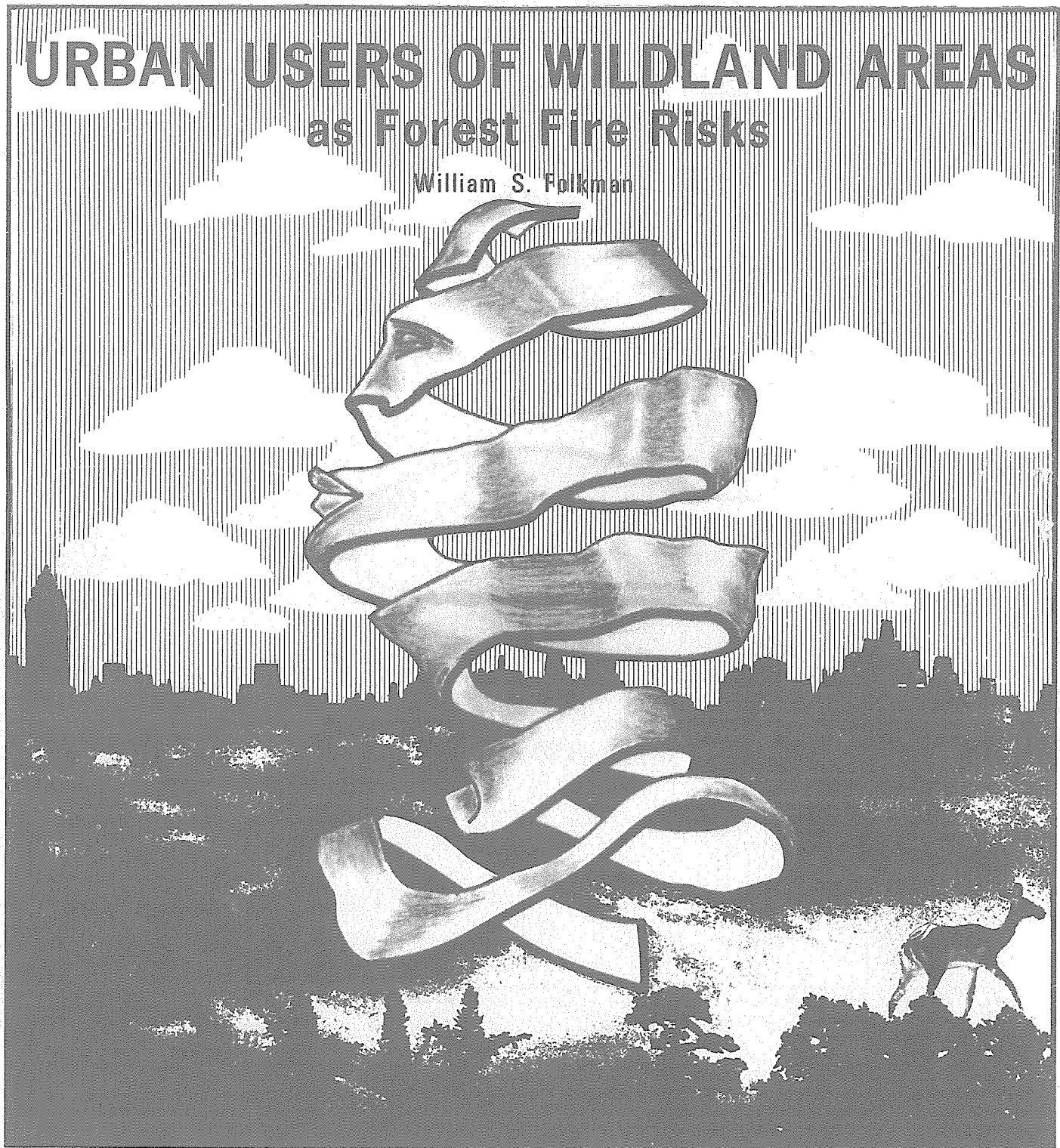


PACIFIC SOUTHWEST Forest and Range Experiment Station

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URBAN USERS OF WILDLAND AREAS as Forest Fire Risks

William S. Folkman



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The Author

WILLIAM S. FOLKMAN is a social scientist doing research on sociological problems in the prevention of man-caused forest fires, with headquarters in Berkeley, Calif. He holds a bachelor's degree in agriculture from Utah State Agricultural College, a master's degree in sociology from the University of Utah, and a doctorate in rural sociology from Cornell University. He joined the Station staff in 1962.

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Previous studies of the human risk factor in the prevention of wildland fires have focused on rural and small-town populations, which were presumed to contribute disproportionately to fire starts. Prior to this study, the urban population, which provides an increasing number of wildland users each year, has been neglected.

By means of a random-digit-dialing telephone interview survey, approximately 700 wildland visitors were reached in the Los Angeles-Long Beach and San Francisco-Oakland Standard Metropolitan Statistical Areas of the 1970 U.S. Census. Limited data were also obtained from an additional 800 households, none of whose members had visited wildland areas. Interviews were completed with 86.6 percent of all households reached.

The research objectives of the study were (1) to determine the prevalence of wildland use by residents of the two metropolitan areas, the reasons for non-use, and the characteristics of users; (2) to describe and analyze the activities, knowledge, and attitudes of urban visitors of wildland areas that may contribute to their fire risk; (3) to assess selected communication channels for conveying forest fire prevention information to the residents of metropolitan areas.

Fifty-three percent of the San Francisco households and 40 percent of the Los Angeles households contained adult members who had visited a wildland area in California in the previous 2 years. Differences in socioeconomic characteristics between visitor and nonvisitor households were quite marked. The reason most respondents gave for not visiting was simply that they preferred to do other things. Economic reasons were seldom mentioned, but the characteristics of the households suggest that this factor may be significant.

The median length of time spent in wildland areas within the span of one year by those making such visits was between 7 and 8 days. About half the visitors reported that their most recent visit required a drive of 2 or more hours from their residence.

Although direct comparisons are not possible, urban wildland visitors appear to be as knowledgeable

as rural residents about fire characteristics and fire prevention precautions. There are some serious gaps in their knowledge, however.

A number of sets of statements were used in the interviews to determine the attitudes presumed to relate to fire risk. In general, wildland visitors showed positive attitudes toward protecting the natural resource and also toward the forestry agencies responsible for wildland management. Attitude and knowledge scores did not vary greatly with the frequency or type of wildland experience, nor with differences in demographic and other background characteristics of the visitors.

More than half of the respondents recalled having been exposed to a fire prevention message within the previous month or so. The most frequently recalled source for such a contact was television; billboards were next in frequency. Radio was seldom mentioned. Fire prevention messages channeled through voluntary organizations concerned with wildland use or conservation would reach only 10 to 15 percent of urban wildland visitors. Those who were personally handed lists of rules were more likely to read them than were those who merely saw them posted.

This study makes it clear that there is no sharp distinction between those who represent high fire risk and those who constitute little or no risk. On the basis of our criteria, however, young, single males from lower or low middle socioeconomic levels do appear to represent higher than average risk. To a somewhat lesser extent, so also do older, retired persons.

In general, it is apparent that people in all walks of life are aware of the forest fire problem and are in favor of fire prevention efforts. But we still have a high incidence of fire of human origin. Therefore, aside from normal procedures to maintain favorable attitudes, future efforts should be concentrated on filling the gaps in the public's knowledge of appropriate behavior in fire-fragile wildlands, and, most importantly, on assuring that these attitudes and understandings are expressed in changed behavior.



The escalating demands on the limited natural resources of our wildland areas have become, justifiably, a national concern. The inadequacies of our future timber supply, the need for plentiful clear water, and the burgeoning demand for wildland recreation facilities all accentuate the need for prudent, informed, and well-planned management of our wildland areas.

A primary responsibility of wildland management is to minimize losses from fire. By their very nature, most wildlands, such as forests, brushlands, and grasslands, contain vast accumulations of highly combustible vegetation; the increasing numbers of recreational visitors represent increasingly numerous sources of potential ignition. The result is increasing fire risk, threatening valuable timber resources, protective watershed cover, and recreational lands. As dramatically demonstrated every year or two, each fire start is potentially a major disaster, and even when the fires are of smaller magnitude they destroy not only natural resources but private property, and even human lives.

Fire prevention is a primary aim of both Federal and State agencies. Prevented fires do not require expensive fire suppression efforts nor do they entail losses to natural resources, private property, or human lives.

This study is part of the continuing research program of the Wildfire Prevention Research Work Unit of Pacific Southwest Forest and Range Experiment Station, conducted in cooperation with the California Department of Forestry over a period of years. Since the great majority of forest fires are the result of human carelessness, the activities of this work unit have focused on research into the behavioral aspects of fire prevention. Previous work (Folkman 1965, 1973) has concentrated on rural and small town populations residing near forest areas, which were presumed to contribute disproportionately to forest fire starts (Chandler 1960). Mounting evidence now suggests that visitors from metropolitan areas are becoming a more important source of fire starts as the number of visitors from these areas continues to

grow. To shape more effective forest fire prevention policies and programs, information is now required on wildland users from metropolitan areas—information comparable in coverage and detail to that already available on local populations. The telephone interview survey reported here was directed toward filling this need.

The focus of the study was on visits to California wildlands by residents of the State's two largest metropolitan areas, the Los Angeles-Long Beach and the San Francisco-Oakland standard metropolitan statistical areas. Together, these two metropolitan areas contain approximately half the residents of the state.

The setting is an appropriate one. The greater part of California is covered by wildlands, including major forests, and the extended dry season presents serious fire hazards throughout most of the summer and fall. In addition, many of the State's metropolitan residents enter these wildland areas for day use and more extended recreational visits. Hiking and camping in nearby regional parks are especially popular with residents of the San Francisco area, while Los Angeles County is bordered on the north, east, and south by National Forests providing recreational areas for day use. Residents of both areas also make extensive vacation use of wildlands farther from their homes.

The study had three major objectives, each defined by a series of interrelated research questions.

The first objective was to explore the extent of wildland use, the reasons for non-use, and the characteristics of users, on the following basis:

1. What proportion of households of major California metropolitan areas contain members who make use of wildland areas, to the extent of at least one visit to such an area in California within the past 2 years?
2. When no member of a household makes use of wildland areas, is the main reason personal preference, or constraints related to lack of transportation, economic level, or other conditions?
3. How do wildland use and the reasons for non-use vary by household demographic characteris-

tics, place of residence, socioeconomic level, and ethnic identification?

The answers to these questions should provide an indication of the number of urban users of wildland areas, the segments of the urban population from which they are drawn, and probable influences on the volume of their wildland use in the future.

The term "wildlands" is used in a restricted sense throughout this report. The study concentrated on visits to forests, brushland, and grassland areas, where fire prevention is most needed. Deserts and seashore areas were not dealt with, even when officially designated as wildlands, as they generally do not contain major concentrations of flammable vegetation.

The second objective was to describe and analyze the activities, knowledge, and attitudes of urban visitors to wildland areas as contributing to fire risk, as follows:

1. How much and what types of use do urban visitors make of wildland areas, especially as to use of fire in back country areas, where fire starts are less easily detected?

2. How knowledgeable are urban visitors regarding (a) seasonal and weather conditions as fire hazards in wildland areas; (b) the role of human carelessness in forest fires; (c) the meaning of fire safety regulations; (d) fire safety practices; and (e) related information about forest fires?

3. How salient are the concepts of forest fires and fire prevention to urban visitors to wildland areas, and what attitudes do such visitors hold toward (a) the seriousness of forest fires; (b) rules and regulations in wildland areas and their enforcement; (c) government agencies responsible for wildland areas; and (d) persons who may or have caused fire through carelessness?

4. How do fire prevention knowledge and attitudes vary with (a) the frequency and type of wildland use; (b) place of residence; and (c) demographic and other background characteristics of the visitor?

Answers to these questions help identify types of visitors and situations presenting the greatest fire prevention risks; they also aid in pinpointing areas of knowledge, awareness, and opinion to which fire prevention programs may be most effectively addressed.

The third objective was to assess selected communication channels for conveying forest fire prevention information to the residents of metropolitan areas, as follows:

1. What proportion of urban visitors recall seeing lists of rules and regulations distributed or posted in wildland areas?

2. What proportion of urban visitors recall recent exposure to forest fire prevention messages in the mass media?

3. What proportion of urban visitors belong to national or statewide voluntary organizations with interests in wildland use?

4. How does exposure to these communication channels vary with fire risk, with place of residence, and with demographic and other background characteristics of visitors?

Answers to these questions aid in choice of appropriate and effective channels for fire prevention educational and public relations programs. It should be noted, however, that this objective was a secondary one. It was given less thorough treatment than the others and was included in part to provide convenient introductions to more central interview questions on fire prevention knowledge and attitudes.

Several surveys related to the present one have been conducted in the United States, although none of them meets the study objectives that have been outlined.

The two previously mentioned studies (Folkman 1965, 1973) were conducted in Butte County, California. The present study covers many of the same topic areas and has drawn heavily on the earlier work for construction of the interview form. Butte County is a predominantly rural area within a forest environment, and residents make local use of its wildland areas. This is a very different population from wildland visitors from metropolitan areas. The communication of fire prevention messages is highly complex, and must be modified to fit the wildland use, attitudes, knowledge, residential, and demographic characteristics of the audience. Results of these earlier studies are therefore not appropriate.

The Smokey Bear Study (Haug Associates 1968) was conducted in selected small and medium-sized cities in 1967. As its name implies, it primarily evaluated the Smokey Bear campaign. It did include questions to measure forest fire prevention attitudes, and some of these questions appear in the present study, but it did not include information on fire prevention knowledge nor on types of wildland use. Large metropolitan areas also were specifically excluded from its sample.

Another study of the Smokey Bear campaign was published after the field work for our study was completed (AHF Marketing Research 1976). It covered essentially the same questions as the earlier study of Smokey Bear, but the national probability sample used did include respondents from large metropolitan areas.

Other related studies are the North Pacific Border Study (Cheek and Field 1972) and the Piedmont Study (Payne and others 1973) undertaken for the National Park Service. Both included large metropolitan areas in their samples but were principally focused on the use of parks, especially visits to

National Parks and National Park Service areas. Neither included survey questions on fire prevention knowledge or attitudes. Their successful use of telephone interviews for studies of park use, however, was helpful in shaping the design of the proposed study.

METHODS

The study design and the interview schedules were developed in cooperation with the staff of the Survey Research Center, University of California, Berkeley. The sample was developed by William L. Nicholls II, and interviews were conducted by the Survey Research Center's staff of trained interviewers.

A random-digit-dialing telephone interview survey with a two-stage interviewing plan was adopted as the most cost-effective method of collecting the information specified by the study objectives.¹ Households were sampled by following the general procedures developed by Cooper (1964).

Within each metropolitan area a probability sample of telephone households was interviewed to identify those which did and did not contain wildland visitors and to obtain background information for comparative purposes. Nonvisitor households were also asked their reasons for not using wildland areas. Then, in visitor households, one wildland visitor was selected for a more detailed interview on the nature and extent of his or her wildland use, fire prevention knowledge and attitudes, and exposure to channels of fire prevention communications.

The majority of questions in the main schedule closely paralleled those of an earlier personal interview survey of forest fire prevention knowledge and attitudes (Folkman 1965) conducted in Butte County, California, a predominantly rural area. Question wordings were modified, however, to accommodate plans for telephone interviewing. Additional questions were based on items from the Smokey Bear Study (Haug Associates 1968) or were developed to take account of newly emerging topics, such as the

changing public image of forest rangers. Spanish versions of the interview schedules were prepared for Spanish-speaking respondents.

The study populations were defined as telephone households in the Los Angeles-Long Beach (LAMA) and San Francisco-Oakland (SFMA) standard metropolitan statistical areas of the 1970 U.S. Census. The LAMA consists of the County of Los Angeles. The SFMA includes Alameda, Contra Costa, Marin, San Francisco, and San Mateo Counties. Together, these two metropolitan areas contain more than half of the residents of the State. An estimated 92 to 94 percent of the residents of these areas were reachable by telephone.

Samples of approximately equal size were planned for the two metropolitan areas, since they represented different settings and anticipated use patterns of equal interest. Minimum sample sizes, established by funds available for field work, were set at 700 completed interviews per area, including both visitor and nonvisitor interviews. These minimums were exceeded in both areas (table 1).

The timing of the survey was the result of necessity rather than design. Original plans called for interviews in September-October 1975, when wildland experience of the preceding summer could be more easily recalled. Notification of U.S. Office of Management and Budget clearance (not affecting design or instruments) was not received, however, until February 1976. To complete the work by the contract termination date, interviews were held between March 24 and May 22.

The California winter of 1975-76 was the driest in the previous 50 years, and while interviewing was in progress the mass media devoted considerable attention to the prospects of a water shortage and increased forest fire hazards during the coming months. As a result of these unusual circumstances, public awareness and concern regarding forest fires, as reflected in the interviews, may be somewhat greater than would be expected during normal spring periods.

¹ Details of the methods are given in the report by William L. Nicholls II, *Sampling and field work methods of a telephone survey of urban users of California wildland areas*, available on request from the Wildfire Prevention Work Unit, Pacific Southwest Forest and Range Experiment Station, P.O. Box 245, Berkeley, California 94701.

Table 1—Field outcomes of sampled telephone numbers by area

Outcome	Los Angeles metropolitan area	San Francisco metropolitan area	Total
Sampled numbers	1,530	1,705	3,235
Percent nonworking	26.5	32.7	29.8
Percent working	73.5	69.3	70.3
Working numbers	1,124	1,148	2,272
Percent nonresidential (business, office)	21.7	20.8	21.3
Percent never answered	2.6	2.0	2.3
Percent residential	75.6	77.2	76.4
Residential numbers	850	886	1,736
Percent completed interview	86.8	86.4	86.6
Percent refused	10.5	11.1	10.8
Percent inaccessible (ill, out of town, etc.)	2.7	2.5	2.6
Estimated total completion rate ¹	84.9	85.3	85.2

¹The estimated total completion rate is the percent of completed interviews among residential numbers after adjustment for residential numbers among those never answered.

Table 2—Nonvisitors' reasons for not visiting California wildland, by metropolitan area, 1976

Reason	Los Angeles metropolitan area n=443	San Francisco metropolitan area n=363
	<i>Percent</i> ¹	<i>Percent</i> ¹
Prefer other things	56.0	54.5
Something makes it difficult	39.3	37.5
Confined by age or illness	11.7	18.2
Lack of transportation	8.6	7.7
Economic reasons	2.9	.6
Time constraints	16.0	11.3
Other constraining reasons	1.6	.8
Other nonconstraining reasons	2.3	1.9
Difficult and prefer other things	4.7	8.0
Confined by age or illness	.4	2.2
Lack of transportation	.7	.8
Economic reasons	.7	.6
Time constraints	2.9	3.9
Other constraining reasons		
Other nonconstraining reasons	.7	.6

¹ Percentages (in italic) that apply to specific reasons may add to more than the total for that general category, as some persons gave more than one reason.

RESULTS

Wildland Use and Wildland Users

The first objective was to explore the extent of wildland use by residents of metropolitan areas, the reasons for non-use, and the characteristics of users and non-users.

Occurrence of Wildland Visiting

Wildland use is affected by a variety of influences, such as physical access, competing attractions, and differing values and interests. For this reason, we expected to find considerable difference between the SFMA and the LAMA, and between both of the metropolitan areas and the rural areas previously studied. In general, we anticipated our survey to show SFMA residents to have better access to the wildlands than do LAMA residents. The results of this survey bore out this impression: 53 percent of the SFMA households reported that adult household members had visited a wildland area in California in the previous two years, as compared to 40 percent of the households in the LAMA.² The Butte County, Cali-

fornia, studies of more rural populations reported the contrasting figures of 76 percent (Folkman 1965) and 68 percent (Folkman 1973). (These figures are for visits during just the previous year, not the previous two years as in the current study.)

Reasons for Not Visiting Wildlands

The most frequent reason for not visiting was simply that the respondents—over half of them—preferred to do other things (*table 2*). Some stated that something such as time constraints, or physical incapacity due to age or illness, made it difficult to visit such areas. Economic reasons were seldom specifically mentioned, but in view of the socioeconomic characteristics of the respondents, economic circumstances can be assumed to influence wildland activity more than the reasons reported might indicate. Respondents in households headed by a female, or by someone who was older than the average, as well as those whose family income was lower than average, were more likely to state that their not visiting was due to some difficulty rather than merely to a preference for other types of activity (*table 3*). Education, years of residence in California, household size, and number of household members under 18 were not found to be significantly related to type of reason for not visiting wildlands.

Visitor and Nonvisitor Households

Differences in socioeconomic characteristics between visitor and nonvisitor households were quite marked, and were consistent for both areas studied

² Differences singled out for discussion throughout this paper (unless specifically indicated) are those deemed to be large enough to be of practical significance. They are also, of course, statistically significant ($p = 0.05$ or less) as determined by chi square or other tests appropriate to the data. Statistical significance must be interpreted carefully, however, where many independent tests are conducted on a single set of data.

Table 3—*Relation of nonvisitors' average age, income, etc., to reason for not visiting wildlands.*

Characteristics	Los Angeles metropolitan area			San Francisco metropolitan area		
	Something makes it difficult	Difficult and prefer other things	Prefer other things	Something makes it difficult	Difficult and prefer other things	Prefer other things
Age (years)	50.2	44.0	46.8	54.7	51.9	48.5
Income (dollars)	9,520	10,440	13,130	8,950	12,120	12,150
California resident (years)	5.2	4.5	5.3	5.2	5.2	5.4
Education (grades completed)	12.0	12.8	12.2	11.5	12.4	12.2
Household size (number)	2.6	2.6	3.0	2.6	2.9	2.9
Household members under 18 (number)	.8	.7	.9	.6	.8	.8
Female household head (percent reporting)	37.4	28.6	27.0	39.7	24.1	25.8

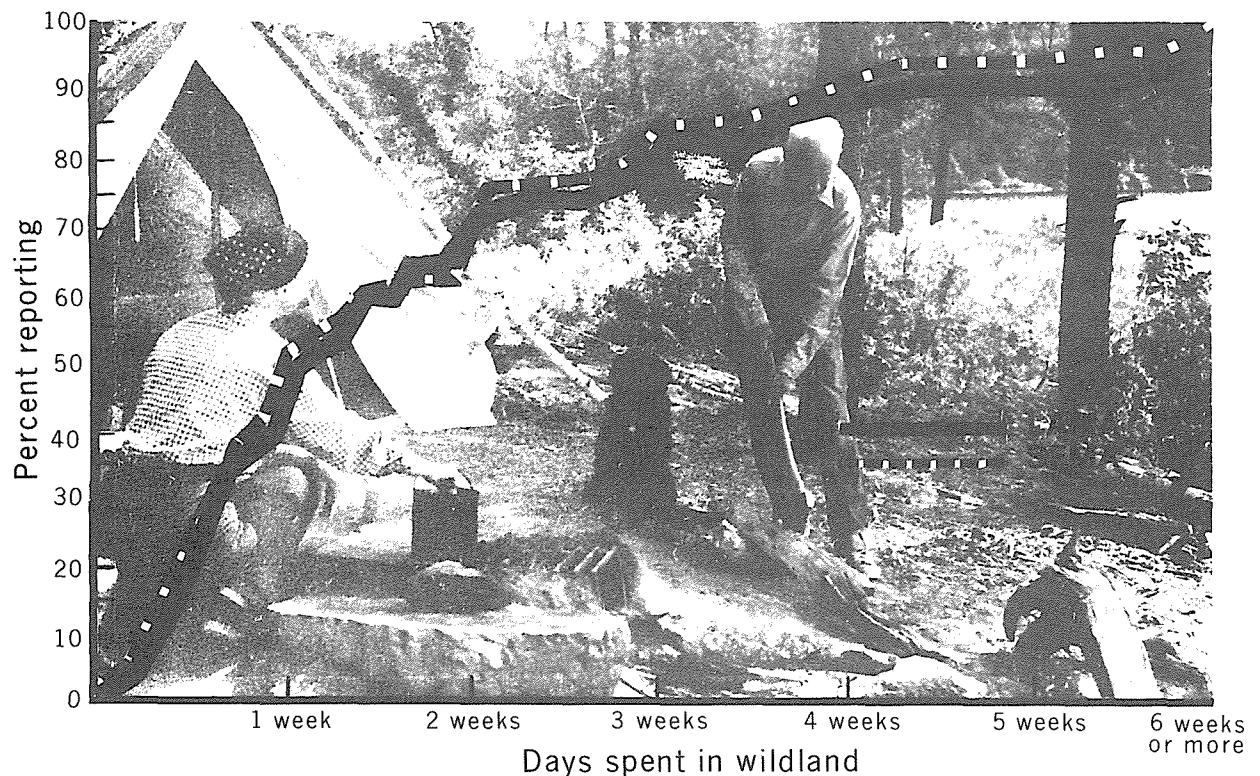


Figure 1—Most visitors spent between 7 and 8 days in California wildlands, as shown by this cumulative frequency curve.

(table 4). Differences in family income, age, amount of education, ethnic identification, occupation, and occupational status of household head were all related to whether or not a family member had visited the wildlands. The total family income in approximately half of the nonvisitor households was less than \$10,000. Only one-fourth of the visitor households had this small an income. Conversely, about a third of the visitor households had incomes over \$20,000, whereas only a sixth of nonvisitor households did.

Although nonvisitor households did not differ greatly from visitor households in average number of adult members (the difference was statistically significant only for SFMA), there were noticeable differences in detail. Nonvisitor households had a higher proportion of one, two, or seven and more household members. Similarly, although the majority of both visitor and nonvisitor households had two adults, a higher proportion of nonvisitor households had three or four adults. A higher proportion of nonvisitor households also had *no* members under 18, although many households did have three, four, or more non-adult members. The average number of children per household did not differ significantly.

Considerable information was gathered on the

characteristics of the heads of visitor and nonvisitor households (table 5). Both types of households were most frequently headed by males, although in the nonvisitor households, a considerably higher proportion were female. The heads were also more frequently older; the difference in the proportions of heads 65 or more years of age being especially noticeable. These differences were most marked in the SFMA.

On the average, heads of visitor households were more than one full school grade in advance of heads of nonvisitor households in schooling, and were more apt to have at least some college education. Those from nonvisitor households were more likely to have reached high school level, or less.

Except for American Indians, ethnic minority households were less likely to include wildland visitors than were the white or Anglo households.

Visitor and nonvisitor households were not markedly distinguished in type of occupation of the head. Some categories, however, did tend to be over-represented among visitor households: professional, technical and kindred workers; managers, officials, and proprietors; and sales workers. Service workers were over-represented among nonvisitor households.

The occupational status of household heads was

Table 4—Percent of surveyed wildland visitor or nonvisitor households, by metropolitan area, showing various socioeconomic characteristics, 1976

Characteristics	Los Angeles metropolitan area		San Francisco metropolitan area	
	Visitor (n=278)	Nonvisitor (n=367)	Visitor (n=383)	Nonvisitor (n=302)
Total family income:				
Under \$10,000	25.6	48.5	27.2	52.7
\$10,000–14,999	24.1	18.5	17.4	18.2
\$15,000–19,999	19.8	16.4	20.4	14.2
\$21,000—or more	30.5	16.6	35.0	14.9
Mean	\$14,990	\$11,575	\$15,348	\$10,935
Household size (members):	(n=294)	(n=442)	(n=401)	(n=360)
1	16.7	21.5	16.0	23.1
2	30.3	34.6	26.7	33.9
3	18.7	13.8	21.2	15.6
4	19.0	14.0	18.5	12.8
5	9.5	9.3	9.2	7.2
6	4.1	3.6	5.2	3.1
7 or more	1.5	3.2	3.2	4.5
Mean (members)	2.9	2.8	3.1	2.7
Household members under 18 years of age	(n=296)	(n=442)	(n=401)	(n=358)
None	56.7	62.9	55.4	62.5
1	17.1	12.0	19.0	15.4
2	16.0	12.9	15.2	12.3
3	6.5	7.9	6.5	5.3
4	1.7	2.0	1.7	2.5
Five or more	2.0	2.3	2.2	2.0
Mean (number)	.9	.8	.9	.8
Number of adult household members:	(n=293)	(n=441)	(n=401)	(n=357)
1	24.6	27.3	19.7	29.1
2	51.2	55.8	51.6	52.4
3	16.4	9.7	20.2	12.0
4	5.1	4.7	6.2	3.1
5	1.4	1.6	1.5	2.5
6	1.0	—	.2	.3
7 or more	.3	.5	.5	.6
Mean (number)	2.1	2.0	2.2	2.0

marked by the comparatively low percentage of non-visitor household heads who were working full time, and the high percentage who were in a retired or disabled status; nearly one-third were in the latter

category in SFMA.

Household heads who had resided in California but a short time, or who had lived there for more than 20 years, were less likely to be wildland visitors.

Table 5—Percent of heads of surveyed wildland visitor or nonvisitor households, by metropolitan area, showing various socioeconomic characteristics, 1976

Characteristic	Los Angeles metropolitan area		San Francisco metropolitan area	
	Visitor	Nonvisitor	Visitor	Nonvisitor
Sex:	(n=291)	(n=443)	(n=403)	(n=363)
Male	75.6	68.8	76.9	69.1
Female	24.4	31.2	23.1	30.9
Age (years):	(n=295)	(n=422)	(n=402)	(n=350)
Under 25	8.5	5.7	11.9	3.4
25 to 34	30.5	19.0	34.1	13.1
35 to 49	32.5	29.4	29.8	30.4
50 to 64	22.4	26.0	17.7	29.4
65+	6.1	19.9	6.5	23.7
Mean (years)	37.3	47.9	36.6	51.1
Median	34.1	47.1	32.5	50.3
Range	17-74	18-91	17-88	19-89
Highest grade of school completed:	(n=293)	(n=430)	(n=400)	(n=343)
None	.3	1.4	—	2.3
Grades 1–6	.3	5.8	1.0	4.4
Grades 7–8	1.7	4.7	2.0	6.4
Grades 9–11	6.1	12.3	4.0	12.5
Grade 12	27.7	31.7	23.3	34.1
Some college	30.1	18.8	31.0	17.8
College graduate	17.8	16.5	18.0	14.6
Graduate work	16.0	8.8	20.7	7.9
Mean	13.5	12.2	13.8	12.0
Ethnic identification:	(n=288)	(n=437)	(n=395)	(n=353)
White	82.7	64.0	83.3	67.5
Black	6.9	15.6	4.1	13.6
Mexican-American	5.2	12.8	3.3	4.5
Oriental	.7	3.7	4.3	7.9
American Indian	1.4	.5	1.5	—
Other	3.1	3.4	3.5	6.5
Resident in California (years):	(n=295)	(n=442)	(n=402)	(n=360)
Less than one	.7	3.2	1.2	3.6
1 to 2	1.7	2.7	4.7	.8
3 to 5	4.7	5.9	6.7	4.4
6 to 10	9.8	9.5	11.9	9.2
11 to 20	22.4	16.5	18.7	14.2
More than 20	60.7	62.2	56.8	67.8

Characteristic	Los Angeles metropolitan area		San Francisco metropolitan area	
	Visitor	Nonvisitor	Visitor	Nonvisitor
Occupational status:	(n=293)	(n=443)	(n=401)	(n=360)
Working full-time	79.2	63.2	75.4	55.7
Working part-time	5.8	7.4	8.5	4.2
Looking for work or on lay-off	4.4	4.5	4.2	4.7
Retired or disabled	4.8	19.5	7.5	30.6
Attending school	2.7	.9	3.2	1.7
Keeping house	2.4	3.4	1.0	2.5
Other	.7	1.1	.2	.6
Occupation or former occupation:	(n=273)	(n=401)	(n=383)	(n=322)
Professionals, technicians, etc.	28.6	21.0	28.5	18.9
Proprietors, managers and officials	18.3	15.8	17.7	12.7
Sales workers	8.4	5.7	9.2	6.8
Craftsmen, foremen and related workers	11.4	12.7	11.5	14.9
Clerical and related workers	12.8	14.2	13.8	10.9
Service workers	4.8	11.0	8.1	13.4
Operatives, and related workers	11.0	10.7	6.3	13.4
Laborers	4.0	5.7	4.7	5.9
Private household workers	.7	2.5	.3	.9
Farmers, farm managers	—	.2	—	—
Armed Forces	—	—	—	1.9
Other	—	.5	—	.3

Wildland Users and Fire Risk

The second study objective was to describe and analyze the activities, knowledge, and attitudes of urban visitors of wildland areas which may contribute to their fire risk. Again, a "visitor" is defined as an adult who has made one or more visits to forest and wild grass or brush land areas in California within the past 24 months.

Extent and Type of Wildland Activities

Although the interviewing was conducted relatively early in the year for outdoor recreation (March 24 to May 22, 1976), 60 percent of the visitors (both SFMA and LAMA) reported having made at least one visit to California wildlands during the previous 6 months.

Approximately half (52 percent of the LAMA visitors and 46 percent of the SFMA visitors) reported that their most recent visit included a drive of more than 2 hours from their home. Only 6 percent of the LAMA and 2 percent of the SFMA visitors said they had never visited an area at that distance from home.

The number of days, or parts of days, spent in California wildlands during the previous 12 months was very similar for both metropolitan areas (*fig. 1*). The median number was between 7 and 8 days. Some respondents spent considerably more time than this in the wildlands, however, so that the resultant mean was approximately double that of the median—2 weeks instead of 1.

Walking and driving through the wildlands and picnicking were the forms of activity most popular with forest visitors (*table 6*). Again the results are quite similar for visitors from both metropolitan areas. About half the visitors reported that they had remained overnight in the wildland; about a third said that this had been in a developed campground. The proportion reporting that they had spent at least one night in a tent or under the stars in a campsite they had made themselves was half as large as that reporting using a developed campsite.

While it is true that developed campgrounds have been made relatively fire-safe, many of the activities reported take place outside such places and bring the participants into intimate contact with the fire-fragile environment of the California forest or wild grass or brush land. The use of fire is implicit in several of these wildland activities (15 percent of the visitors from LAMA and 22 percent from SFMA said that they had obtained fire permits, suggesting that they had intended to build fires outside of developed

Table 6—Activities reported by visitors to California Wildlands, 1976

Activities	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)
	Percent	
Driving through area (off main highway)	61.7	65.3
Picnicking	50.8	59.8
Building camp or warming fire	27.5	31.0
Walking (at least one-half mile)	73.9	74.2
Hiking (off main trails, one mile or more)	40.3	40.3
Fishing	26.4	29.0
Hunting	4.7	6.9
Staying over night:		
in developed campground	53.9	50.9
in undeveloped site	36.3	30.8
	15.6	15.9
Obtaining campfire permit	15.3	21.6

campgrounds). Although smokers are urged to avoid smoking in wildland areas and if they must smoke, to exercise precautions, we must expect that there are frequent deliberate or unconscious lapses from recommended practice. Over one-third of the respondents said they were smokers.

Knowledge of Forest Fire Prevention

Although a person's actual behavior may be quite at variance with his knowledge of appropriate behavior, in the absence of measures of such behavior we must assume that whether or not the forest visitor is knowledgeable about fire danger has a bearing on the degree of fire risk the visitor represents. A series of questions probed the understanding of forest visitors from metropolitan areas of conditions making for fire hazards, the human role in forest fire starts, fire safety regulations and practices, and related forest fire matters.

When queried concerning the kinds of weather that most increase the danger of forest fires, three-fifths of the visitors mentioned high temperature and low humidity (*table 7*, item 14).³ Those from LAMA were more aware of the role of wind than were visitors from the SFMA: the effects of the notorious Santa Anas of Southern California have been quite

³ Tables 7, 8, and 9 will be found on pages 18-22.

widely publicized. Drying winds also contribute to hazardous fire conditions in other parts of the state, but have not been given as much public attention.

One in five LAMA residents thought that green trees and shrubs in California will catch fire only during the hottest summer days (*table 7*, item 20a).³ The SFMA respondents revealed no higher proportion of correct knowledge, but they were more willing to admit they did not know. The respondents revealed even less knowledge about the timing of the fire season by their agreement with the statement that the danger of forest fires in California rises in August and then tapers off (*table 7*, item 20q). Over half called this true, apparently unaware that there is a continual build-up until the advent of the rainy season, and some of the worst fire weather often occurs in September or October. Less than a third gave the correct answer. The remainder admitted they did not know.

Most respondents were aware that human carelessness is responsible for a majority of forest fires (*table 7*, item 12). Few took the opportunity to give examples, but carelessness with smoking materials was most frequently mentioned by those who did specify. There was some overestimation of the proportion of forest fires in California that are started by human carelessness, but for fire prevention, this is a helpful tendency (*table 7*, item 13).

Three of the knowledge items probed respondents' understanding of fire safety regulations (*table 7*, items 20h, 20i, 20o). Seven out of 10 were aware that a campfire permit does not give you permission to build an open campfire anywhere in a forest away from residential areas, but only about a third of them knew that where campfire permits are required, they are also needed for gasoline or propane campstoves.

The use of "closures" to control fire risk in forest areas during periods of high hazard is more common in the southern part of the State, but respondents from both SFMA and LAMA proved equally familiar with the term. Seven-eighths of those interviewed in both areas correctly answered this item.

Five items tested knowledge of common fire safety practices (*table 7*, items 20b, 20d, 20f, 20k, 20n). Again the responses from the two metropolitan areas were very similar. Most respondents were aware that one should avoid driving a vehicle through dry grass or brush and that it is very dangerous to carry extra gasoline in a plastic container; however, two-thirds still had the misconception that the safest way to put out a campfire is to cover it with loose dirt, ignoring the danger of the fire later escaping, as fuel settling or wind uncovers live embers. Three-

fourths were familiar with the forest practice of breaking a match in two before discarding it, but a lesser proportion were aware that a lighter is safer than book-type matches.

Seven items of the knowledge questionnaire concerned with related forest fire knowledge revealed widely differing levels of knowledge for different items, although the responses from the two metropolitan areas were very similar (*table 7*, items 20c, 20e, 20g, 20j, 20l, 20m, 20p). Many people shared the common misconception that forest fires are often caused by spontaneous combustion. They were fairly well aware, however, that a fire may smolder inconspicuously for some time before it erupts into flame. They recognized that most people who start a forest fire through carelessness remain unaware of what they have done. The majority did not know that a campfire can start a forest fire by burning through roots underground, and three-fourths were either misinformed or did not know the extent of liability for a carelessly started forest fire.

Attitudes Toward Forest Fire Prevention

The variety of attitudes presumed to be related to fire risk were explored through items dealing with awareness of fire threat, impression of the seriousness of forest fires, attitudes toward wildland rules and regulations, attitudes toward persons displaying high fire risk behavior, and attitudes toward governmental agencies responsible for wildland management.

Large-scale catastrophic brush fires are more common in southern California. Their dramatic coverage by the communications media intensifies their immediacy for residents of this area. Consequently, respondents from the LAMA might be expected to be more apt to say they follow news accounts of forest fires very closely than would those from the SFMA (*table 8*, item 15b).³ Differences between the groups on items related to reaction to environmental fire hazards or incautious behavior of others when they are in a wildland area (*table 8*, item 15a, 15c, 15f) are not so marked, however.

To assess the seriousness with which the respondents viewed the forest fire problem, they were asked to state which was the most serious property-damaging phenomenon in the state—floods, smog and air pollution, forest fires, landslides, or earthquakes (*table 8*, item 8a, 8b). The question was asked early in the interview, before there was any indication that forest fires were the focus of the survey. Forest fire was a decided first choice. It was selected twice as frequently as the runner up—smog.

³Tables 7, 8, and 9 will be found on pages 18-22.

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In recent years, considerable public concern has centered on logging practices. In some circles "clear-cutting" has become an opprobrious epithet. This is, no doubt, reflected in responses to the statement that, on the average, fires probably do less damage to the forests than logging (*table 8*, item 9c). Those from the SFMA were quite evenly divided between agreement and disagreement; more LAMA respondents disagreed, although over a third agreed.

Nearly three out of four disagreed with the statement that grass and brush fires are mostly a nuisance and do little real harm (*table 8*, item 9d). The response was similar, but a little stronger, to the statement that harm from forest fires is often exaggerated (*table 8*, item 9e). SFMA respondents were slightly more inclined to agree with both of these items than were those from the LAMA.

Other items designed to measure subjective impressions of the harm done by forest fires were a series on the necessity of fighting forest fires (*table 8*, items 9a, 9b, 9f, 9g). Current fire management philosophy recognizes that fire has had strong influence on the development of forest and range ecosystems. Given certain land management objectives and under specific conditions, fire may be a useful and beneficial ally. Fire prevention specialists recognize this fact, but fear that the general public may not grasp the nuances of this philosophy and may assume that it condones indiscriminate starting of fires. The results of this survey are open to interpretation. Over half the respondents agreed that an occasional forest fire is part of nature's plan for renewing the land, but nearly three-fourths did not agree that forest fires that start from natural causes should be allowed to burn if they don't threaten life or private property. What is essentially the reciprocal of this statement—"It's important for government agencies to stop each forest fire as soon as they can, no matter where it occurs"—drew an even larger proportion of responses in agreement, as did the statement that "tax money spent fighting forest fires is always well spent."

About two in five persons thought the number of major forest fires in California had gone up over the last 5 years (*table 8*, item 10). A similar proportion felt that it had remained about the same. Only about one in eight felt that the number had decreased.

An inquiring reporter for a San Francisco newspaper a few years ago asked people what they liked about being in the wilds. One response was that they liked feeling free from all laws and regulations. Wildland managers, of course, do attempt to enforce regulations to prevent abuse of the resource, as well as injustice to other users. But, a sense of release from

the pervasive restrictions of everyday life is, no doubt, part of the appeal of wildland recreation. Respondents were therefore given a series of statements related to such rules and regulations (*table 8*, items 6a-f, 15e).³ The general consensus was that such rules and regulations are necessary, generally fair and reasonable, and no stricter than they need to be. Respondents were especially conscious of the need for strict smoking and campfire rules. However, there was a feeling, expressed by more than one in three, that fire regulations are pretty much just a matter of common sense—experienced campers would not need to give special thought to them.

Most people did not seem to feel that forest rangers' enforcement of rules restricted their freedom too much. In fact, approximately two-thirds of the respondents felt it would be desirable to have more rangers engaged in enforcement of forest regulations.

Wildland visitors appear to feel some responsibility for the protection of the forest. The vast majority indicated that they would take some personal action if they observed someone using fire carelessly (*table 8*, item 17). Four out of five said they would caution the individual. Most of the remainder said they would report such a person. Only a few admitted that they would let others take care of the situation.

Being made to pay a fine was the punishment that most respondents (two out of three) felt would be appropriate punishment for accidentally starting a forest fire (*table 8*, item 18). About 1 out of 6 felt that a warning was sufficient, while 1 in 10 thought such a person should be jailed. A few suggested that the guilty party should be required to help with reforestation, or make similar restitution.

In this era of general disenchantment with governmental activities, forestry agencies appear to have retained a fairly high level of credibility among forest visitors (*table 8*, item 7a, 7b). Seven out of 10 wildland visitors felt that the agencies were doing a good or very good job in taking care of California's forest and wildlands. They were slightly more impressed (8 in 10) with the job the agencies were doing in making the wildland experience enjoyable for visitors. It was reported earlier that most respondents did not feel that agencies exaggerate the harm done by forest fires (*table 8*, item 9e). However, about one-fourth did feel that the agencies might exaggerate *fire danger* in order to encourage visitors to abide by the fire regulations (*table 8*, item 15d).

³ Tables 7, 8, and 9 will be found on pages 18-22.

Attitude and Knowledge Scores

Most of the statements probing knowledge about fire prevention and fire behavior and related attitudes had been used in our previous studies. Changes were made on the basis of experience, and the format was modified for telephone interviewing. The knowledge items were changed to a true-false form rather than multiple choice, and the attitude items to a simple agree or disagree response, without an attempt to measure degree.

Factor and reliability analysis was used to produce indices for further analysis. As a result of this analysis, some attitude items were dropped and the remainder combined in summary measures of three dimensions of fire-related attitude: (1) awareness of forest fire threat (*table 8*, items 15c, 15d, 15e, 15f),³ (2) subjective impressions of the role of fire in wildlands (items 9a-9g); and (3) attitudes toward wildland rules and regulations (items 6a-6d, 6f). For convenience, these groups are referred to in the discussion as Threat, Let Burn, and Regulations.

Because probability theory cannot be applied to this type of analysis, a significance level for applicability to the sampled population cannot be assigned. However, these methods are invaluable in "making sense" of complex data.

Aggregate attitude scores for these three dimensions are based on giving positive responses a weight of 3, negative responses a weight of 1, and "no opinion" an intermediate weight of 2 on each item. Scores are reported on the basis of percent of a theoretical possible score. Responses were considered positive if they reflected agreement with prevalent values of fire prevention. For the "Let Burn" dimension, responses in harmony with a policy of exclusion of fire from wildlands were recorded as positive, although fire prevention policy currently recognizes the role of fire in the development of certain ecological systems.

The knowledge items tapped such a complex variety of information that it was not possible to extract any scaleable set of factors. It was decided to use a simple aggregate score representing the percent of possible correct responses (referred to as "Knowledge" in the following discourse). Scoring on the basis of number correct minus number wrong, to adjust for possible guessing, proved to be very highly correlated with scores based on percent correct so this simpler method was used.

A measure of wildland activity ("Activity") based

on number of days, or part of days, spent in forests and other wildlands in California in the previous 12 months expressed as percent of largest number of days reported, was found to provide as effective a measure as one based on a combination of complexly weighted types and frequencies of different wildland activities.

An examination of the correlation matrix (*table 9*)³ shows that these various measures bear weak relationships to each other. To the extent that the attitude scales tap different dimensions, such lack of correlation is acceptable, but to find that frequent visitors to wildlands are not more knowledgeable than those who seldom go is quite disconcerting when one considers the implications for fire risk.

Mean scores on the various measures obtained by respondents in the LAMA were very similar to those obtained by the respondents in the SFMA. Although the mean Activity scores appear to show a higher level of wildland visiting by SFMA respondents, this difference is not statistically significant. Although changes in format and procedure prevent precise, direct comparisons, the knowledge scores of 58 percent (LAMA) and 59 percent (SFMA) correct, obtained by the two metropolitan samples, indicate that these wildland visitors from urban areas are equally as knowledgeable about fire prevention as those from more rural environments (Folkman 1965, 1973). In these previous studies the scores were 58 and 57 percent, respectively. High average scores on the two attitude measures, Regulations and Threat, suggest a very high positive feeling about the aspects of the fire prevention situation these measures tap. This confirms the findings of a recent study of the national Smokey Bear program, which found an overwhelming majority endorsing fire prevention efforts (AHF Marketing Research 1976). Lower average scores on the Let Burn scale no doubt reflect the difficulty the general public has in reconciling a management philosophy that recognizes the desirability of accepting fires of natural origin while enforcing strict regulation of man-caused fires.

Relation of Attitude and Knowledge Measures to Other Variables

We expected that attitude and knowledge scores would vary considerably with the frequency and type of wildland experience and with demographic and other background characteristics of the visitors. However, differences were not found as frequently as

³ Tables 7, 8, and 9 will be found on pages 18-22.

³ Tables 7, 8, and 9 will be found on pages 18-22.

anticipated and the magnitude of the differences was seldom very great, often failing to reach statistical significance for one or the other metropolitan area sample. In the following discussion, significant differences are noted by area—(LAMA) or (SFMA). Unless so noted, however, data from one area were consistent with those of the other.

Wildland Activity—As expected, participation in various types of wildland activity (driving through, picnicking, hiking, camping, and so on) is rather closely and positively correlated with number of days spent in California wildlands (Activity). In the main, however, fire prevention attitudes and knowledge do not vary with such participation. Where statistically significant differences did appear, attitude scores tended to be lower for those who had participated than for those who had not. Most of those differences were associated with Threat—respondents who reported driving in wildlands, fishing, camping overnight outside of an established campground (LAMA), and respondents who reported having built a campfire or warming fire, or gone hunting (SFMA), had significantly lower scores in the Threat dimension. Lower scores on the attitude measure Regulations (LAMA) were also reported by respondents who had gone hunting or camped overnight outside an established campground. Respondents who had done some hiking off main trails and those who had obtained campfire permits tended to have higher fire prevention knowledge scores than did others (SFMA). However, those who reported camping overnight outside an established campground tended to have lower Knowledge scores (SFMA). No wildland activity was related to the Let Burn attitude measure.

Residence—Residents in suburban SFMA had statistically significant higher knowledge scores than those from other parts of the area. No other relation to residence was evident for any of the measures of attitude, knowledge, and wildland activity in either metropolitan area.

Demographic and Socioeconomic Characteristics—Age was the characteristic most consistently related to variations in fire prevention attitudes and knowledge. Mean scores on Regulations and Threat were lowest (most negative) among persons under 25 years of age and highest among those 65 or over. Knowledge scores followed a similar pattern, except that the progression was not consistent at the upper age levels. Activity levels proved highest for persons under 25, and next highest for those 65 and over (LAMA).

The attitude scores of females tended to be more positive than those of males, and the reverse for knowledge scores. Scores on the Regulations dimen-

sion did not differ significantly by sex (SFMA), nor did scores on Let Burn (LAMA).

Marital status accounted for some variation in attitude and knowledge, particularly among those from the SFMA. Married persons had higher average scores on the Regulations, Threat, and Knowledge measures than those who had never been married. Those widowed, divorced, or separated tended to have more intermediate scores, and the never married had the lowest scores.

Persons with family incomes under \$10,000, or \$20,000 or more, had higher scores, on the average, on the Let Burn dimension; those with incomes between \$10,000 and \$15,000 had higher than average scores on the Threat dimension. Those with family incomes of \$20,000 or more had higher average scores on the Regulation and Threat dimensions (SFMA).

In addition to the above, respondents differed significantly in the following ways: White collar workers had higher average scores on the Regulations and Threat dimensions than did blue collar workers (SFMA). Persons who were retired, students, or housekeepers had higher Threat scores on average than did those who were in the labor force (SFMA). College graduates had higher average Let Burn and Knowledge scores than did those with lesser education (SFMA). The Knowledge scores of suburban residents averaged higher than those of the central cities (SFMA).

Exposure to Information Sources

Fire prevention workers desire to bring their message to the attention of wildland visitors as effectively and efficiently as possible. Three main types of communication channels are used. The mass media channel is heavily relied on to reach the widely dispersed visitor population in their home environment; it is diffuse and broad-focused, and largely unable to distinguish between wildland visitors and nonvisitors. A more specific channel is contact through various voluntary organizations whose membership might be expected to include many wildland visitors. The most specific channel is direct contact with the target group while they are in the wildland. There are difficulties in reaching people effectively when they are scattered over a large expanse of wildland, but there is also assurance that those reached are the ones who should be influenced.

Although choosing appropriate and effective channels for dissemination of fire prevention educational materials is important in planning an action

program, this concern was not explored in depth. Interview items were included mainly to provide convenient introductions to more central questions on fire prevention knowledge and attitudes. These data do have some implications for the subject, however.

Type of Channel

Mass Media—The question of whether or not the respondents recalled seeing or hearing any message or information about forest fire prevention through the various mass media, during the previous month or so, was answered affirmatively by slightly more than half of the respondents (57 percent in LAMA and 55 percent in SFMA). The sources mentioned were similar for the two areas.

Source:	LAMA (n=163)	SFMA (n=214)
	Percent Reporting	
☐ Television	44	45
☐ Billboards	35	30
☐ Magazines	10	7
☐ Newspapers	3	6
☐ Radio	2	4
☐ Pamphlets	2	3
☐ Displays	1	2
☐ Other	2	3

It is surprising that radio was mentioned so infrequently, because fire prevention announcements are given nearly as often on radio as on television.

Voluntary Organizations—Membership in voluntary conservation organizations was not found to be widespread; only slightly more than one in ten (10 percent for LAMA and 14 percent for SFMA) said they did belong. Membership was distributed among a variety of organizations. The Sierra Club, with 5 percent of the SFMA and 2 percent of the LAMA respondents, had the highest representation. The National Audubon Society, with 2 percent of SFMA respondents, was the only other single organization with more than a fraction of a percentage of representation. Local or minor organizations with primary or subsidiary interest in conservation, together, accounted for 5 percent of the response in both metropolitan areas.

Direct Contact—Direct personal contact, generally recognized as most effective in influencing behavior change, was implied when respondents were asked if they had visited any National or State Park or Forest in the last year where they were handed a list of rules and regulations when they went in. Approximately half (46 percent, LAMA; 53 percent, SFMA) said they had; of the remainder, 30 percent (LAMA) and 26 percent (SFMA) said that they had seen such a list

posted on a sign in the area. Some indication of the relative efficacy of the two methods was gained through a question as to whether the list was read through, or either just glanced at or not even looked at. Of visitors who were directly handed the list of regulations, approximately three out of five (57 percent, LAMA; 61 percent, SFMA) said they read them through. Of those who merely saw the rules posted, the proportions who reportedly read them were considerably less (44 percent in LAMA, and 33 percent in SFMA).

Littering regulations were most frequently remembered, campfire regulations only slightly less frequently. Respondents from the LAMA were more likely to recall the smoking regulations, while the SFMA respondents tended to remember rules concerning pets.

Relation to Other Factors

Fire Risk—The relation between exposure to communication channels, and fire risk, as measured by fire prevention attitudes and knowledge scores and wildland visit frequency, was found to be fairly weak. Those who recalled being handed a list of regulations did tend to be more frequent wildland visitors and to have higher Knowledge scores (SFMA). Those whose experience was limited to regulations posted on signboards had lower Regulations scores on average (SFMA). Those who claimed to have read the list of regulations tended to be more frequent visitors and to have higher Regulations and Knowledge scores.

Frequent visitors to wildlands were more likely to recall seeing or hearing fire prevention messages by way of the mass media (LAMA). Respondents who were members of conservation organizations tended to have higher Knowledge scores. They also tended to be more favorable to the Let Burn philosophy (SFMA) and to be more frequent visitors to wildlands (LAMA).

Residence—The attempt to relate communication to place of residence proved particularly unfruitful. Visitors from suburbs (SFMA) more frequently reported having a list of regulations handed to them, but this was the only significant difference noted.

Demographic or Socioeconomic Characteristics—Being handed a list of regulations or merely seeing them posted was not related to other variables except that visitors under 35 years of age were more likely to report the less personal contact (LAMA).

Persons who recalled having seen or heard a mass media-disseminated fire prevention message also tended to be younger than average (LAMA), have a high school education or less (LAMA), to have a family income of between \$10,000 and \$20,000

(LAMA), and to have a full-time occupation (SFMA). Those with a college education tended to mention magazines as the source of the message, while those with less education most frequently mentioned television (SFMA).

Members of conservation organizations are not apt to be typical of the general population. The study showed that they tended to be older (35 years of age, or older) than non-members (SFMA), college graduates (SFMA), and have a family income of \$20,000

or more (SFMA). This corresponds very closely with the findings of a recent study of Audubon Society members. They found the average member to be an executive, earning \$36,000 annually (26 percent in top and middle management positions and 40 percent engaged in professional or technical occupations). The median age was 44 years and the membership was composed of 58 percent males and 43 percent females, 85 percent had attended college and 43 percent had attended graduate school (Line 1977).

DISCUSSION

Human motivation is exceedingly complex. The reasons people gave for not visiting wildland areas, however honest, probably only partially reflect the influences on their choices. Aside from irreversible physical infirmity due to aging or illness, the types of reasons for not making wildland visits and some of the factors influencing these reasons are subject to modification, as social models, economic circumstances, stages of family life cycle, or other influences on the individual, change. If we can anticipate a continuing emphasis on wildland-based recreational activity in our society, we may expect a larger and larger proportion of urban residents participating. A general economic decline, on the other hand, would possibly force a larger share of current visitors to reluctantly join the nonvisitor ranks. Projections of the future age structure of our population suggest increased proportions in the older age brackets and corresponding reductions of the more youthful ones. To the extent that wildland activity is youth oriented, a future decrease in wildland use is suggested. However, if the projection implies a larger group of retirees who have relatively few economic, familial, or time restraints, we could expect a continued increase in the types of use favored by retirees. Effective fire prevention program planning will require a dynamic format adjusting to changing types of people making differing demands on the natural resource base and resulting in differing levels of fire risk.

When we consider only the wildland visitor portion of our sample, the two metropolitan areas studied are very similar in most respects. Although both metropolitan areas have wildlands conveniently nearby, much of the wildland use by residents takes place 2 or more hours driving time away from their homes and is of a week or more in duration.

While much use is made of developed camp-

grounds, which are relatively fire safe, many of the activities reported take place under more dispersed circumstances where the fire hazard is considerable. In addition, fire use in one or more forms is a frequent element of such activities.

A recent national survey of the Smokey Bear program (AHF Marketing Research 1976) revealed that practically all people in the United States held very favorable attitudes about forest fire prevention. In this study, we likewise found that negative attitudes could not be a significant factor in the forest fire problem. However, the level of knowledge reported revealed some areas of weakness in previous fire prevention educational efforts.

Differences do exist among wildland visitors in scores on various measures of attitude, knowledge, and activity. To the extent that these measures are valid, we may define relative fire risk, but when we attempt to associate different levels of risk with demographic and socioeconomic circumstances, we find general tendencies rather than sharp distinctions. The lower attitude levels shown by respondents who had higher levels of participation may be explainable as familiarity breeding—if not contempt—indifference. The reality testing provided by exposure might be expected to reduce an overly idealized concept of wildland. But this does not explain lower levels of knowledge.

Although our efforts have not revealed a mark of Cain that will readily distinguish the high fire risk forest visitor from others, we can point out the characteristics of those who, on the basis of our criteria, do appear to represent higher than average risk. The data are by no means conclusive, but they suggest that such high risk persons are most likely to be found among the young, single males from low or lower middle socioeconomic levels.

To a somewhat lesser extent, the older, retired

person who, although his attitude tends to be positive, tends to have a high activity level and low knowledge score, also represents a higher than average risk. These findings are very similar to those from our study of a more rural population (Folkman 1973).

The limited data gathered on communication channels do permit some observations. Personal contacts, as when visitors are handed fire prevention leaflets or other material, appear to have the greatest impact, and the frequency of such contact was related to Knowledge scores. It is apparent, however, that the educational effect of these contacts could be improved with a little more attention to how the contact is made and where the emphasis is placed. A visitor who is anxious about how his dog will be accepted in a campground is probably more likely to become aware of regulations about leashing (whether he observes them or not) than about campfires. The ranger who through personal contact is acquainting him with the regulations might help him rearrange his priorities.

The way the questions were asked does not permit a direct comparison of the effectiveness of such personal contacts with the more diffuse contact provided by the mass media. About half of the visitors recalled having been exposed to a mass-media-disseminated prevention message, with television and billboards the most frequently mentioned sources. Radio produced a surprisingly low rate of response.

Contacts through voluntary conservation organizations represent effective channels for reaching special types of frequent wildland visitors, but they, in total, represent a small fraction of all visitors.

From this study, and from other sources (AHF

Marketing Research 1976, Haug Associates 1968), it is apparent that people in all walks of life are aware of the forest fire problem and that they do favor fire prevention efforts. Therefore, the major future thrust, aside from some minor attention to maintenance of this awareness, should be in other directions. There are, for example, serious gaps in knowledge related to fire prevention—as shown by different types of forest users. Our problems would not be solved, however, simply by switching from attempts to change attitudes to attempts to present facts. It is apparent that adding high levels of knowledge to strong positive attitudes in itself would not be enough. The aim is behavior change. The merely rational view that people are capable of altering their attitudes, habits, and other patterns drastically once they are told the facts, usually leads to ineffective communication. People are not interested in *the facts*, nor do they know what to do with them, unless we, as communicators, not only tell them what to do, but show them how to do it in an explicit, interesting, dramatic, and, most important, persuasive manner.

Persuasion, however, has its own limitations in inducing behavioral change. Positive reinforcement, or feedback, immediately following desired behavior and the obverse, following lapses in desired behavior, have been proven to be more effective. Unfortunately, fire-related behavior occurs under conditions that make application of immediate feedback exceedingly difficult. Only innovative and creative departures from traditional fire prevention practice will surmount this problem.

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TABLES

Table 7—Distribution of responses of visitors to California wildlands to questionnaire items relating to forest fire prevention knowledge, by metropolitan area, 1976

Item ¹	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)	Item ¹	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)
	<i>Percent</i>				
What one thing do you suppose causes most forest fires? (12)			Many forest fires start just from the heat of the sun, whether people are there or not. (20c)		
Carelessness with cigarettes or matches or smoking	14.6	19.6	True	45.7	41.7
Carelessness with campfires	4.1	7.2	False	37.6	40.2
Carelessness, other, or unspecified	67.7	60.4	Don't know	15.3	17.1
People who set fires deliberately	4.8	.7	No answer	1.4	1.0
Acts of nature, like lightning, etc.	4.8	9.9	When lighting cigarettes in a forest, it is safer to use book type matches than a cigarette lighter. (20d)		
Other	3.7	2.2	True	10.5	14.6
Don't know or no answer	.3	—	False	68.4	67.8
About what proportion of forest in California would you guess are started by human carelessness (13)			Don't know	19.7	16.6
Almost all	31.5	26.7	No answer	1.4	1.0
Two-thirds	43.8	40.0	If a discarded cigarette is going to start a forest or grassfire, it will usually be obvious in a few minutes. (20e)		
Half	14.9	20.6	True	15.6	12.7
One-third	5.1	8.7	False	76.3	82.3
Less than that	2.7	2.0	Don't know	6.4	4.0
Have no idea	1.7	1.5	No answer	1.7	1.0
No answer	.3	.5	The surest way to put out a campfire is to cover it with loose dirt. (20f)		
Do you happen to know what kinds of weather most increase the danger of a forest fire? (14) ²			True	62.6	54.8
High temperature, hot days	60.7	63.0	False	31.9	39.2
Low humidity, dry air, little moisture in the air	62.4	59.8	Don't know	4.1	5.0
Lack of rain, not raining, hasn't rained for a long time, drought	31.2	30.0	No answer	1.4	1.0
Windy day, winds for several days	48.8	40.0	An open campfire can start a forest fire by burning through roots under the ground. (20g)		
Lightning or thunder storm	14.2	16.4	True	35.6	41.5
Other	.3	.5	False	23.7	22.4
Don't know or no answer	1.0	.7	Don't know	39.3	35.1
In California, green trees and shrubs will catch fire only during the hottest summer days. (20a)			No answer	1.4	1.0
True	19.0	16.4	Where campfire permits are required, permits also are needed for gasoline or propane campstoves. (20h)		
False	72.1	68.2	True	36.6	33.8
Don't know	7.5	14.4	False	16.9	22.3
No answer	1.4	1.0	Don't know	45.1	42.9
If you use stick type matches in a forest you should always break them in half after putting them out. (20b)			No answer	1.4	1.0
True	75.3	74.9	A campfire permit gives you permission to build an open campfire anywhere in the forest away from residential areas. (20i)		
False	12.2	12.2	True	6.8	8.9
Don't know	10.8	11.9	False	70.4	68.0
No answer	1.7	1.8	Don't know	21.4	22.1
			No answer	1.4	1.0

Table 7—Distribution of responses of visitors to California wildlands to questionnaire items relating to forest fire prevention knowledge, by metropolitan area, 1976—Continued

Item ¹	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)	Item ¹	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)
Most people who start a forest fire through carelessness are unaware of what they've done. (20j)			Even a well-maintained car or motorcycle can start a fire if driven off the road through dry grass or brush land. (20n)		
<i>True</i>	81.7	89.6	<i>True</i>	85.4	81.8
False	10.5	6.2	False	5.1	5.0
Don't know	6.4	3.2	Don't know	8.1	11.7
No answer	1.4	1.0	No answer	1.4	1.5
It is dangerous to carry extra gasoline for a car, campstove, or outboard in a plastic container. (20k)			A sign in a National Forest that reads "Closed Area" means that you may not go into that area at all. (20o)		
<i>True</i>	82.0	85.2	<i>True</i>	87.5	87.6
False	7.4	6.9	False	4.7	3.0
Don't know	9.2	6.9	Don't know	6.4	7.9
No answer	1.4	1.0	No answer	1.4	1.5
A fire in the rotten vegetation on the forest floor smolders slowly with little visible smoke. (20l)			A person could be sued for his life savings if it was proved that he started a forest fire even through carelessness. (20p)		
<i>True</i>	65.0	66.0	<i>True</i>	27.5	23.6
False	11.9	9.9	False	18.6	17.4
Don't know	21.7	22.9	Don't know	52.5	57.5
No answer	1.4	1.2	No answer	1.4	1.5
Rotting vegetation on the forest floor often produces enough heat to start a fire by itself. (20m)			The danger of forest fires in California reaches its peak in August and then tapers off. (20q)		
<i>True</i>	43.0	38.4	<i>True</i>	51.5	56.9
False	22.7	22.6	False	30.8	27.5
Don't know	32.9	37.5	Don't know	16.3	14.4
No answer	1.4	1.5	No answer	1.4	1.2

¹Numbers in parentheses following items are those used in questionnaire. Italic indicates correct response.

²Multiple response possible; percentages add to more than 100.

Item	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)	Item	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)
<i>Percent</i>					
The one place where people should be free from rules and regulations is when they're off in the woods. Do you agree or disagree? (6a)			And how good a job are they doing making the forests and wildland areas—enjoyable places for people to visit—excellent, good, fair, or poor? (7b)		
Agree	11.5	9.7	Excellent	26.1	21.1
Disagree	87.9	89.6	Good	53.2	59.1
No opinion	.3	.7	Fair	16.3	17.1
No answer	.3	—	Poor	3.4	1.2
The rules and regulations they have in forest areas are usually fair and reasonable. (6b)			Don't know	1.0	1.5
Agree	94.6	95.8	Which of these do you think causes the most property damage in California every year? (8a)		
Disagree	2.7	3.5	Floods	3.1	2.0
No opinion	2.7	.7	Smog and air pollution	32.9	25.3
It would be a good idea to have more rangers to check up on forest visitors and make sure they abide by the forest regulations. (6c)			Forest fires	61.4	69.0
Agree	69.8	64.5	Landslides	.7	1.0
Disagree	22.4	29.5	Earthquakes	1.4	.5
No opinion	7.1	6.0	Don't know	.3	2.0
No answer	.7	—	No answer	.3	.2
Some of the rules and regulations they have in forest areas are a lot stricter than they have to be. (6d)			Which do you think causes the next most damage? (8b) (Not asked unless "forest fires" was not given in 8a.)		
Agree	13.2	17.9	Floods	2.0	2.0
Disagree	81.4	77.4	Smog and air pollution	1.4	1.2
No opinion	5.4	4.7	Forest fires	31.2	23.6
Experienced campers and people with common sense generally don't have to pay much attention to forest regulations. (6e)			Landslides	2.0	.7
Agree	35.6	30.8	Earthquakes	1.0	1.0
Disagree	61.7	68.0	Don't know	.3	.5
No opinion	2.0	.7	No answer	.3	—
No answer	.7	.5	Not asked	61.8	71.0
These days, the rangers spend too much time enforcing rules that interfere with personal freedom. (6f)			An occasional forest fire is part of nature's plan for renewing the land. Do you agree or disagree? (9a)		
Agree	8.1	8.4	Agree	52.5	56.8
Disagree	83.5	84.2	Disagree	44.4	39.0
No opinion	8.1	7.2	No opinion	3.1	4.0
No answer	.3	.2	No answer	—	.2
In your opinion, how good a job are government agencies doing in taking care of California's forests and wildland areas—excellent, good, fair, or poor? (7a)			Forest fires that start from natural causes should be allowed to burn if they don't threaten lives or private property. (9b)		
Excellent	19.7	16.6	Agree	21.4	23.6
Good	50.5	57.1	Disagree	74.6	71.4
Fair	19.0	22.6	No opinion	4.1	4.5
Poor	6.4	1.5	No answer	—	.5
Don't know	4.4	2.2	On the average, fires probably do less damage to the forest than logging. (9c)		
			Agree	35.9	44.4
			Disagree	53.9	43.7
			No opinion	10.2	11.4
			No answer	—	.5

Table 8—Distribution of responses of visitors to California wildlands to questionnaire items relating to forest fire prevention attitudes, by metropolitan area, 1976—Continued

Item	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)	Item	Los Angeles metropolitan area (n=295)	San Francisco metropolitan area (n=403)
Grass and brush fires are mostly a nuisance and do little real harm. (9d)			It really bothers me to see people smoking in a forest or grassland area during the dry season. (15c)		
Agree	20.7	24.6	Agree	84.4	78.7
Disagree	74.6	71.0	Disagree	14.6	20.3
No opinion	4.4	4.2	No opinion	.3	.5
No answer	.3	.2	No answer	.7	.5
The harm done by forest fires is often exaggerated by government agencies who look after the forests. (9e)			The people in charge of the forests sometimes exaggerate the danger of a fire to encourage visitors to abide by forest regulations. (15d)		
Agree	11.5	13.6	Agree	26.1	25.8
Disagree	79.7	75.3	Disagree	71.2	69.7
No opinion	8.5	10.9	No opinion	2.0	4.0
No answer	.3	.2	No answer	.7	.5
It's important for government agencies to stop each forest fire as soon as they can no matter where it occurs. (9f)			The rules they have in forest areas about smoking and campfires are much stricter than they have to be. (15e)		
Agree	83.4	78.2	Agree	8.5	6.7
Disagree	13.9	20.1	Disagree	89.1	90.1
No opinion	2.4	1.5	No opinion	1.7	3.0
No answer	.3	.2	No answer	.7	.2
Tax money spent fighting forest fires is always money well spent. (9g)			It really bothers me to see people leave a campfire unattended, even for a few minutes. (15f)		
Agree	83.4	85.2	Agree	91.6	86.4
Disagree	13.9	13.6	Disagree	6.4	12.4
No opinion	2.4	1.0	No opinion	1.0	1.0
No answer	.3	.2	No answer	1.0	.2
From what you've heard or read, do you think the number of major forest fires in California has gone up, gone down, or stayed about the same over the last five years? PROBE: What would be your best guess? (10)			Suppose you saw someone acting careless with cigarettes or a campfire in a forest. Do you think you would report them, say something to them, or let other people take care of it? (17)		
Gone up	38.6	40.0	Report them	15.6	14.9
The same	43.1	35.0	Say something to them	77.7	80.6
Gone down	12.2	14.8	Let others take care of it	4.7	3.5
No idea	5.4	10.2	No answer	2.0	1.0
No answer	.7	—	Suppose someone accidentally starts a forest fire through carelessness. Do you think he should be put in jail, made to pay a fine, given a warning, or just let go? (18)		
When I'm in a forest or grassland area during the summer, I seldom think of the dangers of a fire. Do you agree or disagree? (15a)			Put in jail	10.2	9.2
Agree	32.9	32.3	Pay a fine	66.0	65.7
Disagree	66.1	67.0	Warning	14.6	18.9
No opinion	.3	.5	Let go	1.0	1.0
No answer	.7	.2	No answer	4.1	3.0
When I see news stories about forest fires on television or in the papers, I usually follow them very closely. (15b)			Other	4.1	2.2
Agree	70.1	59.1			
Disagree	28.5	39.5			
No opinion	.7	1.2			
No answer	.7	.2			

Table 9—Zero-order correlations, means and standard deviations of attitude, knowledge, and activity measures of Los Angeles and San Francisco metropolitan area respondents, 1976

Sample area and variable	Correlations						
	Regulations	Let Burn	Salience	Knowledge	Activity	Mean	S.D.
Los Angeles metro. area (n=295)							
Regulations	1.00					90.42	13.82
Let Burn	-.11	1.00				51.11	17.01
Salience	.33	-.09	1.00			89.55	16.12
Knowledge	-.16	-.06	.29	1.00		58.07	14.52
Activity	-.06	.03	-.07	.10	1.00	11.67	15.52
San Francisco metro. area (n=403)							
Regulations	1.00					89.56	13.38
Let Burn	-.18	1.00				53.62	17.69
Salience	.36	-.14	1.00			88.15	15.18
Knowledge	.11	.06	.10	1.00		58.63	15.19
Activity	-.01	.08	-.03	.04	1.00	14.79	20.46



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Folkman, William S.

1979. **Urban users of wildland areas as forest fire risks.** Res. Paper PSW-137, 22 p., illus. Pacific Southwest Forest and Range Exp. Stn., Forest Serv., U.S. Dep. Agric., Berkeley, Calif.

A telephone survey of 1500 households in metropolitan Los Angeles and San Francisco was made to (1) determine extent of wildland use by residents of the two metropolitan areas, reasons for non-use, and the characteristics of users; (2) describe and analyze activities, knowledge, and attitudes of users which may contribute to their fire risk; and (3) assess selected communication channels for conveying forest fire prevention information to the residents of metropolitan areas. Wildland use was more prevalent among San Francisco households, but otherwise households in the two areas were similar. Visitor and nonvisitor households differed markedly in socioeconomic characteristics. Visitors proved aware of the fire problem and in favor of fire prevention efforts, but showed gaps in knowledge of appropriate behavior in fire-fragile wildlands. Television and billboards were most frequently recalled sources of fire prevention messages. Radio was seldom mentioned.

Retrieval Terms: fire prevention; urban visitor; fire risk; knowledge; attitudes; urban visitor characteristics.

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