the organizations employing the respondents had an average of \$10,230 available for annual fire prevention services, \$2,913 for educational programs, and only \$1,477 for fire communication products and materials.

Of relevance to the present study, Sanyal (1998) found that about 50% of respondents 'agreed' or 'strongly agreed' that "PECWT products should be generic and applicable to an audience anywhere in the USA" (p.16). Thirty percent 'disagreed' or 'strongly disagreed', while the remaining 20% neither agreed nor disagreed. The researcher then asked respondents if "PECWT products should be tailored for specific regions in the country" (p.16). Interestingly, about 68% of respondents 'agreed' or 'strongly agreed' with the statement, while only 11% 'disagreed' or 'strongly disagreed'. The remaining 21% neither agreed nor disagreed.

2.1.4 PUBLIC KNOWLEDGE, ATTITUDES, AND BARRIERS

2.1.4.1 PUBLIC KNOWLEDGE AND ATTITUDES REGARDING WILDLAND FIRE

There have been a number of studies over the past 25 years about the level of knowledge and attitudes held by the general public, as well as some specific segments of it, with respect to wildland fire. The following provides a synopsis of some of the more significant findings from these research works that are relevant to the present study.

- In 1971, Stankey (1976) tested visitors on their knowledge of fire's effects on Montana's Selway-Bitterroot Wilderness. Results of a true/false test revealed that the average visitor could correctly answer only about half of the statements that related to fire's effects upon the ecosystem. Stankey concluded that the sample population's knowledge

about fire in wilderness settings was generally low. The most interesting finding was that participants with higher knowledge levels concerning fire were more willing to tolerate it in wilderness settings.

- Nielsen and Buchanan (1986) questioned National Park Service visitors attending two forms of interpretive programs – interpreter lead tours and automated visitor center based slide programs – as part of their study of fire management interpretive programs. The authors found a “positive correlation between fire ecology knowledge and support for management that permits naturally occurring fires” (p.3) and that “negative attitudes toward [fire] management policies are largely the result of lack of knowledge” (p.9). Additionally, they discovered that there was no significant difference in results based upon the methods used to communicate fire information, but rather “park visitors made more aware of the ecological effects of fire are likely to be more receptive toward fire management policies” (p.8-9).
- The results of a telephone survey of regional residents (Montana and Wyoming) and national residents conducted by Manfredo et al. (1990) suggested “that as knowledge about fires and fire policy increases, support of prescribed fire policy also increases” (p.23). The authors also concluded, “a substantial proportion of Americans are [sic] illiterate about wildfire and its effects” (p.23).
- Christiansen et al. (1969) sampled forest users’ knowledge about forest resources and fire protection. The authors concluded that knowledge differed among respondents from different geographic areas. They found that respondents from Utah were more knowledgeable about fire prevention than Californians. They also found that “frequent forest visitors, especially hunters and fisherman [sic], scored better than average on the knowledge test” (p.2).
- In a 1993 study, Jacobson and Marynowski (1997) examined users of, and residents living around, the forest resources of Florida’s Eglin Air Force Base. The authors tested both groups based upon their knowledge and attitudes toward a number of topics, one of which was fire ecology. They concluded that “all respondents revealed relatively low

levels of knowledge about forest resources and fire ecology” (p.778), but that users of the resource “were more knowledgeable about forests and fire ecology than citizens.” (p.778). Of the respondents, 63% of base users knew that fire every few years was beneficial to wildlife, 56% knew fire was beneficial to Eglin’s plants, and 37% knew that fire helped to maintain the balance of pine and oak tree species. Jacobson and Marynowski (1997) reported that the attitudes of Eglin Air Force Base hunters about fire were “significantly more positive” than the “more neutral recreationalists” (p.774), while those of citizens ranked lowest. They concluded that “recreational users of public natural resources are an audience ripe for education programs” (p.779). Interestingly, Jacobson and Marynowski also found that families “making less than \$25,000/year displayed more negative attitudes toward fire than higher income groups who were neutral on the subject” (p.775).

- In a 1996 survey conducted in Blue Ridge Mountain communities, Shindler (1997) found that most respondents preferred selective thinning (76%) over prescribed fire (16%) or to doing nothing (8%) when faced with the necessity of addressing the buildup of dead trees in the surrounding mountains. The researcher also found that a “substantial segment of the public believes that all fires should be extinguished, suggesting that fire education is still needed in these communities” (p.3).
- Jacobson (1999), in the book “Communication Skills for Conservation Professionals”, writes, “while public acceptance of fire has increased in the past few decades, knowledge lags” (p.24). The author went on to express the view that “public ignorance about the ecological role of fire in natural systems adds fuel to the [wildland/urban interface] conflict” (p.21).
- Cortner et al. (1984) in a study of Tucson, Arizona residents found that “the public was not very familiar with the principal causes and normal intensity of fire in pine forests, nor with average acreages burned. In addition, most respondents were uninformed about effects on animals or the rate at which vegetation would be reestablished.” (p.360). The researchers discovered that 88% of respondents believed that “a rapidly moving fire

would kill either 'lots' or 'moderate' numbers of animals, although actual animal mortality from an intense wildfire is often quite low" (p.360).

- Monroe (2000) developed a 'toolkit' for county extension agents, Florida Division of Forestry field staff, and other personnel that could be used in conjunction with public education programs to enhance "awareness, knowledge, and comfort with the use of prescribed fire in suburban areas" (p.2). In conjunction with this effort, the researcher conducted a survey to determine the knowledge and attitudes of local residents about fire. The assessment revealed that "there is a somewhat schizophrenic perspective on fire in Florida. People know it is good for natural areas, they think nearby residents should tolerate smoke, and they know prescribed fire is 'better' than wildfire for a variety of reasons, but they want stricter controls on burning and they value air quality more than burning" (p.7). Monroe believed "there may be some confusion about wildfire and prescribed fire, as only 63% of the population correctly identified the definition of prescribed fire" (p.7). The author went on to point out that, in "a recent survey of *all* Floridians, only 40% correctly defined prescribed fire" (p.7), leading to a recommendation "for program materials to emphasize the distinctions between wildfire and prescribed fire" (p.7).
- Taylor and Daniel (1984) in a test of 'public education and perception' found that the public was reasonably well informed about, and tolerant of, prescribed burning. Nonetheless, the authors recommended the use of educational brochures as a tool to "increase the public's knowledge of fire effects and tolerance of fire use in forest management" (p.364). The authors concluded that "attitudes of respondents who read brochures consistently tended...towards the more [fire] tolerant position", especially with respect to the aesthetic impacts of different intensity fires and their effects upon recreation (p.364).
- Similarly, Taylor et al. (1986), in their study of attitudes towards recreation and fire management, reported that "public knowledge of fire effects and public tolerance toward the presence of light-intensity fires can be increased through use of educational materials" (p.184).

- Hall (1972), at a conference in Denver, Colorado, observed that there was an “infinite range of individual attitudes towards fire” (p.60) and that “many people are unknowing, uncaring or not particularly concerned about forest fires” (p.59). Yet, “if there is one attitude about fire which dominates North America, it is that fires that affect our environments are bad” (p.58). Hall (1972) also cited Haug Associates Inc. (1968) who reported that teenagers and adults believed that forest fires caused the most damage when compared to other natural catastrophes including floods, hurricanes, and earthquakes.
- Folkman (1979) found that over half of respondents agreed that occasional fires were an important part of ecosystem renewal. Yet, slightly more than three-quarters of surveyed residents in Los Angeles and San Francisco believed that it was important for government agencies to suppress fire as soon as possible after ignition, no matter where the fire was located.
- Rauw (1980) had similar responses in a study he conducted, finding that while over 70% of respondents could define the practice of prescribed burning, 65% still felt that fires should be controlled at any cost.
- In 1982, Omi and Laven (1982) published, “Prescribed Fire Impacts upon Recreational Wildlands: A Status of Review and Assessment of Research Needs” in which they expressed the opinion that public attitudes can play a significant role in the acceptance or rejection of fire management policies.
- Shelby and Speaker (1990) summarized a number of common themes concerning public attitudes towards wildfire. They stated that public support “may be high if a prescribed burn is used to reduce the risk of severe wildfire, to manage ecological conditions by simulating the historic fire regime, or to improve recreation potential” (p.254). They also expressed the view that “public attitudes toward prescribed burning are largely focused on concerns about the health, ecological, aesthetic, and commercial impacts of these fires” (p.254).

The literature about wildland fire is quite consistent in its reporting that a knowledgeable, informed public is more receptive to the use of prescribed fire than are those individuals who may be misinformed or have limited or no information upon which to form an opinion or make an informed judgment.

2.1.4.2 BARRIERS TO WILDLAND FIRE ACCEPTANCE

The combination of the public's inadequate knowledge about, and negative attitude towards, wildland fire and its management creates a substantial barrier for wildland fire communicators in their efforts to address the concerns held by the public. Many of the same researchers who have reported on the public's knowledge and attitudes concerning wildland fire also have studied the barriers to the public's acceptance of it. The concerns or the barriers take many forms. They include:

- the risks of fire, especially the possibility of its causing damage to valued assets (Daniel et al., 1996; DeBano et al., 1998; Hall, 1972; Jacobson, 1999; Shindler, 1997; Taylor and Mutch, 1986);
- emissions from fire, including the health and aesthetic effects of smoke (Omi and Laven, 1982; Shelby and Speaker, 1990; Shindler, 1997; Taylor and Mutch, 1986; Winter and Fried, 2000);
- aesthetic impacts on the landscape (Hall, 1972; Jacobson, 1999; Shelby and Speaker, 1990; Shindler, 1997; Taylor and Daniel, 1984);
- economic losses, mainly to forestry-related activities (Hall, 1972; Shindler, 1997);
- impacts on the ecosystem, including wildlife (Cortner et al., 1984; Hall, 1972; Jacobson, 1999; Shelby and Speaker, 1990; Shindler, 1997);
- confused, disjointed or uncoordinated 'messaging' about suppression, and/or the inaccurate interpretation of prevention messages (Jacobson, 1999; Omi and Laven, 1982; Shelby and Speaker, 1990; Taylor and Mutch, 1986);
- the lack of a consensus among 'experts' regarding the use of fire (Glasscock 1972; Shelby and Speaker, 1990);
- the lack of confidence in organizations entrusted with fire management (Taylor and Mutch, 1986); and,
- the media's generally negative portrayal of wildland fire (Jacobson, 1999; Taylor and Mutch, 1986).

The challenge for fire communicators is to address the perceptions that give rise to these barriers in a straightforward, honest, scientifically based manner, thereby doing their part to ensure relevant, accurate, and timely information is provided to the public about wildland fire management practices.

2.2 METHODOLOGY LITERATURE

2.2.1 THE DELPHI METHOD

2.2.1.1 PURPOSE

The Delphi method employs a group of experts at varying locations who provide input through an anonymous, multi-stage, iterative questionnaire process. It has been described as a “qualitative, long-range forecasting technique, that elicits, refines, and draws upon the collective opinion and expertise of a panel of experts” (Gupta and Clarke, 1996, p.185). Its name was taken from “the ancient Greek oracle at *Delphi*, who offered visions of the future to those who sought advice” (Cassino, 1984, cited in Gupta and Clarke, 1996) and who was “frequently consulted for its expert opinions and forecasts” (Jonassen et al., 1999, p.267).

The first Delphi experiment was conducted in 1948 by Helmer and Dalkey who were employed by the Rand Corporation (a government contractor). Since these experiments were of military significance, the early findings using the technique were not publicly reported (Dalkey and Helmer, 1963, cited in Gupta and Clarke, 1996). It was not until the mid-1960s that the methodology began to gain popularity after the first accounts of the technique were published.

The Delphi methodology is regularly used as a tool to assess the ‘present’ and the ‘ideal’ with regard to organizational conditions, goals and objectives (Ludwig, 1994). Hostrop (1983) stated there are “endless examples of how the Delphi procedure can be used to determine ‘what was’, ‘what is’, ‘what should be’, and ‘what is to become’” (p.76). Similarly, Stuphin (1981) reflected that the “Delphi could assist an investigator in assessing the what is and what should be with regard to organizational conditions, goals and objectives” (p.41).

Some authors, including Jonassen et al. (1999), believed the Delphi should be used as a “structured group interview technique for seeking consensus among a group about ideas, goals, or other issues” (p.267). Others, including Gutierrez (1989, cited in Gupta and Clarke, 1996), held the differing view that the goal of a Delphi was not to elicit a single answer or to arrive at a consensus, but simply to obtain as many high-quality responses and opinions as possible on a given issue from a panel of experts to enhance decision-making. Ray and Sahu (1990, cited in Gupta and Clarke, 1996) maintained that the Delphi method was well-suited and able to capture a wide range of interrelated variables and multidimensional features common to most complex problems. Gamon (1991) said the Delphi technique was also “ideally suited for needs assessment or analyses of future directions when experts are widely scattered or likely to have diverse opinions” (p.1). Finally, Henson (1997) noted that the Delphi “has become recognized as a standard procedure for eliciting expert opinion to bridge gaps and inherent uncertainties in available data” (p.198).

2.2.1.2 IMPLEMENTATION

The implementation of a typical Delphi follows six basic steps according to Jonassen et al. (1999):

- select the panel of experts,
- pose the initial question and distribute the initial questionnaire,
- tabulate the results and design the second questionnaire,
- distribute the second questionnaire,
- design and distribute subsequent questionnaires, and
- report the results (Delbecq et al., 1975; Ulschak, 1983; Johnson et al., 1987).

Jonassen et al. (1999) suggested that “data collection and tabulation can be automated to facilitate the Delphi technique” (p.268). Along this same line, Ziglio (1996) described sending questionnaires by e-mail or by computerized systems to a group of experts.

2.2.1.3 KEY CHARACTERISTICS

Linstone and Turoff (1975) described the Delphi process as having several key characteristics:

- structured communications,
- some feedback of individual contributions of information and knowledge,

- some assessment of the group judgment or views,
- some opportunity for individuals to revise reviews, and
- some degree of anonymity for the individual responses.

They also outlined situations in which they believed the use of the Delphi methodology was desirable:

- when precise analytical methods were not suitable for studying the problem but subjective judgment on a collective basis could provide beneficial information relative to the problem;
- when time and cost limited the ability to convene group meetings of the individuals needed to address the problem;
- when the individuals needed to examine a broad and complex problem had different backgrounds, experience, and expertise;
- when anonymity might assist in avoiding disagreement among individuals that might result if there were face-to-face interactions among them; and,
- when domination by an individual or group of individuals might be expected.

Ludlow (1972) believed the critical elements of the Delphi included anonymity, statistical summation of the information provided by the group, controlled feedback, and an iterative process that permitted and encouraged reassessment of initial judgments.

2.2.1.4 SELECTION OF PANEL OF EXPERTS

The selection of individuals to participate in a Delphi is critical to its success. The panelists should be:

- experts in their field,
- well known and respected within their peer group (Linstone and Turoff, 1975), and
- highly self-motivated (Altschuld, 1993; Altschuld et al., 1992; Delbecq et al., 1975; Ulschak, 1983; Johnson et al., 1987).

Writers, such as Ludwig (1994) and Jonassen et al. (1999), have suggested that the ideal number of expert participants is typically 10 to 20. Cyphert and Gant (1970) stressed that a Delphi study

is not designed to involve a random sample; rather, each person selected has a certain amount of expertise to contribute to the process.

2.2.1.5 ADVANTAGES OF DELPHI USE

Using the Delphi technique has several advantages when compared to other information gathering approaches. The Delphi methodology works well when it is not possible to gather the participants in the same location (Ludwig, 1994). Having participants separated by distance has been cited as an advantage since it provides anonymity, allows the voicing of opinions from both the more vocal and the shy participants (Jonassen et al., 1999), and reduces the possibility that a dominant member of the group – by force of presence – might be able to sway opinion or inhibit creativity or expression (Campbell, 1966; Dalkey, 1967 and 1969; Dalkey et al., 1972; Jones and Twiss, 1978; Linstone and Turoff, 1975; Ludwig, 1994; and Rowe et al., (1991, cited in Gupta and Clarke, 1996)). The Delphi methodology allows more individuals to participate in the process than could be easily brought together to “effectively interact in a face-to-face exchange (Linstone and Turoff, 1975, p.4). It also facilitates a convergence of opinions on difficult topics or concepts (Jonassen et al., 1999). Additionally, the process saves time and cost, especially when face-to-face meetings are not feasible (Linstone and Turoff (1975), Masser and Foley (1987, cited in Gupta and Clarke, 1996), and Jonassen et al. (1999)).

2.2.2 NEEDS ASSESSMENT

2.2.2.1 PURPOSE

Needs assessment is a methodology used to assess the needs of a defined population using “a systematic set of procedures undertaken for the purpose of setting priorities and making decisions about program or organizational improvements and allocation of resources” (Witkin and Altschuld, 1995, p.4). It may also be thought of as a process for “ranking goals for importance and setting priorities...for program development and attainment” (Witkin, 1977, p.6), or for “documenting relevant needs” (Etling, 1995, p.1). Needs are defined as discrepancies or gaps between ‘what is’ and ‘what should be’ (Witkin and Altschuld, 1995).

Needs assessment has been used in a number of disciplines, including mental health (Cox, 1994; Dingas, 1993; Hochheiser, 1996; and, Villalobos, 1999), education (Equall, 1977; Idaho State Department of Education, 1977; and, Borich, 1980), and natural resources (Banda, 1995; Knerr, 1996; and, Responsive Management, 1997). In the field of wildland fire management, Pinedo et al. (1995), as noted earlier, undertook a needs assessment study for the Canadian Forest Service to determine managers' perceptions of current and future research needs.

2.2 2.2 KEY CHARACTERISTICS

Witkin and Altschuld (1995) identified three levels of needs assessment within “a regularly interacting or interdependent group of people forming a unified whole and organized for a common purpose” (p.13). Research involving individuals at Level 1 (primary) typically focuses upon the “service receiver”, such as students, patients, and customers. It is important to note that service receivers can be found both inside and outside the system (Figure 2.1). A needs assessment focusing on Level 2 (secondary) explores “service providers” and policy makers such as teachers, health care professionals, and managers. Finally, a Level 3 (tertiary) needs assessment examines “resources”, including facilities, equipment, and supplies (Witkin and Altschuld, 1995, p.10).

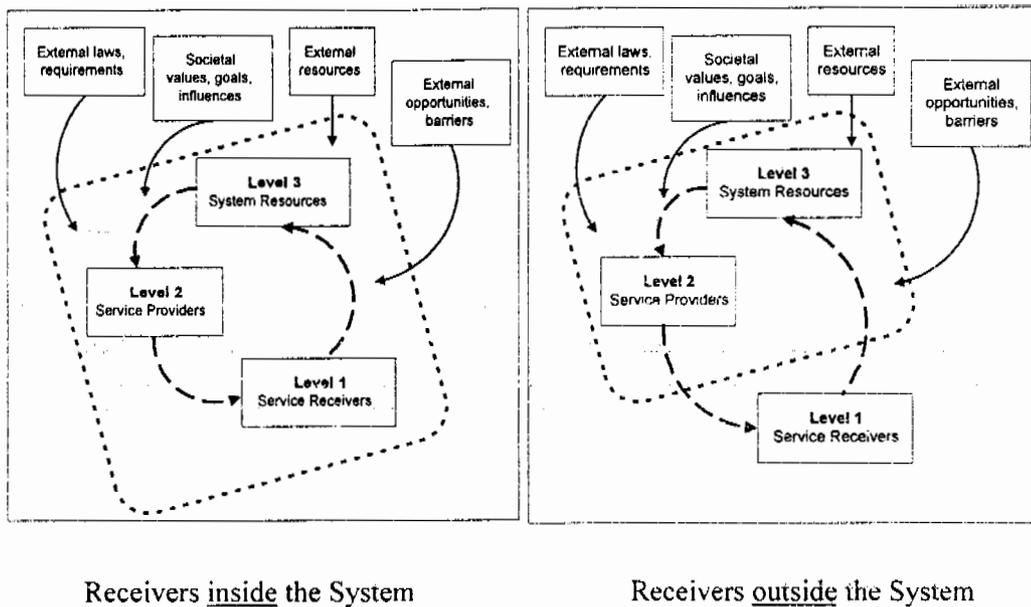


Figure 2.1: The Levels of Need (Witkin and Altschuld, 1995)

Hobbs (1987) has suggested that in constructing a successful needs assessment the following questions need to be answered:

- “Who is the assessment attempting to inform, influence, or persuade?”
- What purpose is the needs assessment intended to accomplish?
- Whose needs are to be assessed?
- What questions are asked?
- What resources are available to do the needs assessment, including time and organization as well as funds and expertise?” (p.24)

2.2.2.3 IMPLEMENTATION

Witkin and Altschuld (1995) described a three-phase sequence for implementing a needs assessment (NA): the pre-assessment, assessment, and post-assessment stages. The pre-

assessment phase was exploratory and intended to “determine what is already known about needs in the system; to identify issues and major areas of concern; and to decide on system boundaries, focus and purpose of the NA, potential sources of data, how the information will be used, and what kinds of decisions will be made on the basis of the findings” (p.14). The second phase, the assessment, was the process of data collection. It was designed to “gather and analyze information and opinions on the needs, set priorities, and analyze causes related to all three system levels” (p.14). In the third and final phase, “tasks are to set priorities and criteria for solutions, weigh alternative solutions, and formulate action plans for program changes or other interventions” (p.14).

Horton (1976, cited in Rothman and Gant, 1987) suggested a variety of methods of gathering data for a needs assessment. The methods can be grouped into two categories – social surveys that include surveys dealing with the general population, target population, service provider, and key informant, and secondary analysis that comprises a review of social indicators as well as administrative and managerial records (p.173). More specifically, the author described a general population survey as “a selected crosscutting sample of community members” which is typically “interviewed or requested to complete a questionnaire” (p.37). Horton noted that “if properly applied, there can be a high level of statistical generalizability and validity assessment” with this method (p.38). Target population surveys are typically “smaller, more focused, and generally concerned with a specific population at risk within the community” (p.38). “They can sometimes provide more in-depth information than general surveys”, especially if the “target population is a population currently being served” (p.38). This method can easily obtain large amounts of “data regarding effects of current services, access and barriers to service delivery, and the like” (p.38).

A service provider survey, “in addition to assessing community opinions regarding services or agencies...is often useful to gather data from the service personnel of community agencies. Staff perception of unmet needs and barriers to service may provide other rich sources of information. Providers can illuminate objectives and contexts of service delivery as seen from a professional perspective” (p.38). Key informant surveys typically question “recognized leaders or representatives within the community. Such key informants may be formal leaders such as agency board members, elected officials, or ministers. However, informal leaders should also be contacted. These are grass roots individuals, whom people seek out for advice or assistance even

though they hold no formal positions. Surveys of key informants can provide insight into what community problems may emerge as public record and who is likely to support or oppose proposed changes. While the results of this type of survey are not generalizable, they are valid in their own terms, since they indicate what community leaders believe” (p.39).

In secondary analysis, a review of social indicators can provide “a large volume of statistical data...on a variety of subjects: economic and income levels, spending patterns, occupational status, job satisfaction”. “These statistics are accumulated, synthesized, and published on a regular basis by government bureaus, research institutes, universities, and professional organizations” (p.39-40). They can be inexpensively obtained and can serve as a very valuable source of information. Reviewing administrative and managerial records can provide “information regarding client characteristics, services provided, services needed but unavailable, and referrals across agencies and organization....An intimate picture of service patterns can be easily constructed” (p.40). However, Horton pointed out that this latter method of data collection often has strong barriers preventing access to information.

Cross (1980, cited in Moore, 1984) stressed that any needs assessment should have three critical characteristics regardless of the method(s) used to gather data. It should:

- have a set of carefully delineated objectives,
- be seen as a part of a continuing planning process, and
- use state-of-the-art survey methodology (p.83).

Witkin (1977) recommended using discrepancy surveys when implementing needs assessments. To conduct a discrepancy survey, respondents rate a series of questions on two five-point scales. The first of these scales is the respondents’ “perception of the extent to which the condition actually exists, the ‘actual state’”, and the second scale is the respondents’ “perception of the extent to which the condition should exist, the ‘desired state’” (p.7). The authors defined the “numerical difference between the two scale values” as the needs index (p.7).

2.2.3 SOCIAL MARKETING

2.2.3.1 PURPOSE

Social marketing has been defined as the “use of commercial marketing techniques to promote the adoption of a behavior that will improve the health or well-being of the target audience or of society as a whole” (Weinreich, 1999, p.3). It is based upon the premise that “the organization should determine the needs, wants, and interests of target markets. It should then deliver the desired satisfaction more effectively and efficiently than competitors in a way that maintains and improves the consumer’s *and the society’s* well-being” (Kotler and Armstrong, 1991, p.15). Social marketing’s primary focus is on the consumer and on learning what people want and need, rather than trying to persuade them to buy what is being produced (Weinreich, 1999).

2.2.3.2 HISTORY

According to Weinreich (2000), “Social marketing was ‘born’ as a discipline in the 1970s when Philip Kotler and Gerald Zaltman realized that the same marketing principles that were being used to sell products to consumers could be used to ‘sell’ ideas, attitudes and behavior”. In 1985, the American Marketing Association (AMA) acknowledged the concept of social marketing by revising its definition of marketing by adding the word “ideas”. The definition then read, “Marketing is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individuals and organizational objectives” (“AMA Board Approves New Marketing Definition”, 1985).

In the public sector, social marketing falls into “three categories – informational, educational, and political. Informational marketing is used to bring important facts to the public’s attention, for example, information about a change in tax laws or speed limits, the announcement of a public auction of surplus goods and so forth. Educational marketing is used to disseminate public interest programs, such as those concerned with promoting energy conservation or increasing seat belts use. Political marketing is intended to enhance the image of the party in power” (Fine, 1990, p.22).

Social marketing has been used extensively in the health care field in support of such initiatives as immunization, smoking cessation, AIDS prevention, and cholesterol reduction (Andreasen and Tyson, 1994). Others have started to adopt social marketing as an effective and efficient tool to encourage behavior change. In the field of natural resources, social marketing has been used in programs which have dealt with agricultural soil conservation, environmental protection, energy conservation, and recycling (Andreasen and Tyson, 1994). Of particular relevance, Fine (1990) has noted that social marketing could be applied to the “fire prevention” and “forest fire prevention” fields (p.3).

2.2.3.3 KEY CHARACTERISTICS OF SOCIAL MARKETING

Andreasen (1995) has pointed out significant differences between social and other forms of marketing. With respect to the former, he has noted that:

- “the ultimate objective of social marketing is to benefit target individuals or society and not the marketer”;
- “the basic means of achieving improved welfare is through influencing behavior”; and,
- “the target audience has the primary role in the social marketing process” (p.8).

Similarly, Kotler and Zaltman (1971, cited in Weinreich (2000)) observed that social “marketing” seeks to influence social behavior not to benefit the marketer, but to benefit the target audience and the general society”. The Novartis Foundation (2000) expressed the view that social marketing tends to focus on “so-called non-tangible products-ideas and practices as opposed to the tangible products and services that are the focus of commercial marketing”.

In social marketing, Andreasen (1995) emphasized the need to use a customer-centered mindset so that that marketers are seen as bringing about “behavior change by meeting the target market’s needs and wants” (Andreasen, 1995, p.48). Such an approach considers the audience as people “with unique perceptions, needs, and wants to which the marketer must adapt” (Andreasen, 1995, p.48). This can be contrasted (Table 2.1) with the more traditional commercial marketing or organization-centered mindset.

The Customer-Centered Mindset (Andreasen, 1995, p.48)	The Organization-Centered Mindset (Andreasen, 1995, p.41)
The organization's mission is seen as bringing about behavior change by meeting the target market's needs and wants.	The organization's mission is seen as inherently good.
The customer is seen as someone with unique perceptions, needs, and wants to which the marketer must adapt.	Customers are the problem.
Marketing is seen as more than communications.	Marketing is seen as communications.
Market research is vital.	Marketing research has a limited role.
Customers are grouped in segments.	Customers are treated as a mass.
Competition is seen to be everywhere and never ending.	Competition is ignored.
Marketers are chosen for their knowledge of consumers.	Staffers are drawn from those with product or communications skills.

Table 2.1: Characteristics of the Organization-Centered and the Customer-Centered Marketing Mindset

2.2.3.3.1 Marketing Mnemonics

Many writers have described some form of mnemonic technique used to remind marketers of the principles or sets of variables underlying their marketing efforts. For example, in commercial marketing there are the 4Ps of product, price, promotion, and place that are regularly referred to as the four important aspects of the marketing process that must be well understood and combined in the correct proportions in order to successfully market products or services (Kotler and Armstrong, 1991).

With the development of social marketing, there has been an attempt made to expand upon Kotler and Armstrong's (1991) 4Ps, as referenced in Table 2.2.

Marketing Variables				
Commercial Marketing Ps	Social Marketing Mnemonics			
Kotler & Armstrong (1991)	Kotler & Roberto (1989)	Fine (1990)	Andreasen (1995)	Weinreich (1999)
-	-	Producer	-	Policy
-	Target Adopters	Purchaser	-	Publics
Product	Cause	Product(s)	Product	Product
Price	Change Agent(s)	Price(s)	Price	Price
Promotion	Change Strategy	Promotion	Place	Promotion
Place	Channels	Place	Place	Place
-	-	Probing	-	Partnership
-	-	-	-	Purse strings

Table 2.2: Marketing Mnemonics

Fine (1990) has described his seven social marketing Ps as follows:

- **Producer** – The producer is the source of the promotional message. He or she must be a trusted and credible source since a “concept makes more sense to the audience when it is promulgated by a reliable and dependable person or organization [producer]” (Fine, 1981 p.56).
- **Purchaser** – The purchaser is often referred to as the audience, target audience, target market, market segment, constituency, customer, or clientele. Essentially the purchaser is the would-be purchaser of the information. Typically in social marketing, purchasers are divided up into “smaller segments as it is more effective to address each [market] separately” (p.6). This is referred to as ‘targeting’ (Weinreich, 1999, p.51). The challenge for the marketer is to determine what a particular market needs and wants.

- Product – The product(s) must be “designed to satisfy the needs of the markets for which they are intended” (p.6). The individual(s) promoting the product should communicate what “people want to buy, not what one wants to sell” (Weinreich, 2000).
- Price – “To determine price, the producer must find out what value people place on its product. These values are measured not only in money but also time, effort, change in life style, and other social prices” (p.7). “One important way to increase patronage is to make the customer feel he or she is getting good value for the products being purchased. That is really what price is all about” (p.7).
- Promotion –The idea of promotion is essentially the same as communicating information about the product from the producer to the purchaser. “The channels used to promote a product include the mass media and such interpersonal channels as publicity, advocacy, lobbying, etc” (p.7).
- Place – The producer must ensure that the product is available at a convenient time and place for the consumer.
- Probing – Feedback from purchasers is required to evaluate the marketer’s efforts and/or success. The results of the evaluation then need to be incorporated back into the revision of present products or the development of new ones.

2.2.3.4 IMPLEMENTATION

Fine (1990) suggested that a social marketing plan could be developed based upon answers to seven questions that mirrored his 7Ps:

- Who is the producer, the source of the promotional message?
- Who are the potential purchasers in the particular market and what needs and wants do these people have?
- What specific product(s) can the marketer design to help fill the needs identified?
- What price(s) must the purchaser sacrifice in order to obtain the product?
- How can the marketer promote the product, that is communicate with the given market?
- Which product is available at the best place and time for the consumer?

- What probing will be necessary to obtain feedback from purchasers to evaluate the marketer's efforts to sell existing and develop new products? (Fine, 1990, p.5)

In a similar vein, Weinreich (1999) developed a five-step social marketing process (Figure 2.2) that called for:

- planning,
- message and materials development,
- pretesting,
- implementation, and
- evaluation and feedback.

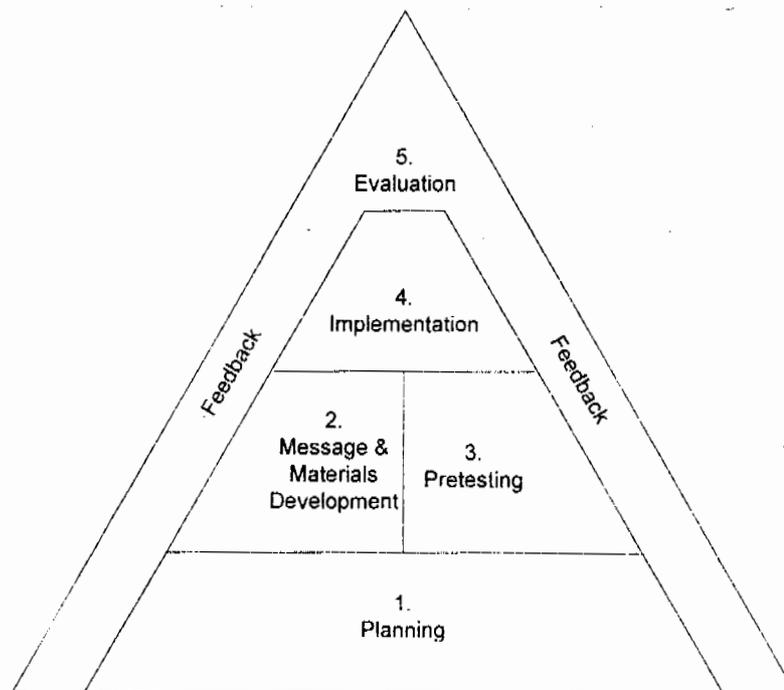


Figure 2.2: The Social Marketing Process (Weinreich, 1999)

The planning phase, according to Weinreich (1999), “forms the foundation on which the rest of the process is built. To create an effective social marketing program, you must understand the problem you are addressing, the audiences you are targeting, and the environment in which the program will operate. Research is used to analyze these factors and to develop a workable strategy for effecting behavior change” (p.21-22).

Weinreich (1999) suggested that, in the planning stage, researchers seek to answer a number of questions, such as:

- “What is the problem being addressed?
- What is the context in which the problem exists?
- Who will be the target audience?
- How does the target audience think and behave as related to the problem?
- How can the target audience best be reached?
- Which message and materials work best?
- “What is the best social marketing mix” (p.27) or the optimum allocation of resources to each of the Ps?

The message and materials phase “uses the information learned in the planning phase to design the messages to be conveyed as well as the materials that will carry the messages to the target audience” (p.22). Pretesting “involves using various methods to test messages and materials with the target audience members to determine what works best to accomplish the program’s objectives. It is not uncommon to go back and forth several times between development and pretesting as you make necessary changes in the message, materials, or overall strategy and explore whether the new approach works” (Weinreich, 1999, p.22). The implementation phase (the fourth step) introduces the program to the previously identified target audience(s). “Finally, the evaluation and feedback phase assesses the effects of the program as a whole as well as the individual elements to the strategy. Evaluation occurs throughout the process of program development, not just at the end, and feedback is used at each stage to improve the program” (Weinreich, 1999, p.22).

2.2.4 MAIL SURVEYS

Mail surveys have proven to be an accurate and cost-effective method for collecting information. One of the most commonly cited individuals with expertise in the design and implementation of mail-administered surveys is Dillman (1978).

Salant and Dillman (1994) in their work pointed out several advantages to using mail surveys. These included:

- ease of implementation,
- lower costs compared to other methods used in social science research,
- minimal amount of resources required compared to other methods,
- more anonymous participation than face-to-face surveys,
- less interviewer bias, and
- a reduction in sampling error at a relatively low cost.

Dillman (1978) and Salant and Dillman (1994) have described a widely-accepted, four-step methodology for implementing mail surveys. The process involves sending:

- “To all members of the sample – a personalized, advance notice letter. Its purpose is to tell people they have been selected for the survey and they will be receiving a questionnaire.”
- “About one week later, again to all members of the sample – a personalized cover letter with slightly more detail on the survey, a questionnaire, and stamped returned envelope.”
- “Four to eight days after the questionnaire goes out, again to all member of the sample – a follow-up postcard thanking those who have responded and requesting a response from those who have not.”
- “Three weeks after the first questionnaire goes out, to those who have not yet responded – a new personalized cover letter informing people, ‘We have not yet heard from you’ with a replacement questionnaire and stamped returned envelope.” (Salant and Dillman, 1994, p.138)

2.3 APPLICATION

In subsequent chapters, the background information, concepts, and methodologies described in the preceding sections will be drawn upon as part of this study of wildland fire communicators.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION TO THE RESEARCH DESIGN

Miles and Huberman (1994) observed that “numbers and words are *both* needed if we are to understand the world” (p.40). By using both qualitative and quantitative data collection techniques, the project followed their recommendation of linking qualitative information to numerical data.

Phase 1 of the research used the Delphi technique to gather information about wildland fire communicators’ perspectives on issues involving wildland fire and its communication. It specifically focused on the roles of wildland fire communicators, the organizations employing them, and the target audiences to whom wildland fire information is directed.

Phase 2 employed a quantitative questionnaire administered to natural resource professionals with wildland fire communication responsibilities to determine the relevance of issues identified both from the qualitative data collected in Phase 1 and from the available literature. Specifically, this phase explored and described the perceived knowledge, attitudes, and skills of wildland fire communicators, as well as the barriers/opportunities they believe exist in doing their job.

3.2 RESEARCH PHASE 1: THE DELPHI METHOD

To begin Phase 1, a suitable technique for qualitative data collection needed to be identified. In a review of qualitative methods literature and in discussions with those knowledgeable about such matters, one methodology – a non-consensus forming Delphi – appeared to be the optimum vehicle given the character of the study. The Delphi was chosen because:

- the method permitted respondents who were widely separated to participate;

- the technique was compatible with a limited budget that prevented face-to-face contact between the researcher and the respondents;
- the method ensured the anonymity of respondents, presumably aiding in accurate data collection;
- the process was straightforward to administer;
- the data gathering process was relatively unobtrusive for the participants; and,
- the participants were assumed to be well-educated, good communicators who were highly self-motivated and would participate in the study because of the nature of their professional responsibilities.

3.2.1 PARTICIPANT SELECTION

Twenty-five wildland fire communicators in different areas of the United States were selected to participate in the Delphi exercise, having been identified by the researcher through personal contacts, suggestions by his committee members, or recommendations from other wildland fire communicators. The goal was to obtain the assistance of individuals who could be considered 'experts' in the field of wildland fire communications and who represented a good cross-section of those employed in such endeavors across the United States. The selection of participants was based upon:

- their availability to participate in all rounds of the Delphi (Did they have the time and inclination to make a commitment to the study?).
- their location within the United States (Was there good geographical representation?)
- their 'place' within the fire community (Who employed them – federal, state/local, or non-governmental/academic organization?); and, most importantly,
- their knowledge, expertise, and reputation in the field of fire communications (Could they be considered to be an 'expert'?).

The 25 wildland fire communicators identified were sent a letter (Appendix B) introducing them to the research project, requesting their participation, and outlining the expectations of them should they wish to be participants. Of those initially contacted, a number of persons expressed the belief that they were not the best individual to participate in such a research undertaking. Many of these individuals recommended other colleagues, usually in the same state, whom they

believed were more knowledgeable about wildland fire communications. After both telephone and e-mail communication with the 25 persons contacted first and with the suggested alternates, 15 individuals ultimately were selected. They exhibited their commitment by agreeing to participate anonymously in a four-round, modified Delphi that would take approximately seven weeks to complete. The participants were drawn from across the country (Table 3.1) and from a variety of employers (Table 3.2). Central to the study was the fact that, based upon their professional activities, their record of service, and their reputations among their peers, the participants could be considered to be 'experts' in wildland fire communications.

State/district	Number of Delphi Participants
Alaska	2
California	2
Florida	2
Idaho	2
Kentucky	1
Maine	1
Minnesota	1
Texas	1
Utah	1
Washington D.C.	2
Total	15

Table 3.1: Delphi Participants by State/District

Organization	Number of Delphi Participants
National Interagency Fire Center and several Affiliate Organizations (e.g. Bureau of Land Management and USDA Forest Service)	3
National Park Service	5
U.S. Fish and Wildlife Service	3
State Natural Resource Agency	2
The Nature Conservancy	1
Academic Institution	1
Total	15

Table 3.2: Delphi Participants by Organization

3.2.2 THE APPROACH

Questions in each of the rounds utilized a ‘needs assessment’ framework (Witkin and Altschuld, 1995). Each question was phrased in such a way as to ascertain the current or ‘what is’ situation regarding a wildland fire communication topic, followed by a question inquiring about the ideal situation or ‘what should be’.

The first round of questions focused upon the needs of wildland fire communicators, the second upon the participants’ perceived needs of organizations or agencies involved with wildland fire management/communications, the third upon the target audience for communications regarding wildland fire, while the fourth asked no new questions but supplied feedback to the respondents on previous rounds of questioning and provided an opportunity for their final comments.

Delphi Round	Topic
1	About Fire Communicators
2	About the Organizations
3	About the Target Audience(s)
4	Final Feedback Round

Table 3.3: Delphi Rounds and Topics

The format used in each round was similar to facilitate ease of response. There were sections in each questionnaire dealing with “Information and Instructions”, “Findings from the Previous Round of Questioning”, “Comments on the Findings”, and “This Week’s Questions”.

The first section was designed to:

- provide instructions for the particular round of questioning,
- remind participants that the comments provided in the round of questioning would not be linked to individual participants,
- remind participants of when responses were due, and
- express appreciation for their participation.

The “Findings from the Previous Round” was used to provide a summary of responses received from the respondents in the last round. The summaries were generally kept short, highlighting similar themes identified by respondents. The “Comments on the Finding” section provided the participants with an opportunity for additional comments or feedback, ensuring an iterative process. The final section, “This Week’s Questions”, presented new questions to be answered.

3.2.3 IMPLEMENTATION

Introductory mailings followed by the questionnaires were sent to participants, the latter over a seven-week period in accordance with the following schedule (Table 3.4).

Event	Date
1. Delphi participants contacted regarding participation	October 15
2. Participation letter sent electronically to those who had not yet responded	October 25
3. First Delphi round sent (Topic: About Fire Communicators)	November 8
4. First round suggested return date	November 12
5. First round analysis	November 12 - 21
6. Second Delphi round sent (Topic: About Communicators' Organizations)	November 22
7. Second round suggested return date	November 26
8. Second round analysis	November 26 - December 6
9. Third round sent (Topic: About the Target Audiences)	December 6
10. Third round suggested return date	December 10
11. Third round analysis	December 10 - 20
12. Fourth round sent (Final Feedback)	December 20
13. Fourth round suggested return date	December 24

Table 3.4: Timeline for Delphi Implementation

Questionnaires were sent via electronic mail (e-mail) to participants at previously confirmed addresses. In the distribution process, the e-mail addresses of the members of the group were suppressed to ensure the respondents' anonymity. Each message was sent in plain language text, with additional copies attached in popular word-processing software formats. The approach was utilized to ensure prompt and easy access to the materials for the respondents. Participants were given five working days to complete and return each questionnaire. Those who did not respond within seven days and who did not make prior arrangements for the late return of their questionnaires received a reminder notice via e-mail encouraging them to send back their completed materials as soon as possible.

3.2.4 DATA ANALYSIS

Once responses were received from the participants, they were analyzed by recording the themes, ideas, and comments expressed by the respondents, and then grouping these accordingly.

Commonly referenced responses were then summarized. An accuracy reviewer, a colleague of the researcher working in the same field, compared the initial e-mail responses with the prepared summary to ensure the latter's accuracy. Response summaries then were provided to the participants in the next round in the "Findings from the Previous Round of Questioning" section of the questionnaire.

The total process of developing questions, administering the questionnaires, and analyzing responses continued until three rounds of questioning had been completed and the fourth round, which provided participants with a final opportunity to comment and/or express their views, concluded.

3.3 RESEARCH PHASE 2: THE QUANTITATIVE QUESTIONNAIRE

For the study, a mail-administered questionnaire was determined to be the optimum vehicle for data collection. A purposeful survey was used, rather than a random sampling of natural resource professionals, since no comprehensive list of individuals charged with responsibility for communicating wildland fire information existed. A mail survey was used given:

- the logistical challenges of conducting a national survey of widely separated natural resource professionals,
- the relatively unobtrusive nature of mail surveys,
- the comparatively low cost of implementation, and
- the ease of administration.

3.3.1 PARTICIPANT SELECTION AND SEARCH METHODS

The following criteria were established for participation in the study. Individuals needed to:

- be employed in the natural resources field,
- be employed by a federal, state or local government or governmental agency, by a non-governmental organization, or by an academic institution,

- be employed in the United States (including the District of Columbia, Alaska, and Hawaii, but excluding Puerto Rico and other U.S. territories), and
- be involved or have a high probability of being involved with wildland fire management and/or its communication. The latter was often determined by job title or the branch of the organization in which the prospective participant was employed.

Five principal ways were used to locate participants who met the above criteria:

- written and e-mail requests to organizations for names, mailing addresses, and phone numbers of those individuals charged with wildland fire communication,
- Internet searches for contacts in natural resource organizations, especially in those divisions or departments responsible for wildland fire management and communication,
- print and on-line searches of organizational phone directories for appropriate participants,
- searches of recent wildland fire and natural resource management conference proceedings for individuals working with wildland fire management and its communication, and
- personal correspondence with professionals in the field known to the researcher, his colleagues, and/or committee members.

After generating a master list of possible survey participants, the list was edited to remove duplicates. A total of 905 natural resource professionals working with wildland fire and its communication were identified at this point. It is unknown how many individuals are charged with wildland fire communication in the United States. The difficulty in ascertaining a complete census of wildland fire communicators results from the fact that such persons are widely dispersed geographically, are employed by numerous organizations, and possess a variety of job titles. At the current time no formal attempt has been made to establish a comprehensive list of individuals responsible for wildland fire communication in the United States. Therefore, it is impossible to determine the proportion of communicators identified using the methods described above compared to the total number of wildland fire communicators in the entire United States.

3.3.2 QUESTIONNAIRE CONSTRUCTION

Questionnaire construction began with the grouping of information to be sought into three distinct sections. The first of these dealt with the respondents' perception of their knowledge, attitudes, and skills, as well as the barriers/opportunities they encountered in doing their job. The second section focused upon NWCG messages, their use, and means of communication, while the third sought to determine the demographics of the respondents.

Development of the first section began with preparation of a matrix. The four columns of the matrix represented participants' perceived knowledge, attitudes, skills, and possible barriers/opportunities. The rows of the matrix reflected the seven questions of Fine's (1990) social marketing process, as well as additional sub-components identified from the literature. For each cell of the matrix (i.e. where a column and row met), a question relevant to the respective column and row was prepared (see Appendix E). Scaling for the first three columns (knowledge, attitude, and skill) used a 5-point scale of 1, 2, 3, 4, 5. The fourth column, focusing upon barrier/opportunity, used a 5-point scale of -2, -1, 0, +1, +2, similar to one described by Fishbein and Azjen (1975).

The second section of the questionnaire employed five NWCG-developed fire management message themes. Participants were asked to rate the usefulness of each of the messages for their region of the United States on a 5-point scale (1, 2, 3, 4, 5). In addition, they were asked to rank five ways of possibly employing the wildland fire message themes. Respondents also were asked questions about whom they communicate with, how often that occurs, what information is typically sought and provided, and their most frequently used means of communication.

The final section, dealing with demographics, asked participants about their employment experience, wildland fire experience, employing organization, state in which they were employed, age, gender, and educational background. In addition, several questions were included to determine the extent to which participants were involved with wildland fire and wildland fire communication activities. Most demographic questions used closed-ended questions with ordered choices, but four were open-ended.

3.3.3 QUESTIONNAIRE TESTING

After initial preparation and review of the 20-page questionnaire, it was sent to 50 participants, randomly selected from the list of 905 natural resource professionals. With it went a covering letter explaining the project, describing its significance, and asking for the participation of the recipient. If they chose to complete the questionnaire, participants were also encouraged to make suggestions on possible improvements to its content and layout. Finally, they were asked to return the completed questionnaire in the pre-addressed, postage paid envelope provided.

Of the 50 questionnaires mailed, only one was returned as undeliverable. Sixteen survey participants returned their completed questionnaires within a three-week period. Most of these individuals, however, indicated that the instrument was too long and took too much time to complete. Many respondents also included excellent suggestions on improving the questionnaire.

Subsequent refinements focused on producing a less lengthy document based upon a new matrix structure with fewer questions – a reduction from 242 questions to 141. The second section of the initial questionnaire concerning wildland fire communication means and methods was deleted. Another change addressed concerns about the clarity of a question about NWCG message themes. Not surprisingly, given this observation, some respondents in the pilot test appeared to have chosen not to answer this question. Finally, minor enhancements to question and scale clarity were undertaken.

With the changes made, the questionnaire (Appendix G) comprised seven sections – A to G -- (Table 3.5) and had been reduced from 20 to 13 pages.

Section	Topic	Number of Questions	Question/Scale Type
A	Participant's Perceived Knowledge	30	Rating – interval
B	Participant's Attitude Regarding WF Communication	30	Rating – interval
C	Participant's Perceived Skill Level	30	Rating – interval
D	Perceived Barriers and Opportunities to WF Communication Efforts	30	Rating – interval
E	NWCG Message Themes and Their Use	6	Rating – interval
F	Respondent's Background (Demographics)	14	Rating – ordinal & interval Open-ended
G	Comments	1	Open-ended

Table 3.5: Questionnaire Construction Summary

Some authors have pointed out that “the distinction between different scales of measurement is often unclear when considering specific measurements.” (Gravetter and Wallnau, 2000, p.25). Kerlinger (1986) noted that while “most psychological scales are basically ordinal, we can with considerable assurance often assume equality of interval” (p.402). The author also expressed the opinion that “many scales and tests used in psychological and educational measurement approximate interval measurement well enough for practical purposes” (p.401). Similar scales were used in all questions in Sections A to D and part of Section E (Table 3.5). They were considered interval or “ordered categories where all of the categories are intervals of exactly the same size” (Gravetter and Wallnau, 2000, p.24). This means that “equal differences between numbers on the scale reflect equal differences in magnitude” (Gravetter and Wallnau, 2000, p.24). The development and use of interval scaling in this project is similar to that employed by Figueiredo (2000).

3.3.4 IMPLEMENTING THE QUESTIONNAIRE

Implementation of the mail survey closely followed the well-established process of Salant and Dillman (1994). This included the mailing of:

- a letter to prospective participants, sent one week before the questionnaire, introducing the study, inviting them to participate in it, and asking them to watch for the questionnaire that would follow shortly by mail (Appendix F);
- the questionnaire and a covering letter reiterating the importance of the study and asking for the questionnaire to be completed and returned within a prescribed timeframe (Appendix G and Appendix H);
- a postcard, sent one week after the questionnaire, reminding participants to return their completed questionnaire, if they had not done so (Appendix I); and,
- a second postcard, sent two weeks after the initial mailing, notifying non-respondent participants that their completed questionnaire had not been received, that their input was still desired, and encouraging them to respond promptly. (Appendix J).

3.3.5 DATA ANALYSIS

Information contained in the completed and returned questionnaires was entered into a Statistical Package for Social Scientists (SPSS 9.0.0) based upon the individual participant's responses to both scaled and ranked questions. Answers to open-ended questions were coded and the frequency of the coding recorded.

Data were analyzed using several methods. First the mean and standard deviation were calculated for all interval scale data in Parts A to D of the questionnaire and for relevant parts of Sections E and F. This technique allowed the center rating and spread around the center rating to be determined when data were aggregated into particular groups, such as ones based upon Fine's (1990) seven social marketing Ps, respondents' regions, or respondents' employers.

Pearson correlational analysis was employed to highlight the extent of relationships between two interval data variables. Results were recorded on a range of -1.0 to +1.0. The closer the

relationship was to 1.0, the stronger it was. When numbers approached 0.0 the relationship was weaker. Pearson correlation identified the character of relationships – a positive value (+) indicated a positive relationship and a negative value (-) a negative one. Descriptions of relationships in this research were based upon the description of correlation coefficients set forth by Davis (1971), and presented in Table 3.6.

Correlation Coefficient	Description of Relationship
.70 and higher	very strong relationship
.50 - .69	substantial relationship
.30 - .49	moderate relationship
.10 - .29	low relationship
.01 - .09	negligible relationship

Table 3.6: Correlation Descriptors from Davis (1971)

Correlation analysis, however, does not offer suggestions on possible ‘cause and effect’ relationships. Results in the report are based upon the responses of the 321 wildland fire communicators who returned completed questionnaires within the four-week response period. No attempt was made to generalize results to the entire population who received questionnaires or to extrapolate beyond the bounds of this study and report implications for all wildland fire communicators in the United States.

One inferential statistic, a one-way analysis of variance (ANOVA), was used in an exploratory manner, not to infer results to all 905 participants, or to the presently unknown number of wildland fire communicators in the United States. The use of ANOVA merely provided refined exploration in the attempt to define areas of future study. It also was used to “evaluate mean differences between two or more treatments (or populations)” (Gravetter and Wallnau, 2000, p.397), specifically those relating to perceived knowledge, attitude, skill, barrier/opportunity and

regions in which participants were employed. When the results indicated that the means were not all the same, a least significant difference (LSD) post hoc test was necessary to compare individual treatments.

3.4 METHODOLOGICAL LIMITATIONS

A methodological limitation – ‘coverage error’ as defined by Salant and Dillman (1994) – was encountered during development of the study. Identification of possible participants provided a challenge since no comprehensive list of wildland fire communicators existed and since it was not known how many natural resource professionals working with wildland fire and its communication there were in the United States. Similarly, it was difficult, by simply using job title, employer, or other demographic characteristic, to gauge accurately the extent to which individuals who may be involved with wildland fire might actually serve as wildland fire communicators. To address this unknown, respondents were asked to indicate the extent of their personal involvement in wildland fire communication.

Another limitation can be attributed to the timeframe in which the study, of necessity, was conducted. Pilot testing of the questionnaire was undertaken during the spring fire season and then the questionnaire was mailed during the peak of the summer fire season. It is conceivable that such timing may have reduced the response rates given the other demands upon wildland fire communicators during these periods. It is worth noting, however, that the challenges and opportunities, for example, faced by respondents would be uppermost in their minds during the times in which responses were being sought, perhaps contributing to more accurate completion of the questionnaires than would have occurred had their impressions been tempered by time.

3.5 INSTRUMENT VALIDITY AND RELIABILITY

Babbie (1998) defines validity as “the extent to which an empirical measure adequately reflects the *real meaning* of the concept under consideration” (p.133). Two measures of validity were used in the research – content validity and face validity. Content validity or the “degree to which a measure relates to other variables as expected within a system of theoretical relationships” (Babbie, 1998, p.62) was employed to analyze the survey instrument – as it was being developed – using a panel composed of faculty and graduate students at The Ohio State University, as well as a random sample of wildland fire communicators. The latter group was asked to complete a

draft questionnaire and make suggestions or comments concerning its content and structure. The questionnaire was revised based upon both groups' recommendations. Face validity is the "quality of an indicator that makes it seem a reasonable measure of some variable" (Babbie, 1998, p.63). Fifty wildland fire communicators randomly selected from a total population of 905 then were used to pilot test the questionnaire to assess face validity. Their suggestions also were incorporated into the final version of the instrument.

Data reliability (the "quality of data measurement method that suggests that the same data would have been collected each time in repeated observations of the same phenomenon" (Babbie, 1998, p.66)), was determined for each measurement scale by calculating Cronbach's Alpha using SPSS 9.0.0. The calculation measures the consistency of an item with other items within a specific scale. The methodology was used as the primary reliability measure. It was determined that any results equal to or greater than 0.6 using Cronbach's Alpha would be considered reliable. Reliability measures using Cronbach's Alpha are presented throughout Chapter 4 as they relate to specific question areas.

CHAPTER 4

RESULTS

4.1 RESEARCH PHASE 1: THE DELPHI

Of the 15 experts who started the seven-week Delphi process, 13 completed the three rounds designed to identify key issues concerned with the current and ideal state of wildland fire communications in the United States. Two individuals did not complete all rounds because of required alterations in their personal schedules to accommodate unscheduled travel and emergency fire suppression responsibilities.

The following three sections detail the findings of each round of Delphi questioning. The questions posed to Delphi participants are set out followed by a summary of the responses participants provided to them. Where participants made other pertinent comments, observations, or recommendations in the “Comments on the Findings” section of the questionnaire, they also have been noted.

4.1.1 ROUND 1

Question 1. Briefly describe the current state of wildland fire communication, as you perceive it, in your area or region of the country. Please then compare the state you have just described with the situation in the United States as a whole.

Responses varied from region to region, but the following common themes emerged:

- wildland fire communication is reactive rather than proactive and is generally limited to times of extreme fire danger;

- there is less wildland fire communication conducted in areas with infrequent fire regimes;
- the quality of communication relates directly to the existence of personnel dedicated to wildland fire communication;
- “Lots of different groups are saying similar, but not identical things. There are a lot of [wildland fire] messages out there!”; and,
- wildland fire resources are either abundant or totally lacking depending upon whether or not there are active fires.

Question 2a). Is the state you described above ideal for wildland fire communication?

Most respondents answered in the negative by responding, “Not at all” or “No”, although a few individuals said that the situation approached the ideal.

Question 2b). If not, what do you believe the ideal to be?

The universal ‘ideal’ seemed to have three components:

- a clear message about wildland fire:
 - that was intended for an entire state or tailored to specific regions/ecosystems;
 - that emphasized the need for fire suppression, while recognizing that total fire suppression may be undesirable; and,
 - that was part of a sustained public relations campaign that included developing and maintaining good relations with the media.
- sufficient resources, both financial and human, including having trained fire information personnel available for both public and media inquiries.
- adequate planning that included:
 - ensuring the existence of proactive communication plans and tools designed to reach the desired audiences at the least possible cost, and
 - increased coordination and collaboration in communication projects.

Question 2c). If the current state of wildland fire communication differs from your ideal state, what prevents this ideal state from being achieved and what do you believe is the single greatest barrier to be overcome?

Barriers to improved communication included:

- the absence of sufficient resources for education ('overwhelming resources when fires are in progress, but non-existent resources when fires are not burning');
- a lack of staff dedicated to communicate wildland fire information;
- inadequately trained personnel ('there are not many people with a fire management background...most have only been taught fire suppression techniques');
- lack of a common perspective about wildland fire as illustrated by the gulf between suppression advocates and prescribed burning supporters;
- the absence of some standardized communication devices/products with flexibility to use around the country;
- the disconnection with the public and policy-makers; and,
- restrictive laws and regulations about the use of prescribed fire.

Question 3. Is there any information (scientific, technical or otherwise) that is needed to advance wildland fire communication within agencies/organizations across the United States?

Informational needs identified by participants included:

- evidence to show that wildfire is more destructive (particularly to watersheds) than prescribed fire,
- more information about the effects of fire on air quality,
- information on landscape plants and their flammability,
- how to define defensible space (by ecosystem) utilizing standardized methodologies,
- more information on how people learn,
- how to anticipate communication needs, and
- how to convey wildland fire concepts through the use of improved terminology ('reduce jargon').

Question 4. What wildland fire related education/communication products have you used when communicating about fire?

The tools employed included:

- 1 - 800 numbers,
- general advertising,
- billboards,
- brochures,
- CD-ROMs,
- county meetings,
- 'dear neighbor' letters,
- signed demonstration areas,
- door hangers,
- educational programs in schools,
- educational publications,
- exhibits,
- fire-fighting tools and gear,
- press kits,
- videos,
- websites, and
- workshops/presentations to target audiences (i.e. opinion makers and neighbors).

Question 4b). Which of these products was most useful?

There seemed to be some agreement that websites were an inexpensive and easy way to get information into the hands of those people who wanted it. There was also a recognition that the Internet would be an essential tool for communications in the future.

Question 4c). What other products are needed?

Suggestions included products:

- for communities (community involvement through extension education, talks with communities at a personal level),
- for 'power brokers' outside the natural resources field (dialog with developers, builders, real estate agents), and
- for wildland fire communicators to use to evaluate their present communication efforts and/or products.

4.1.2 ROUND 2

Question 1a). Does your agency/organization (or one with which you are very familiar) presently have a formal message that it is trying to communicate to audiences about wildland fire management?

About 90% of respondents reported that their agency/organization had a formal message about wildland fire. The remaining ten percent indicated their agency/organization had no formal message, but many of these respondents referenced 'unofficial' messages of relevance to wildland fire management that were important to the agency or organization.

Question 1b). If so, what is it?

The message – of those agencies/organizations that had one – focused upon:

- the natural role of fire,
- fire prevention, suppression, and prescription, and
- prescribed fire and the need to reduce fuel loads.

Question 2. (Respondents noted that many groups are saying similar, but not identical things, about wildland fire management).

Question 2a). Should there be a singular message about wildland fire management for the U.S. as a whole?

- Two-thirds of respondents said “no”. Explanations for this position included:
 - it is risky to promote a single solution to a complex problem;
 - too broad a message could not be effectively communicated (as there are too many factors to deal with when creating a single message – types of ecosystems, physical geography, audiences, policies); and,
 - mission differences among organizations would make it almost impossible to establish a common message.

- The remaining one-third of respondents believed there should be a single message and suggested:
 - that repetition is the key (since a common, consistent message would allow it to be used and then repeated throughout the nation creating familiarity with it);
 - that the public should understand that fire is a national problem that needs a national solution; and,
 - that more use should be made of the National Wildfire Coordinating Group (NWCG)’s series of messages that it is encouraging its members to use.

Question 2b). If ‘yes’ to 2a, should there also be messages tailored to particular ecosystem types or geographic areas?

Question 2c). If ‘no’ to 2a, should there be individual messages tailored to particular ecosystem types or geographic areas?

Respondents believed that there should be messages tailored to particular ecosystem types or geographic areas since:

- a message at the regional or ecosystem level would be more meaningful to audiences than one communicated at the national level;
- differences in the fire regimes of particular habitats needed to be communicated; and,

- products needed to be tailored to specific situations and audiences – generic products are often not useful for different areas of the country.

Question 3a). Who should assume lead responsibility for wildland fire messaging in the United States?

Answers focused primarily on:

- The National Wildfire Coordinating Group (NWCG) since it:
 - is a coalition comprising state and federal entities,
 - already is funded,
 - encompasses all the main players in fire management nationwide, and
 - has developed appropriate messages, and just needs to distribute them more widely and encourage their use.
- A collaboration of federal and state agencies – some suggested fire agencies, some suggested natural resource management agencies, and others recommended a combination of the two.

Question 3b). Who else should be involved?

Respondents suggested the involvement of:

- advocates and proponents of wildland fire management,
- county extension agents,
- educational organizations (especially those focusing on youth education),
- emergency response officials,
- field personnel,
- insurance agents,
- land developers,
- land management agencies (local, state and federal),
- landowners,
- local governments,
- resources agencies (in addition to those dealing with fire suppression),

- special interest groups,
- the states, and
- volunteer fire departments.

Question 4. (Many respondents talked about planning for effective communication).

Question 4a). Has your agency (or one with which you are very familiar) ever conducted a study or evaluation to determine your audience for wildland fire communication?

- About two-thirds of respondents reported that no study or evaluation had been done.
- Ten percent indicated an evaluation or study had been completed.
- Another ten percent reported one underway.
- Ten percent also stated that their audience had been 'assumed' for evaluation purposes.

Question 4b). If yes, who were the most significant members of that audience?

Where a determination of an audience had been made, the most significant members were:

- residents and visitors to the area, and
- adult debris burners and juvenile fire starters.

Question 4c). What products were of optimum use in reaching the audience identified in 4b.

Products or methods identified included:

- park newspapers
- focus groups on communication effectiveness and needs,
- electronic media,
- public service announcements,
- bulletin boards,
- continuing education programs, including workshops, and
- media stories for juvenile readers.

4.1.3 ROUND 3

Question 1a). In the ideal situation, what do you believe should be the U.S. public's perception of wildland fire?

The respondents believed that the public should have:

- an understanding that fire is an important natural agent of renewal that is necessary for the maintenance of many types of ecosystems;
- an understanding that prescribed fire is an important resource management tool that managers can use for resource protection, as well as ecological and fuel management;
- the knowledge that fire is neither good nor bad but has beneficial and negative effects in each ecosystem;
- the knowledge that wildland fires that threaten life or property should be suppressed, while those that do not should not need human intervention;
- an idea of the actions people can take to protect their property from wildland fires and a recognition that they must adapt their style of living to accommodate the periodic presence of fire; and,
- an understanding that continued fire suppression can lead to far more devastating wildfires.

Question 1b). Which of the elements listed in 1a) is most important?

Respondents listed the following:

- fire is a natural part of our environment;
- fire is not necessarily an agent of destruction, but an agent of renewal;
- almost all U.S. ecosystems have evolved with fire; and,
- wildland fires that do not threaten life or property should not be suppressed.

Question 2a). What do you believe is the U.S. public's current perception of wildland fire?

Two general views prevailed:

- fires are bad because they damage ecosystems, resources, and the economy; and,
- fire is a force of nature that can be controlled with enough people and equipment.

Question 2b). Does the public's view in the state (or geographic area) with which you are most familiar differ from that in the United States as a whole, and if so, why?

Most respondents believed that the public in their region had about the same level of knowledge about wildland fire related issues as citizens in the rest of the country.

Question 2c). In what area(s) of the country is the public most knowledgeable about wildland fire related issues? Please suggest reasons for this level of knowledge.

Most respondents focused on:

- the Southeastern U.S. (especially Florida).

Reasons for increased knowledge included:

- the vast use of prescribed fire,
- the high frequency of natural fire,
- a culture of using fire for agriculture and natural resource management, and
- recent severe fires.

- the Western U.S. (with most respondents citing California)

Reasons for increased knowledge included:

- the high frequency of natural fire,
- media attention,
- the public's exposure to the benefits of fire,
- the public's having been personally affected by fire (both prescribed burning and wildfire), and

- extensive educational outreach efforts by agencies.
- Alaska
 - Reasons for increased knowledge included:
 - citizens in predominantly rural areas being more tolerant of fire because of a better understanding of the forces of nature.

Question 3a). How can wildland fire professionals generate increased and ongoing interest about fire related issues in a public that may not be interested in wildland fire management issues?

Respondents suggested communicators:

- develop an interesting message;
- coordinate educational efforts in areas where fire related issues are of importance to the general public;
- try to reach the public through education immediately after fires have occurred;
- continue fire education year-round;
- work more with community leaders with the goal of developing a greater understanding of wildland fire issues;
- explain that the re-introduction of fire is an environmentally responsible practice;
- utilize various media (and particularly television) continuously to explain the need for the use of fire to reduce the occurrence of adverse fire situations;
- invite media representatives to wildland fire activities (e.g. prescribed fires and fire suppression efforts); and,
- encourage the media to report on the public's personal experiences with wildland fire.

Question 3b). What specific recommendations would you make for those areas of the United States, such as the East, with less frequent fire regimes?

It was suggested that efforts be made to:

- integrate fire education into the school curriculum – both theory and 'hands on' experience with fire systems;
- educate agency personnel who have been suppression oriented;

- educate professional foresters and loggers who sometimes ‘send messages’ based on economics rather than ecology;
- work specifically with landowners in areas where there is truly an issue with fire danger;
- develop information about the history of fire for natural community types so that sound ecological information can be presented;
- educate the public about the differences between the effects of wildfire and the benefits of prescribed burning;
- organize state fire councils to develop unified wildland fire messages;
- make fire a media event when it occurs; and interestingly,
- avoid any discussion of fire until it occurs in areas where fire is infrequent.

4.2 RESEARCH PHASE 2: THE QUANTITATIVE QUESTIONNAIRE

Of the 855 questionnaires mailed, 51 were returned as a result of being undeliverable or addressees recently having retired, changed employers, and/or their having left no forwarding address. After four weeks and two post card reminders, 321 completed questionnaires were returned. This equates to a 40% response rate following the calculations of Dillman (1978). It should be noted that data from the pilot testing of the questionnaire were not included since it was not comparable given subsequent revisions to the survey instrument.

4.2.1 DEMOGRAPHICS

Respondents came from all but three states – Delaware, Iowa, and New Jersey (Appendix K). Of the 316 respondents who listed the state in which they were employed, 7.6% were from Florida, 7.2% from Idaho, 6.3% from California, 5.7% from New Mexico, 4.7% from each of Arizona and Oregon, 4.4% from each of Alaska and Colorado, 4.1% from Montana, and 3.2% from Georgia. Participants from these ten states comprised just over 52% of all respondents. Using the modified U.S. Fish and Wildlife Service regions (described below) most responses were received from Region 1 – the West (86, being 27.3% of the total) – and Region 4 – the Southeast (61/19.4%). The Midwest (Region 3), the Northeast (Region 5), and the Southwest (Region 2) had the fewest returns with 33/10.5%, 42/13.3%, and 42/13.3%, respectively, while the North Central (Region 6) had 51/16.2%.

The response rates were highest for the following states: Arkansas (100%), Kentucky (100%), South Dakota (100%), Michigan (80%), Missouri (71%), Ohio (66%), Indiana (62%), South Carolina (58%), North Dakota (57%), Florida (54%), and Wisconsin (53%). As for the regions, the Midwest (Region 3) scored highest (55.9%), Region 4 (Southeast) had a response rate of 46.9%, Region 2 (Southwest) 46.2%, Region 6 (North Central) 37.0%, Region 5 (Northeast) 31.1%, and finally, Region 1 (West) 28.5%.

While only approximately one in four prospective survey participants in the West responded to the questionnaire, they still represented over 25% of all study participants. In contrast, over 55% of the questionnaires mailed to the Midwest were completed, but these constituted only about 10% of all responses received. Response rates for particular states and regions are presented in Appendix K.

4.2.1.1 GENDER

Of the 312 individuals who responded to the gender question, three-quarters (74.7%) were male and one-quarter (25.3%) female.

4.2.1.2 AGE

The respondents ranged between 25 and 67 years old, as of their last birthday, with the mean being 46 years of age.

4.2.1.3 EDUCATIONAL BACKGROUND

Respondents to the questionnaire were typically very well-educated – almost 93% had graduated from college or university and nearly 30% had graduate degrees. Four and a half percent held a doctoral degree, 25.2% possessed a master's degree, 18.2% had completed some graduate work, 39.9% had received a bachelor's degree, 5.1% a technical or associate degree, 6.1% completed some college education, and 1.0% of respondents had a high school diploma.

Fifty-two different fields of endeavor were listed by the 303 respondents who identified an educational field or subject area in which they had attained their highest level of education. Six general categories, however, encompassed 48% of respondents. Not surprisingly, the most

common subject area was forestry (including silviculture and forest management) with 31.4% of respondents. Next came wildlife management with 9.9%, natural resources (including natural resource management) 5.3%, communications (4.3%), and fire management (including fire science) and biology, each with 3.6%.

4.2.1.4 EMPLOYMENT

Sixty-four percent of respondents indicated that they were employed by a federal government organization, with over one-quarter of these working for the USDA Forest Service. State and local employees comprised 18.4% of respondents. Non-governmental organizations and academic institutions employed 9.3% of survey participants, while 7.8% of respondents worked for 'other' employers.

Organization	Number of Respondents	Percent of Total
USDA Forest Service	95	28.6
Natural Resource Conservation or Protection Organization (state or local level only)	57	17.2
U.S. Fish and Wildlife Service	46	13.9
Bureau of Land Management	44	13.3
The Nature Conservancy	26	7.8
Other	26	7.8
National Park Service	21	6.3
Academic Institution	5	1.5
Park or Preserve Organization (state or local level only)	4	1.2
Bureau of Indian Affairs	3	0.9
National Interagency Fire Center	3	0.9
U.S. Military	2	0.6
Total	332*	100.0

* Respondents could list more than one employing organization.

Table 4.1: Respondents' Employers

Two hundred and ninety-eight respondents reported their current job title. About fifty-eight percent of respondents' jobs could be grouped into ten categories. The four most commonly cited jobs were Fire Management Officer (also including Assistant or Acting) by 12.8% of respondents, Public Affairs Specialist (9.4%), Public Affairs Officer (8.1%), and Forester (6.7%).

4.2.1.5 EXPERIENCE WITH WILDLAND FIRE AND ITS COMMUNICATION

About two-thirds of respondents reported that they worked 'sometimes', 'very often' or 'extensively' with wildland fire in their current position (Table 4.2). Two out of three individuals in this group were in the 'very often' or 'extensively' categories. Over 70% of federal respondents who worked with wildland fire reported such activity occurred 'very often' or 'extensively'. The comparable figure for employees of the other organizations was approximately 60%.

Number of Respondents Who Work with Wildland Fire...	Organization			
	Federal	State/Local	NGO	Other
Never	5.4%	0.0%	3.2%	7.7%
Rarely	23.4%	41.7%	35.5%	34.6%
Sometimes	24.9%	15.0%	32.3%	19.2%
Very Often	14.6%	11.7%	12.9%	23.1%
Extensively	31.7%	31.7%	16.1%	15.4%
Total	100.0%	100.0%	100.0%	100.0%

Table 4.2: Respondents' Work with Wildland Fire by Organization

When the 'work with wildland fire' data were considered by region (Table 4.3), over three-quarters of individuals in the Southwest and the Southeast worked 'sometimes', 'very often', or 'extensively', compared to only slightly more than 40% in the Midwest.

Number of Respondents Who Work with Wildland Fire...	Region					
	1(W)	2(SW)	3(MW)	4(SE)	5(NE)	6(NC)
Never	9.4%	4.9%	0.0%	1.7%	2.4%	4.0%
Rarely	25.9%	19.5%	57.6%	20.0%	35.7%	24.0%
Sometimes	22.4%	26.8%	12.1%	36.7%	9.5%	26.0%
Very Often	10.6%	19.5%	9.1%	16.7%	19.0%	18.0%
Extensively	31.8%	29.3%	21.2%	25.0%	33.3%	28.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4.3: Respondents' Work with Wildland Fire Work by Region

There was little variation by organization in the percentage (approximately 60%) of respondents who reported working with wildland fire communications 'sometimes', 'very often', or 'extensively' (Table 4.4).

Number of Respondents Who Work with Wildland Fire Communication...	Organization			
	Federal	State/Local	NGO	Other
Never	2.0%	0.0%	3.2%	3.8%
Rarely	34.3%	43.3%	35.5%	38.5%
Sometimes	32.4%	20.0%	38.7%	23.1%
Very Often	19.6%	20.0%	19.4%	26.9%
Extensively	11.8%	16.7%	3.2%	7.7%
Total	100.0%	100.0%	100.0%	100.0%

Table 4.4: Respondents' Work with Wildland Fire Communication by Organization

When respondents who worked 'sometimes', 'very often', or 'extensively' with wildland fire communication were grouped by region (Table 4.5), the results ranged from a low of 45% in the Northeast to a high of 75% in the Southwest.

Number of Respondents Who Work With Wildland Fire Communication...	Region					
	1(W)	2(SW)	3(MW)	4(SE)	5(NE)	6(NC)
Never	4.8%	0.0%	0.0%	0.0%	4.8%	0.0%
Rarely	38.1%	24.4%	45.5%	35.0%	50.0%	28.0%
Sometimes	23.8%	39.0%	24.2%	38.3%	16.7%	38.0%
Very Often	20.2%	31.7%	6.1%	18.3%	14.3%	26.0%
Extensively	13.1%	4.9%	24.2%	8.3%	14.3%	8.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4.5: Respondents' Work with Wildland Fire Communication By Region

About one-third of respondents described the amount of time they worked with wildland fire as ‘very often’ or ‘extensively’ (Table 4.6). Of this group, those who also worked ‘very often’ or ‘extensively’ with wildland fire communications constituted about one-quarter of all respondents. There was a very clear pattern in that those in their current jobs who worked more with wildland fire also communicated more about it. In this regard, there was a positive correlation of 0.649 (Table 4.8).

		AMOUNT RESPONDENTS WORK WITH WILDLAND FIRE...					
		Never	Rarely	Sometimes	Very Often	Extensively	Total
AMOUNT RESPONDENTS COMMUNICATE ABOUT WILDLAND FIRE...	Never	5	3	5	1	0	14
	Rarely	1	75	12	2	0	90
	Sometimes	0	20	40	11	2	73
	Very Often	0	6	13	25	3	47
	Extensively	0	11	23	25	31	90
	Total	6	115	93	64	36	314

Table 4.6: Respondents’ Work with Wildland Fire and Wildland Fire Communication

Almost 60% of respondents reported that they had been employed as natural resource professionals for over 20 years, with nearly 38% working in the field for 24 years or more (Table 4.7). Over 55% of respondents had been in their present position for seven years or less, with three-quarters of all survey participants holding their present job for 15 years or less. About 40% of respondents had worked with wildland fire as one element of their job(s) for 20 or more years, while half that number for the same period were involved with wildland fire communications. Nearly 40% of all respondents had seven years or less of wildland fire communications experience.

	Percent of respondents ...			
	Employed as natural resource professionals for...	Who, as one element of their job(s), have worked with wildland fire for...	Who, as one element of their job(s), have communicated about wildland fire for...	Who have been in their present position for...
3 years or less	2.2	7.2	19.8	29.0
4 to 7 years	5.3	15.7	19.2	26.1
8 to 11 years	10.7	16.6	17.6	21.7
12 to 15 years	10.7	11.9	13.2	13.1
16 to 19 years	11.3	9.1	7.9	2.2
20 to 23 years	21.9	18.5	10.4	4.1
24 or more years	37.9	21.0	11.9	3.8

Table 4.7: Respondents' Employment History

Data presented in Table 4.8 indicated additional significant relationships:

- between the respondents' time in the natural resources field (F1) and their time working with wildland fire (F2) 0.683, and
- between the respondents' time working with wildland fire (F2) and their time communicating wildland fire information (F3) 0.740.

		F1	F2	F3	F9	F10
F1 (working as a natural resource professional)	Pearson Correlation	1	0.683**	0.511**	0.032	-0.049
	Sig. (2-tailed)	.	6.0E-21	6.1E-21	5.8E-01	3.9E-01
	N	319	319	318	315	314
F2 (wildland fire part of job)	Pearson Correlation	0.683**	1	0.740**	0.308**	0.169**
	Sig. (2-tailed)	6.0E-21	.	6.1E-21	2.3E-08	2.7E-03
	N	319	319	318	315	314
F3 (communication about wildland fire part of job)	Pearson Correlation	0.511**	0.740**	1	0.255**	0.216**
	Sig. (2-tailed)	6.1E-21	6.1E-21	.	4.7E-06	1.2E-04
	N	318	318	318	314	313
F9 (wildland fire part of current job)	Pearson Correlation	0.032	0.308**	0.255**	1	0.646**
	Sig. (2-tailed)	0.58	0.00	0.00	.	6.4E-21
	N	315	315	314	315	314
F10 (communication about wildland fire part of current job)	Pearson Correlation	-0.049	0.169**	0.216**	0.646**	1
	Sig. (2-tailed)	0.39	0.00	0.00	0.00	.
	N	314	314	313	314	314

** Correlation is significant at the .01 level (2-tailed).

Table 4.8: Pearson Correlation of Respondents' Years of Service, Work with Wildland Fire, Work with Wildland Fire Communication, Work with Wildland Fire in Current Job, and Work with Wildland Fire Communication in Current Job.

4.2.2 PERCEIVED KNOWLEDGE

Objective 1: To describe communicators' perception of their knowledge of wildland fire communications.

This section contains the record of respondents' self-reported knowledge ("the range of one's information or understanding" (Merriam-Webster, 2000)) about wildland fire topics based upon their answers to 30 questions. Respondents were asked to rate their knowledge of specific subjects on a scale that ranged from one to five with one representing 'limited knowledge', three 'some knowledge', and five 'extensive knowledge'.

4.2.2.1 OVERALL PERCEIVED KNOWLEDGE

On average, respondents rated their overall knowledge at 3.36 on the scale described above. The topic that received the highest rating (4.26) dealt with the respondents' knowledge of the "fire-related mission or mandate" of their employing organization. The topics that ranked the highest (3.96 to 4.26) generally were associated with what might be called organizational issues.

Number	Statement	Mean	Std. Dev.
A25	The fire-related mission or mandate of my organization.	4.26	0.90
A1	My organization's wildland fire communication message(s).	4.15	0.93
A16	Formal communication channels within my organization.	4.14	0.85
A2	Organizational training opportunities regarding wildland fire that are available to me.	4.02	0.97
A29	Working in partnerships, cooperatively and collaboratively.	3.96	0.92

Table 4.9: Respondents' Five Areas of Greatest Perceived Knowledge

Respondents revealed that their lowest overall knowledge (2.82) concerned the use of "evaluative feedback". The other topics receiving the lowest overall ratings (Table 4.10) also related to communication activities.

Number	Statement	Mean	Std. Dev.
A18	Incorporating evaluative feedback into new or existing communication efforts.	2.82	1.02
A10	Producing communication products that appeal to clients during times of low fire risk.	2.86	1.11
A13	Promotional theories and techniques for wildland fire communication.	2.88	1.09
A24	Developing long-term wildland fire communication programs.	2.89	1.15
A17	Identifying audience subsets within a larger population to direct communication efforts towards.	2.94	1.06

Table 4.10: Respondents' Five Areas of Least Perceived Knowledge

Reliability for the knowledge section was calculated at 0.9642 using Cronbach's Alpha. All the topics to which respondents responded with respect to their level of knowledge are ranked in Appendix L.

4.2.2.2 PERCEIVED KNOWLEDGE BY SOCIAL MARKETING PS

Responses to the knowledge questions by respondents were grouped for purposes of analysis using each of Fine's (1990) social marketing Ps (see Chapter 2). Respondents revealed that they perceived their greatest knowledge in the area of 'producer' with a mean of 3.94 and their least knowledge about 'probing' at 2.89. (Table 4.11) Reliability for each of the Ps was calculated, ranging from 0.7252 to 0.8976.

Social Marketing Ps	Mean Perceived Knowledge Rating	Std. Dev.	Reliability (Cronbach's Alpha)
Producer	3.94	0.97	0.7933
Place	3.70	1.04	0.7856
Products	3.34	1.04	0.7252
Purchasers	3.27	1.03	0.8643
Promotion	3.27	1.05	0.8495
Price	3.08	1.11	0.8976
Probing	2.89	1.11	0.8453
Overall	3.36	1.05	0.9642

Table 4.11: Respondents' Perceived Knowledge About the Social Marketing Ps

4.2.2.3 PERCEIVED KNOWLEDGE BY REGION

Results of the knowledge section were also categorized by geographic region using the regions employed by the U.S. Fish and Wildlife Service with one modification, that being the inclusion of Alaska in Region 1 (West) rather than having it comprise its own region. The regions and number of respondents in each are presented in Table 4.12.

Region	States	Number of States	Number of Respondents (% of Total)
1 (West)	AK, WA, OR, ID, NV, CA, HI	7	86 (27.3%)
2 (Southwest)	AZ, NM, TX, OK	4	42 (13.3%)
3 (Midwest)	MN, WI, MI, MO, IL, IA, IN, OH	8	33 (10.5%)
4 (Southeast)	KY, TN, NC, SC, GA, FL, AL, MS, LA, AR	10	61 (19.4%)
5 (Northeast)	ME, NH, VT, NY, DE, NJ, DC, WV, VA, CT, RI, MA, PA, MD	14	42 (13.3%)
6 (North Central)	MT, ND, SD, NE, CO, UT, KS, WY	8	51 (16.2%)
Total			315 (100.0%)

Table 4.12: Regions – Adapted from U.S. Fish and Wildlife Service Regions

When participants' responses about knowledge were grouped by region and by the social marketing Ps, Region 2 (SW) recorded the highest score (3.44) overall and Region 5 (NE) the lowest (3.26).

Participants in Region 2 (SW) were most knowledgeable about 'purchasers' (3.39), 'products' (3.48), and 'promotion' (3.39); respondents in Region 1 (W) about 'price' (3.21), 'place' (3.81), and 'probing' (3.01); and, those in Region 4 (SE) were most knowledgeable about the 'producer' category (4.02).

The regions reporting the lowest scores were Regions 1 and 5 with regard to 'producer' (3.88), Region 3 (MW) concerning 'place' (3.61), Region 4 (SE) with regard to 'purchasers' (3.11) and 'probing' (2.97), Region 5 (NE) concerning 'products' (3.21), Region 6 for 'promotion' (3.21), and, finally, Regions 4 and 5 had the same rating of 2.87 concerning 'price'. Internal consistency of rating was calculated by region, ranging from 0.9004 to 0.9542.

Perceived Knowledge of...	Region					
	1(W)	2(SW)	3(MW)	4(SE)	5(NE)	6(NC)
Producer	3.88 (0.74)	4.01 (0.74)	3.97 (0.55)	4.02 (0.78)	3.88 (0.90)	3.92 (0.57)
Purchasers	3.38 (0.94)	3.39 (0.89)	3.36 (0.68)	3.11 (0.91)	3.13 (0.94)	3.25 (0.78)
Products	3.35 (0.81)	3.48 (0.80)	3.35 (0.57)	3.28 (0.80)	3.21 (0.88)	3.38 (0.73)
Price	3.21 (1.01)	3.20 (0.94)	3.18 (0.75)	2.87 (1.00)	2.87 (0.99)	3.11 (0.84)
Promotion	3.28 (0.80)	3.39 (0.87)	3.28 (0.82)	3.30 (0.89)	3.24 (0.88)	3.21 (0.85)
Place	3.81 (0.77)	3.76 (0.91)	3.61 (0.76)	3.62 (0.92)	3.71 (0.91)	3.67 (0.68)
Probing	3.01 (0.99)	2.98 (1.01)	2.97 (0.87)	2.70 (1.04)	2.76 (1.04)	2.94 (0.87)
Overall Rating (Std. Dev.)	3.42 (0.87)	3.44 (0.88)	3.39 (0.71)	3.27 (0.91)	3.26 (0.93)	3.36 (0.76)
Reliability – Cronbach's Alpha	0.9477	0.9478	0.9004	0.9485	0.9542	0.9389

Table 4.13: Respondents' Perceived Knowledge About the Social Marketing Ps by Region

4.2.2.4 PERCEIVED KNOWLEDGE BY ORGANIZATION

Respondents employed by federal organizations ranked highest with an overall perceived knowledge rating of 3.40, while those respondents employed by state/local organizations reported the lowest at 3.20.

Federal employees also had the highest overall perceived knowledge concerning 'purchasers' (3.34), 'products' (3.39), 'price' (3.19), 'place' (3.74), and 'probing' (2.97). Respondents from non-governmental/academic organizations possessed the highest 'producer' knowledge (4.14), and those from 'other' organizations were most knowledgeable in the 'promotion' category (3.45).

Survey participants of state/local organizations recorded the lowest rating in the ‘producer’ (3.88), ‘products’ (3.23), ‘promotion’ (3.15), ‘place’ (3.54), and ‘probing’ (2.68) categories. Non-governmental/academic respondents had the least knowledge about ‘purchasers’ (3.05) and ‘price’ (2.79) when compared to those respondents from all other employers. Internal consistency of rating was calculated by organization, ranging from 0.9008 to 0.9580.

	Organization			
	Federal	State/Local	NGO	Other
Perceived Knowledge of...				
Producer	3.91 (0.67)	3.88 (0.86)	4.14 (0.61)	4.02 (0.88)
Purchasers	3.34 (0.87)	3.06 (0.83)	3.05 (0.96)	3.28 (0.91)
Products	3.39 (0.75)	3.23 (0.83)	3.24 (0.57)	3.28 (0.96)
Price	3.19 (0.92)	2.87 (0.89)	2.79 (0.97)	2.94 (1.06)
Promotion	3.28 (0.81)	3.15 (0.93)	3.17 (0.84)	3.45 (0.83)
Place	3.74 (0.76)	3.54 (0.94)	3.69 (0.74)	3.62 (1.12)
Probing	2.97 (0.97)	2.68 (0.89)	2.71 (1.05)	2.82 (1.05)
Overall Rating (Std. Dev.)	3.40 (0.82)	3.20 (0.88)	3.26 (0.82)	3.34 (0.97)
Reliability – Cronbach’s Alpha	0.9445	0.9513	0.9008	0.9580

Table 4.14: Respondents’ Perceived Knowledge About the Social Marketing Ps by Organization

4.2.3 ATTITUDES

Objective 2: To describe communicators' attitudes.

This section presents the respondents' attitudes ratings with respect to wildland fire communication. Thurstone (1946) has defined an attitude as "the intensity of positive or negative affect for or against a psychological object" (p.39).

Respondents were asked to rate their level of agreement with 30 statements using a one-to-five scale, where one represented 'strongly disagree', two 'disagree', three 'neither agree nor disagree', four 'agree', and five 'strongly agree'.

4.2.3.1 OVERALL ATTITUDES

Respondents' average rating for all statements in the attitudes section of the questionnaire was 4.04, with a reliability measure of 0.7875. The statement receiving the highest score (4.63) was, "Collaboration among wildland fire management organizations is necessary for successful wildland fire communication campaigns". All statements from the attitudes section are ranked by mean in Appendix M.

Number	Statement	Mean	Std. Dev.
B4	Collaboration among wildland fire management organizations is necessary for successful wildland fire communication campaigns.	4.63	0.60
B15	My organization has an important and unique role to play in wildland fire communications in the United States.	4.39	0.76
B5	Incorporating evaluative feedback into new or existing communication efforts is critical to improving them.	4.39	0.64
B2	The public is eager to learn about wildland fire during times of high fire risk.	4.37	0.69
B8	Communicating about wildland fire fits appropriately within my organization's mission or mandate.	4.37	0.79

Table 4.15: Respondents' Five Areas of Greatest Agreement

The statement with the lowest ranking (“The public is very knowledgeable about wildland fire management in the United States”) received an average rating of 1.93. The next lowest was, “My organization consistently has sufficient resources (e.g. physical, human, financial, etc.) for wildland fire communication” (2.33). Three of the five statements that respondents ranked lowest dealt with the public’s knowledge, perception, and eagerness to learn about wildland fire. The remaining two concerned the adequacy of organizational resources for communications about wildland fire and, very interestingly, the public’s confidence in such bodies.

Number	Statement	Mean	Std. Dev.
B19	The public is very knowledgeable about wildland fire management in the United States.	1.93	0.69
B6	My organization consistently has sufficient resources (e.g. physical, human, financial, etc.) for wildland fire communication.	2.33	0.96
B3	The public is eager to learn about wildland fire during times of low fire risk.	2.55	0.90
B18	The public has a great deal of confidence in organizations that are charged with wildland fire management in the United States.	2.79	0.98
B12	The public perceives that wildland fire communication products are valuable.	3.21	0.79

Table 4.16: Respondents' Five Areas of Least Agreement

4.2.3.2 ATTITUDES BY SOCIAL MARKETING PS

The attitudes of participants to the social marketing Ps averaged 3.86, with a reliability of 0.7392. Respondents ranked 'probing' highest at 4.21, with a reliability of 0.6155. Responses to the six remaining social marketing Ps were deemed unreliable because their Cronbach's Alpha coefficients were less than 0.6.

Attitude of...	Mean Attitude	Std. Dev.	Reliability (Cronbach's Alpha)
Probing	4.21	0.54	0.6155
Place	4.11	0.38	0.4736
Promotion	4.08	0.50	0.4860
Producer	4.01	0.38	0.5825
Price	3.66	0.44	0.2730
Purchasers	3.55	0.47	0.3592
Products	3.43	0.48	0.3781
Overall	3.86	0.46	0.7392

Table 4.17: Respondents' Attitudes About the Social Marketing Ps

4.2.3.3 ATTITUDES BY REGION

Respondents' attitudes about social marketing were evaluated based upon participants' regions. Overall, Region 4 (SE) ranked highest (3.92) and Region 5 (NE) lowest (3.77). Region 1 (W) had the highest agreement with 'purchasers' and 'price' statements, 3.61 and 3.73, respectively, while Region 2 (SW) had the highest agreement with 'place' (4.19), 'probing' (4.28) and 'products' (4.16), and Region 4 (SE) with 'producer' (3.75) and 'promotion' (4.19).

Region 3 (MW) recorded the lowest agreement with four categories – 'producer' (3.34), 'price' (3.59), 'place' (3.97), and 'products' (3.79). Region 4 (SE) had the lowest agreement with 'purchasers' (3.48). 'Promotion' (3.98) and 'probing' (4.07) were both rated lowest by respondents in Region 5 (NE). With regard to data reliability, Region 2 (SW) had the highest internal consistency (0.8353) and Region 6 (NC) the lowest at 0.6342.

Attitude of...	Region					
	1(W)	2(SW)	3(MW)	4(SE)	5(NE)	6(NC)
Producer	3.48 (0.55)	3.35 (0.61)	3.34 (0.62)	3.75 (0.47)	3.40 (0.50)	3.35 (0.53)
Purchasers	3.61 (0.34)	3.56 (0.43)	3.58 (0.41)	3.48 (0.41)	3.49 (0.28)	3.56 (0.40)
Products	4.05 (0.46)	4.16 (0.48)	3.79 (0.51)	4.09 (0.46)	3.82 (0.45)	4.04 (0.42)
Price	3.73 (0.36)	3.64 (0.44)	3.59 (0.41)	3.70 (0.48)	3.62 (0.29)	3.62 (0.47)
Promotion	4.01 (0.46)	4.10 (0.52)	4.05 (0.37)	4.19 (0.35)	3.98 (0.42)	4.15 (0.39)
Place	4.15 (0.44)	4.19 (0.32)	3.97 (0.35)	4.16 (0.32)	3.99 (0.47)	4.15 (0.37)
Probing	4.22 (0.57)	4.28 (0.77)	4.13 (0.75)	4.25 (0.66)	4.07 (0.44)	4.23 (0.46)
Overall Rating (Std. Dev.)	3.89 (0.45)	3.89 (0.51)	3.78 (0.49)	3.92 (0.45)	3.77 (0.41)	3.87 (0.43)
Reliability – Cronbach’s Alpha	0.7175	0.8353	0.7253	0.7532	0.6997	0.6342

Table 4.18: Respondents’ Attitudes About the Social Marketing Ps by Region

4.2.3.4 ATTITUDES BY ORGANIZATION

Agreement with attitude statements involving the social marketing Ps was also calculated based upon the employing organization of the respondents. Those working for federal organizations reported the greatest agreement (3.89), while those from state/local organizations exhibited the least (3.78).

Federal respondents had the highest agreement with ‘purchasers’ (3.59), ‘products’ (4.03), ‘price’ (3.72), ‘place’ (4.15), and ‘probing’ (4.24); non-governmental/academic organizations with ‘producer’ (3.60); and, those from ‘other’ organizations rated ‘promotion’ (4.14) highest.

Respondents employed by 'other' organizations rated 'producer' (3.25), 'price' (3.53), and 'place' (3.96) lowest; non-governmental/academic organizations rated both 'purchasers' (3.45) and 'products' (3.89) lowest; and, 'promotion' (4.05) and 'probing' (4.08) ranked lowest for federal and state/local respondents, respectively. Reliability was calculated to be highest for federal organizations (0.7556) and lowest for non-governmental ones (0.7315).

	Federal	State/Local	NGO	Other
Attitude of...				
Producer	3.44 (0.51)	3.33 (0.49)	3.60 (0.60)	3.25 (0.70)
Purchasers	3.59 (0.38)	3.46 (0.46)	3.45 (0.34)	3.48 (0.27)
Products	4.03 (0.49)	3.94 (0.53)	3.89 (0.51)	4.01 (0.43)
Price	3.72 (0.37)	3.56 (0.35)	3.56 (0.42)	3.53 (0.37)
Promotion	4.05 (0.44)	4.09 (0.45)	4.12 (0.48)	4.14 (0.38)
Place	4.15 (0.49)	3.98 (0.47)	4.06 (0.50)	3.96 (0.45)
Probing	4.24 (0.49)	4.08 (0.37)	4.17 (0.48)	4.13 (0.47)
Overall Rating (Std. Dev.)	3.89 (0.45)	3.78 (0.45)	3.84 (0.48)	3.79 (0.44)
Reliability – Cronbach's Alpha	0.7556	0.7582	0.7315	0.7614

Table 4.19: Respondents' Attitudes About the Social Marketing Ps by Organization

4.2.4 PERCEIVED SKILL

Objective 3: To describe communicators' perception of their skills.

This section presents the respondents' evaluation of their skills ("the ability to use one's knowledge effectively and readily in execution or performance" (Merriam-Webster, 2000)). Survey participants were asked to rate their personal skills in 30 areas relating to wildland fire communication. Respondents used a five-point scale anchored at three points – one being 'limited skill', three 'some skill', and five 'extensive skill'.

4.2.4.1 OVERALL PERCEIVED SKILL

The average rating of all respondents was 3.22, with a reliability of 0.9631. Respondents indicated their 'greatest' skill (Table 4.20) was "working as a member of a team involving representatives from several organizations and communities" (4.15). Three of the five highest rated skills of respondents involved 'working together' with a team, an audience, and/or clients.

Number	Statement	Mean	Std. Dev.
C5	Working as a member of a team involving representatives from several organizations and communities.	4.15	0.94
C17	Working with audiences of differing knowledge levels.	3.93	0.92
C6	Integrating information gained from training sessions conducted by my organization into my daily responsibilities.	3.92	0.86
C3	Developing the trust and confidence of the clients my organization serves.	3.90	0.83
C25	Using finite organizational resources (e.g. physical, human, financial, etc.) effectively.	3.78	0.89

Table 4.20: Respondents' Five Areas of Greatest Perceived Skill

Respondents perceived that they had the least skill (2.57) “conducting wildland fire communication training programs for staff in their organization”. Next lowest was “integrating the results of evaluation efforts into the development or revision of wildland fire communication products” (2.61). Those skill areas identified by respondents as being lowest generally appear to have a communications planning, programming, or training dimension to them. All skill statements and their overall rating are presented in Appendix N.

Number	Statement	Mean	Std. Dev.
C8	Conducting wildland fire communication training programs for staff in my organization.	2.57	1.26
C13	Integrating the results of evaluation efforts into the development or revision of wildland fire communication products.	2.61	1.11
C15	Developing responsive wildland fire communication programs.	2.71	1.14
C18	Generating public interest in wildland fire information during times of low fire risk.	2.72	1.06
C1	Preparing long-term communication plans.	2.81	1.25

Table 4.21: Respondents’ Five Areas of Least Perceived Skill

4.2.4.2 PERCEIVED SKILL BY SOCIAL MARKETING PS

When individual statements were grouped based upon the Ps of social marketing, respondents’ highest perceived skill level related to that of the ‘purchasers’ (3.52) and ‘producer’ (3.51). Probing ranked lowest (2.75). Overall reliability was 0.9631. Results based upon the social marketing Ps are presented in Table 4.22.

Social Marketing Ps	Mean Perceived Skill Rating	Std. Dev.	Reliability (Cronbach's Alpha)
Purchaser	3.52	0.82	0.8340
Producer	3.51	1.00	0.6985
Place	3.37	1.14	0.8013
Promotion	3.30	1.11	0.8038
Price	3.09	1.04	0.8326
Products	3.00	1.07	0.8155
Probing	2.75	1.12	0.8463
Overall	3.22	1.06	0.9631

Table 4.22: Respondents' Perceived Skill Based upon the Social Marketing Ps

4.2.4.3 PERCEIVED SKILL BY REGION

Overall, survey participants in Region 3 (MW) perceived their skill with regard to the social marketing Ps as being highest (3.39), while those in Region 5 (NE) reported the lowest (3.03). Respondents in Region 3 (MW) perceived themselves as most skillful in six of the seven Ps – ‘purchasers’ (3.62), ‘products’ (3.19), ‘price’ (3.35), ‘promotion’ (3.44), ‘place’ (3.53), and ‘probing’ (3.03). Respondents in Region 4 (SE) ranked first in the ‘producer’ (3.62) category.

Region 5 (NE) reported the lowest ratings in five areas – ‘producer’ (3.42), ‘price’ (2.89), ‘promotion’ (3.10), ‘place’ (3.29), and ‘probing’ (2.48) – and tied with Region 4 (SE) for the lowest with regard to ‘purchasers’ (3.18) and ‘products’ (2.86). Complete results are presented in Table 4.23.

Perceived Skill Regarding...	Region					
	1(W)	2(SW)	3(MW)	4(SW)	5(NE)	6(NC)
Producer	3.49 (0.74)	3.62 (0.64)	3.58 (0.54)	3.56 (0.72)	3.42 (0.62)	3.47 (0.65)
Purchasers	3.51 (0.95)	3.36 (0.86)	3.62 (0.77)	3.18 (0.93)	3.18 (0.78)	3.34 (0.76)
Products	2.99 (0.99)	3.07 (1.08)	3.19 (0.78)	2.86 (0.90)	2.86 (0.87)	3.08 (0.82)
Price	3.15 (0.96)	3.19 (0.86)	3.35 (0.70)	2.91 (0.90)	2.89 (0.83)	3.12 (0.75)
Promotion	3.32 (0.80)	3.40 (0.71)	3.44 (0.71)	3.24 (0.86)	3.10 (0.77)	3.27 (0.81)
Place	3.31 (0.91)	3.45 (0.85)	3.53 (0.69)	3.31 (0.87)	3.29 (0.97)	3.40 (0.79)
Probing	2.90 (1.02)	2.72 (1.05)	3.03 (0.91)	2.53 (1.02)	2.48 (0.86)	2.77 (0.97)
Overall Rating (Std. Dev.)	3.24 (0.91)	3.26 (0.87)	3.39 (0.73)	3.08 (0.89)	3.03 (0.81)	3.21 (0.79)
Reliability – Cronbach's Alpha	0.9561	0.9451	0.9459	0.9660	0.9509	0.9629

Table 4.23: Respondents' Perceived Skill Involving the Social Marketing Ps by Region

4.2.4.4 PERCEIVED SKILL BY ORGANIZATION

'Level of skill' data provided by respondents also were analyzed by social marketing Ps and employing organization. Respondents in federal organizations reported the highest perceived skill (3.24), while individuals in non-governmental organizations reported the lowest (3.00).

Individuals employed in federal organizations perceived the highest level of skill in six areas – 'purchasers' (3.42), 'products' (3.09), 'price' (3.14), 'promotion' (3.32), 'place' (3.39), and 'probing' (2.82), – while non-governmental organization employees ranked first for 'producer' (3.57).

Non-governmental organization respondents reported the lowest perceived skill with regard to five of the Ps – ‘purchasers’ (3.13), ‘products’ (2.64), ‘price’ (2.76), ‘promotion’ (3.13), and ‘probing’ (2.48), while the ‘other’ category recorded the lowest for ‘producer’ (3.37) and ‘place’ (3.19). A summary is presented in Table 4.24.

	Federal	State/Local	NGO	Other
Perceived Skill Regarding...				
Producer	3.52 (0.67)	3.52 (0.70)	3.57 (0.59)	3.37 (0.60)
Purchasers	3.42 (0.88)	3.31 (0.77)	3.13 (0.98)	3.23 (0.74)
Products	3.09 (0.91)	2.96 (0.90)	2.64 (0.80)	2.70 (0.96)
Price	3.14 (0.87)	3.11 (0.82)	2.76 (0.85)	2.92 (0.84)
Promotion	3.32 (0.78)	3.29 (0.78)	3.13 (0.86)	3.25 (0.75)
Place	3.39 (0.84)	3.36 (0.90)	3.30 (0.79)	3.19 (0.93)
Probing	2.82 (0.99)	2.66 (0.91)	2.48 (1.12)	2.55 (0.84)
Overall Rating (Std. Dev.)	3.24 (0.85)	3.17 (0.83)	3.00 (0.85)	3.03 (0.81)
Reliability – Cronbach’s Alpha	0.9602	0.9612	0.9567	0.9287

Table 4.24: Respondents’ Perceived Skill Involving the Social Marketing Ps by Organization

4.2.5 BARRIERS/OPPORTUNITIES

Objective 4: To explore and describe communicators' perception of the barriers and opportunities for wildland fire communications.

Section D of the questionnaire asked wildland fire communicators to rate 30 statements by the extent to which the issue in question represented a barrier ('an impediment to progress or achievement') or an opportunity ('an occurrence that offers a chance for progress or achievement'). The ranking was conducted using a five-point scale, with -2 representing a significant barrier, -1 a moderate one, 0 neither a barrier nor opportunity, +1 a moderate opportunity, and +2 a significant opportunity.

4.2.5.1 OVERALL BARRIERS/OPPORTUNITIES

Respondents identified the 30 statements, on average, as representing a slight opportunity (0.25), with a reliability of 0.9361. "My organization's fire-related mission or mandate" provided the greatest opportunity rating of (1.12). Three of the five greatest opportunities (Table 4.25) were based upon the mission, reputation, or message conveyed by the respondents' organizations.

Number	Statement	Mean	Std. Dev.
D11	My organization's fire-related mission or mandate.	1.12	0.97
D4	The reputation of my organization with the public that it serves.	0.92	1.07
D3	The wildland fire training opportunities within my organization.	0.89	1.07
D9	My organization's efforts at working with other organizations that also have a role in wildland fire communication.	0.79	1.02
D5	My organization's current wildland fire message(s).	0.66	1.00

Table 4.25: Respondents' Five Greatest Opportunities for Wildland Fire Communication

Respondents held the view that the “resources my organization allocates to understanding the public’s needs and wants concerning wildland fire” was the greatest barrier (-0.49) they faced. Of note, three of the five greatest barriers (Table 4.26) relate to the availability of resources. All statements from the barriers/opportunity section are ranked in Appendix O.

Number	Statement	Mean	Std. Dev.
D24	The resources my organization allocates to understanding the public’s needs and wants concerning wildland fire.	-0.49	1.07
D29	The willingness of the public in my geographic area to obtain wildland fire information produced by my organization during times of low fire risk.	-0.45	1.00
D8	The degree to which my organization evaluates its wildland fire communication products.	-0.38	0.95
D1	The resources (e.g. physical, human, financial, etc.) my organization allocates for wildland fire communication.	-0.36	1.21
D13	The resources available within my organization for promoting upcoming or existing wildland fire communication efforts.	-0.15	1.17

Table 4.26: Respondents’ Five Greatest Barriers to Wildland Fire Communication

4.2.5.2 BARRIERS/OPPORTUNITIES BY SOCIAL MARKETING PS

Participants’ responses to the barriers/opportunity section were also categorized using the social marketing Ps. Respondents identified the ‘producer’ P as the greatest opportunity (+0.61) with a reliability of 0.6972. The greatest barrier to wildland fire communication efforts was felt to be ‘probing’ (-0.19) with a reliability of 0.7602. More detailed results are presented in Table 4.27.

Social Marketing Ps	Mean Barrier/Opportunity Rating	Std. Dev.	Reliability (Cronbach's Alpha)
Producer	0.61	1.08	0.6972
Place	0.38	1.00	0.7643
Products	0.34	0.93	0.6896
Promotion	0.23	1.03	0.7559
Purchasers	0.13	1.00	0.6902
Price	0.11	1.04	0.6702
Probing	-0.19	0.99	0.7602
Overall	0.23	1.01	0.9361

Table 4.27: Respondents' Perceptions of Barriers and Opportunities Presented by the Social Marketing Ps

4.2.5.3 BARRIERS/OPPORTUNITIES BY REGION

The overall 'barrier/opportunity' ratings varied from 0.40 in the Southeast to 0.51 in the Northwest. Respondents in Region 4 (SE), relative to those in the other regions, rated all seven of the social marketing Ps as providing the greatest opportunity – 'producer' (0.77), 'purchasers' (0.31), 'products' (0.45), 'price' (0.19), 'promotion' (0.39), 'place' (0.57), and 'probing' (0.13).

'Purchasers' (-0.01) and 'promotion' (0.13) were considered to be the greatest barrier in Region 1 (W), 'place' (0.23) and 'probing' (-0.34) in Region 2 (SW), 'products' (0.20) in Region 3 (MW), 'price' (0.01) in 3 and 5, and 'producer' (0.56) in Regions 3, 5, and 6. Full results are presented in Table 4.28.

Barrier/Opportunity Regarding...	Region					
	1(W)	2(SW)	3(MW)	4(SE)	5(NE)	6(NC)
Producer	0.59 (0.74)	0.57 (0.59)	0.56 (0.70)	0.77 (0.83)	0.56 (0.74)	0.56 (0.72)
Purchasers	-0.01 (0.78)	0.16 (0.68)	0.03 (0.65)	0.31 (0.72)	0.27 (0.69)	0.11 (0.71)
Products	0.22 (0.72)	0.41 (0.76)	0.20 (0.58)	0.45 (0.64)	0.38 (0.67)	0.39 (0.61)
Price	0.14 (0.62)	0.08 (0.68)	0.01 (0.72)	0.19 (0.68)	0.01 (0.71)	0.18 (0.73)
Promotion	0.13 (0.70)	0.21 (0.69)	0.15 (0.80)	0.39 (0.77)	0.25 (0.70)	0.26 (0.69)
Place	0.29 (0.84)	0.23 (0.85)	0.35 (0.76)	0.57 (0.87)	0.42 (0.71)	0.43 (0.70)
Probing	-0.28 (0.88)	-0.34 (0.84)	-0.22 (0.81)	0.13 (0.79)	-0.13 (0.80)	-0.32 (0.72)
Overall Rating (Std. Dev.)	0.16 (0.75)	0.19 (0.73)	0.15 (0.72)	0.40 (0.76)	0.25 (0.72)	0.23 (0.70)
Reliability – Cronbach's Alpha	0.9528	0.9293	0.9293	0.9138	0.9097	0.9141

Table 4.28: Respondents' Perceptions of Barriers and Opportunities Presented by the Social Marketing Ps by Region

4.2.5.4 BARRIERS/OPPORTUNITIES BY ORGANIZATION

Individuals working for non-governmental organizations perceived the 30 barrier/opportunity statements as more of an opportunity (0.59) compared to federal employees who perceived them on average to be less so (0.17) – indeed, less so than respondents from all the other types of organizations.

Survey participants from non-governmental organizations consistently rated all seven of the social marketing factors – ‘producer’ (1.05), ‘purchasers’ (0.50), ‘products’ (0.59), ‘price’ (0.25),

'promotion' (0.54), 'place' (0.85), and 'probing' (0.34) – more positively than did those from other groups.

In contrast, employees of federal organizations scored lowest in five of the seven categories -- 'producer' (0.54), 'purchasers' (0.01), 'products' (0.28), 'promotion' (0.15) and 'probing' (-0.29). State/local organizations perceived 'price' (0.00) to be the greatest barrier, while 'other' organizations reported 'place' (0.17). Reliability in this section ranged from 0.9007 to 0.9370, reported in Table 4.29.

	Federal	State/Local	NGO	Other
Barrier/Opportunity Regarding ...				
Producer	0.54 (0.70)	0.64 (0.76)	1.05 (0.68)	0.58 (0.75)
Purchasers	0.01 (0.73)	0.27 (0.57)	0.50 (0.72)	0.24 (0.80)
Products	0.28 (0.69)	0.36 (0.58)	0.59 (0.51)	0.32 (0.84)
Price	0.12 (0.65)	0.00 (0.72)	0.25 (0.54)	0.03 (0.92)
Promotion	0.15 (0.72)	0.27 (0.66)	0.54 (0.73)	0.26 (0.71)
Place	0.35 (0.80)	0.31 (0.76)	0.85 (0.63)	0.17 (0.86)
Probing	-0.29 (0.79)	-0.15 (0.76)	0.34 (0.70)	-0.15 (1.02)
Overall Rating (Std. Dev.)	0.17 (0.72)	0.24 (0.69)	0.59 (0.64)	0.21 (0.84)
Reliability – Cronbach's Alpha	0.9193	0.9012	0.9007	0.9370

Table 4.29: Respondents' Perceptions of Barriers and Opportunities Presented by the Social Marketing Ps by Organization

4.2.6 RELATIONSHIPS

Objective 5: To describe and explain the relationships among these factors (Objectives 1 to 4).

Pearson correlation and, to a limited extent, one-way analysis of variance (ANOVA) were used to determine relationships among different variables in Sections A to F of the questionnaire. Pearson correlation was employed to compare the relationships among the respondents' perception of knowledge, attitude, skill and barriers/opportunities. Table 4.30 illustrates relationships found among these four variables. A very strong positive Pearson correlation (0.804) was discovered to exist between knowledge and skill. The next most positive relationship was between attitude and skill (0.445). Moderate relationships existed between knowledge and attitude (0.424), knowledge and barriers/opportunities (0.413), attitude and barriers/opportunities (0.333) and finally, skill and barriers/opportunities (0.300).

		Knowledge	Attitude	Skill	Barrier/ Opportunity
Knowledge	Pearson Correlation	1	0.424**	0.804**	0.413**
	Sig. (2-tailed)	.	0.00	0.00	0.00
	N	302	284	292	285
Attitude	Pearson Correlation	0.424**	1	0.445**	0.333**
	Sig. (2-tailed)	0.00	.	0.00	0.00
	N	284	297	288	281
Skill	Pearson Correlation	0.804**	0.445**	1	0.300**
	Sig. (2-tailed)	0.00	0.00	.	0.00
	N	292	288	305	293
Barrier/ Opportunity	Pearson Correlation	0.413**	0.333**	0.300**	1
	Sig. (2-tailed)	0.00	0.00	0.00	.
	N	285	281	293	300

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.30: Pearson Correlation among Participants' Perception of Knowledge, Attitude, Skill, and Barrier/Opportunity

Correlational analysis was also conducted of respondents' perceived knowledge, attitudes, skills, barriers/opportunities and demographic variables. It showed low to negligible relationships. Additionally, respondents' perceived knowledge, attitudes, skills and barriers/opportunities as well as their employing organizations were tested using Pearson correlation. Once again there were low to negligible relationships.

A series of exploratory one-way analysis of variance (ANOVA) tests were conducted to analyze participants' responses based upon perceived knowledge, attitude, skill, barriers/opportunities, and the region in which they worked. After computation, several of the ANOVA null hypotheses were rejected as the means were not the same. After further least significant difference (LSD) analysis investigating individual treatments, it was determined that no significant relationships existed among perceived knowledge, attitude, skill, and barriers/opportunities and the geographical region in which the respondents were employed.

4.2.7 NATIONAL WILDFIRE COORDINATING GROUP MESSAGES

Objective 6: To assess the usefulness of National Wildfire Coordinating Group (NWCG)-developed thematic messages.

Of the five National Wildfire Coordinating Group (NWCG) message themes (Appendix G) presented to wildland fire communicators, message E5 ("wildland fire provides substantial benefits") was selected as most useful with an overall mean of 4.07. Message E3 ("fire is an important natural agent of change") received a rating of 3.96, E2 ("the lack of periodic fire increases risk") 3.92, E1 ("we can all take steps to reduce wildland fire risks") 3.89 and, finally, message E4 ("fire management affects us all") was ranked least useful at 3.52 (Table 4.31).

NWCG Statement	Mean Rating	Std. Dev.	N
E5 - Wildland fire provides substantial benefits...	4.07	0.99	311
E3 - Fire is an important natural agent of change...	3.96	1.01	312
E2 - The lack of periodic fire increases risk...	3.92	1.06	312
E1 - We can all take steps to reduce wildland fire risks...	3.89	0.99	313
E4 - Fire management affects us all ...	3.52	1.13	311
Mean	3.87	1.04	312

Table 4.31: Usefulness of National Wildfire Coordinating Group Message Themes

When responses were grouped by region (Table 4.32), it appeared that the NWCG themes were judged to be most useful in the Southeast (4.13) and least so in the Midwest (3.69) and the Northeast (3.70).

NWCG Message Theme	Region					
	1(W)	2(SW)	3(MW)	4(SE)	5(NE)	6(NC)
E1 - We can all take steps to reduce wildland fire risks...	3.82 (1.00)	4.05 (1.07)	3.84 (0.85)	4.10 (0.96)	3.76 (1.02)	3.84 (1.02)
E2 - The lack of periodic fire increases risk...	3.88 (1.01)	4.05 (1.00)	3.59 (1.19)	4.25 (0.99)	3.51 (1.23)	4.08 (0.93)
E3 - Fire is an important natural agent of change...	3.83 (1.12)	3.98 (1.01)	3.59 (1.10)	4.28 (0.97)	4.00 (0.84)	3.96 (0.90)
E4 - Fire management affects us all ...	3.33 (1.11)	3.39 (1.32)	3.72 (0.96)	3.66 (1.20)	3.49 (1.14)	3.67 (1.01)
E5 - Wildland fire provides substantial benefits...	4.02 (0.96)	4.20 (0.99)	3.72 (1.02)	4.38 (0.82)	3.78 (1.08)	4.14 (1.01)
Mean Rating (Std. Dev.)	3.77 (1.04)	4.01 (1.08)	3.69 (1.02)	4.13 (0.99)	3.70 (1.06)	3.93 (0.97)

Table 4.32: Usefulness of National Wildfire Coordinating Group Message Themes by Region

There were, however, no wide variations in preferred messaging based on the respondents' employers (Table 4.33).

NWCG Message Theme	Organization			
	Federal	State/local	NGO	Other
E1 - We can all take steps to reduce wildland fire risks...	3.86 (1.01)	3.97 (0.96)	3.94 (0.89)	3.88 (1.03)
E2 - The lack of periodic fire increases risk...	3.96 (1.00)	3.83 (1.13)	4.00 (1.06)	3.73 (1.34)
E3 - Fire is an important natural agent of change...	3.97 (1.00)	3.78 (1.04)	4.13 (1.06)	4.00 (1.02)
E4 - Fire management affects us all ...	3.46 (1.10)	3.84 (0.99)	3.26 (1.26)	3.65 (1.20)
E5 - Wildland fire provides substantial benefits...	4.09 (0.95)	3.93 (1.01)	4.19 (0.98)	3.96 (1.22)
Mean Rating (Std. Dev.)	3.87 (1.02)	3.87 (1.03)	3.90 (1.05)	3.84 (1.16)

Table 4.33: Usefulness of National Wildfire Coordinating Group Message Themes by Organization

Respondents also were asked to rank the manner in which wildland fire management message themes should be used in the United States. “A single, universal wildland fire management message that can be used in conjunction with regionally focused and developed sub-components”(E6-2) was ranked first by 130 respondents – almost double that of the 62 individuals who preferred option E6-4 (“messages tailored to areas by natural [historic] fire regimes”). E6-3 (“messages tailored to specific ecoregions”) was the preferred second choice of respondents and E6-4, the third choice. Messages E6-2, E6-4, and E6-3 were the clear favorites with each being chosen either first, second, or third by well over 70 percent of respondents, compared to the next most popular – E6-5 (“messages tailored to a specific state”) – which garnered just less than 40 percent of such mentions.

Message Organization	Rank						Total
	1	2	3	4	5	6	
E6-1: Single universal message for entire U.S.	6.4%	9.6%	10.5%	19.5%	40.9%	13.1%	100.0%
E6-2: Single message with regional sub-components	41.5%	16.9%	15.3%	19.5%	4.8%	1.9%	100.0%
E6-3: Message tailored by ecoregions	19.2%	37.7%	23.3%	13.7%	4.8%	1.3%	100.0%
E6-4: Messages tailored by natural (historic) fire regimes	19.9%	23.7%	30.4%	14.7%	8.3%	2.9%	100.0%
E6-5: Messages tailored to a specific state	13.1%	12.2%	14.1%	22.8%	28.8%	9.0%	100.0%
E6-6: Other	15.0%	6.3%	3.8%	6.3%	6.3%	62.5%	100.0%

Table 4.34: Respondents' Preference for Employing National Wildfire Coordinating Group Message Themes

The overwhelming preference of survey participants in all regions was for a single message with regional sub-components. From one-third to nearly one-half of participants in each region chose this option. It was interesting to note, however, that nearly 25% of respondents in the Midwest also expressed strong support for a message tailored to a specific state. In this same region, the choice of a message tailored to ecoregions received little support, particularly when compared to the views of respondents in the West, Southwest, and Southeast.

Message Organization	Region					
	1(W)	2(SW)	3(MW)	4(SE)	5(NE)	6(NC)
E6-1: Single universal message for entire U.S.	8.6%	4.4%	8.1%	1.6%	4.7%	7.3%
E6-2: Single message with regional sub-components	34.6%	37.8%	43.2%	33.9%	48.8%	45.5%
E6-3: Message tailored by ecoregions	22.2%	26.7%	8.1%	22.6%	11.6%	14.5%
E6-4: Messages tailored by natural (historic) fire regimes	21.0%	17.8%	10.8%	22.6%	23.3%	16.4%
E6-5: Messages tailored to a specific state	7.4%	11.1%	24.3%	16.1%	7.0%	14.5%
E6-6: Other	6.2%	2.2%	5.4%	3.2%	4.7%	1.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4.35: Respondents' Preference for Employing National Wildfire Coordinating Group Message Themes by Region

CHAPTER 5

DISCUSSION

U.S. Assistant Interior Secretary Sylvia Baca has called the 2000 fire season the worst in the past 50 years (NBC, 2000). Given the recent public, media, and political interest in wildland fire, many organizations and individuals have been forced to communicate about wildland fire on nearly a non-stop basis. Traditionally, messaging about wildland fire communication has been limited to that associated with the Smokey Bear campaign and its messages of fire prevention and the wise use of fire. Even though many organizations, including the Department of the Interior and the Department of Agriculture, have committed to the reintroduction of wildland fire for both human and ecosystem benefits, there have been limited initiatives designed to increase the amount or quality of fire communication. This is in spite of the fact that many of these same organizations have noted the importance of wildland fire communication and education. At this time, no national wildland fire communication strategy exists in the United States to provide a focus and support for these efforts.

This study undertook to describe and explain, in the context of social marketing, the current state of wildland fire communications in the United States, based upon the perspective of wildland fire communicators. Specifically the research objectives were:

1. To describe communicators' perception of their knowledge of wildland fire communications,
2. To describe communicators' attitudes,
3. To describe communicators' perception of their skills,
4. To explore and describe communicators' perception of the barriers and opportunities for wildland fire communications,
5. To describe and explain the relationships among these factors,

6. To assess the usefulness of National Wildfire Coordinating Group (NWCG)-developed thematic messages, and
7. To interpret and explain the descriptive data collected using a social marketing framework.

Data from the Delphi were utilized to ascertain the 'current' and 'ideal' state for wildland fire communications, as viewed by expert wildland fire communicators from their perspective in organizations and from locations throughout the United States. Next, data were gathered from 321 wildland fire communicators in 47 states and the District of Columbia who responded to a 13-page questionnaire that was mailed to them.

In the remainder of this chapter, the responses provided by both Delphi and questionnaire participants will be reviewed in the context of the work of other researchers cited in Chapters 2 and 3, and in particular that of Fine (1990) with respect to social marketing. The information gathered also will be considered within the framework of the study's objectives.

5.1 DISCUSSION OF FINDINGS BY STUDY OBJECTIVES

5.1.1 OBJECTIVE 1

To describe communicators' perception of their knowledge of wildland fire communications.

Overall, respondents perceived that they had better than 'some' knowledge (3.36) of the topics presented in Section A of the questionnaire. They believed they had the highest knowledge about things directly relating to their organization and its mission, and the lowest concerning ways of evaluating wildland fire communication products. The close relationship between wildland fire communicators and their organizations is also reflected in the participants' perceived knowledge of the 'producer' of the message. It is not surprising that employees are knowledgeable about the organization that employs them. Perhaps this level of comfort also explains why they may have accepted the organization's messaging without considering the need to evaluate it. Such acceptance may help to explain why respondents reported little knowledge of evaluation methodology.

With knowledge responses grouped by region, respondents from Regions 2 (SW) and 1 (W) reported the highest knowledge, with scores of 3.44 and 3.42 respectively (Table 4.13), whereas respondents from Region 5 (NE) perceived the lowest overall knowledge (3.26). One might assume that those in areas with more frequent fire regimes might also have the opportunity to learn more about wildland fire and its communication.

Respondents working in federal organizations believed they had the greatest level of knowledge when compared to those of all remaining organizations, while state and local respondents revealed the lowest. Respondents from federal organizations also reported the most time spent working 'very often' or 'extensively' with wildland fire (Table 4.2). There would appear to be a relationship between the time spent and the knowledge gained.

5.1.2 OBJECTIVE 2

To describe wildland fire communicators' attitudes.

Study participants reported very positive attitudes with regard to working collaboratively with respect to wildland fire communication efforts. Given the involvement of a wide variety and number of agencies and organizations, both inside and outside government, such cooperation would appear to be essential. While too many 'cooks' can spoil the message and contribute to friction and frustration, this does not appear to be the case.

Respondents also strongly expressed their attitudes about the lack of resources for wildland fire communication, particularly given an 'uneducated' public with little incentive most times to be concerned about wildland fire issues.

Again, respondents from Regions 1 (W) and 2 (SW) showed the highest agreement with attitude statements in the questionnaire, in contrast to those in Region 5 (NE). Geography and the frequency of fire would appear to be significant factors once more.

Federal respondents again showed the most positive attitude, while participants working for state/local organizations displayed the least. Such attitudes may partially reflect the fact that the federal authorities generally take the lead in fire communication matters, partly as a result of the number of wildland fires that occur on federal lands.

5.1.3 OBJECTIVE 3

To describe wildland fire communicators' perception of their skills.

Wildland fire communicators reported slightly more than 'some' skill (3.24) with respect to the topics presented in Section C of the questionnaire (Appendix N). They once again rated highest their skill working as a member of a team, working with a variety of audiences, and integrating training into their daily job responsibilities. Activities communication again were ranked lowest by respondents. Interestingly, respondents perceived their skill level to be lower than their knowledge level when using the identical evaluation scale and very similar questions. This may suggest that wildland fire communicators believe they have the knowledge but lack some of the skills necessary to do the job.

Respondents in Region 3 (MW) reported the highest skill level, while once again those in Region 5 (NE) ranked the lowest compared to all other regions (Table 4.23).

Respondents from federal organizations recorded the highest skill rating compared to employees of other surveyed organizations. Participants of non-governmental bodies reported the lowest rating. Clearly, federal employees would appear to have the necessary knowledge, attitude, and skills when it comes to wildland fire communications.

5.1.4 OBJECTIVE 4

To explore and describe communicators' perception of the barriers and opportunities for wildland fire communications.

When respondents were provided with 30 statements relating to topics previously discussed in Sections A to C, they indicated that the issues identified represented, on balance, 'neither a barrier nor an opportunity' (0.25) to their wildland fire communication efforts. Respondents did indicate that matters concerning their organization, such as its mission, its reputation, and the training provided, represented strong opportunities.

In contrast, the resources allocated to understanding the public's needs and wants, the willingness of the public to learn about wildland fire during times of low fire risk, and the lack of communication product and process evaluation were identified as the greatest barriers. Respondents generally appeared to be supportive of, and supported by, their organization but believed more could be accomplished with additional resources targeted at improving the public's knowledge and understanding of wildland fire management practices. As one communicator put it, "A barrier today can turn into an opportunity tomorrow with the right action from organizational superiors".

No clear regional pattern appeared to exist concerning barriers and opportunities to wildland fire communication efforts.

Respondents from non-governmental organizations appeared to see more opportunities than barriers, while employees of federal organizations were less optimistic. This might be explained by the fact that those within a large bureaucracy may be more realistic about prospects for positive change.

5.1.5 OBJECTIVE 5

To describe and explain the relationships among these factors (Objectives 1-4).

A very strong positive relationship (0.804 Pearson correlation) existed between respondents' knowledge and skills. It might be concluded that as one's knowledge concerning wildland fire communication increases, so does the ability to use that knowledge effectively. This, perhaps, explains the respondents' identification of the need for enhanced training opportunities. While there was a moderately positive relationship between skill and attitude, one also existed between knowledge and attitude. Communicators who were more knowledgeable showed a relatively positive attitude about wildland fire communication. Such a situation is not unlike that described earlier with respect to members of the public developing a more positive attitude toward wildland fire, as they learned more about it.

Finally, respondents in the study also recorded a moderately positive relationship between their knowledge and their perception of what constituted a barrier or an opportunity. Survey participants who were more knowledgeable were also more likely to judge situations as opportunities for their communication efforts, rather than barriers to them.

5.1.6 OBJECTIVE 6

To assess the usefulness of National Wildfire Coordinating Group (NWCG)-developed thematic messages.

Respondents expressed the view that the National Wildfire Coordinating Group (NWCG)'s message themes were moderately useful in their area of the country. They showed a distinct preference for the statement – “Effective use of wildland fire will provide substantial benefit to society and the environment. These benefits include...” (Appendix G – E5). This message may have been chosen because the elements described in the full message seem to address many of the reasons, why the public is opposed to wildland fire management practices, as described in Chapter 2.

When given options for the use of these message themes in the United States, respondents' preference was for "a single, universal wildland fire message that can be used in conjunction with regionally focused and developed sub-components" (Appendix G – E6). Their least preferred option (other than 'other') was "a single, universal wildland fire message for use in the entire U.S." This latter view existed, according to Delphi participants, given the difficulty, and near impossibility, of creating and utilizing only one message in a country as diverse as the United States. Both Delphi and questionnaire participants commented that a nationally coordinated message with flexible components was needed if one were to undertake wildland fire communications on a national scale and, at the same time, provide flexibility to address issues unique to certain areas of the country.

5.1.7 OBJECTIVE 7

To interpret and explain the descriptive data collected using a social marketing framework.

5.1.7.1 PRODUCER

"Who is the producer, the sources of the promotional message?" (Fine, 1990, p.5)

Wildland fire communicators can be considered to be the 'producers' of the products (messages) about wildland fire that are intended for the purchasers (identified audiences). Whether they are Fire Management Officers (who spend about half of their time communicating about wildland fire 'extensively' or 'very often' – Table 5.1), Public Affairs Specialists (who similarly spend about one-quarter of their time), Public Affairs Officers, or individuals who carry some other title, such persons have an important role to play in providing a bridge between their professional colleagues and the member of the public. For that reason they were judged to be a critical element in the Wildland Fire Communication Model (Figure 1.1) described earlier, and were chosen as the subject of the first stage of the larger study being undertaken.

Amount of Work with Wildland Fire Communication	Fire Management Officer	Public Affairs Specialists
Never (0% of employed time)	0.0%	3.6%
Rarely (1-25%)	0.0%	50.0%
Sometimes (26-50%)	34.2%	25.0%
Very Often (51-75%)	34.2%	17.9%
Extensively (76-100%)	15.8%	3.6%
Total	100.0%	100.0%

Table 5.1: Time Spent Communicating About Wildland Fire by Position

The demographics of study respondents (the producers) have been detailed elsewhere, but readers may wish to review Sanyal (1998) for additional information. Table 5.2 shows the array of respondents in both of these non-random studies, which collectively provide insight into wildland fire communicators.

	Clute (2000) (321 Respondents)		Sanyal (1998) (317 Respondents)	
Gender of Respondents	Male	74.7%	Male	-
	Female	25.3%	Female	-
Age of Respondents	Mean	46	Mean	42.9
	Range	25 – 67	Range	-
Four Most Prevalent Job Titles of Respondents	Fire Management Officer	12.8%	Fire Management Officer	41.2%
	Public Affairs Specialist	9.4%	Other	34.4%
	Public Affairs Officer	8.1%	Fire Prevention Officer	14.8%
	Forester	6.7%	Public Affairs Specialist	9.6%
Three Most Prevalent Respondents by Organization	Forest Service	28.6%	Forest Service	53.0%
	State/Local NR Department	17.2%	NPS	18.3%
	FWS	13.9%	BLM	8.2%
Six Most Prevalent Respondents by State	Florida	7.6%	California	12.3%
	Idaho	6.3%	Idaho	7.8%
	California	5.7%	Utah	7.0%
	New Mexico	4.7%	Arizona	6.5%
	Arizona	4.4%	Montana	6.0%
	Oregon	4.4%	Oregon	5.8%

Table 5.2: Array of Wildland Fire Communicators based upon Clute (2000) and Sanyal (1998)

Wildland fire communicators do not work in isolation. In most instances they are members of large organizations, such as the USDA Forest Service for which more than 25% of respondents worked. It may not be unusual to discover that respondents reported having the highest perceived knowledge of their organization's mission, mandate, communication messages,

channels of communication, and training opportunities. What may be different is that they also viewed these, including their organization's reputation, as providing the greatest opportunities for them in their wildland communication efforts. Other positives included respondents ranking most highly their skill and attitude in collaborating with their colleagues, and their ability to work with a team, an audience, or clients.

Respondents, however, perceived their employing organization also as creating barriers for enhanced communication. In both the Delphi process and needs assessment, two major problems were clearly identified. The first – a constant and recurring theme – was there was a lack of resources for wildland fire communications, except perhaps during times of active fires. Three of the five items judged to be the greatest barriers could be categorized in this fashion. As noted earlier, Sanyal (1998) reported that the organizations employing the respondents in his study had an average of \$2,913 available for educational programs, and only \$1,477 for fire communication products and materials. Secondly, respondents identified the absence of adequate planning for future needs, including the availability of well-trained staff, as a major impediment.

There were varying opinions as to a preferred organization to be charged with the lead responsibility for developing wildland fire messages. While NWCG was a popular choice to be the primary producer, others stressed the need to involve personnel from state/local governments, as well as those not in government. In addition, it was suggested a variety of other individuals be included, such as insurance agents or volunteer firefighters, who might not normally be involved in such an exercise. Finally, respondents to both the Delphi and mail questionnaire called on 'producers' to develop and employ a clear, coordinated message regarding wildland fire.

5.1.7.2 PURCHASERS

“Who are the potential purchasers in this particular market and what needs and wants do these people have?” (Fine, 1990 p.5)

Purchasers are the audience to which the messages concerning wildland fire are directed. The audience may be individuals or groups of people. Indeed, it can be argued that there are multiple audiences that must be considered when communicating about wildland fire – from school children to community leaders and from homemakers to media representatives. No matter the audience, what is desired is a clear, understandable, reliable transfer of relevant information to the individual(s) involved. Often messages are sent but not received because they may be unclear, confusing, unbelievable, or of no relevance to the recipient. A principle of social marketing holds that communication products must address the purchasers’ needs and wants rather than simply being that which the ‘producer’ wishes to market. Therefore, it is critical that communication efforts be designed to reach the target audience.

Despite the recognition that the public’s understanding of wildland fire and its management is extremely limited, relatively little work has been conducted into these ‘purchasers’ of wildland fire related information. Survey respondents obviously considered this a major limitation, rating “the resources my organization allocates to understanding the public’s needs and wants” as the greatest barrier to their wildland fire communication efforts (Appendix O, D24).

The third phase of the larger study, of which this is a part, will focus on ‘target audiences’. This will be an important undertaking since questionnaire respondents expressed the belief that the public has little knowledge about wildland fire management in the United States (Appendix M, Statement B19). This finding is consistent with that of Manfredi et al. (1990).

The value of learning more about purchasers is apparent when one considers the findings from a number of studies (see Chapter 2) that members of the public, who are exposed to information concerning wildland fire management, increase their knowledge about it, and generally develop more positive attitudes towards its use. Therefore, one would assume that organizations

interested in overcoming the barriers to wildland fire's re-introduction would wholeheartedly endorse efforts designed to support wildland fire communications.

Many of the barriers to the public's acceptance of wildland fire management practices have been well identified. As noted earlier, they include the risks of fire, especially the possibility of its causing damage to valued assets; emissions from fire, including the health and aesthetic effects of smoke; aesthetic impacts on the landscape; economic losses, mainly to forestry-related activities; and, detrimental impacts on the ecosystem. What is needed is a better understanding of how purchasers perceive these factors so that they can be addressed in a way that is meaningful for them.

At present, some consider messaging about wildland fire management to be contradictory. This view is enhanced by those professionals and organizations that disagree about the need for suppression and/or the proper use of fire. A lack of confidence in organizations entrusted with fire management is a natural outcome. One need only 'log on' to one purchaser's website (<http://shirtmagic.com/Lowdenfire.html>) to see the loss of confidence in one federal agency following the Lowden Ranch prescribed fire that got 'out of hand'. After the Lowden Ranch and Cerro Grande prescribed fires, immediate moratoriums and policy reviews of prescribed fire's use were put in place. As one professional fire communicator observed, "these events caused prescribed fire activities to regress 20 or 30 years".

5.1.7.3 PRODUCT

"What specific product(s) can the marketer design to help fill those needs?" (Fine, 1990 p.5)

In wildland fire communication, the message is the product. The characteristics of a useful, positive message were described earlier. They included the need for clarity and ease of understanding.

Both Delphi and questionnaire respondents observed that various organizations responsible for wildland fire management were conveying similar but not identical messages. For example, they cited organizations and associations that have produced their own terminology to describe specific types of fire. Terms used included arson fire, controlled burn, controlled fire, debris

burning fire, escaped fire, escaped prescribed fire, forest fire, human-caused fire, lightning ignited fire, management ignited prescribed fire, naturally-caused fire, prescribed burning, prescribed fire, prescribed natural fire, uncontrolled fire, wildfire, and wildland fire.

For an audience that may be unfamiliar with wildland fire, this multitude of similar terms is confusing and limits effective communication. To help clarify communication efforts, organizations and interested stakeholder groups should work together to develop standardized language for use in the United States. In this regard, the proposed federal fire terminology (USDI & USDA, 1995) is a step in the right direction.

Delphi participants outlined a number of key elements that they believed should be included in any message about wildland fire. These included the natural role of fire in the United States, with an emphasis on developing an understanding that fire is neither good nor bad but has positive and negative effects in all ecosystems; what some organizations have labeled the ‘three faces of fire’ – prevention, prescription, and suppression; and, the benefits of fire’s effective use for such things as reducing fuel loads and wildfire risk, promoting healthier fire-dependent ecosystems, and lessening suppression costs. Clearly, the challenge is to formulate a message that is comprehensive, and yet comprehensible, given its many sub-themes. It must be remembered that Smokey’s message could be summarized in one brief sentence. Wildland fire communicators need to develop their own unique ‘bumper sticker’.

In Section B of the questionnaire (Appendix G), participants were asked to rate their level of agreement with the statement, “The United States needs a national wildland fire management message”. Respondents recorded an average rating of 3.83 on the scale of 1 to 5, with five representing ‘strong agreement’. Interestingly, when presented in Section E with a very similarly worded statement calling for a “single, universal wildland fire message for use in the entire United States”, it received the lowest desirability ranking except for ‘other’. In this instance, respondents preferred a “single, universal wildland fire message that can be used in conjunction with regionally focused and developed sub-components”.

Clearly, there was some ambiguity in the views expressed by questionnaire respondents. This was not unlike the differing views among Delphi participants. Some showed preference for the

idea of a single message since they believed it could be repeated to target audiences creating familiarity with the wildland fire concepts presented. They also argued that a single message would provide consistency among various wildland fire management organizations. Others suggested the addition of regionally focused and developed subcomponents of the message would allow specific regions of the country the flexibility to target messages at particular audience types. Once again, more work is obviously required to ascertain the optimum message that will convey to the desired audience the benefits associated with wise wildland fire management practices.

5.1.7.4 PLACE

“Which parties (institutions) will participate in making the product available at the best *place* and time (best for the purchaser)?” (Fine, 1990 p.5)

Survey respondents indicated that the amount of effort that is required by the public to obtain wildland fire information from wildland fire organizations is currently a barrier to their communication efforts. The challenge of making a message more accessible is directly related to who is conveying it, the vehicle used to convey it, and the character and location of the target audience(s).

Several organizations have been identified as parties or institutions that could take the lead role in the distribution of wildland fire information and products. Respondents in the Delphi suggested the National Wildfire Coordinating Group as one such entity because of its unique structure, comprised as it is of a coalition of federal and state organizations that work with wildland fire on a nationwide basis. Additionally, the NWCG has previously attempted, and is currently funded, to develop and distribute wildland fire communication products. Whether messages should be delivered on a national, regional, state, local, or some combination of these basis is an issue that needs to be decided as part of determining the place best suited for conveying such messages about wildland fire to various audiences.

Other decisions will be required as to whether it is better and/or more efficient to deliver the messages to individuals or groups. In doing so, will messages be available in today's and tomorrow's 'high tech' world to members of the target audience virtually everywhere or will they

be provided in more traditional ways in their homes, at work, or in public places? No matter what the answer, ease of access to information for the public is both a priority and a necessity.

5.1.7.5 PRICE

“What price(s) must the purchaser sacrifice in order to obtain this product?” (Fine, 1990 p.5)

Price can be considered to be the perceived value of a product or service, or the monetary cost incurred in acquiring that product or service. Usually, the greater the demand for the product or service, the greater is its value and/or price.

In the context of this study, if the ‘price’ of attending a workshop on wildland fire management is too great, a member of the public may decide to make more valuable use of his or her time. In order to make the workshop more valuable, thereby reducing the price, it is essential that the information being conveyed at the session, from the participant’s viewpoint, provide value for the time and effort expended attending. Similarly, if there are monetary costs involved in participating, such as for registration or materials, they also must be at a level that does not limit attendance. Even so-called free products, such as public service announcements, involve the message recipient’s paying a price for choosing to use his or her time to watch, listen to, or read about the issue in question.

In times of few fires and low fire risk, there is usually, as survey respondents reported, an unwillingness on the part of the public to pay for goods or services, including information, associated with the management of wildland fires. This perhaps helps to explain why budgets for wildland fire communication remain very low during such periods. With an increase in the fire danger, people then weigh the price of attending the workshop to learn how to protect their home against some other activity in which they might wish to engage. It should be remembered that there might also be a price to be paid for not taking any action.

To date, little work has been done concerning the price ‘purchasers’ of information about wildland fire management are willing to pay. This is, undoubtedly, an area worthy of future study.

5.1.7.6 PROMOTION

“How can the marketer promote (communicate with) the given market?” (Fine, 1990 p.5)

Communicating with those in the marketplace can take a wide variety of forms. The Delphi participants provided a list of nearly twenty ways to reach target audiences. The tool chosen, however, must be applicable to the situation and to the members of the audience whom it is desired to reach. For example, there is little benefit in using a videotape to convey a message if the recipient does not own a VCR, or signing a demonstration area if it is in an area with little traffic. It is obvious that identifying and understanding the purchaser is key to the selection of the most appropriate promotion vehicle.

As noted, one of the most successful social marketing campaigns was the Smokey Bear initiative. Smokey's message has appeared on almost every conceivable type of product, and his public service advertisements have used television, radio, and print. In fact, Jacobson (1999) reported that Smokey in 1996 received \$30 million worth of free promotion. Not all communication programs, however, need multi-million dollar promotion budgets. Jacobson and Marynowski (1997) in their ecosystem management study of Florida's Eglin Air Force Base and vicinity found that the study population was generally unaware of the significance of fire in maintaining the area's fire-dependent ecosystem. The researchers discovered that one segment of the population that lacked knowledge about wildland fire did, however, have an interest in golf. As a result, researchers convinced local golf course operators to allow them to install signs near water taps on different holes of the golf course to promote fire's natural role in Florida's ecosystem (Jacobson, personal communication). It is often such creative promotions as this that are most efficient and effective.

While questionnaire participants in the present study reported that they had relatively little knowledge about “promotional theories and techniques for wildland fire communication products”, they did recognize, and indeed emphasized, the need to work with the media regularly to ensure the information and messages provided were transmitted to the public as accurately as possible. Furthermore, the Internet was suggested as an inexpensive, immediate tool of widespread and increasing use that could be employed to advantage by wildland fire communicators.

Surprisingly, a number of survey participants reported that they had never heard of the National Wildfire Coordinating Group's (NWCG) wildland fire message themes. Some also noted that they were unfamiliar with NWCG as an association. Previous research conducted by Sanyal (1998) similarly found that about 60% of the wildland fire professionals surveyed had never heard of the National Wildfire Coordinating Group's Prevention, Education, Communications Work Team (NWCG-PECWT). There clearly is a challenge to promote wildland fire communications both inside the natural resource community as well as outside it to the general public.

5.1.7.7 PROBING

“What probing will be necessary to evaluate the marketer's campaign and to obtain feedback from the purchasing audience?” (Fine, 1990 p.5)

In the first phase of this study, respondents were asked if their organization had ever conducted an evaluation to determine its audience(s) for wildland fire communication efforts. Remarkably, about two-thirds of participants responded that they had not ‘probed’ to determine characteristics, concerns, or needs of their audience. The remaining one-third revealed that they had an evaluation currently underway or had already completed one.

The issue of probing was also included as part of the quantitative questionnaire. Respondents revealed that, “Incorporating evaluative feedback into new or existing communication efforts” was on average the subject about which they knew the least. It was also rated an area in which respondents had little skill. Yet, interestingly, in the attitudes section of the questionnaire, respondents agreed strongly that, “Incorporating evaluative feedback into new or existing communication efforts is critical to improving them”. Despite this extremely positive attitude towards evaluation, respondents still rated the “degree to which my organization evaluates its wildland fire communication products” as the third greatest barrier to their communication efforts.

There is an obvious and definite need to establish or enhance training opportunities that deal with product and promotion evaluation as it applies to new or existing wildland fire communication

materials and efforts. Evaluation should not be a one-time occurrence, but rather an ongoing process that provides insight into changes in an audience's needs and wants, from which informed product and promotion modifications can be made.

5.2 RESEARCH METHODOLOGY AND STRUCTURE

The Delphi methodology used in conjunction with needs assessment to identify issues relevant to the 'current' and 'ideal' state of wildland fire communications proved to be extremely useful, with the information supplied by Delphi participants providing the basis for the construction of the questionnaire. The advantages cited in the literature of using these techniques were, indeed, found to be accurate.

The use of a mail survey to administer Phase 2 of the study allowed hundreds of geographically separated respondents to participate. However, with recent technological advances, the use of computer-based survey methods should be carefully considered for future studies. A computer- or e-mail-based survey technique was not employed in this study because of the prohibitive cost of the software at the present time, and the possibility that incompatible government computer systems would be encountered. Nonetheless, with such an approach, mailing costs would be non-existent; respondent response times could be reduced, providing more timely results; and, follow-up studies facilitated since e-mail addresses are not dependent upon respondents remaining in the same geographic location.

Finally, the use of social marketing in a study of this nature provided an interesting framework in which to explore and describe respondents' knowledge, attitudes, skills, and the barriers and opportunities they perceived. It has the potential of serving as a conceptual vehicle for the marketing of wildland fire communication messaging.

5.3 CONCLUSIONS

A number of conclusions can be drawn from this study of wildland fire communicators. First of all – since those who participated in the study were well-educated, experienced, had a generally positive attitude, valued teamwork, saw more opportunities than barriers to their efforts, and had a relatively high perception of their knowledge and skills with respect to the organization for which they worked, its mission or mandate, and its role in wildland fire management – there is a significant opportunity for natural resource organizations to build upon their stated commitment of enhancing wildland fire communications. This goal can be accomplished by demonstrating ‘a commitment’ to the public and to a dedicated staff through the allocation of additional resources – both financial and human – and by undertaking planning to meet future needs.

Wildland fire communicators both require and desire additional training. Their lowest perceived knowledge and skill levels relate to communications activities, such as identifying target audiences, developing communication plans and products, and using evaluative feedback. Particularly needed is additional training in ways to evaluate existing communications’ processes and products and develop new ones. Such training is imperative if greater reliance is to be placed on wildland fire communicators and if their role is to be other than a reactive one. Initiating such activities, starting with wildland fire communicators employed in those areas with high fire regimes, but eventually including all communicators, would be desirable and welcomed.

Recognizing that members of the public have limited knowledge of wildland fire, there also is a need for improved and better coordinated messaging directed to them. A single national wildland fire message with regionally focused and developed subcomponents would appear to be the preferred approach. Starting with the NWCG messages, it is essential to clarify, simplify, and promote the messaging that is undertaken.

Little has been done to identify or begin to understand the target audience(s) for wildland fire communications. Additional work is required to define those audiences if attempts to educate them are to be successful, thereby engendering additional support for the reintroduction of wildland fire into America’s ecosystems.

Finally, there is an ongoing need to ascertain how wildland fire management organizations can better communicate wildland fire messages in such a manner as to meet societal needs, address community needs/concerns, gain public support, and comply with organizational mandates, all while utilizing the best science and technology available.

5.4 RECOMMENDATIONS FOR WILDLAND FIRE ORGANIZATIONS

It is recommended that wildland fire organizations:

1. Increase their commitment to research focusing on target audiences' knowledge, attitudes and concerns regarding wildland fire and its management.
2. Increase personnel and resources dedicated to ongoing wildland fire communication.
3. Increase cooperation among federal, state, non-governmental, and outside stakeholders in the development, promotion, and use of standardized wildland fire terminology.
4. Develop a single, universal wildland fire management message that can be used in conjunction with regionally focused and developed subcomponents.
5. Generate increased public interest in wildland fire management, particularly during times of low fire risk.
6. Increase training for wildland fire communicators with respect to incorporating 'probing' or evaluation into new and existing wildland fire communication products.
7. Increase promotion of new and existing wildland fire communication products, especially those created/managed by the National Wildfire Coordinating Group, to both the public and the natural resource community.

8. Develop a comprehensive list of individuals that are charged with wildland fire communication in the United States. This list would facilitate future research and organizational efforts to improve training and promote current and future wildland fire communication products.

5.5 RECOMMENDATIONS FOR FUTURE RESEARCH

Additional research concerning wildland fire communication would be useful in addressing a number of questions that remain unanswered. These include:

- What is the current perspective of key opinion leaders, politicians, and bureaucrats concerning wildland fire?
- What are the current knowledge, attitudes, needs and concerns of target audiences in different areas of the country? Do they differ, and if so how, from the perceptions offered by wildland fire communicators and those offered by key opinion leaders?
- What should be the role of the National Wildfire Coordinating Group with respect to wildland fire communication? How can it be carried out more effectively?
- How can 'probing' or evaluation be effectively incorporated into current wildland fire communication efforts?
- What are some of the success stories in wildland fire communication and what do they have in common?
- Why do certain segments of the public show more interest in learning about wildland fire than others? What characteristics do these groups have in common?

- What geographic differences exist in the public's knowledge concerning wildland fire management? Does the public in an area with more frequent fire regimes have an increased knowledge about fire?
- To what extent are purchasers willing to 'pay', as described in a social marketing content, during times of high risk of fire?
- Would the use of an inferential statistic, such as factor analysis, in a larger randomly sampled study of all wildland fire communicators load on similar groupings of critical communication components to those defined by Fine's (1990) seven social marketing Ps? If not, which author's social marketing Ps (Table 2.2) do the groupings of critical communication components most closely reflect?
- How well would a larger random sample of the total population of wildland fire communicators cluster, using cluster analysis, around the various array of social marketing Ps?

LITERATURE CITED

- AMA Board Approves New Marketing Definition. (March 1, 1985). *Marketing News*, 1.
- Agee, J.K. (1981). Fire Research Needs in National Park System Areas of Oregon and Washington. National Park Service Cooperative Park Studies Unit, College of Forest Resources, University of Washington, Seattle, Washington, 98195. CPSU/UW 81-14. May 1981.
- Altschuld, J.W., P.M. Thomas, W.H. McCloskey, D.W. Smith, W.W. Wiesmann, and M.A. Lower (1992). Mailed evaluation questionnaires, replications of a 96 percent return rate procedure. *Evaluation and Program Planning* 15:239-246.
- Altschuld, J.W. (1993). Delphi Technique. Lecture, evaluation methods: Principles of needs assessment II. Columbus, OH: The Ohio State University.
- Andreasen, A.R. (1995). *Marketing Social Change*. San Francisco, CA: Jossey-Bass Publishers.
- Andreasen, A.R. and C.B. Tyson (1994). Applying Social Marketing to Ecological Problems through Consumer Research. *Asia Pacific Advances in Consumer Research* Volume 1.
- Ashton-Sabrie, K.L. (1993). Managers' and users' perceptions and the demand toward public and commercial campground services. M.Ed. Thesis, Bowling Green State University.
- Babbie, E. (1998). *The Practice of Social Research*. Belmont, CA: Wadsworth Publishing Company.
- Banda, A. Z. (1995). Training needs assessment report of non-governmental organizations involved in natural resources management. Lilongwe, Malawi: Ministry of Research and Environmental Affairs, Environmental Support Program/Preparation Coordination Unit. June 1995.
- Barney, R.J. (1979). Wildland Fire Research Needs in the West: Forest Managers' Views. USDA Forest Service, Intermountain Forest and Range Experiment Station, General Technical Report INT-63.
- Bieber, J.G. (1978). Perceptions of Connecticut water managers relating to the recreational use of water utility lands and reservoirs. M.Sc. Thesis, Department of Geography, Southern Illinois University.

- Billings, R.F. (2000). State Forest Health Programs: A Survey of State Foresters. *Journal of Forestry* 98(1): 20-25.
- Borich, G.D. (1980). A Needs Assessment Model for Conducting Follow-up Studies. *Journal of Teacher Education* 31(3): 39-42.
- Buscher, R.F. (1979). Wildland recreational impacts from the U.S. Forest Service land manager's perspective. In: *Proceedings, recreational impacts on wildlands conference*; (pages 11-13) 1978 October 27-29; Seattle, WA: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, R-6-001-1979.
- Campbell, R.M. (1966). A methodological study of the utilization of experts in business forecasting. Ph.D. dissertation. University of California at Los Angeles.
- Christiansen, J.R., W.S. Folkman, J.L. Adams, and P. Hawkes (1969). Forest-Fire Prevention Knowledge and Attitudes of Residents of Utah County, Utah with Comparisons to Butte County, California. Provo, UT: Brigham Young University and Pacific Southwest Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Social Science Research Bulletin Number 5.
- Cortner, H.J., M.J. Zwolinski, E.H. Carpenter, and J.G. Taylor (1984). Public Support for Fire-Management Policies. *Journal of Forestry* 82: 359-361.
- Cox, R.M. (1994). Evanston residents with mental illness: a needs assessment. M.Sc. Thesis, Department of Public Service, DePaul University.
- Cross, K.P. (1980). The State of the Art in Needs Assessment. In L.G. Johnson (ed.), *Assessing the Needs of Adult Learners: Methods and Models*. Columbus, Ohio: Ohio Board of Regents.
- Cyphert, F.R. and Gant, W.L. (1970). The Delphi Method: A tool for collecting opinions in teacher education. *Journal of Teacher Education* 22(4): 508-516.
- Dalkey, N.C. (1967). Delphi (Research Report P-3704). Santa Monica, CA: Rand Corporation.
- Dalkey, N.C. (1969). The Delphi method: An experimental study of group opinion (Research Report RM-5888-PR). Santa Monica, CA: Rand Corporation.
- Dalkey, N.C., D.L. Rourke, R. Snyder (1972). *Studies in the quality of life*. Lexington, MA: Lexington Books.
- Danforth, L. (1989). Recreation managers' perceptions of the recreation product: an interactive model. M.Ed. Thesis, University of Arkansas.
- Davis, J.A. (1971). *Elementary Survey Analysis*. Englewood Cliffs, NJ: Prentice-Hall.
- DeBano, L.F., D.G. Neary and P.F. Ffolliott (1998). *Fire's Effects on Ecosystems*. New York, NY: John Wiley & Sons, Inc.

- Delbecq, A.L., A.H. Van de Van and D.H. Gustafson (1975). *Group Techniques for Program Planning: a guide to nominal group and Delphi processes*. Glenville, IL: Scott, Foresman and Company.
- Dillman, D.A. (1978). *Mail and Telephone Surveys: The Total Design Method*. New York, NY: John Wiley & Sons, Inc.
- Dingas, N.G. (1993). Alaska youth mental health needs assessment. Fairbanks, AK: Alaska Department of Health and Social Services.
- Divine, G. (1980). Managers' perceptions and support of planning and evaluation functions in the U. S. Fish and Wildlife Service. M.A. Thesis, University of New Mexico.
- Downing, K. and R.N. Clark (1979). User's and manager's perceptions of dispersed recreation impacts: a focus on roaded forest lands. In: *Proceedings, recreational impacts on wildlands conference*; (pages 18-23) 1978 October 27-29; Seattle, WA: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, R-6-001-1979.
- Equall, S.A. (1977). Planning for vocational education through needs assessment. Lincoln, NB: Nebraska Department of Education.
- Etling, A. (1995). Needs Assessment: A Handbook. *Journal of Extension* 33(1). Available online at www.joe.org
- Fazio, J.R. and D.L. Gilbert (1986). *Public Relations and Communications for Natural Resource Managers*. Dubuque, IA: Kendall/Hunt Publishing Company.
- Fine, S.H. (1981). *The Marketing of Ideas and Social Issues*. New York, NY: Praeger Division, Holt, Rinehart and Winston.
- Fine, S.H. (1990). *Social Marketing: Promoting the Causes of Public and Nonprofit Agencies*. Boston, MA: Allyn and Bacon.
- Fishbein, M. and I. Ajzen (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley Publishing Company.
- Folkman, W.S., (1979). Urban users of wildland areas as forest fire risks. USDA Forest Service research paper, Berkeley, CA. 22 pages.
- Ford, J.D. (1982). Wilderness managers' perceptions of recreational horse use in the northwestern United States. M.Sc. Thesis, Washington State University.
- Figueiredo, Claudia Cunha Malafaia de (2000). Getting to know the neighborhood: a relational study of perception of community needs and environmental concern of 8th grade students in public and private schools of Belo Horizonte, Brazil. M.Sc. Thesis, The Ohio State University.

- Gamon, J.A. (1991). The Delphi -- An Evaluation Tool. *Journal of Extension* 29 (4). Available on-line at www.joe.org.
- Glasscock, H.R. (1972). Forces shaping public opinion toward fire and the environment. In: *Symposium Proceeding, Fire in the Environment* (May 1-5, 1972, Denver, CO). USDA Forest Service.
- Gravetter, F.J. and L.B. Wallnau (2000). *Statistics for the Behavioral Sciences*. Belmont, CA: Wadsworth/Thomson Learning.
- Gupta, U.G. and R.E. Clarke (1996). Theory and Application of the Delphi Technique: A Bibliography (1975-1994). *Technological Forecasting and Social Change* 53:185-211.
- Hall, A.D. (1972). Public Attitudes Toward Fire. In: *Fire in the Environment Symposium Proceedings* (pages 57-63). Denver, CO: Forest Service, U.S. Department of Agriculture. FS-276.
- Hendee, J.C. and R.M. Pyle (1971). Wilderness managers, wilderness users: a problem of perception. *Naturalist* 22(3): 22-26.
- Henson, S. (1997). Estimating the incidence of food-borne *Salmonella* and the effectiveness of alternative control measure using the Delphi method. *International Journal of Food Microbiology* 35: 195-204.
- Hobbs, D. (1987). Strategy for needs assessments. In: D.E. Johnson, L.R. Meiller, L.C. Miller, G.F. Summers (eds.) *Needs assessment: Theory and methods* (pages 20-34). Ames, IA: Iowa State University Press.
- Hochheiser, R.M. (1996). Rural mental health: an assessment of mental health and primary care physician provider's beliefs about needs for services. D. Psyc. Thesis, Antioch University.
- Hughes, M. (1993). Career-oriented program activities and learning experiences that promote achievement of middle-grad educational goals. Ph.D. dissertation, The Ohio State University.
- Humpherys, T.D. (1991). Natural resources managers' perceptions of visitor attitudes, preferences and perceptions. M.A. Thesis, California State University.
- Idaho Department of Education (1977). Needs assessment manual for local education agencies. Boise, ID: Department of Education.
- Jacobson, S.K. (1999). *Communication Skills for Conservation Professionals*. Washington, D.C.: Island Press.

- Jacobson, S.K. (2000). Personal communication. Columbus, OH: The Ohio State University.
- Jacobson, S.K. and S.B. Marynowski. (1997). Public Attitudes and Knowledge about Ecosystem Management on Department of Defense Land in Florida. *Conservation Biology*. 11(3): 770-781.
- Johnson, D.E., L.R. Miller, L.C. Miller and G.F. Summers (eds.) (1987). *Needs assessment theory and methods*. Ames, IA: Iowa State University Press.
- Johnson, D.R. (1994). A survey of park managers' perceptions of non-compliant visitor behavior causing resource damage in the national park system. Seattle, WA & Denver, CO: Cooperative Park Studies Unit, College of Forest Resources, University of Washington & Denver Service Center, Technical Information Center. Technical Report NPS/PNRUW/NRTR 92-07.
- Jonassen, D.H., M. Tessmer, and W.H. Hannum (1999). *Task Analysis Methods for Instructional Design*. London, U.K.: Lawrence Erlbaum Associates, Publishers.
- Jones, H. and B.C. Twiss (1978). *Forecasting technology for planning decisions*. London, UK: Macmillan Press Ltd.
- Kaage, W. (1988). Predicting Prescribed Fire Managers' Perceptions of their Information Sources' Worth. M.Sc. Thesis, University of Montana.
- Kerlinger, F.N. (1986). *Foundations of Behavioral Research*. New York, N.Y.: Holt, Rinehart and Winston.
- Kluwe, J.M.L. (1987). Wilderness law enforcement: a comparison of wilderness managers' perceptions. M.Sc. Thesis, Southern Illinois University at Carbondale.
- Knerr, V.L. (1996). A needs assessment of integrated resource management educational activities as perceived by cattle producers in Montana. M.Sc. Thesis, Montana State University.
- Kotler, P. and E.L. Roberto (1989). *Social Marketing: Strategies for Changing Public Behavior*. New York, N.Y.: The Free Press.
- Kotler, P. and G. Armstrong (1991). *Principles of Marketing*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Leopold, A.S., S.A. Cain, C.H. Cottam, and L. Gabrielson (1963). Wildlife Management in the National Parks. *American Forests* 69(4): 32-35, 61-63.
- Linstone, H.A. and M. Turoff (eds.) (1975). *The Delphi Method: Techniques and Applications*. Reading, MA: Addison-Wesley Publishing Company, Inc.

- Ludlow, J.D. (1972). Evaluation of methodology in the University of Michigan sea grant Delphi inquiry. Ann Arbor, MI: Technical Report Number 22, February, 1972.
- Ludwig, B.G. (1994). Internationalizing Extension: An exploration of the characteristics evident in a state university extension system that achieves internationalization. Ph.D. dissertation, The Ohio State University.
- Manfredo, M.J., M. Fishbein, G.E. Haas, and A.E. Watson (1990). Attitudes Towards Prescribed Fire Policies. *Journal of Forestry*. July 1990: 19-23.
- Merriam-Webster (2000). *Merriam-Webster Collegiate Dictionary*. Available on-line at www.m-w.com/dictionary.htm July 10, 2000 Version.
- Miles, M.B. and A.M. Huberman (1994). *Qualitative Data Analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.
- Mitchell, J.E. (1976). The attitudes and perceptions of Idaho off-road vehicle users and managers: final report submitted to Steven W. Bly, Director, Idaho Department of Parks and Recreation and Idaho Off-Road Vehicle Advisory Committee. Moscow, ID: College of Forestry, Wildlife and Range Sciences, University of Idaho.
- Monroe, M.C. (2000). Increasing Public Awareness and Knowledge of Wildland Fire Through County Programs. Final Report to the Advisory Council for Environmental Education. Florida Fish and Wildlife Conservation Commission. School of Forest Resources and Conservation, University of Florida. May 30, 2000.
- Moore, D.E. (1984). Determining Priorities for Adult Education: An Example of Statewide Needs Assessment. In: S.V. Martorana and W.E. Piland (eds.) *Designing Programs for Community Groups* (pages 71-84). New Directions for Community Colleges, no.45. San Francisco, CA: Jossey-Bass, March 1984.
- Moustsinas, C.M. (1976). Attitudes of forest managers toward dispersed recreation on roaded lands in the Pacific Northwest. M.Sc. Thesis, Oregon State University.
- Mullins, G.W. and K.P. Clute (1999). Personal communication. Columbus, OH: The Ohio State University, School of Natural Resources.
- NBC (2000). Montana fires rips through homes. MSNBC Staff and Wire Reports. August 6, 2000 Version. Available on-line at: www.msnbc.com/snap/435945.asp.
- Nielsen, C. and T. Buchanan (1986). A Comparison of the Effectiveness of Two Interpretive Programs Regarding Fire Ecology and Management. *Journal of Interpretation*. 2(1): 1-10.
- Novartis Foundation. (2000). A Short Course in Social Marketing. Available on-line at www.foundation.novartis.com/social_marketing.htm. January 28, 2000 Version.

- Omi, P.N. and R.D. Laven (1982). Prescribed Fire Impacts on Recreational Wildlands: A Status Review and Assessment of Research Needs. Eisenhower Consortium for Western Environmental Forestry Research. Bulletin 11. February 1982.
- Peterson, G.L. (1971). Motivations, perceptions, satisfactions and environmental dispositions of Boundary Waters Canoe Area users and managers: a pilot study. The Technological Institute, Department of Civil Engineering, Northwestern University. Project No. 13-253.
- Phillips, M. (1994). Understanding users' and wildlife managers' perceptions of wildlife management. M.Sc. Thesis, Agricultural and Resource Economics, University of Maine.
- Pinedo, M.M, B.S. Lee, K.G. Hirsch (1995). A perception survey of forest fire research needs for west-central Canada (Information Report NOR-X-343). Edmonton, AB: Natural Resources Canada, Canada Forest Service, Northwest Region, Northern Forestry Centre.
- Plevel, S.R. (2000). Fire Policy at the Wildland-Urban Interface: A Local Responsibility. *Journal of Forestry* 95(10): 12-15.
- Propst, D.B. (1976). The attitudes and perceptions of Idaho off-road vehicle users and managers. M.Sc. Thesis, University of Idaho.
- Pyne, S.J. (1997). *America's Fires: Management on Wildlands and Forests*. Durham, NC: Forest History Society.
- Pyne, S.J., P.L. Andrews, and R.D. Laven (1996). *Introduction to Wildland Fire*. New York, NY: John Wiley & Sons, Inc.
- Ratcliffe, R.T. (1988). The relationship of river managers' perceptions of recreation management problems and the content and dissemination of mailed pre-trip information. M.Sc. Thesis, University of Idaho.
- Rauw, D.M. (1980). Interpreting the natural role of fire: Implications for fire management policy. In: *Proceedings of the 6th Conference on Fire and Forest Meteorology* (pages 228-233). Washington D.C.: Society of American Foresters.
- Responsive Management (1997). State biological science information needs assessment: survey results report. Harrisonburg, VA: Responsive Management National Office. #1445-CT09-95-0404, Volume 1. April, 1997.
- Rothman J. and L.M. Gant (1987). Approaches and models of community intervention. In: D.E. Johnson, L.R. Meiller, L.C. Miller, G.F. Summers (eds.) *Needs assessment: Theory and methods* (pages 35-44). Ames, IA: Iowa State University Press.
- Salant, P. and D.A. Dillman (1994). *How to Conduct Your Own Survey*. New York, N.Y.: John Wiley & Sons, Inc.

- Sanyal, N. (1998). A Study of the National Wildfire Coordinating Group Fire Prevention, Education, and Communications Working Team. Department of Resource Recreation and Tourism, University of Idaho. Contribution #795 of the Idaho Forest, Wildlife and Range Experiment Station, Moscow, ID. May, 1998.
- Shelby, B. and R.W. Speaker (1990). Public Attitudes and Perceptions about Prescribed Burning. In J.D Walstad, S.R. Radosevich, and D.V. Sandberg (eds.) *Natural and Prescribed Fire in Pacific Northwest Forests* (p. 253-260). Corvallis, OR: Oregon State University Press.
- Shew, R.L., P.R. Saunders, and J.D. Ford (1986). Wilderness Managers' Perceptions of Recreational Horse Use in the Northwestern United States. National Wilderness Research Conference. Ogden, UT: USDA Forest Service, Intermountain Research Station. INT-212.
- Shindler, B. (1997). Public Perspectives on Prescribed Fire and Mechanical Thinning. Technical Notes from the Blue Mountains Natural Resource Institute. BMNRI-TN-9. July 1997. Available on-line at <http://www.fs.fed.us/pnw/bmnri/pubs/tn9.pdf>.
- Siemer, W.F. (1993). Key perceptions held by wildlife managers and wildlife rehabilitators in New York. Ithaca, N.Y.: Human Dimension Research Unit, Department of Natural Resources, Cornell University.
- Stankey, G.H., (1976). Wilderness fire policy: An investigation of visitor knowledge and beliefs. Ogden, Utah: USDA Forest Service. Research paper INT-180. 17 pages.
- Sutphin, H.D. (1981). Positions held by teachers, teacher educators, and state supervisors about selected national issues in agricultural education. Ph.D. dissertation, The Ohio State University.
- Taylor, J.G. and R.W. Mutch (1986). Fire in Wilderness: Public Knowledge, Acceptance, and Perception. Ogden, UT: National Wilderness Research Conference, USDA Forest Service, Intermountain Research Station. INT-212. July 1986.
- Taylor, J.G. and T.C. Daniel (1984). Prescribed Fire: Public Education and Perception. *Journal of Forestry*. 82: 361-365.
- Taylor, J.G., H.J. Cortner, P.D. Gardner, T.C. Daniel, M.J. Zwolinski, E.H. Carpenter (1986). Recreation and Fire Management: Public Concerns, Attitudes, and Perceptions. *Leisure Sciences* 8(2): 167-187.
- Terry, B.J. (1997). Prevention: An Emerging Science. *Fire Management Notes* 57(3): 4-6.
- Thurstone, L.L. (1946). Comment. *American Journal of Sociology* 52: 39-50.

- Tobin, D.J. (1979). Wildland recreation impact from the National Park Service land manager's perspective. In: *Proceedings, recreational impacts on wildlands conference* (pages 8-10); 1978 October 27-29; Seattle, WA: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, R-6-001-1979.
- Ulschak, F.L. (1983). *Human resources development: the theory and practice of needs assessment*. Reston, VA: Reston Publishing Company, Inc.
- United States Department of Agriculture, Forest Service (1984). "Remember Only YOU..."
- United States Department of the Interior (2000). "Babbitt and Glickman Suspend Federal Prescribed Fire Policy that Allows Prescribed Burns". Washington, D.C: DOI News Release Number 0160.00, May 12, 2000.
- United States Department of the Interior and United States Department of Agriculture (1995). *Federal Wildland Fire Management Policy and Program Review: Final Report*. December 18, 1995.
- United States Department of the Interior and United States Department of Agriculture (1996). *Federal Wildland Fire Management Policy and Program Review: Implementation Action Plan Report*. May 23, 1996.
- Villalobos, E. I. (1999). Mental health services for the Hispanic community in Las Vegas: an exploratory community needs assessment. M.Sc. Thesis. University of Nevada, Las Vegas.
- Weinreich, N.K. (1999). *Hands-on Social Marketing: A Step-by-Step Guide*. Thousand Oaks, CA: Sage Publications.
- Weinreich, N.K. (2000). What is Social Marketing? Available on-line at www.social-marketing.com. January 28, 2000 Version.
- Wiita, A.L. (1998). Evaluation of managers' and visitors' perceptions of wilderness conditions at the Nordhouse Dunes Wilderness Area. M.Sc. Thesis, Department of Forestry, Michigan State University.
- Winter, G. and J.S. Fried (1997). Valuing the Social and Economic Impacts of Fire at the Urban-Wildland Interface: A Statistical Summary of Survey Responses. Project report for the USDA Forest Service Cooperative Agreement 239332 on file at Michigan State University Department of Forestry. Available on-line at <http://jeremy.msu.edu/pubs/snr98/index.htm>.
- Witkin, B.R. (1977). Needs Assessment Kits, Models and Tools. *Educational Technology* 14(11): 5-18.
- Witkin, B.R. and J.W. Altschuld (1995). *Planning and Conducting Needs Assessments: A Practical Guide*. London, UK: Sage Publications.

Yaffee, S.L., A.F. Phillips, I.C. Frenzt, P.W. Hardy, S.M. Maleki, and B.E. Thorpe (1996). *Ecosystem Management in the United States: An Assessment of Current Experience*. Washington, D.C.: Island Press.

Ziglio, E. (1996). The Delphi Method and its Contribution to Decision-Making. In: M. Adler and E. Ziglio (eds.). *Gazing into the Oracle: The Delphi Method and its Application to Social Policy and Public Health* (pages 3-34). London, UK: Jessica Kingsley Publishers.

APPENDICES

APPENDIX A: GLOSSARY

ATTITUDE – “the intensity of positive or negative affect for or against a psychological object.”
(Thurstone 1946, p.39)

BARRIER – an impediment to progress or achievement

KNOWLEDGE – “the range of one's information or understanding” (Merriam-Webster, 2000)

OPPORTUNITY – an occurrence that offers a chance for progress or achievement

PRESCRIBED FIRE – any combustion occurring under particular conditions to achieve specific land management or resource management objectives (fuel load reductions, seedbed preparation, improvements in wildlife habitat, etc.), regardless of ignition method, in which an approved fire management plan has been completed and approved.

SKILL – “the ability to use one's knowledge effectively and readily in execution or performance”
(Merriam-Webster, 2000)

WILDFIRE – any uncontrolled combustion occurring in the wildland that is unwanted and/or unable to meet management objectives and thus requires a containment or suppression response.

WILDLAND FIRE – any fire in the ‘wildland’, that being a region in which development is of low density or nonexistent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered. A region typically contains natural vegetation and may be used for recreational or agricultural purposes. “Wildland fire can be divided into ‘wildfire’ and ‘prescribed fire’” (USDI & USDA, 1995, p.5).

WILDLAND FIRE COMMUNICATION(S) – is the transfer, or attempted transfer, of wildland fire-related information between an organization charged with this responsibility and its audience(s).

WILDLAND FIRE COMMUNICATORS – individuals who during their paid employment have the responsibility for, or spend a significant amount of time, transferring wildland fire-related information between an organization charged with this responsibility and its audience(s).

APPENDIX B: INVITATION TO PARTICIPATE IN DELPHI



School of Natural Resources

2021 Coffey Road
Columbus, OH 43210-1085

Phone 614-292-2265
TLX 245334
FAX 614-292-7432

October 15, 1999

«Title» «FirstName» «LastName»
«Organization»
«Address1»
«Address2»
«City», «State» «ZipCode»

Dear «Title» «LastName»:

You have been identified as one of the leaders in the wildland fire field. Thus we are requesting your help in determining the future direction of the field. But before I tell you more about how you can help, let me first introduce myself, as project leader.

My name is Kevin Clute and I am in a Master of Science program in the School of Natural Resources at The Ohio State University, working with Dr. Gary Mullins. For the past year, my research interests have centered upon wildland fire communications in the United States. The study we are presently undertaking with our Ecological Communications Lab examines current perceptions, needs, and barriers involved with wildland fire communication.

The method best suited for this study involves gathering a group of well-respected individuals, such as you, from across the United States to serve on a panel of experts for this research. This panel of experts will be responsible for answering a number of questions via e-mail within a given amount of time. These responses will serve to formulate specific questions for a larger national study designed to determine the prevalence of current issues in wildland fire communication.

We are requesting that you serve as one of these experts associated with this project. As an expert on this research project, your sole responsibility would be to respond to a series of short questions relating to the current state of wildland fire communication. Each of four series of questions would be e-mailed to you on a regular basis for a period of about six weeks starting in November and concluding by the week of December 13th. You would be expected to promptly respond to the questions and then send the e-mail message, containing your responses, back to me. Each series should take no more than 15 minutes to complete.

Please advise me by e-mail (clute.7@osu.edu) or by telephone with your decision. Please be advised that this project is solely funded by the School of Natural Resources. If you would like more details, a full study proposal is available upon request.

Sincerely,

Kevin Clute, B.E.S.
Project Leader
Ecological Communications Lab
School of Natural Resources
The Ohio State University
E-mail: clute.7@osu.edu
Phone: (614) 292-9828

Gary W. Mullins, Ph.D.
Professor and Director
School of Natural Resources
The Ohio State University
E-mail: mullins.2@osu.edu
Phone: (614) 292-8522

APPENDIX C: EXAMPLE OF DELPHI ROUND

Round 1: Wildland Fire Communication Study

1. Information and Instructions

Welcome to the first round of questions for The Ohio State University wildland fire communication study. We very much appreciate your participation.

We wish to stress that in no circumstance will responses be linked to individual respondents.

The "Information and Instructions" section for this round of questioning is to provide each respondent with background information to facilitate the completion of this questionnaire.

This is the first of three rounds of questions that will be e-mailed to you. The schedule (below) outlines when you should expect a new series of questions (every other week) and when your responses should be returned.

Schedule of Questioning Rounds

Round #	Questions Mailed	Questions Returned by
1	Monday, November 8	Friday, November 12
2	Monday, November 22	Friday, November 26
3	Monday, December 6	Friday, December 10

During some weeks, when a round of questions has been mailed out, it may be difficult for you to respond within the requested time. If this is the case, please just send brief e-mail message (or leave a voice mail message (614) 292-9828) letting us know that your responses will be received shortly. By doing this, you will avoid our sending you 'gentle' reminders.

The format for each round of questions will be the same. Each e-mail message sent will be divided into four sections. The first section will provide general information and instructions about the round's questions. The second section will summarize the findings from the previous round of questioning. The third section will ask you to comment on the findings from the previous round. And finally, the fourth section will present the new questions.

During this first round of questioning, you are asked to reply to the four questions in section four below. Please take no more than about 15 minutes to complete the questions. You may wish to use point-form if appropriate. Please remember that your perspective is important and there are no right or wrong answers. All ideas are valuable.

Finally, we would greatly appreciate the return of your responses by this Friday (November 12). When you have completed the questions please e-mail them to <clute.7@osu.edu>. Thank you once again for your participation in this study and we look forward to receiving your responses.

Kevin Clute

2. Findings from the Previous Round of Questioning

Not applicable this week.

3. Comments on the Findings

Not applicable this week.

4. This Week's Questions

1. Briefly describe the current state of wildland fire communication, as you perceive it, in your area or region of the country. Please then compare the state you have just described with the situation in the United States as a whole.

2a). Is the state you described above ideal for wildland fire communication?

b). If not, what do you believe the ideal to be?

c). If the current state of wildland fire communication differs from your ideal state, what prevents this ideal state from being achieved and what do you believe is the single greatest barrier to be overcome?

3. Is there any information (scientific, technical or otherwise) that is needed to advance wildland fire communication within agencies/organizations across the United States?

4. What wildland fire related education/communication products have you used when communicating about fire?

b). Which of these products was most useful?

c). What other products are needed?

Thank you again for your participation and assistance.

APPENDIX D: INVITATION TO PARTICIPATE IN QUESTIONNAIRE PILOT TEST



School of Natural Resources

2021 Coffey Road
Columbus, OH 43210-1085

Phone 614-292-2265
TLX 245334
FAX 614-292-7432

May 3, 2000

Dear Natural Resource Professional:

In recent years there has been significant research into the physical, behavioral and biological aspects of wildland fire. However, little is known about those who are charged with the responsibility of working with wildland fire and the challenges they face.

Enclosed is a draft of a questionnaire that when finalized will be sent to 850 natural resource professionals across the United States. This is part of a larger study, under the direction of Dr. Gary W. Mullins, Director of the School of Natural Resources, that seeks to better understand wildland fire communications.

You have been contacted in the hope that you would be willing to pilot test this questionnaire before it is widely distributed. Individuals participating in this research project may work extensively with fire communication or may have little or no wildland fire communication responsibilities. What we are seeking is a broad perspective.

We would appreciate your completing the questionnaire that should take approximately 10-20 minutes. Additional space has been provided should you wish to add any suggestions with regard to improving the design of the questionnaire or the clarity of specific questions.

All data collected in this questionnaire will be pooled for analysis so that no specific individuals can be identified. To better track respondents, a non-respondent coding number has been placed on the last page of the questionnaire. This number will only be used by the project coordinator to determine where to direct follow-up mailings.

If you have any questions regarding this research please do not hesitate to contact us at (614) 292-9828 or e-mail <clute.7@osu.edu>.

We would hope it would be possible for you to complete and return the questionnaire (in the pre-addressed stamped envelope) by May 12, 2000.

Thank you for your help.

Sincerely,

Kevin Clute
Project Coordinator
Wildland Fire Communication Study

Enclosure

APPENDIX E: QUESTIONNAIRE DEVELOPMENT MATRIX

Social Marketing P	Question Grouping #	(Knowledge) Background knowledge about...	(Attitude) Do you disagree or agree that...?	(Skill Level) Personal skill at...	Barrier or Opportunity?
PRODUCER "Who is the producer, the source of the promotional message?" (Fine, 1990, p.5)	1 Mission or Mandate of Organization	A25	B8	C20	D11
	2 Amount of wildland fire communication by my organization	A28	B1	C8	D6
	3 Organizational Resources	A30	B6	C25	D1
	4 Wildland Fire Communication Opportunities	A2	B30	C6	D3
	5 Public image of organization	A8	B18	C3	D4

Social Marketing P	Question Grouping #	(Knowledge) Background knowledge about...	(Attitude) Do you disagree or agree that...?	(Skill Level) Personal skill at...	Barrier or Opportunity?
PURCHASERS "Who are the potential purchasers in this particular market and what needs and wants do these people have?" (Fine, 1990, p.5)	1 Knowledge levels of purchasers	A7	B19	C17	D7
	2 Identify audience subsets to direct communication effort at	A17	B9	C4	D2
	3 Encouraging dialogue with purchasers	A12	B16	C16	D18
	4 Needs and wants of purchasers	A3	B24	C11	D24

Social Marketing P	Question Grouping #	(Knowledge) Background knowledge about...	(Attitude) Do you disagree or agree that...?	(Skill Level) Personal skill at...	Barrier or Opportunity?
PRODUCT(S) "What specific product(s) can the marketer design to help fill those needs" (Fine, 1990, p.5)	1 Suitable Message	A1	B10	C10	D5
	2 NWCG Message Themes	A14	B26	C7	D20
	3 Development of wildland fire communication products for addressing specific audience needs.	A15	B11	C26	D28
	4 Increasing support for the use of wildland fire through communication products	A9	B28	C28	D17

Social Marketing P	Question Grouping #	(Knowledge) Background knowledge about...	(Attitude) Do you disagree or agree that...?	(Skill Level) Personal skill at...	Barrier or Opportunity?
PRICE "What price(s) must the purchasers sacrifice in order to obtain this product?" (Fine, 1990, p.5)	1 Consumer's demand during times of high fire risk	A11	B2	C9	D16
	2 Consumer's demand during times of low fire risk	A10	B3	C18	D29
	3 Perceived value of product	A20	B12	C2	D22
	4 Cost to participants of obtaining wildland fire communication products	A6	B20	C24	D14
	5 Incremental knowledge increases	A19	B25	C14	D12

Social Marketing P	Question Grouping #	(Knowledge) Background knowledge about...	(Attitude) Do you disagree or agree that...?	(Skill Level) Personal skill at...	Barrier or Opportunity?
PROMOTE "How can the marketer promote (communicate with) the given market?" (Tone, 1990, p.5)	1 Promotional techniques	A13	B21	C12	D30
	2 Promotion efforts	A23	B7	C21	D19
	3 Availability of promotion resources	A21	B14	C29	D13
	4 Interagency promotion	A29	B4	C5	D9
	5 Competition	A22	B22	C19	D27

Social Marketing P	Question Grouping #	(Knowledge) Background knowledge about...	(Attitude) Do you disagree or agree that...?	(Skill Level) Personal skills at...	Barrier or Opportunity?
PLACE "Which parties (institutions) will participate in making the product available at the best place and time (best for the purchaser)?" (Fane, 1990, p.5)	1 Role of my organization in wildland fire communication in the United States	A27	B15	C23	D26
	2 Existing communication channels	A16	B13	C27	D15
	3 Communication responsiveness	A4	B17	C15	D25
	4 Individuals doing the communication	A26	B29	C30	D21

Social Marketing P ¹	Question Grouping #	(Knowledge) Background knowledge about...	(Attitude) Do you disagree or agree that...?	(Skill Level) Personal skill at...	Barrier or Opportunity?
PROBING "What probing will be necessary to evaluate the marketer's campaign and to obtain feedback from the purchasing audience?" (Fine, 1990, p.5)	1 Evaluation of communication efforts	A5	B27	C22	D8
	2 Feedback implementation for program revisions	A18	B5	C13	D10
	3 Long term communication efforts	A24	B23	C1	D23

APPENDIX F: LETTER ACCOMPANYING QUESTIONNAIRE



School of Natural Resources

2021 Coffey Road
Columbus, OH 43210-1085
Phone 614-292-2265
TLX 245334
FAX 614-292-7432

June 23, 2000

Dear Natural Resource Professional:

In recent months there has been a great deal of attention focused on wildland fire in the United States, especially in states such as New Mexico, Colorado, and Florida. In different sections of the country individuals working with wildland fire have faced many challenges. It is about these challenges that we are contacting you.

In about a week you will receive a questionnaire entitled, "A Study of Wildland Fire Communications in the United States." This is part of a larger study, being undertaken under the direction of Dr. Gary W. Mullins, Director of the Ohio State University School of Natural Resources, that seeks to better understand the challenges associated with wildland fire.

You have been contacted in the hope that you will be willing to complete this questionnaire. In our research we are seeking a broad perspective so we are contacting nearly 900 natural resource professionals who may or may not have direct responsibility for wildland fire activities. Your personal perspective is what is important to us.

We recognize that it is an extremely busy time of the year for all natural resource professionals, particularly those working with wildland fire, but we hope that you will be willing to take just a few minutes to complete the questionnaire and then return it to us by July 14, 2000.

We very much look forward to, and appreciate, your help.

Sincerely,

Kevin Clute
Project Coordinator
Wildland Fire Communications Study

E-mail: clute.7@osu.edu
Tel: (614) 292-9828
Fax: (614) 292-7432

APPENDIX G: QUESTIONNAIRE



A STUDY OF WILDLAND FIRE
COMMUNICATIONS IN THE UNITED STATES



FOR MORE INFORMATION PLEASE CONTACT:

KEVIN CLUTE
PROJECT COORDINATOR
WILDLAND FIRE COMMUNICATIONS STUDY
SCHOOL OF NATURAL RESOURCES
OHIO STATE UNIVERSITY
2021 COFFEY ROAD, ROOM 210
COLUMBUS, OHIO 43210-1085

PHONE: (614) 292-9828
FAX: (614) 292-7432
E-MAIL: CLUTE.7@OSU.EDU

GENERAL INFORMATION

- Please read the specific instructions that pertain to each group of questions since different groupings may use different response scaling.
- To assist you, all instructions are presented in boxes.
- For most questions only one response is required (unless otherwise specified).
- Please review the definitions below for clarification of commonly used terms in the questionnaire.
- When you have completed the questionnaire, please return it using the pre-printed return address label provided on the back cover of this booklet.

DEFINITIONS

Wildland fire is any combustion occurring under particular conditions to achieve specific land management objectives (fuel loads reductions, seedbed preparation, improvements in wildlife habitat, etc.) in which an approved fire management plan has been completed and approved. *This definition excludes the type of fire often described as "wildfire".*

Wildland fire communication(s) is the transfer of wildland fire-related information between an organization charged with this responsibility and its audience(s). Three examples of wildland fire communications are given below. This list provides only a guide and does not attempt to outline all possible types of wildland fire communication.

WILDLAND FIRE COMMUNICATION...	SPECIFIC EXAMPLE
...Between an Organization and the Public	A natural resource professional leading an educational/interpretive program for the public about the effects of a recent wildland fire.
...Between an Organization and Another Organization	An organizational representative talking with personnel from another natural resource management organization about the effects of fire upon particular endangered species.
...Within a Single Organization (Intra-organizational)	An expert in fire who is training other employees within the organization about the benefits of wildland fire's re-introduction into fire-dependent ecosystems.

Wildland fire communicators are individuals who during their paid employment have the responsibility for, or spend a significant amount of time, transferring wildland fire-related information between an organization charged with this responsibility and its audience(s).

This project is undertaken with the cooperation of Ohio State University faculty coordinators:

Gary W. Mullins, Ph.D.
Director & Professor,
School of Natural Resources

David M. Hix, Ph.D.
Associate Professor,
School of Natural Resources

Emmalou Norland, Ph.D.
Associate Professor,
School of Educational Policy
and Leadership

No federal funding is used in support of this study.

PART A: BACKGROUND KNOWLEDGE

Please indicate your wildland fire knowledge of the following areas by circling one response for each on the scale ranging from:

1 = Limitedto..... 5 = Extensive

#	BACKGROUND KNOWLEDGE ABOUT...	LIMITED		SOME		EXTENSIVE
A1	My organization's wildland fire communication message(s).	1	2	3	4	5
A2	Organizational training opportunities regarding wildland fire that are available to me.	1	2	3	4	5
A3	Determining needs and wants of audience(s).	1	2	3	4	5
A4	Developing responsive communication programs.	1	2	3	4	5
A5	Evaluating communication efforts.	1	2	3	4	5
A6	Barriers to public participation in communication efforts.	1	2	3	4	5
A7	Determining the knowledge level(s) of my audience(s).	1	2	3	4	5
A8	Developing and maintaining a desirable public image of my organization.	1	2	3	4	5
A9	Developing communication products that promote specific behavior changes.	1	2	3	4	5
A10	Producing communication products that appeal to clients during times of low fire risk.	1	2	3	4	5
A11	Producing communication products that appeal to clients during times of high fire risk.	1	2	3	4	5
A12	Encouraging two-way communication between organizations and their clients.	1	2	3	4	5
A13	Promotional theories and techniques for wildland fire communication.	1	2	3	4	5
A14	Existing National Wildfire Coordinating Group (NWCG) fire management message themes.	1	2	3	4	5
A15	Existing wildland fire communication products designed for specific audience needs.	1	2	3	4	5
A16	Formal communication channels within my organization.	1	2	3	4	5
A17	Identifying audience subsets within a larger population to direct communication efforts towards.	1	2	3	4	5
A18	Incorporating evaluative feedback into new or existing communication efforts.	1	2	3	4	5
A19	Increasing audience knowledge levels through the development of communication products.	1	2	3	4	5

#	BACKGROUND KNOWLEDGE ABOUT...	LIMITED		SOME		EXTENSIVE
A20	Producing high quality wildland fire communication products.	1	2	3	4	5
A21	Organizational resources available for the promotion of wildland fire communication efforts.	1	2	3	4	5
A22	Other organization's wildland fire communication efforts.	1	2	3	4	5
A23	Promoting wildland fire communication efforts.	1	2	3	4	5
A24	Developing long-term wildland fire communication programs.	1	2	3	4	5
A25	The fire-related mission or mandate of my organization.	1	2	3	4	5
A26	The role of wildland fire communicators within my organization.	1	2	3	4	5
A27	The uniqueness of my organization's role in wildland fire communication when compared to other natural resource organizations in the United States.	1	2	3	4	5
A28	Wildland fire communication within my organization.	1	2	3	4	5
A29	Working in partnerships, cooperatively and collaboratively.	1	2	3	4	5
A30	Resources available within my organization for wildland fire communication.	1	2	3	4	5

PART B: ATTITUDES REGARDING WILDLAND FIRE COMMUNICATION

Please indicate the extent to which you agree or disagree with the following statements by circling one response for each when:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

#	DO YOU AGREE OR DISAGREE THAT...?	STRONGLY DISAGREE	DISAGREE	NEITHER	AGREE	STRONGLY AGREE
B1	Communicating about wildland fire has been carried out extensively by my organization.	1	2	3	4	5
B2	The public is eager to learn about wildland fire during times of high fire risk.	1	2	3	4	5
B3	The public is eager to learn about wildland fire during times of low fire risk.	1	2	3	4	5
B4	Collaboration among wildland fire management organizations is necessary for successful wildland fire communication campaigns.	1	2	3	4	5
B5	Incorporating evaluative feedback into new or existing communication efforts is critical to improving them.	1	2	3	4	5
B6	My organization consistently has sufficient resources (e.g. physical, human, financial, etc.) for wildland fire communication.	1	2	3	4	5
B7	A strong promotional effort is critical to get the public interested in wildland fire issues.	1	2	3	4	5
B8	Communicating about wildland fire fits appropriately within my organization's mission or mandate.	1	2	3	4	5
B9	Audiences should be divided up into smaller audience segments based upon descriptive and behavioral characteristics.	1	2	3	4	5
B10	Wildland fire communication messages are very seldom relevant to my area of the country.	1	2	3	4	5
B11	Developing wildland fire communication products targeted to specific audience needs is critical to educating target audiences about wildland fire.	1	2	3	4	5
B12	The public perceives that wildland fire communication products are valuable.	1	2	3	4	5
B13	Formal communication channels within any organization must operate efficiently and effectively.	1	2	3	4	5
B14	More resources (e.g. physical, personnel, financial, etc.) are needed for the promotion of wildland fire communication in the United States.	1	2	3	4	5
B15	My organization has an important and unique role to play in wildland fire communications in the United States.	1	2	3	4	5

#	DO YOU AGREE OR DISAGREE THAT...?	STRONGLY DISAGREE	DISAGREE	NEITHER	AGREE	STRONGLY AGREE
B16	Dialogue with the public is critical in understanding their needs and wants concerning wildland fire communication.	1	2	3	4	5
B17	Responsiveness is one of the keys to effectively communicating with wildland fire audiences.	1	2	3	4	5
B18	The public has a great deal of confidence in organizations that are charged with wildland fire management in the United States.	1	2	3	4	5
B19	The public is very knowledgeable about wildland fire management in the United States.	1	2	3	4	5
B20	The public should not have to invest excessive amounts of time and effort to gather wildland fire information.	1	2	3	4	5
B21	A variety of promotional techniques are needed to effectively communicate with target audiences.	1	2	3	4	5
B22	There are many competing messages produced by natural resource management organizations in the United States regarding wildland fire.	1	2	3	4	5
B23	Those charged with fire communication efforts must develop a long-term wildland fire communication campaign.	1	2	3	4	5
B24	Understanding the needs and wants of my audience(s) is critical to effectively communicating with them.	1	2	3	4	5
B25	Wildland fire communication efforts help to increase the public's knowledge about wildland fire and its management.	1	2	3	4	5
B26	The United States needs a national wildland fire management message.	1	2	3	4	5
B27	Evaluating communication efforts is an integral part of developing future communication products.	1	2	3	4	5
B28	Wildland fire communication products can help to promote positive behavior changes in the audiences they target.	1	2	3	4	5
B29	Wildland fire communicators are the best individuals for communicating information to the public about wildland fire.	1	2	3	4	5
B30	Wildland fire training provided to me by my organization is a valuable use of my time.	1	2	3	4	5

PART C: PERSONAL SKILL

Please indicate your personal skill in the following areas by circling one response for each on the scale ranging from:
 1 = Limitedto..... 5 = Extensive

#	PERSONAL SKILL AT...					
		LIMITED		SOME		EXTENSIVE
C1	Preparing long-term communication plans.	1	2	3	4	5
C2	Evaluating the quality of communication products.	1	2	3	4	5
C3	Developing the trust and confidence of the clients my organization serves.	1	2	3	4	5
C4	Tailoring communication strategies to different audiences.	1	2	3	4	5
C5	Working as a member of a team involving representatives from several organizations and communities.	1	2	3	4	5
C6	Integrating information gained from training sessions conducted by my organization into my daily responsibilities.	1	2	3	4	5
C7	Integrating existing National Wildfire Coordinating Group (NWCG) message themes into my wildland fire communication efforts.	1	2	3	4	5
C8	Conducting wildland fire communication training programs for staff in my organization.	1	2	3	4	5
C9	Ability to address the public's interest about wildland fire during times of high fire risk.	1	2	3	4	5
C10	Designing wildland fire communication messages.	1	2	3	4	5
C11	Determining the needs and wants of my audience(s).	1	2	3	4	5
C12	Determining when to employ specific promotional theories and techniques.	1	2	3	4	5
C13	Integrating the results of evaluation efforts into the development or revision of wildland fire communication products.	1	2	3	4	5
C14	Developing communication products that increase the knowledge of the audience(s) they are intended to serve.	1	2	3	4	5
C15	Developing responsive wildland fire communication programs.	1	2	3	4	5
C16	Encouraging two-way communication with the clients my organization serves.	1	2	3	4	5
C17	Working with audiences of differing knowledge levels.	1	2	3	4	5
C18	Generating public interest in wildland fire information during times of low fire risk.	1	2	3	4	5
C19	Identifying competing sources of information about wildland fire management.	1	2	3	4	5

#	PERSONAL SKILL AT...	LIMITED		SOME		EXTENSIVE
C20	Integrating wildland fire communication into my organization's activities.	1	2	3	4	5
C21	Promoting communication programs to intended audiences.	1	2	3	4	5
C22	Integrating effective evaluation into communication efforts.	1	2	3	4	5
C23	Promoting my organization's strengths when discussing wildland fire communication.	1	2	3	4	5
C24	Reducing the barriers to obtaining wildland fire information for the public.	1	2	3	4	5
C25	Using finite organizational resources (e.g. physical, human, financial, etc.) effectively.	1	2	3	4	5
C26	Integrating audience needs into wildland fire communication product development.	1	2	3	4	5
C27	Utilizing existing organizational communication channels to achieve desired outcomes.	1	2	3	4	5
C28	Promoting positive behavior change through the use of wildland fire communication products.	1	2	3	4	5
C29	Utilizing resources within my organization designated for promotional activities.	1	2	3	4	5
C30	Working closely with other wildland fire communicators.	1	2	3	4	5

PART D: BARRIERS AND OPPORTUNITIES TO WILDLAND FIRE COMMUNICATION EFFORTS

Please rate the following statements (by circling one response for each) based upon the extent to which they describe a barrier or opportunity (see definitions below) to your wildland fire communication efforts when:

- 2 = Is a significant barrier
- 1 = Is a moderate barrier
- 0 = Is neither a barrier nor an opportunity
- +1 = Is a moderate opportunity
- +2 = Is a significant opportunity

Barrier = an impediment to progress or achievement

Opportunity = an occurrence that offers a chance for progress or achievement

#	BARRIER OR OPPORTUNITY TO <u>YOUR</u> WILDLAND FIRE COMMUNICATION EFFORTS?					
		SIGNIFICANT BARRIER	MODERATE BARRIER	NEITHER	MODERATE OPPORTUNITY	SIGNIFICANT OPPORTUNITY
D1	The resources (e.g. physical, human, financial, etc.) my organization allocates for wildland fire communication.	-2	-1	0	+1	+2
D2	The audience(s) my organization targets for wildland fire communication efforts.	-2	-1	0	+1	+2
D3	The wildland fire training opportunities within my organization.	-2	-1	0	+1	+2
D4	The reputation of my organization with the public that it serves.	-2	-1	0	+1	+2
D5	My organization's current wildland fire message(s).	-2	-1	0	+1	+2
D6	My organization's commitment to wildland fire communication.	-2	-1	0	+1	+2
D7	My organization's current understanding of the knowledge level(s) of our clients.	-2	-1	0	+1	+2
D8	The degree to which my organization evaluates its wildland fire communication products.	-2	-1	0	+1	+2
D9	My organization's efforts at working with other organizations that also have a role in wildland fire communication.	-2	-1	0	+1	+2
D10	My organization's commitment to incorporating evaluative feedback into the development or revision of wildland fire communication products.	-2	-1	0	+1	+2
D11	My organization's fire-related mission or mandate.	-2	-1	0	+1	+2
D12	The amount of wildland fire knowledge the public possesses as obtained from my organization's communication products.	-2	-1	0	+1	+2
D13	The resources available within my organization for promoting upcoming or existing wildland fire communication efforts.	-2	-1	0	+1	+2
D14	The amount of effort a member of the public must expend to obtain wildland fire information from my organization.	-2	-1	0	+1	+2

#	BARRIER OR OPPORTUNITY TO YOUR WILDLAND FIRE COMMUNICATION EFFORTS?					
		SIGNIFICANT BARRIER	MODERATE BARRIER	NEITHER	MODERATE OPPORTUNITY	SIGNIFICANT OPPORTUNITY
D15	The existing channels within my organization for the communication of wildland fire information.	-2	-1	0	+1	+2
D16	The willingness of the public in my geographic area to obtain wildland fire information produced by my organization during times of high fire risk.	-2	-1	0	+1	+2
D17	The effectiveness of my organization's communication products in changing audience behavior.	-2	-1	0	+1	+2
D18	The emphasis my organization places on two-way communication between its employees and their clients.	-2	-1	0	+1	+2
D19	My organization's efforts at promoting fire communication products.	-2	-1	0	+1	+2
D20	The existing National Wildfire Coordinating Group (NWCG) fire management message themes.	-2	-1	0	+1	+2
D21	The individuals charged with wildland fire communication within my organization.	-2	-1	0	+1	+2
D22	The quality of wildland fire communication products produced by my organization.	-2	-1	0	+1	+2
D23	The status of my organization's long-term wildland fire communication plan(s).	-2	-1	0	+1	+2
D24	The resources my organization allocates to understanding the public's needs and wants concerning wildland fire.	-2	-1	0	+1	+2
D25	The responsiveness of my organization's wildland fire communication effort.	-2	-1	0	+1	+2
D26	The role that my organization plays in wildland fire communication in the United States.	-2	-1	0	+1	+2
D27	The way in which my organization deals with perceived competition from other wildland fire information sources.	-2	-1	0	+1	+2
D28	The wildland fire communication products used by my organization that address specific audience needs.	-2	-1	0	+1	+2
D29	The willingness of the public in my geographic area to obtain wildland fire information produced by my organization during times of low fire risk.	-2	-1	0	+1	+2
D30	The promotional techniques used by my organization when communicating about wildland fire.	-2	-1	0	+1	+2

PART E: WILDLAND FIRE MESSAGE THEMES & THEIR USE

The National Wildfire Coordinating Group (NWCG) has developed five thematic messages regarding the role of fire in the United States. Please rate the following NWCG themes based upon your perception of their overall usefulness to your region of the country when:
 1 = Not Usefulto..... 5 = Extremely Useful

#	USEFULNESS OF NWCG FIRE MESSAGE THEMES IN YOUR REGION OF THE COUNTRY	RATING SCALE				
		NOT USEFUL		MODERATELY		EXTREMELY
		1	2	3	4	5
E1	<p>As partners in wildland fire management, we can all take steps to reduce risks. Many risks can be reduced through the increased use of fire in wildlands. To increase our use of fire successfully, all of us need to:</p> <ul style="list-style-type: none"> • Become better informed about the prevention, control, and use of fire; • Become better informed about the beneficial effects of fire; • Participate in planning and preparing for wildland fire; • Accept the necessary trade-off between manageable smoke impacts from planned wildland fire and the more severe impact of smoke from unwanted fire; • Create incentives for building and maintaining fire-safe homes and communities to reduce the unwanted consequences of wildland fire. 					
E2	<p>We have learned that the lack of periodic fire in many wildlands increases risks to society and the environment. Risks vary from one location to another and may include:</p> <ul style="list-style-type: none"> • Land damaging fire resulting from fuel accumulations above historic levels; • Loss of life or serious injury to firefighters and the public; • Health effects and visibility impairment from intense or extended periods of smoke; • Escalating costs of controlling unwanted wildland fires; • Property loss and damage to economically valuable landscapes; • Loss of plants and animal species and their habitats; • Damage to soil, watersheds, and air quality. 					

#

**USEFULNESS OF NWCG FIRE MESSAGE THEMES
IN YOUR REGION OF THE COUNTRY**

NOT USEFUL			MODERATELY		EXTREMELY
------------	--	--	------------	--	-----------

- | | | | | | | | |
|----|---|--|---|---|---|---|---|
| E3 | <p>Wildlands are always changing, sometimes dramatically, sometimes subtly. Fire is one of the important natural agents of change.</p> <ul style="list-style-type: none"> • Fire has helped shape many of North America's wildlands for thousands of years and is essential for the survival of many plants and animals. • Historic patterns of wildland fire varied from one place to another, depending largely on climate, type of vegetation, and human influence. • Present fire patterns now differ substantially from historic fire patterns due to changing human influence. • The effects of fire range from subtle to extreme and are influenced by the condition of the vegetation when fire occurs. | <table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 20px;">1</td> <td style="width: 20px;">2</td> <td style="width: 20px;">3</td> <td style="width: 20px;">4</td> <td style="width: 20px;">5</td> </tr> </table> | 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 | | | |
| E4 | <p>Wildland fire management, which includes the prevention, control and use of wildland fire, is a process affecting all of us.</p> <ul style="list-style-type: none"> • Prevention is education and other actions that reduce unwanted wildland fires. • Control is action taken on unwanted wildland fires to protect life, and to reduce damage to resources and property. | <table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 20px;">1</td> <td style="width: 20px;">2</td> <td style="width: 20px;">3</td> <td style="width: 20px;">4</td> <td style="width: 20px;">5</td> </tr> </table> | 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 | | | |
| E5 | <p>Effective use of wildland fire will provide substantial benefits to society and the environment. These benefits include:</p> <ul style="list-style-type: none"> • Increased safety for wildland firefighters and the public; • Reduced effects of smoke on public health and visibility; • Minimized damage from wildland fire; • Reduced costs of wildland fire management; • Protection of plants and animals that depend on fire; • Improved habitats and watersheds. | <table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 20px;">1</td> <td style="width: 20px;">2</td> <td style="width: 20px;">3</td> <td style="width: 20px;">4</td> <td style="width: 20px;">5</td> </tr> </table> | 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 | | | |

Please rank from 1 to 6 the following ways of using wildland fire management message themes in the United States when 1 = most desirable and 6 = least desirable. Numbers (1, 2, 3, 4, 5, 6) may only be used once.

E6	<p>HOW SHOULD WILDLAND FIRE MANAGEMENT MESSAGE THEMES BE USED IN THE UNITED STATES?</p>	<p>RANK</p>
	A single, universal wildland fire message for use in the entire U.S.	_____
	A single, universal wildland fire message that can be used in conjunction with regionally focused and developed sub-components	_____
	Messages tailored to specific ecoregions	_____
	Messages tailored to areas by natural (historic) fire regimes	_____
	Messages tailored to a specific state (e.g. Ohio)	_____
	Other (please specify): _____	_____

PART F: RESPONDENT'S BACKGROUND

F1. I have been employed as a natural resource professional for (circle one):

1. 3 years or less
2. 4 to 7 years
3. 8 to 11 years
4. 12 to 15 years
5. 16 to 19 years
6. 20 to 23 years
7. 24 or more years

F2. During this time, involvement with wildland fire has been one element of my job(s) for (circle one):

1. 3 years or less
2. 4 to 7 years
3. 8 to 11 years
4. 12 to 15 years
5. 16 to 19 years
6. 20 to 23 years
7. 24 or more years

F3. During this time, communicating about wildland fire has been one element of my job(s) for (circle one):

1. 3 years or less
2. 4 to 7 years
3. 8 to 11 years
4. 12 to 15 years
5. 16 to 19 years
6. 20 to 23 years
7. 24 or more years

F4. The state in which I am employed is (e.g. Ohio): _____

F5. I am currently employed by (circle all that apply):

1. Bureau of Indian Affairs
2. Bureau of Land Management
3. National Interagency Fire Center (Agency affiliation: _____)
4. National Park Service
5. U.S. Fish and Wildlife Service
6. U.S. Forest Service
7. U.S. Military (including U.S. Army Corps of Engineers)
8. Natural resource conservation/protection organization (state or local level)
9. Parks, preserves or natural areas organization (state or local level)
10. The Nature Conservancy
11. Academic institution
12. Other (please specify): _____

F6. My current job title is: _____

F7. I have been in my present position for (circle one):

1. 3 years or less
2. 4 to 7 years
3. 8 to 11 years
4. 12 to 15 years
5. 16 to 19 years
6. 20 to 23 years
7. 24 or more years

F8. My current position is (circle one):

1. full-time
2. part-time or seasonal

F9. How much do you work with wildland fire in your current position? (circle one)

1. I never work with wildland fire (0% of my employed time)
2. I rarely work with wildland fire (1 – 25% of my employed time)
3. I sometimes work with wildland fire (26 – 50% of my employed time)
4. I very often work with wildland fire (51 – 75% of my employed time)
5. I extensively work with wildland fire (76 – 100% of my employed time)

F10. How much do you communicate about wildland fire in your current position? (circle one)

1. I never communicate about wildland fire (0% of my employed time)
2. I rarely communicate about wildland fire (1 – 25% of my employed time)
3. I sometimes communicate about wildland fire (26 – 50% of my employed time)
4. I very often communicate about wildland fire (51 – 75% of my employed time)
5. I extensively communicate about wildland fire (76 – 100% of my employed time)

F11. My age on my last birthday was _____ (years).

F12. My gender is (circle one):

1. Female
2. Male

F13. Highest education level completed (circle one):

1. High school diploma
2. Some college
3. Technical or Associate degree
4. Bachelor's degree
5. Some graduate work
6. Master's degree
7. Doctoral degree

F14. The field or subject area in which your highest educational level was attained:

PART G: COMMENTS

G1. Any comments and suggestions concerning wildland fire communication and/or this questionnaire would be welcomed.

PLEASE RETURN THE COMPLETED QUESTIONNAIRE USING
THE PRE-PRINTED RETURN ADDRESS LABEL PROVIDED.

THANK YOU FOR TAKING TIME OUT OF YOUR BUSY SCHEDULE
TO ASSIST US WITH THIS IMPORTANT STUDY.

YOUR PARTICIPATION IS GREATLY APPRECIATED.

APPENDIX H: REQUEST TO COMPLETE QUESTIONNAIRE



School of Natural Resources

2021 Coffey Road
Columbus, OH 43210-1085

Phone 614-292-2265
TLX 245334
FAX 614-292-7432

June 30, 2000

Dear Survey Participant:

Enclosed is the questionnaire about which I wrote to you earlier.

We would sincerely appreciate your taking the time necessary to complete the questionnaire and then to return it to us by July 14, 2000. Brief instructions can be found on the inside front cover of the booklet. We would encourage you to read these before starting. Also a pre-printed return address label has been included at the back of the booklet to assist in the return of your completed questionnaire.

We would stress that all data collected will be pooled so that no individual's responses can be identified. However, a coding number has been placed on the last page of the questionnaire to assist the project coordinator should follow-up mailings be necessary.

If you would like additional information concerning any aspect of this research or need clarification on some portion of the questionnaire, please do not hesitate to contact us at (614) 292-9828 or e-mail <clute.7@osu.edu>. In addition, if you are interested in receiving results of this research project, please write your name, mailing address, and e-mail address on a separate piece of paper (not on the questionnaire) and enclose it with your completed questionnaire.

Thank you once again for your participation.

Sincerely,

Kevin Clute
Project Coordinator
Wildland Fire Communications Study

Enclosure

APPENDIX I: POSTCARD REMINDER TO COMPLETE QUESTIONNAIRE



Kevin Clute
Project Coordinator
Wildland Fire Communications Study
School of Natural Resources
2021 Coffey Road, Room 210
Columbus, OH 43210-1085

Mail Alert #: 201175-361



A Study of Wildland Fire Communications in The United States



A Study of Wildland Fire Communications in the United States

Approximately a week ago you were sent a questionnaire concerning the current state of wildland fire communications in the United States. Your input into this study is extremely important. If you have not already done so, please return your completed questionnaire as soon as possible. Should you require an additional copy of the questionnaire, please contact us at the address below. If you recently returned your completed questionnaire, we sincerely thank you.



School of
Natural Resources

Kevin Clute
Project Coordinator
Wildland Fire Communications Study
2021 Coffey Road, Room 210
Columbus, OH 43210-1085
Phone: (614) 292-9828
E-mail: clute.7@osu.edu

APPENDIX J: FINAL POSTCARD REMINDER TO COMPLETE QUESTIONNAIRE



Kevin Clute
 Project Coordinator
 Wildland Fire Communications Study
 School of Natural Resources
 2021 Coffey Road, Room 210
 Columbus, OH 43210-1085

Mail Meter #: 201173-361



**Deadline
 Extended!**

It's Not Too Late!
 For YOU to Participate in the
 Wildland Fire Communications Study



Deadline Extended!
 Please Return Your Wildland Fire
 Communications Study Questionnaire ASAP

Approximately three weeks ago you were sent a questionnaire concerning the current state of wildland fire communications in the United States. Our records indicate that you have not as yet returned a completed questionnaire. It may be that you have been away from your office on business or summer vacation. Either way it is not too late for you to participate in "A Study of Wildland Fire Communications in the United States". We would hope that you would be willing to do so by responding to us ASAP. Should you require an additional copy of the questionnaire, please contact us at the address below. If you recently returned your completed questionnaire, we sincerely thank you.

THE OHIO STATE UNIVERSITY
 School of
 Natural Resources

Kevin Clute
 Project Coordinator
 Wildland Fire Communications Study
 2021 Coffey Road, Room 210
 Columbus, OH 43210-1085
 Phone: (614) 292-9828
 E-mail: clute.7@osu.edu

APPENDIX K: RESPONSE RATE BY STATE AND REGION

Region 1 (W)			
State	# Sent	# Received	%
AK	35	14	40.0
CA	76	20	26.3
HI	4	1	25.0
ID	88	23	26.1
NV	15	6	40.0
OR	60	15	25.0
WA	24	7	29.2
	302	86	28.5

Region 2 (SW)			
State	# Sent	# Received	%
AZ	33	15	45.5
NM	36	18	50.0
OK	5	2	40.0
TX	17	7	41.2
	91	42	46.2

Region 3 (MW)			
State	# Sent	# Received	%
IA	2	0	0.0
IL	8	4	50.0
IN	8	5	62.5
MI	5	4	80.0
MN	13	6	46.2
MO	7	5	71.4
OH	3	2	66.7
WI	13	7	53.8
	59	33	55.9

Region 4 (SE)			
State	# Sent	# Received	%
AL	5	1	20.0
AR	4	4	100.0
FL	44	24	54.5
GA	20	10	50.0
KY	5	5	100.0
LA	7	1	14.3
MS	5	1	20.0
NC	17	4	23.5
SC	12	7	58.3
TN	11	4	36.4
	130	61	46.9

Region 5 (NE)			
State	# Sent	# Received	%
CT	2	1	50.0
DC	16	8	50.0
DE	2	0	0.0
MA	21	6	28.6
MD	10	4	40.0
ME	10	3	30.0
NH	6	2	33.3
NJ	1	0	0.0
NY	26	4	15.4
PA	18	5	27.8
RJ	2	1	50.0
VA	14	5	35.7
VT	4	2	50.0
WV	3	1	33.3
	135	42	31.1

Region 6 (NC)			
State	# Sent	# Received	%
CO	31	14	45.2
KS	4	2	50.0
MT	39	13	33.3
ND	7	4	57.1
NE	5	1	20.0
SD	1	1	100.0
UT	32	8	25.0
WY	19	8	42.1
	138	51	37.0

APPENDIX L: PERCEIVED KNOWLEDGE RANKED BY MEAN

Please indicate your wildland fire knowledge of the following areas by circling one response for each on the scale ranging from:

1 = Limitedto..... 5 = Extensive

Question	Statement	Mean	Std. Dev.	N
A25	The fire-related mission or mandate of my organization.	4.26	0.90	318
A1	My organization's wildland fire communication message(s).	4.15	0.93	320
A16	Formal communication channels within my organization.	4.14	0.85	320
A2	Organizational training opportunities regarding wildland fire that are available to me.	4.02	0.97	318
A29	Working in partnerships, cooperatively and collaboratively.	3.96	0.92	319
A28	Wildland fire communication within my organization.	3.88	1.01	319
A8	Developing and maintaining a desirable public image of my organization.	3.88	0.94	318
A26	The role of wildland fire communicators within my organization.	3.75	1.06	317
A27	The uniqueness of my organization's role in wildland fire communication when compared to other natural resource organizations in the United States.	3.66	1.09	318
A30	Resources available within my organization for wildland fire communication.	3.63	1.06	318
A3	Determining needs and wants of audience(s).	3.45	1.02	320
A12	Encouraging two-way communication between organizations and their clients.	3.44	1.01	319
A11	Producing communication products that appeal to clients during times of high fire risk.	3.36	1.16	318
A4	Developing responsive communication programs.	3.27	1.16	319
A7	Determining the knowledge level(s) of my audience(s).	3.26	1.06	319

Question	Statement	Mean	Std. Dev.	N
A21	Organizational resources available for the promotion of wildland fire communication efforts.	3.26	1.15	317
A23	Promoting wildland fire communication efforts.	3.23	1.10	317
A14	Existing National Wildfire Coordinating Group (NWCG) fire management message themes.	3.21	1.12	319
A6	Barriers to public participation in communication efforts.	3.12	1.05	318
A19	Increasing audience knowledge levels through the development of communication products.	3.07	1.07	317
A15	Existing wildland fire communication products designed for specific audience needs.	3.02	1.00	319
A22	Other organization's wildland fire communication efforts.	3.02	1.02	319
A20	Producing high quality wildland fire communication products.	2.99	1.19	318
A9	Developing communication products that promote specific behavior changes.	2.97	1.12	319
A5	Evaluating communication efforts.	2.97	1.16	318
A17	Identifying audience subsets within a larger population to direct communication efforts towards.	2.94	1.06	316
A24	Developing long-term wildland fire communication programs.	2.89	1.15	317
A13	Promotional theories and techniques for wildland fire communication.	2.88	1.09	318
A10	Producing communication products that appeal to clients during times of low fire risk.	2.86	1.11	318
A18	Incorporating evaluative feedback into new or existing communication efforts.	2.82	1.02	319
Overall		3.38	1.05	318
Valid N				302

APPENDIX M: ATTITUDES RANKED BY MEAN

Please indicate the extent to which you agree or disagree with the following statements by circling one response for each when:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither agree nor disagree
- 4 = Agree
- 5 = Strongly agree

Question	Statement	Mean	Std. Dev.	N
B4	Collaboration among wildland fire management organizations is necessary for successful wildland fire communication campaigns.	4.63	0.60	317
B15	My organization has an important and unique role to play in wildland fire communications in the United States.	4.39	0.76	319
B5	Incorporating evaluative feedback into new or existing communication efforts is critical to improving them.	4.39	0.64	318
B2	The public is eager to learn about wildland fire during times of high fire risk.	4.37	0.69	319
B8	Communicating about wildland fire fits appropriately within my organization's mission or mandate.	4.37	0.79	319
B24	Understanding the needs and wants of my audience(s) is critical to effectively communicating with them.	4.36	0.58	316
B13	Formal communication channels within any organization must operate efficiently and effectively.	4.35	0.66	316
B17	Responsiveness is one of the keys to effectively communicating with wildland fire audiences.	4.32	0.60	317
B30	Wildland fire training provided to me by my organization is a valuable use of my time.	4.31	0.77	316
B16	Dialogue with the public is critical in understanding their needs and wants concerning wildland fire communication.	4.31	0.60	318
B25	Wildland fire communication efforts help to increase the public's knowledge about wildland fire and its management.	4.28	0.56	316
B14	More resources (e.g. physical, personnel, financial, etc.) are needed for the promotion of wildland fire communication in the United States.	4.21	0.76	318
B21	A variety of promotional techniques are needed to effectively communicate with target audiences.	4.18	0.60	316
B27	Evaluating communication efforts is an integral part of developing future communication products.	4.16	0.56	317

Question	Statement	Mean	Std. Dev.	N
B10	Wildland fire communication messages are very seldom relevant to my area of the country.	4.09	1.04	318
B23	Those charged with fire communication efforts must develop a long-term wildland fire communication campaign.	4.07	0.71	317
B11	Developing wildland fire communication products targeted to specific audience needs is critical to educating target audiences about wildland fire.	4.06	0.70	316
B28	Wildland fire communication products can help to promote positive behavior changes in the audiences they target.	4.04	0.62	317
B7	A strong promotional effort is critical to get the public interested in wildland fire issues.	3.99	0.82	318
B20	The public should not have to invest excessive amounts of time and effort to gather wildland fire information.	3.90	0.78	316
B26	The United States needs a national wildland fire management message.	3.83	0.93	314
B9	Audiences should be divided up into smaller audience segments based upon descriptive and behavioral characteristics.	3.61	0.68	317
B29	Wildland fire communicators are the best individuals for communicating information to the public about wildland fire.	3.39	0.95	317
B22	There are many competing messages produced by natural resource management organizations in the United States regarding wildland fire.	3.38	0.99	317
B1	Communicating about wildland fire has been carried out extensively by my organization.	3.36	1.07	317
B12	The public perceives that wildland fire communication products are valuable.	3.21	0.79	317
B18	The public has a great deal of confidence in organizations that are charged with wildland fire management in the United States.	2.79	0.98	318
B3	The public is eager to learn about wildland fire during times of low fire risk.	2.55	0.90	319
B6	My organization consistently has sufficient resources (e.g. physical, human, financial, etc.) for wildland fire communication.	2.33	0.96	319
B19	The public is very knowledgeable about wildland fire management in the United States.	1.93	0.69	318
Overall		4.04	0.75	317
Valid N				297

APPENDIX N: PERCEIVED SKILLS RANKED BY MEAN

Please indicate your personal skill in the following areas by circling one response for each on the scale ranging from:

1 = Limitedto..... 5 = Extensive

Question	Statement	Mean	Std. Dev.	N
C5	Working as a member of a team involving representatives from several organizations and communities.	4.15	0.94	318
C17	Working with audiences of differing knowledge levels.	3.93	0.92	317
C6	Integrating information gained from training sessions conducted by my organization into my daily responsibilities.	3.92	0.86	313
C3	Developing the trust and confidence of the clients my organization serves.	3.90	0.83	317
C25	Using finite organizational resources (e.g. physical, human, financial, etc.) effectively.	3.78	0.89	316
C16	Encouraging two-way communication with the clients my organization serves.	3.68	0.99	316
C30	Working closely with other wildland fire communicators.	3.64	1.14	317
C23	Promoting my organization's strengths when discussing wildland fire communication.	3.64	1.00	315
C9	Ability to address the public's interest about wildland fire during times of high fire risk.	3.63	1.12	317
C27	Utilizing existing organizational communication channels to achieve desired outcomes.	3.47	1.02	316
C20	Integrating wildland fire communication into my organization's activities.	3.41	1.04	316
C29	Utilizing resources within my organization designated for promotional activities.	3.33	1.07	314
C4	Tailoring communication strategies to different audiences.	3.28	1.06	317
C21	Promoting communication programs to intended audiences.	3.27	1.03	315
C11	Determining the needs and wants of my audience(s).	3.19	1.05	317

Question	Statement	Mean	Std. Dev.	N
C7	Integrating existing National Wildfire Coordinating Group (NWCG) message themes into my wildland fire communication efforts.	3.11	1.15	316
C14	Developing communication products that increase the knowledge of the audience(s) they are intended to serve.	3.07	1.17	315
C24	Reducing the barriers to obtaining wildland fire information for the public.	3.07	1.11	315
C10	Designing wildland fire communication messages.	3.03	1.22	317
C2	Evaluating the quality of communication products.	2.97	1.09	317
C28	Promoting positive behavior change through the use of wildland fire communication products.	2.96	1.11	315
C19	Identifying competing sources of information about wildland fire management.	2.90	1.08	316
C26	Integrating audience needs into wildland fire communication product development.	2.87	1.09	315
C22	Integrating effective evaluation into communication efforts.	2.83	1.03	313
C12	Determining when to employ specific promotional theories and techniques.	2.82	1.10	316
C1	Preparing long-term communication plans.	2.81	1.25	317
C18	Generating public interest in wildland fire information during times of low fire risk.	2.72	1.06	315
C15	Developing responsive wildland fire communication programs.	2.71	1.14	314
C13	Integrating the results of evaluation efforts into the development or revision of wildland fire communication products.	2.61	1.11	314
C8	Conducting wildland fire communication training programs for staff in my organization.	2.57	1.26	316
Overall		3.24	1.06	316
Valid N				305

APPENDIX O: BARRIERS/OPPORTUNITIES RANKED BY MEAN

Please rate the following statements (by circling one response for each) based upon the extent to which they describe a barrier or opportunity (see definitions below) to your wildland fire communication efforts when:

- 2 = Is a significant barrier
- 1 = Is a moderate barrier
- 0 = Is neither a barrier nor an opportunity
- +1 = Is a moderate opportunity
- +2 = Is a significant opportunity

Barrier = an impediment to progress or achievement

Opportunity = an occurrence that offers a chance for progress or achievement

Question	Statement	Mean	Std. Dev.	N
D11	My organization's fire-related mission or mandate.	1.12	0.97	316
D4	The reputation of my organization with the public that it serves.	0.92	1.07	315
D3	The wildland fire training opportunities within my organization.	0.89	1.07	314
D9	My organization's efforts at working with other organizations that also have a role in wildland fire communication.	0.79	1.02	315
D5	My organization's current wildland fire message(s).	0.66	1.00	314
D16	The willingness of the public in my geographic area to obtain wildland fire information produced by my organization during times of high fire risk.	0.62	1.07	313
D26	The role that my organization plays in wildland fire communication in the United States.	0.61	1.06	314
D21	The individuals charged with wildland fire communication within my organization.	0.52	1.04	315
D6	My organization's commitment to wildland fire communication.	0.46	1.11	313
D18	The emphasis my organization places on two-way communication between its employees and their clients.	0.46	1.04	317
D2	The audience(s) my organization targets for wildland fire communication efforts.	0.44	0.90	315
D22	The quality of wildland fire communication products produced by my organization.	0.35	1.01	314
D15	The existing channels within my organization for the communication of wildland fire information.	0.32	1.06	315
D20	The existing National Wildfire Coordinating Group (NWCG) fire management message themes.	0.31	0.88	311

Question	Statement	Mean	Std. Dev.	N
D30	The promotional techniques used by my organization when communicating about wildland fire.	0.25	0.95	312
D17	The effectiveness of my organization's communication products in changing audience behavior.	0.20	0.94	313
D28	The wildland fire communication products used by my organization that address specific audience needs.	0.20	0.90	311
D19	My organization's efforts at promoting fire communication products.	0.15	1.06	315
D12	The amount of wildland fire knowledge the public possesses as obtained from my organization's communication products.	0.13	1.04	314
D7	My organization's current understanding of the knowledge level(s) of our clients.	0.10	1.01	315
D27	The way in which my organization deals with perceived competition from other wildland fire information sources.	0.09	0.84	313
D25	The responsiveness of my organization's wildland fire communication efforts.	0.08	1.00	310
D14	The amount of effort a member of the public must expend to obtain wildland fire information from my organization.	-0.09	1.04	314
D10	My organization's commitment to incorporating evaluative feedback into the development or revision of wildland fire communication products.	-0.09	0.99	314
D23	The status of my organization's long-term wildland fire communication plan(s).	-0.11	1.06	311
D13	The resources available within my organization for promoting upcoming or existing wildland fire communication efforts.	-0.15	1.17	314
D1	The resources (e.g. physical, human, financial, etc.) my organization allocates for wildland fire communication.	-0.36	1.21	315
D8	The degree to which my organization evaluates its wildland fire communication products.	-0.38	0.95	314
D29	The willingness of the public in my geographic area to obtain wildland fire information produced by my organization during times of low fire risk.	-0.45	1.00	312
D24	The resources my organization allocates to understanding the public's needs and wants concerning wildland fire.	-0.49	1.07	314
Overall		0.25	1.02	314
Valid N				300