Levels and Sources of Forest Fire Prevention Knowledge of California Hunters

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Males 30-50 years of age from the smaller urban centers (under 25,000 population) make up the bulk of the California hunter population. They are mainly from the skilled-semiskilled and professional-managerial occupations. Their level of knowledge about forest fire prevention is generally high, but their knowledge is weak in some pertinent areas. Most frequently reported sources of information about fire prevention are forest rangers, signs, and Smokey Bear.

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The Author

William S. Folkman is responsible for studies of the sociological problems in the prevention of man-caused forest fires and in the use of forest recreation areas. He joined the Pacific Southwest Station staff in 1962 after a career in sociological research and teaching with several universities and the U.S. Department of Agriculture's Agricultural Marketing Service and Economic Research Service in Washington, D.C.

A native of Ogden, Utah, 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 has also studied at the American Graduate School of the University of Copenhagen in Denmark and at the University of Strasbourg in France.

Many Californians have directly experienced the power and devastation of uncontrolled fire. Dramatic television news coverage has made the ominous smoke and flame of a forest ablaze familiar to most of the others. Through such graphic experience people generally have become aware of high fire risks in the natural environment of the State. In spite of this awareness, and in spite of long and sustained efforts to make fire prevention an active part of our lives, more than 70 percent of the forest fires in California are man-caused.

This report summarizes findings from one study in a research program in forest fire prevention. The study, conducted by the School of Public Administration, University of Southern California, was sponsored jointly by the California Division of Forestry and the Pacific Southwest Forest and Range Experiment Station.

Licensed hunters of the State were chosen for study for several reasons. First, in numbers they represent an important segment of the forest-user public, nearly three-quarters of a million strong. Secondly, the major hunting season occurs during a period of the year when fire risk is generally high. The nature of hunting takes the participant away from established roadways, campgrounds, and other areas where fire-proofing efforts of various kinds can be concentrated. A final and most telling reason—the licensing process provides a convenient and inexpensive method of identifying the members of the group. Other groups are difficult to identify. Americans have a long tradition of moving freely in and out of our forests, and hence offer few points of contact for study purposes. This difficulty is a significant barrier to research.

As intimated above, we do not know much about the people who use our wildlands. However, if our fire prevention activities are to be made more effective, administrative decisions must be bolstered with a knowledge of the characteristics of these people. Efforts may be more finely focused if we know who are involved, where they come from, what use they are making of the area, as well as what they know about good fire use practices and where they get this type of information.

Specific objectives of the study were: to identify the hunter population in California; to determine the hunters' level of forest fire prevention knowledge; and to ascertain their sources of fire prevention information.

Method of Study

In the fiscal year 1959–60—the year the study was begun—California licensed about 680,000 hunters. It was decided that a mailed questionnaire to a representative sample of the total hunter population would be the most feasible means of studying such a large scattered group.

The Sampling Method

Hunters in California are required to purchase hunting licenses from the Department of Fish and Game. The Department made the hunting license stubs available for this study. These stubs, bound in books of 25, were separated into the 5 administrative regions of the Department of Fish and Game to assure a proportional geographical representation.

The first license was taken from every other book within each region to form the desired 2 percent sample. If the first license stub was illegible, incomplete, or otherwise unsatisfactory, the next one was selected. If that was unusable, the next was selected, proceeding sequentially through the book until an adequate one was located. The random nature of license procurement, and the area and sequential procedure used assured a representative sample of the hunter population.

The license stubs provided the names and addresses of the sample to whom questionnaires were mailed. In addition, the stub provided information concerning possession of a California fishing license, age, and sex. Identifying characteristics listed on the stub—height, weight, and color of hair and eyes—were not recorded.

The Questionnaire

For control purposes, two forms of the questionnaire were prepared. Each contained 16 multiple-choice questions. Six of the questions were common to both forms. The respondents were asked to indicate after each question whether they were "very certain," "fairly certain," or "uncertain" of their answer.

The two forms also included identical requests for data on source of fire safety information, possession of a fishing license, age, sex, occupation, and city and county of residence.

The questionnaires were reproduced on one of the panels of an out-size double postcard of the "Business Reply Card" type (appendix 1). Mailing of the questionnaire was preceded by a conditioning letter requesting participation. Pretests had indicated that, within budget limitations, this was the most feasible method of insuring a large response.

Questionnaires were mailed to 10,542 licensed hunters. Thirty-one percent (3,260) of these hunters returned usable forms. These respondents were compared with those in the original sample by age, sex, size of city of residence, and region where license was purchased. They were found to correlate highly, lending strong support to acceptance of the respondent sample as representative of the population.

A preliminary analysis of data from the respondents was submitted to the Station by the School of Public Administration, University of Southern California.[1] This report differs from the earlier one in some detail. Two major changes are in the analyses by regions and by size of city of residence. In the USC report, hunters were included in the region in which they purchased their hunting license. In this report they are reported in the region in which they reside. Figures from the 1960 Census of Population, which were unavailable earlier, are used in reporting size of city of residence in this report. The two reports also differ in orientation and emphasis.

[1]Administrative Dynamics Research Program. The California Hunter: Levels and sources of forest fire prevention knowledge. Univ. S. Calif. School Pub. Admin. 225 pp., 1963.

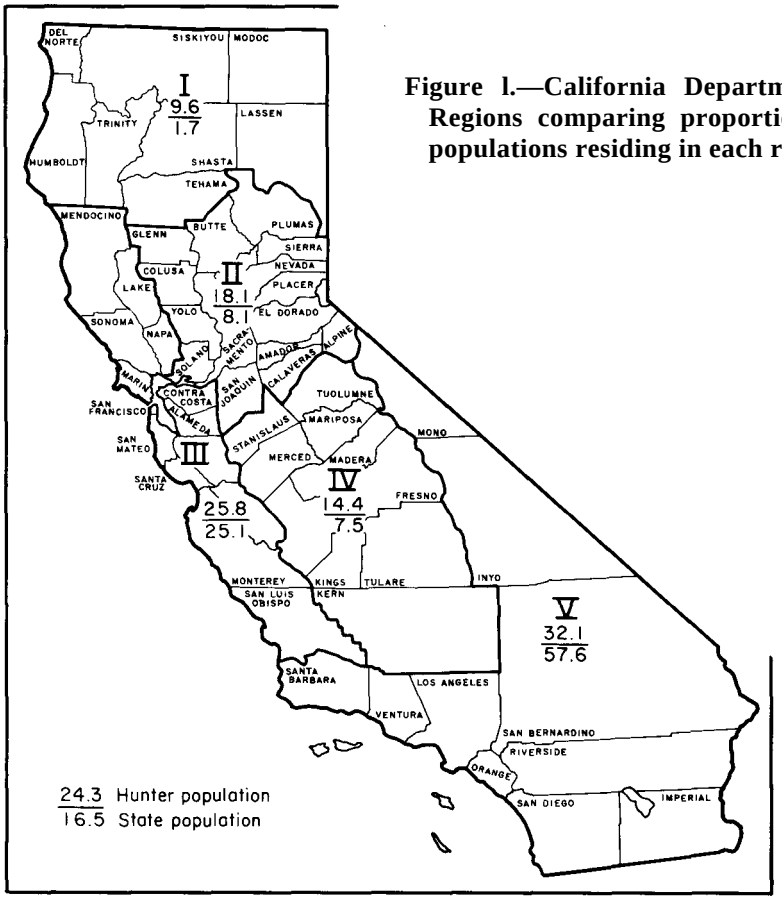

Figure l.—California Department of Fish and Game Regions comparing proportions of State and hunter populations residing in each region.

Characteristics of the California Hunter

A study for the Outdoor Recreation Resources Review Commission reveals some of the characteristics of hunters.[2] We learn that hunting, like other vigorous outdoor activities, is most attractive to young men. Few women hunt, and many men stop hunting as they grow older. Unlike some outdoor activities, however, hunting appeals to people in all income, occupational, and educational groups. These characteristics represent national averages. But the report also shows considerable regional variation in the characteristics of the hunter population. For this reason it is somewhat hazardous to generalize too freely from the ORRRC statistics to a particular locality.

Sex Distribution

Licensed hunters in California represent a sizable army: 6.1 percent of the total 1960 population of the State 14 years of age or older, and in California, as in the Nation as a whole, hunting is almost exclusively a male sport. Only 7.1 percent of the State's licensed hunters were women.[3] Because of this imbalance, licensed hunters amount to about 1 in 10 of the total male population and less than 1 in 100 of the women of the State. An earlier on-the-ground survey of deer hunters in northern California found 144 women to 330 men. Evidently, few women purchase a hunting license, but many of them enjoy the camping experience.

The national study reported that 13 percent of the total U.S. population, 12 years of age and over, went hunting during September to November 1960—25 percent of the males and 2 percent of the females.[4] But the populations in the two studies are not exactly comparable. The California study refers to the population buying hunting licenses, some of whom may not use them. The national survey reports all those doing any hunting, whether licensed or not.

By Department of Fish and Game regions (fig. 1), the proportions of women hunters varied from

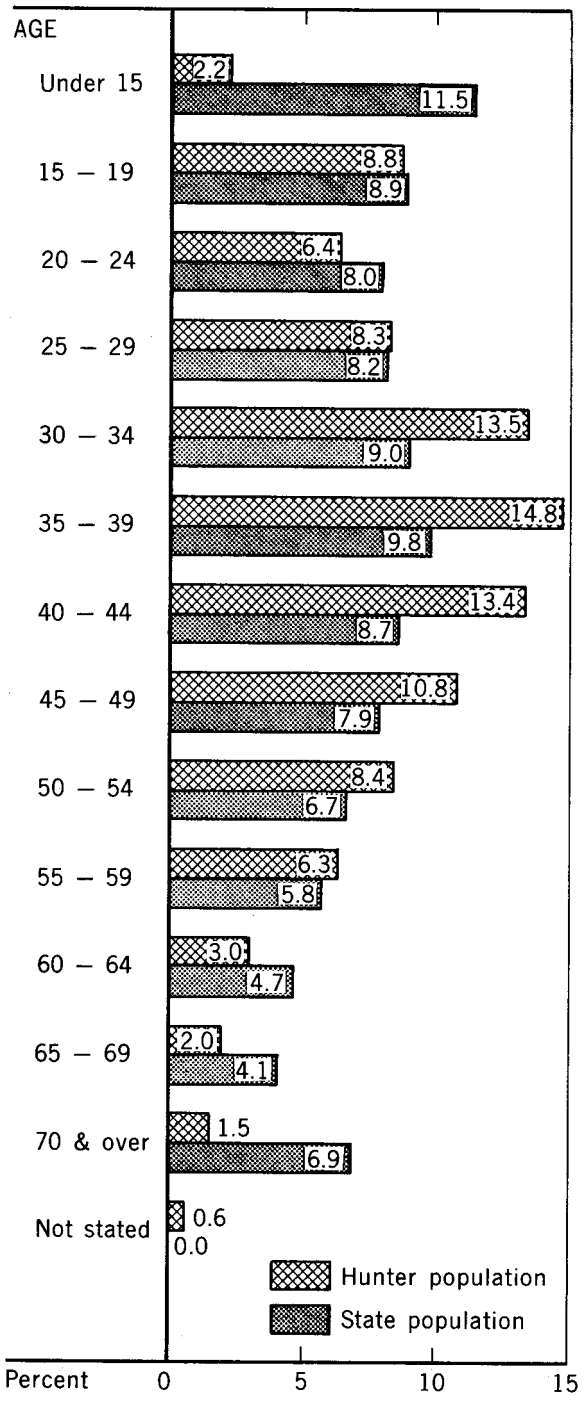

Figure 2.—Percentage distribution of licensed hunters and total population of California by age. (Youngest age group in total population includes only those 10-14 years old.)

[2]Outdoor Recreation Resources Review Commission. National recreation survey. Study report 19. Washington, D.C., 394 pp., 1962.

[3]These data were obtained from the information on the license stubs and concerns the original sample of 10,542 hunters. Women were slightly more inclined to answer the questionnaire, and their proportion among the respondents was 8.1 percent.

[4]ORRRC, op. cit., Table 2.02.11, p. 209.

6.8 percent in Region IV to 13.8 percent in Region I. In Regions II, III, and V, 8.7, 7.1, and 7.4 percent, respectively, of the hunters were women.

Age Characteristics

The average age of the hunters was 37.1 years. The women, on the average, were about one year younger than the men.[5] The hunters tended to be concentrated in the middle ages (fig. 2). Those 25 to 50 years of age were considerably over represented, while each age group after 60 years was underrepresented. Still, 1.5 percent of the hunters were 70 or more years of age.

There was some variation in average age among the different regions. Hunters from Region I had a mean age of 36.4 years; those from Regions III and IV averaged 3 years older (39.3 years in each Region). Regions II and V fell in an intermediate position with average ages of 38.0 and 37.9 years, respectively.

The data in this study show under representation among the younger age groups. One cause is a failure of the younger hunters to respond to the questionnaire at the same rate as the older hunters. However, this failure accounts for only a small part of the variance. In contrast, the national study showed the youngest age group, 12 to 17 years, to have the highest proportion of all participating in hunting.[6] The discrepancy between the two studies would seem to indicate that many younger hunters are unlicensed. The alternative explanation—that California youths are less interested in hunting—seems hardly tenable.

Residence Characteristics

According to the 1960 census, 28.6 percent of all Californians reside in cities of 250,000 or more population. Only 12 percent of the hunters in the State are from cities of this size. At the other end of the scale, 26 percent of the population live in cities under 5,000 population, or are rural residents. These persons account for just about their proportionate share of the hunters: 25 percent. Both in actual numbers and relatively, most of the hunters come from the medium-sized urban centers. In fact, cities of 5,000 to 25,000 persons ' account for over twice their proportional number of hunters (fig. 3).

Only 1.7 percent of the population of the State resides in the eight northern counties comprising the Department of Fish and Game's Region I (headquarters in Redding). However, nearly one-tenth (9.6 percent) of the licensed hunters are from that Region (fig. 1). The proportions of hunters in Region II (Sacramento) and IV (Fresno) are about double the proportions of the State's population residing in these two Regions, 18.1 percent compared to 8.1 percent and 14.4 percent compared to 7.5 percent, respectively.

Region III (San Francisco) is a long narrow region extending from Mendocino on the north to San Luis Obispo on the south. The proportion of the State's hunters in this Region closely matches the proportion of the total population found within its boundaries, 25.8 percent and 25.1 percent, respectively.

The ten counties in Region V (Los Angeles) contain 57.6 percent of the population of California, but their residents account for only about one-third (32.1 percent) of the license purchases in the State.

Fire control officers should find these figures especially significant in planning their fire prevention programs. They should be aware that many non-resident hunters may be unaffected by any local preseason prevention efforts. Our data do not provide direct evidence of the size of this interregional movement of hunters, but they do give some indication of its variation from area to area. In Region I, which encompasses one of the most popular deer hunting parts of the State, about 35 percent of the licenses sold were issued to non-residents of the region. For Regions II, III, IV, and V, these proportions were 15 percent, 8 percent, 4 percent, and 1 percent, respectively.

These figures in no way represent the total number of migrant hunters. Most undoubtedly buy their license before leaving home. In a rough way, though, the data do give some indication of where the mobile hunters come from and where they go. About 8 percent of all hunters in the State purchased their license outside of the region in which they reside. The highest proportion to do so were

[5]Again, these observations are from the data obtained from the original sample of license stubs. The older male hunters, as were the women, were somewhat overrepresented among the respondents to the questionnaire. The average age of respondents was 38.4 years, and the women among them averaged about one year older than the men.

Only these figures on sex distribution and average age of the total hunter population were derived from the license stub data. All other statistics in this report, including those on region breakdowns, were obtained from the questionnaire data.

[6]ORRRC, op. cit, p. 209.

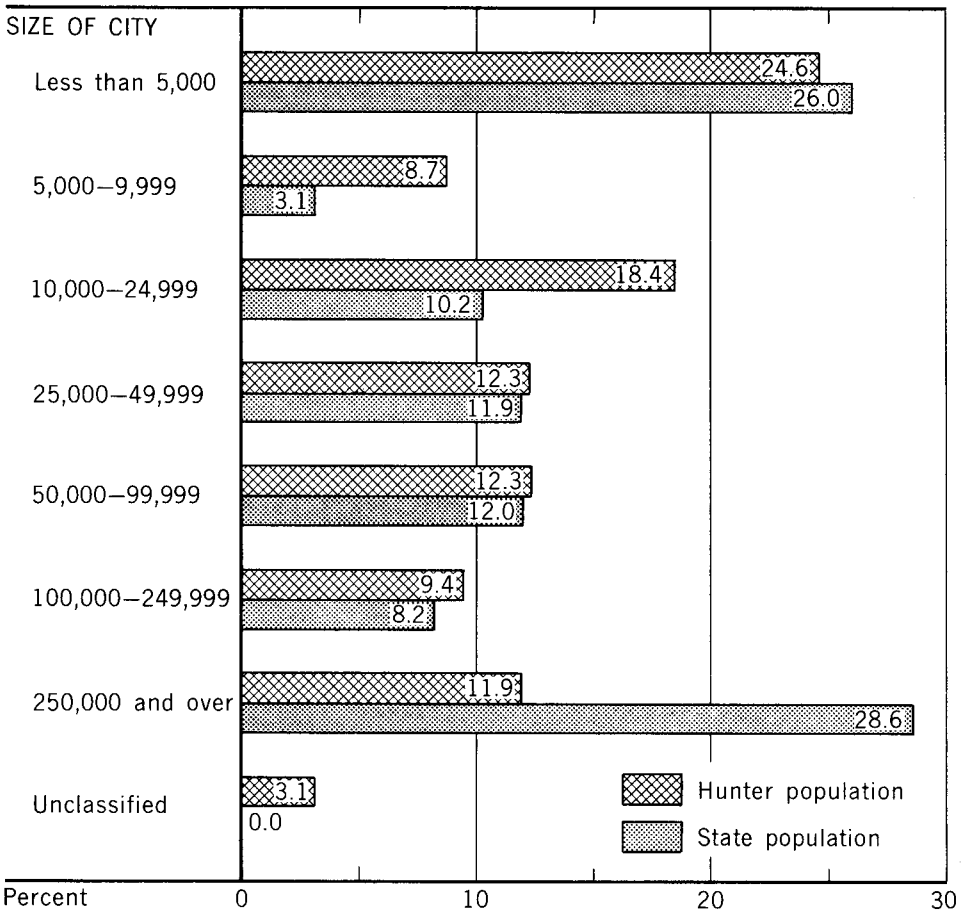

Figure 3.—Percentage distribution of licensed hunters and total population of California by size of city of residence.

from Region II. Twenty-three percent of the hunters from this region bought licenses outside of the region, primarily in Region I. Among the other Regions, the proportions were considerably smaller, varying from 9 percent in Region IV to less than 2 percent in Region I.

On the basis of these figures, the Sacramento area (Region II) would appear to furnish approximately two-thirds of the nonresident hunters in the northern region. Most of the remainder were from the metropolitan counties of the central coast and southern California, each of which accounted for about 5 percent of all purchases in the region. San Joaquin Valley hunters accounted for about half this proportion of the total of license purchasers in the northern California region. In Region II, the bulk of the purchases from out of the region were made by hunters from the central coast and southern California. Out-of-region purchases by San Joaquin Valley hunters were about equally divided between northern and Sacramento Valley regions. All other out-of-region purchases were small and widely distributed.

Occupational Characteristics

Occupations of the hunters cover a wide spectrum. Individual reports include such exotic sounding occupations as choker setter and seaweed inspector. However, when grouped in the customary broad categories, a majority is clustered in the skilled-semiskilled (36 percent) and professional-managerial (18 percent) classifications. A sizable proportion (19 percent) is not in the labor force. Most of the hunters in this latter category are students (fig. 4).

These figures do not take into account the relative size of the different occupation groups in the base population. When considered in terms of the proportion of each occupational group buying a license to hunt, the picture is quite different.

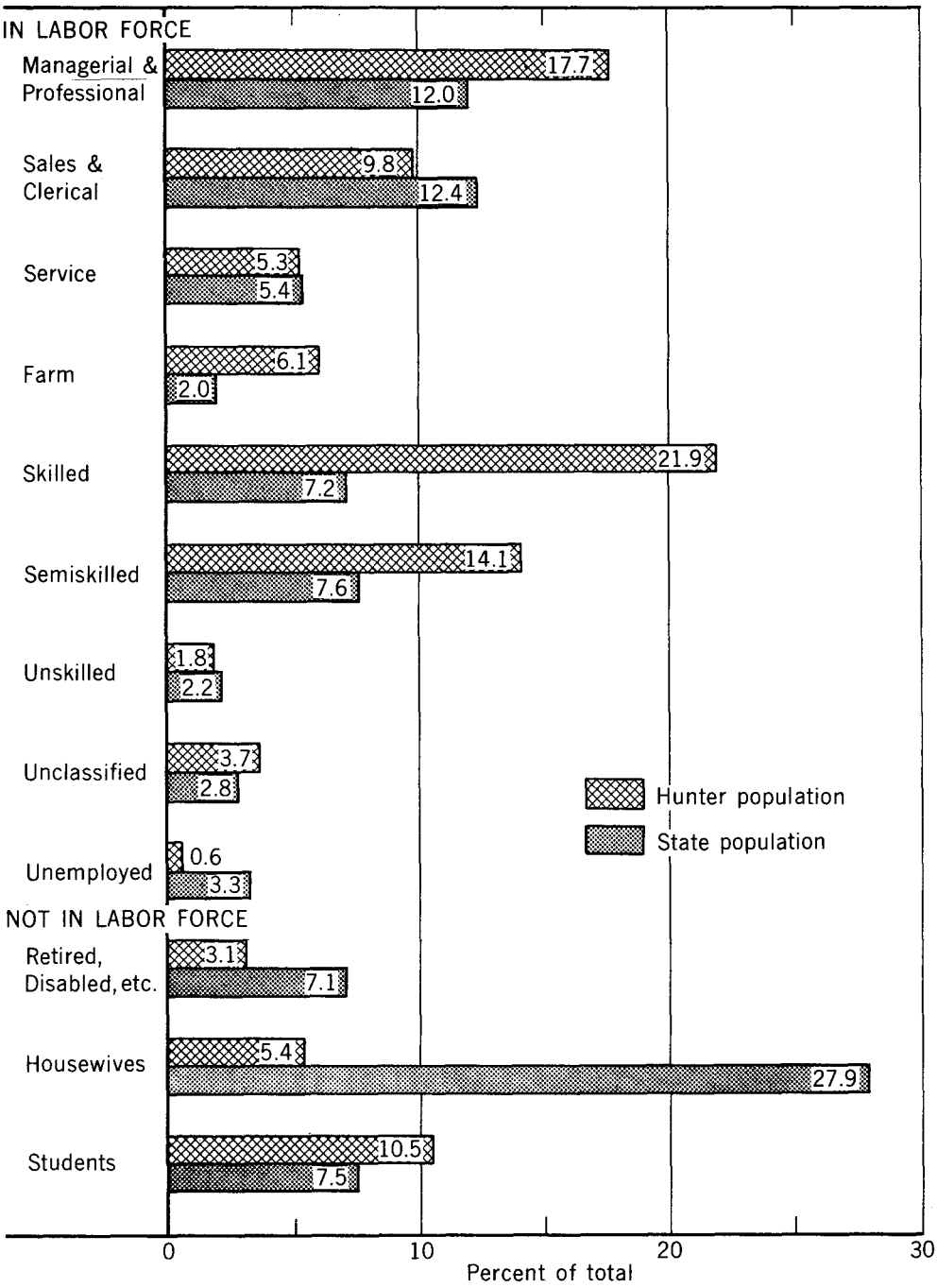

Figure 4.-Percentage distribution of licensed hunters and total population of California by major occupation groups. (Total population includes those 14 years and older.)

The skilled and farm groups rate highest: nearly 1 in 5 of those in each of these occupations purchased licenses. Those in the clerical and sales, unskilled, and service occupations, as well as those unemployed or not in the labor force (except for students) were poorly represented among the licensed hunters in proportion to their numbers in the total population.

The professional-managerial and skilled occupational groupings are highly represented among the hunters from the more urban parts of the State, i.e., Regions III and V. The professional-mana-

gerial group is particularly low among the hunters from Region I. Region IV has a high representation of farmers in its hunter population. Housewives and students seem to be influenced more than other groups by their proximity to the better hunting areas of the State. Women from Region I and students from Regions I and II are especially well represented in contrast to other regions.

In summary, hunting is largely a male sport. Residence and age also affect participation. Some types of occupations supply much more than their proportionate share of the hunters.

Knowledge About Fire Prevention

Levels of Knowledge

In general, California hunters appear to be quite well informed about forest fire prevention. The average (mean) score on the two 16-question tests was 78.9 percent correct. The range was from all correct responses to answering 12 out of 15 scorable questions incorrectly.

When scores were grouped by age, residence, and occupation, no significant differences were observed. Educational level, usually a significant variable in questionnaires concerned with knowledge levels, was not known. But educational and occupational levels are usually highly correlated, and consequently one may presume that education would also have shown little relationship to fire-prevention knowledge. Differences among the regions of the State were similarly slight. Region V had the best showing, with an average score of 80.5 percent correct. Region IV's average score of 76.8 was the lowest in the State.

One can only speculate on the reasons for the failure to find a knowledge differential among these groupings. One might presume, for example, that although hunting attracts individuals from all ages and walks of life, this common interest has a leveling effect in selecting out from the general population those who are similarly woodswise. In support of this presumption is the fact that most of the hunters had urban, "indoor" occupations in which no meaningful on-the-job contact with wildland fire-prevention problems or practices could be expected. Their interest in hunting was the one tie they shared in common, and this tie may account for their similar orientation toward uncontrolled wildland fire.

However, one might also question the test instrument. The mean score for all groups, on an absolute basis, was quite high. On a test having 15 scorable items, the *mean* number correct was about 12 items (11.85 percent). It seems reasonable to suppose that one factor limiting the difference between groups of different socio-economic characteristics is the arbitrary ceiling of the test itself. That is, we may have used a test which is too easy and hence does not allow "true" differences to show. Clearly, this cannot be demonstrated to be the case, but the distribution of scores makes the argument plausible. For example, the scores of 21 percent of the professional-managerial group were suppressed by the test ceiling in that they achieved a perfect, or near perfect (got one item incorrect) score, as compared to 15 percent of the semiskilled group.

Specific Items of Knowledge

The two 16-item forms of the questionnaire used in measuring fire prevention knowledge included 26 different questions, with 6 of these occurring in both forms. An item analysis of these questions reveals some of the specific strengths and weaknesses of the hunters' knowledge of fire behavior and good fire safety practice. The questions actually cover several areas of knowledge. They seek to assess the hunters' understanding of fire behavior characteristics, safety practices in the use of fire, and laws regulating use of fire, the importance of fire prevention, and terminology pertaining to fire behavior and prevention.

An examination of the test results indicates that hunters are generally aware of the proper precautions to take with fire. They know that windy weather makes greater wariness of fire necessary; that the surest way to put out a campfire is to cool it with water and bury it with dirt (but there was some indecision as to whether embers should first be drawn together or spread out); that lighted matches require special care in their disposal; and that extra gasoline for the camp stove should be carried in a safety can. They also know that driving a car off the road into dry grass is hazardous and that the combination of high temperature and low humidity increases the need for fire caution.

In contrast, there was considerable confusion as to the amount of forest land in California and the ownership of it. The general opinion was that the State contains more forest land than actually exists and that it belongs mostly to the Federal Government. About 27 percent did not know that the green trees and shrubs of California burn readily. There was also uncertainty over the time of day that forest fires spread most rapidly; and among those who gave the correct answer, 60 admitted they had guessed.

More than 95 percent of the respondents know that individuals who start forest fires as a result of personal negligence have a civil liability for their action, but only 73 percent know there is any criminal liability for such an act.

Although most hunters are familiar with the term "humidity," about one hunter in five doesn't know what the term "closed area" means. A similar proportion does not know what California foresters mean by "watershed."

Two-thirds of the hunters picked smokers' cigarettes and matches as the principal cause of forest fires. About 20 percent selected lightning as the principal cause.

When presented with several choices including "more men and equipment" and "better fire prevention techniques," 98 percent of the respondents recognized that the. prevention of man-caused forest fires ultimately depends on public cooperation and personal responsibility.

The question concerning the most important reason for fire prevention has no one "right" answer. In one section of the State "regulation of the flow of water" is of transcendent importance; in another, "conservation of forests for wood products" takes precedence over any other reason. The hunters appeared to be influenced by the situational nature of the question. An analysis of their opinions revealed that choice of alternative was closely related to the hunter's place of residence. Those living in areas where commercial lumbering is a major industry by and large picked the alternative referring to utilization of wood products. Those from the larger population centers and the more arid areas were most likely to feel regulating water flow was of major importance.

Only 8 percent of the hunters selected "protection of wildlife" as the most important reason for fire prevention. One might have expected hunters to have a special concern for this alternative. Their response may, of course, reflect the current controversy regarding the use of burning in wildlife habitat management.

"Preservation of recreation areas" did not rank high in any area, but it was given more importance in metropolitan areas than it was in rural areas.

Distribution of responses to individual questions from both test forms are found in Appendix 2.

In general, the responses of the hunters in this study were similar to those found in previous studies of other forest-using groups.[7]

Sources of Knowledge

One of the objectives of this study was to determine where the respondents obtained their knowledge of forest fire prevention. Following the questions testing the respondents' knowledge, there appeared on the questionnaire the question, "Where did you get your principal fire safety information?" A list of 12 possible sources of information followed this question, and the respondents were requested to check one or more sources. The specific sources were derived from free responses to pretest questions. The 12 sources listed were: forest ranger, newspaper, magazine, school, friend or relative, scouting, laws, signs, television, radio, Smokey Bear, and business establishment. Provision was also made for "other" responses.

One of the most obvious and significant observations from the analysis of the sources of fire prevention knowledge is that most hunters recognize a number of sources. On the average, the hunters checked between three and four different sources of fire safety information. Less than two percent (61 persons) failed to indicate a source and only 16 percent checked a single source. Eleven persons (representing less than one-half of one percent of the respondents) indicated a possible lack of discrimination by checking all of the sources.

In an earlier study, an attempt was made to determine sources of knowledge through the use of a non-directive, or free response, type of question. This resulted in a high incidence of non-definitive responses—that is "common sense" and "experience" accounted for 50 to 70 percent of the total sources mentioned.[8] By providing a check list of

[7]Chandler, Craig C., and Davis, James B. What do people know about fire prevention? U.S. Forest Serv. Pacific SW. Forest & Range Expt. Sta. Misc. Paper 50, 4 pp. 1960.

[8]Herrmann, W. W. Progress report on research activities relevant to human behavior aspects of forest fire prevention. Univ. S. Calif. 188 pp., 1959.

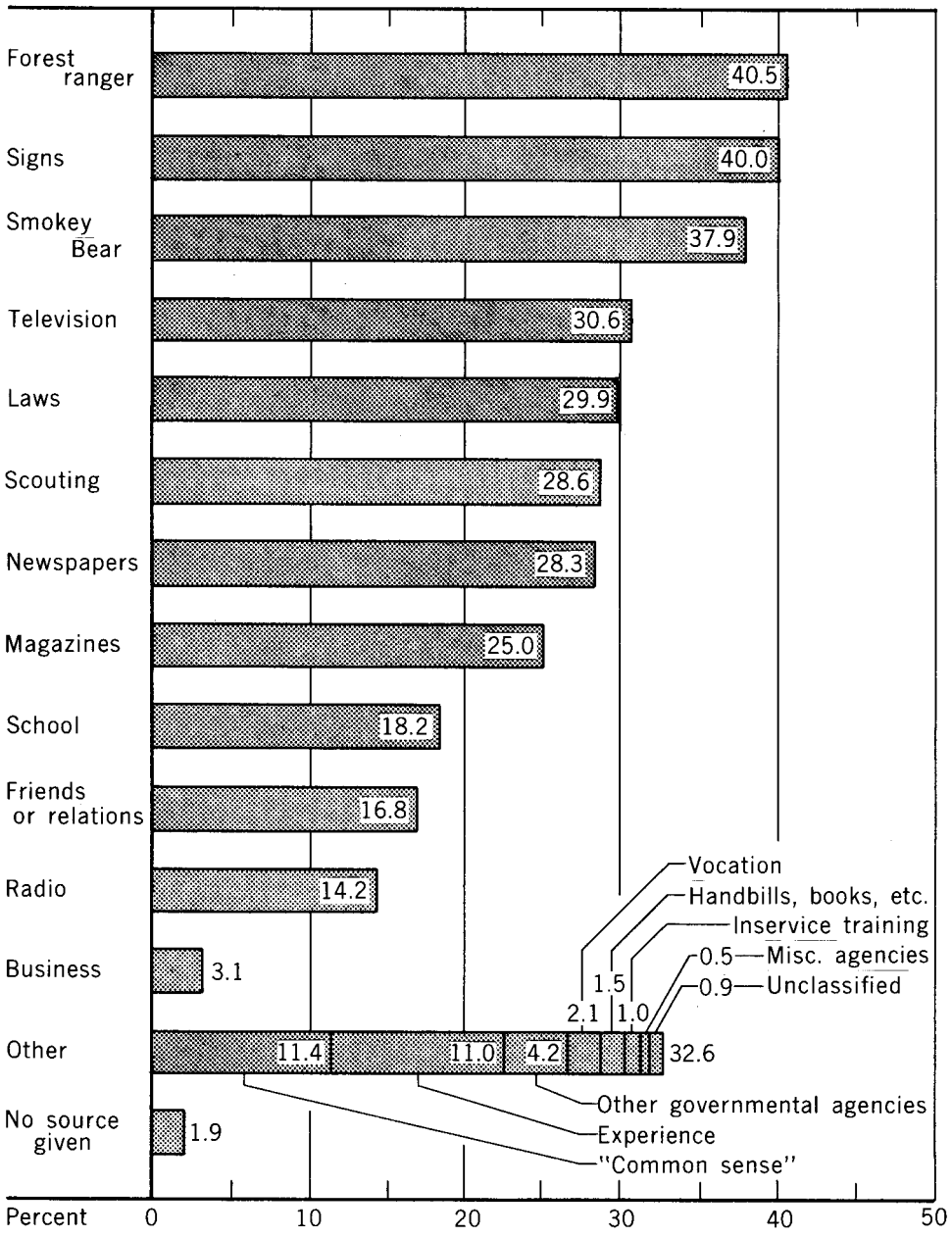

Figure 5.—Percentage distribution of sources of forest fire safety information reported by licensed hunters in California. Percentages do not add as multiple responses were possible.

specific sources from which to choose, the incidence of such non-definitive responses was reduced to less than 6.5 percent of the total sources men-tioned.

"Forest ranger," "signs," and "Smokey Bear" were the most frequently reported sources of fire safety information (fig. 5). About 2 out of 5 hunters reported each of these sources. Together, these three sources accounted for a third of the total number of sources reported.

Each of the mass media (television, newspapers, and magazines), along with scouting experience and laws pertaining to fire prevention, were credited about equally as sources of information about

fire safety. Together, these sources accounted for about 40 percent of the selections.

The school with its conservation programs might be expected to have been identified as a significant source of fire safety information. That it was so identified by so few hunters in this study should not be interpreted to discount its role in establishing positive knowledge and attitude levels regarding fire prevention. For most hunters, this exposure has not been recent. More immediate exposure to other information sources may tend to stand higher in conscious awareness but may not have actually effected as profound or lasting changes in basic knowledge and attitude levels. On the other hand, the contrast between the frequency of choice of schools and scouting, both essentially equal in terms of chronology of exposure, indicates that conservation played a much stronger role in the scouting program than it did in the school curriculum at the time these hunters were being exposed to both.

The influence of friends and relatives in disseminating fire safety information was checked fewer times than schools. Radio does not share the importance attributed to the other mass communications media. Business establishments do not serve as principal sources of fire safety information for many hunters.

Since most of the respondents (72.3 percent) checked more than one of the sources of information on the questionnaire, this limits somewhat the discreet measurement of the relative significance of the individual sources. This comparative analysis of the sources has, of necessity, been in terms of the *relative frequency* with which the various sources were checked.

When forest ranger, school, friend or relative, scouting, and business were grouped together as sources suggesting face-to-face contact with another person, they constituted 69.4 percent of the total selected. In contrast, the mass communication media (newspaper, magazines, television, and radio) accounted for 51.1 percent of the total. The relationship remained constant for all regions. This difference between the face-to-face and more diffuse sources takes on added significance when it is recognized that studies in communication have been consistent in demonstrating the primacy of face-to-face contact in influencing human behavior.

Although not studied in this phase of the project, the credibility of various sources also plays an important part in the extent to which information is accepted. This is an area of study that must be considered in future research.

The various sources maintained about the same rank order when the data were examined by regions (table 1). Generally, such changes as did occur represent transpositions of adjacent items. At most, there were differences of only two positions from that of the total. For example, the three sources of knowledge—forest ranger, signs, and Smokey Bear—led all other sources in frequency of mention in all five regions, with forest ranger ranked first in Regions I and II, and second in the other three regions. Signs ranked first in Regions IV and V, second in Region II, and third in Regions I and III. Smokey Bear ranked first only in Region III, second in Region I, and third in the other regions.

Laws as a source of knowledge ranked fourth in Region IV, but dropped to seventh in Regions II and III. Scouting was tied for fourth place with TV in Region III, but ranked only sixth in the other regions. Newspapers ranked fifth as a source in Region II, in contrast to seventh in all other regions. On the other hand, magazines, which ranked eighth among all the other regions, dropped to tenth place in Region I.

There was considerable variation among regions as to the proportions indicating specific sources. In Region IV, for example, 46.5 percent of the hunters chose the first ranked source—signs. In contrast, only 37.1 percent of the hunters in Region I chose their first ranked source — forest ranger (table 1).

Summary of Conclusions

Personal Characteristics of the California Hunter

Hunting is essentially a male sport. Only seven percent of the California hunter population are women. Residence and age also affect participation. Over half of the hunters (52 percent) live in places under 25,000 in population and only 12 percent live in cities of 250,000 or more.

The average age of the hunters in the State is 37.1 years; about 4 out of 5 are under 50 years of age. Female hunters average about a year younger than their male colleagues, and hunters who come from urban areas are on the whole slightly younger than those who are rural residents.

A wide variety of occupations are represented among the hunter population, but some types are more highly represented than others. More than one-fifth are in the skilled labor class, and only slightly less are professionals or in management positions. The semi-skilled and the students are other highly represented groups.

Most hunters buy their hunting license close to home, but many wait until they go to the more popular deer hunting areas. Most hunters (67 percent) also purchased fishing licenses in 1960.

Level of Knowledge

In general California hunters know quite a lot about forest fire prevention. The average score achieved on the questionnaire was 79 percent. The test instrument did not reveal any significant

Table 1. Rank order of sources of knowledge by regions[1]

Rank order of mention	Region I	Region II	Region III	Region IV	Region V	Total
1	Forest Ranger (37.1)	Forest Ranger (38.6)	Smokey Bear (41.1)	Signs (40.9)	Signs (46.5)	Forest Ranger (40.6)
2	Smokey Bear (34.2)	Signs (36.6)	Forest Ranger (40.3)	Forest Ranger (39.7)	Forest Ranger (43.4)	Signs (40.3)
3	Signs (32.6)	Smokey Bear (32.9)	Signs (37.8)	Smokey Bear (36.5)	Smokey Bear (41.7)	Smokey Bear (38.5)
4	T. V. (32.0)	T. V. (31.2)	Scouting (28.9)	T. V. (31.6)	Law (33.0)	T. V. (31.1)
5	Law (31.6)	Newspaper (29.3)	T. V. (28.9)	Law (29.4)	T. V. (32.3)	Law (30.0)
6	Scouting (26.5).	Scouting (27.5)	Newspaper (28.4)	Scouting (25.6)	Scouting (31.3)	Scouting (28.7)
7	Newspaper (25.9)	Law (27.0)	Law (28.3)	Newspaper (25.4)	Newspaper (29.9)	Newspaper (28.4)
8	School (23.3)	Magazine (19.8)	Magazine (28.1)	Magazine (23.0)	Magazine (29.0)	Magazine (25.1)
9	Friends (19.5)	Friends (18.8)	School (19.4)	School (19.2)	School (16.6)	School (18.2)
10	Magazine (17.6)	School (15.9)	Friends (16.6)	Radio (16.2)	Friends (15.4)	Friends (16.8)
11	Radio (15.6)	Radio (14.4)	Radio (14.4)	Friends (15.8)	Radio (14.6)	Radio (14.8)
12	Business (4.1)	Business (2.7)	Business (3.7)	Business (3.2)	Business (2.4)	Business (3.1)

[1]*Figures in parentheses represent percent indicating this source. Percentages do not add as multiple responses were possible.*

differences between the knowledge levels of the different age, sex, residence, and occupation classifications studied. This may mean that hunters are actually quite homogeneous in their understanding of fire prevention matters. Although they come from varied backgrounds, this common interest may serve to select out those who are similarly woodswise.

Although their answers revealed a rather high awareness of the proper precautions to be taken with fire in the woods, they also showed considerable confusion concerning other related areas of knowledge. The flammability of green plant materials and the time of day when forest fires spread most rapidly are examples of items about which a significant number of hunters were uninformed. Technical terms, such as "closed area" and "watershed" were unfamiliar to about one-fifth of the hunters.

Sources of Information About Fire Prevention

The California hunter receives information on forest fire prevention from a variety of sources, the most frequently reported being forest rangers, signs, and Smokey Bear. But no single source stands out as the most generally selected; most hunters recognized several sources from which they receive this type of information. They checked sources requiring face-to-face contact more frequently than the more impersonal sources involving the mass communications media or reading ability.

Recommendations

1. With 93 percent of the hunter population male, major prevention efforts should be framed to appeal to male interests and directed through channels serving men. At the same time, the women, who may represent a sizable minority in hunting camps, should not be wholly ignored in planning prevention programs.

2. Programs through civic and service clubs probably reach a significant number of hunters from the professional and managerial occupations. Greater effort would appear desirable in attempting to establish closer contact with the skilled and semiskilled workers who make up such a large proportion of the hunter population in the State. Labor union meetings and industry-sponsored employee activities are possible means of directly approaching these people.

Union, as well as professional magazines, and industrial house organs may be' useful additional media through which to present fire prevention messages. High school and college newspapers should be considered as channels for reaching the significant student segment of the hunter population. Study of the reading habits of these young people, and other groups, is needed to determine other promising outlets for fire prevention messages.

3. In general, the hunters know most of the information tested in this study. However, in addition to teaching *what* is adequate caution with fire, perhaps more emphasis should be placed on *how* this care is to be taken. It is apparent, also, that greater attention should be given to the wording of fire prevention messages. If terms more familiar to the layman cannot be found, then more effort must be made to acquaint him with the terms that are used.

If it is deemed operationally desirable, it appears fire prevention messages should stress the following specific points :

a. *Spreading* of embers before cooling with water and covering with dirt.
b. How much of California is forest land.
c. Green trees and shrubs of California burn *readily*.
d. Fires spread most rapidly from 10:00 a.m. to sundown.
e. *Criminal liability* of individuals who are negligently responsible for a forest or wildland fire.
f. The definition of the term "watershed."
g. The chief causes of man-caused forest and wildland fires are smokers' cigarettes and matches.
h. The meaning of the term "closed area."

4. Choice of the "most important" reason for preventing fire varied geographically. This suggests that fire prevention appeals can be slanted to conform with local values in this matter. If this were done, fire prevention messages in northern California (Region I) should stress the importance of

protecting forest areas to prevent loss of wood products, and messages elsewhere in the State (Regions II, III, IV, and V) should highlight loss of water. Protection of wildlife, as a primary purpose of fire prevention, does not appear promising as a message for use among hunters.

5. Failure to know who owns forest land in California may affect understanding and identification with the seriousness of fire loss; ownership should be communicated to hunters.

6. Since many of those who hunt in Region I do not live there, fire prevention efforts relative to the region must cover a broader geographical area or must be intensive during the hunting season, when hunters are present within the region, to reach those who hunt there. This is also true in other regions but to a lesser degree.

7. The role of man as a primary cause in forest and wildland fires should continue to be stressed in fire prevention messages. One hunter in five listed lightning as the primary causative agent. Some persons have difficulty rejecting this idea because their point of reference is to a limited, specific area, such as the higher elevations of the Sierra, where human use is not intense, but summer thunderstorm activity is frequent. Here lightning is the major cause of fire. Explicit recognition of this situational variability in major cause of forest fires may increase the credibility of the overall program.

APPENDIX 1

INSTRUCTIONS—
Check the one most appropriate answer for each question and whether *very certain, fairly certain* or *uncertain* of your answer.
Please detach this portion and mail. No postage is required. Thank you.

1. "A fire is more apt to start where there is:
   a ☐ low temperature and low humidity
   b ☐ high temperature and low humidity
   c ☐ high temperature and high humidity
   d ☐ low temperature and high humidity."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

2. "The time of day that forest fires typically will spread most rapidly is:
   a ☐ sundown to midnight
   b ☐ Midnight to sunrise
   c ☐ 10:00 a.m. to sundown
   d ☐ Sunrise to 10:00 a.m."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

3. "Fire prevention efforts in the forests:
   a ☐ are everyone's business
   b ☐ are money well spent
   c ☐ are necessary
   d ☐ all of these are correct."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

4. "The term, 'forest fire,' means a fire which is burning out of control on lands covered wholly or in part by:
   a ☐ timber and brush only
   b ☐ timber only
   c ☐ timber, brush and grass only
   d ☐ timber, brush, grain, or other flammable vegetation."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

5. "How does fire burn in the rotten vegetation found on the forest floor?
   a ☐ it burns very rapidly—almost like a dry gunpowder train
   b ☐ it smolders slowly as in 'punk' or 'cotton' with little or no visible smoke
   c ☐ it burns slowly along the top of the ground with easily detected production of smoke
   d ☐ it will not burn at all."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

6. "Watersheds are:
   a ☐ Areas where rain falls or snow melts to supply water to springs and creeks
   c ☐ Covered reservoirs
   c ☐ Buildings with gutters that run water to a cistern
   d ☐ Lakes and reservoirs which collect the water run-off from forests."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

7. "Where you drive your car off the road in dry grass areas:
   a ☐ exhaust sparks can cause fire
   b ☐ sparks made by contact of metal parts of the car and rocks can set fires
   c ☐ both a and b are correct
   d ☐ it cannot start a fire."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

8. "Prevention of forest fires is important to all of the following. In this area the most important is the:
   a ☐ Conservation of forest for wood products
   b ☐ Protection of wildlife
   c ☐ Regulation of flow of water
   d ☐ Preservation of recreation areas."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

9. "If you take extra gasoline for your camp stove, you should carry the gasoline in:
   a ☐ glass jar or jug
   b ☐ safety can
   c ☐ container in which flammable liquids were purchased
   d ☐ plastic containers such as used in the kitchen."
   ☐ Very certain ☐ Fairly certain ☐ Uncertain

10. "Which of the following is ordinarily the slowest burning material?
    a ☐ dry grass
    b ☐ dead leaves
    c ☐ brush
    d ☐ logs."
    ☐ Very certain ☐ Fairly certain ☐ Uncertain

11. "If you are negligent with your campfire or warming fire and it escapes to the property of another, whether privately or publicly owned, you are:
    a ☐ Not liable for damages
    b ☐ Criminally liable, but no civil liability
    c ☐ Civilly liable, but no criminal liability
    d ☐ Both criminally and civilly liable."
    ☐ Very certain ☐ Fairly certain ☐ Uncertain

12. "The best place to inquire about areas where campfires may be built in our forests is a:
    a ☐ sheriff's substation
    b ☐ service station
    c ☐ ranger station
    d ☐ camp store."
    ☐ Very certain ☐ Fairly certain ☐ Uncertain

13. "Having in your possession, on or firing across brush covered or forest lands, a tracer bullet or tracer charge:
    a ☐ is not against the law
    b ☐ is unlawful and punishable by a fine
    c ☐ is unlawful and punishable by a jail sentence
    d ☐ is unlawful and punishable by both a fine and a jail sentence."
    ☐ Very certain ☐ Fairly certain ☐ Uncertain

14. "Prevention of man-caused fires ultimately depends upon:
    a ☐ More men and equipment
    b ☐ More and better equipment
    c ☐ Public cooperation and recognition of personal responsibility
    d ☐ Better techniques of fire fighting with the equipment we have."
    ☐ Very certain ☐ Fairly certain ☐ Uncertain

15. "A sign in a National Forest that reads 'Closed Area' means:
    a ☐ that you may enter, but not smoke in the area
    b ☐ you may enter, but not build any camp fires in the area
    c ☐ you may not enter the area
    d ☐ no hunting or shooting within the area."
    ☐ Very certain ☐ Fairly certain ☐ Uncertain

16. "The safest method for lighting cigarettes in the forest area is to use:
    a ☐ book type safety matches
    b ☐ the strike anywhere stick type matches
    c ☐ stick type safety matches
    d ☐ a cigarette lighter."
    ☐ Very certain ☐ Fairly certain ☐ Uncertain

Where did you get your principal fire safety information: Check I or more.

- ☐ Forest Ranger
- ☐ Newspaper
- ☐ Magazine
- ☐ School
- ☐ Friend or relative
- ☐ Scouting
- ☐ Laws
- ☐ Signs
- ☐ Television
- ☐ Radio
- ☐ Smokey Bear
- ☐ Business establishment
- ☐ Other (specify).....

Did you also have a 1959-1960 California Fishing License? ☐ Yes ☐ No

For purposes of classification of your replies please supply the following information:

Age.....Sex.....

Occupation.....

.....
City of residence

.....
County of residence

UNIVERSITY OF SOUTHERN CALIFORNIA
SCHOOL OF PUBLIC ADMINISTRATION
FOREST AND RANGE RESEARCH PROJECT
UNIVERSITY PARK
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AN INVITATION TO PARTICIPATE IN RESEARCH AT USC

UNIVERSITY OF SOUTHERN CALIFORNIA
SCHOOL OF PUBLIC ADMINISTRATION
FOREST AND RANGE RESEARCH PROJECT

California Sportsman:

Did you know that nine out of ten forest fires in the State of California are caused by people? As one of the 680,000 licensed hunters who enjoy and use hunting areas in California, *YOU* have a direct and personal interest in the conservation of forest and wildland regions within this State. The University of Southern California is cooperating in a program of research aimed at preventing the needless destruction of our valuable forest areas. A limited number of sportsmen are being requested to participate in this research.

You can help the University by completing and returning the attached form. By doing so, *YOU* will be taking an active part in assuring better hunting in the future. You will also be contributing your knowledge to the search for solutions to the critical problem of forest fire prevention. In this case, haste does *not* make waste—please answer and return the questions today.

Thank You,

Dr. W. W. Herrmann
Director
Forest and Range Research Project

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APPENDIX 2

Table 2. Percentage distributions of responses to individual questions, Test Form A and B

Question	Percent
Form A(n = 1690)	
1. (Form B – #8) Prevention of forest fires is important to all of the following. In this area the most important is:	
a. Conservation of forest for wood products	24.1
b. Protection of wildlife	8.1
c. Regulation of flow of water	53.3
d. Preservation of recreation areas	7.7
Other	7.4
Very certain correct response	
2. Humidity is a measure of:	
a. Temperature of the air	2.2
b. Amount of rainfall that has fallen in the last 24 hours	.4
c. Percentage of cloudiness during the daylight hours	.2
*d. Amount of moisture in the air	96.3
Other	1.0
Very certain correct response	90.7
3. The surest way to put out a campfire, assuming all these 'methods' are available, is:	
*a. Spread out the embers, cool with water, and cover with dirt	74.0
b. Pull the embers together, cool with water, and cover with dirt	24.9
c. Spread out the burning embers and let it burn itself out	.6
d. Let it alone and it will burn itself out	.1
Other	.4
Very certain correct response	85.5
4. Windy weather:	
a. Tends to put out campfires	.3
b. Affects only poorly built campfires	.1
*c. Makes necessary more precautions with campfires	99.2
d. Has little or no influence on campfires	.1
Other	.3
Very certain correct response	96.2
5. (Form B – #14) Prevention of man-caused fires ultimately depends on:	
a. More men and equipment	.4
b. More and better equipment	.2
*c. Public cooperation and recognition of personal responsibility.	97.5

Table 2. Percentage distributions of responses to individual questions, Test Form A and B, continued

Question	Percent
d. Better techniques of fire fighting with the equipment we have	1.5
Other	.5
Very certain correct response	93.3
6. The chief cause of forest fires in California is:	
a. Lightning	20.5
b. Campfires-	7.0
c. Children with matches	.5
*d. Smoker's cigarettes and matches	66.3
Other	5.7
Very certain correct response	34.6
7. (Form B – #6) Watersheds are:	
*a. Areas where rain falls or snow melts to supply water to springs and creeks	81.1
b. Covered reservoirs	2.5
c. Buildings with gutters that run water to a cistern	1.6
d. Lakes and reservoirs which collect the water run-off from forests	13.4
Other	1.4
Very certain correct response	75.7
8. (Form B – #2) The time of day fires typically will spread most rapidly is:	
a. Sundown to midnight	11.3
b. Midnight to sunrise	3.3
*c. 10:00 a.m. to sundown	79.5
d. Sunrise to 10:00 a.m.	4.1
Other	1.9
Very certain correct response	43.2
9. In areas where open fires are permitted, campfires or warming fires are less dangerous when built:	
a. Against a log	.5
*b. In a cleared-off area	99.0
c. At the base of a tree	.1
d. On the crest of a hill	.3
Other	.1
Very certain correct response	90.6
10. (Form B — #11) If you are negligent with your campfire or warming fires and it escapes to the property of another, whether privately or publicly owned, you are:	
a. Not liable for damages	.5
b. Criminally liable, but no civil liability	2.1
c. Civilly liable, but no criminal liability	25.6
*d. Both criminally and civilly liable	70.2
Other	1.7

Table 2. Percentage distributions of responses to individual questions, Test Form A and B, continued

Question	Percent
Very certain correct response	36.3
11. Green trees and shrubs of California:	
a. Are very difficult to burn	6.6
b. Will not burn at all	.1
*c. Will catch fire and burn very rapidly	72.8
d. Will burn only in the hot sunnier months	19.3
Other	1.3
Very certain correct response	60.0
12. When you are in a National Forest area, the law permits you to:	
a. Never smoke or build campfires	.8
b. Smoke but never build campfires	.5
*c. Smoke and build campfires, but only in areas so designated	97.6
Other	.5
Very certain correct response	83.4
13. The poorest way to put out a match is:	
a. Blow it out and break it in half	9.2
b. Spit on it	.5
*c. Throw it out the car window and let the wind blot it out	48.9
d. Throw it on the ground	39.0
Other	2.4
Very certain correct response	81.2
14. (Form B — #4) The term `forest fire' means a fire which is burning out of control on lands covered wholly or in part by:	
a. Timber and brush only	17.4
b. Timber only	3.1
c. Timber, brush and grass only	22.6
*d. Timber, brush, grass, grain, or other flammable vegetation	56.3
Other	.6
Very certain correct response	50.7
15. If all the forests in the State should burn, what percentage of the State's area do you think would be burned?	
a. 40 percent	.7
b. 8 percent	3.4
*c. 20 percent	32.1
d. 32 percent	62.1
Other	1.8
Very certain correct response	2.6
16. Who owns this forest land?	
a. No one	.5

Table 2. Percentage *distributions of responses to individual questions, Test Form A and B, continued*

Question	Percent
b. Mostly large lumber companies	1.2
c. Mostly the Federal government	48.0
*d. About half Federal and half private	48.5
Other	1.9
Very certain correct response	12.2
Form B (n = 1570)	
1. A fire is more apt to start where there is:	
a. Low temperature and low humidity	1.1
*b. High temperature and low humidity	81.7
c. High temperature and high humidity	15.8
d. Low temperature and high humidity	.6
Other	.9
Very certain correct response	73.2
2. (Form A – #8) The time of day that forest fires typically will spread most rapidly is:	
a. Sundown to midnight	8.5
b. Midnight to sunrise	2.4
*c. 10:00 a.m. to sundown	83.9
d. Sunrise to sundown	3.0
Other	1.7
Very certain correct response	47.9
3. Fire prevention efforts in the forests:	
a. Are everyone's business	15.4
b. Are money well spent	0
c. Are necessary	1.0
*d. All of these are correct	77.2
Other	
Very certain correct response	90.8
4. (Form A – #14) The term 'forest fire' means a fire which is burning out of control on lands covered wholly or in part by:	
a. Timber and brush only	16.4
b. Timber only	4.3
c. Timber, brush, and grass only	24.0
*d. Timber, brush, grain, or other flammable vegetation	53.6
Other	1.7
Very certain correct response	56.7
5. How does fire burn in the rotten vegetation found on the forest floor?	
a. It burns very rapidly--almost like a dry gunpowder train	14.5
*b. It smolders slowly as in 'punk' or 'cotton' with little or no visible smoke	61.7

Table 2. Percentage distributions of responses to individual questions, Test Form A and B, continued

Question	Percent
c. It burns slowly along the top of the ground with easily detected production of smoke	21.7
d. It will not burn at all	.3
Other	1.8
Very certain correct response	44.5
6. (Form A — #7) Watersheds are:	
*a. Areas where rain falls or snow melts to supply water to springs and creeks	85.7
b. Covered reservoirs	1.4
c. Buildings with gutters that run water to a cistern	1.4
d. Lakes and reservoirs which collect the water run-off from forests	9.9
Other	1.7
Very certain correct response	79.4
7. Where you drive your car off the road in dry grass areas:	
a. Exhaust sparks can cause a fire	14.8
b. Sparks made by contact of metal parts of the car and rocks can set fires	2.3
*c. Both a and b are correct	74.1
d. It cannot start a fire	2.2
Other	6.6
Very certain correct response	75.8
8. (Form A — #1) Prevention of forest fires is important to all of the following. In this area the most important is:	
a. Conservation of forest for wood products	26.9
b. Protection of wildlife	5.8
c. Regulation of flow of water	46.9
d. Preservation of recreation areas	6.9
Other	13.5
9. If you take extra gasoline for your camp stove, you should carry the gasoline in:	
a. Glass jar or jug	.3
*b. Safety can	88.2
c. Container in which flammable liquids were purchased	10.5
d. Plastic containers such as used in the kitchen	0
Other	1.0
Very certain correct response	86.4

Table 2. Percentage distributions of responses to individual questions, Test Form A and B, continued

Question	Percent
10. Which of the following is ordinarily the slowest burning material?	
a. Dry grass	.6
b. Dead leaves	9.4
c. Brush	1.1
*d. Logs	88.0
Other	.8
Very certain correct response	70.0
11. (Form A — #10) If you are negligent with your campfire or warming fire and it escapes to the property of another, whether privately or publicly owned, you are:	
a. Not liable for damage	.3
b. Criminally liable, but no civil liability	1.7
c. Civilly liable, but no criminal liability	23.6
*d. Both criminally and civilly liable	72.8
Other	1.6
Very certain correct response	43.1
12. The best place to inquire about areas where campfires may be built in our forests is a:	
a. Sheriff's substation	.1
b. Service station	.1
*c. Ranger station	99.4
d. Camp store	.2
Other	.3
Very certain correct response	92.5
13. Having in your possession, on or firing across brush covered or forest lands, a tracer bullet or tracer charge:	
a. Is not against the law	1.0
b. Is unlawful and punishable by a fine	11.9
c. Is unlawful and punishable by a jail sentence	1.5
*d. Is unlawful and punishable by both a fine and a jail sentence	83.7
Other	1.9
Very certain correct response	43.2
14. (Form A — #5) Prevention of man-caused fires ultimately depends upon:	
a. More men and equipment	.8
b. More and better equipment	.3
*c. Public cooperation and recognition of personal responsibility	96.4
d. Better techniques of fire fighting with the equipment we have	1.0

Table 2. Percentage distributions of responses to individual questions, Test Form A and B, continued

Question	Percent
Other	1.6
Very certain correct response	89.8
15. A sign in a National Forest that reads 'Closed Area' means:	
a. That you may enter, but not smoke in the area	3.1
b. You may enter, but not build any campfires in the area	6.3
*c. You may not enter the area	77.8
d. No hunting or shooting within the area	10.6
Other	2.2
Very certain correct response	59.6
16. The safest method for lighting cigarettes in the forest area is to use:	
a. Book type safety matches	5.7
b. The strike anywhere stick type matches	.1
c. Stick type safety matches	5.2
*d. A cigarette lighter	87.5
Other	1.5
Very certain correct response	40.2

** Indicates correct response. Form A, question 1 (same as Form B, question 8) had no one correct answer.*