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A Survey of Some Opinions of Michigan Sport Fishermen

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ABSTRACT

A two-stage sampling design with fishing license dealers as primary sampling units within which licensed fishermen were subsampled was used to obtain a sample of opinions on certain fish management practices from resident and nonresident anglers in Michigan.

Fishing license dealers were divided into 96 groups (strata), each consisting of dealers in a restricted geographical area whose combined 1961 license sales totaled approximately 9,580. Two dealers were selected from each stratum with probability proportional to estimated size, *i.e.*, the more licenses a dealer sold, the greater the chance of his being included in the sample. Approximately six fishermen per dealer were mailed postcard questionnaires. The sample thus included 192 out of some 4,116 fishing license dealers and, allowing for nonrespondents, 927 fishermen out of a total of 926,470. All licensed fishermen were equally likely to be included in the sample. Three mailings plus a fourth contact attempt by mail, telephone, or personal contact yielded responses from 85.7 percent of the 1,082 fishermen to whom questionnaires were sent. Respondents were distributed among the three Conservation Regions in about the same proportion as license sales. There was no substantial difference in opinions among the three Conservation Regions of the state. Among the opinions expressed by fishermen which are summarized and discussed in this paper, the following were considered especially pertinent to management programs. Few people think that too great a proportion of the Conservation Department's budget is spent on trout stocking. Among nontrout fishermen, who help to finance the trout stocking program through license fees, 52 percent have no opinion about the current expenditure. Among trout fishermen 42 percent desire to have more spent on trout stocking, while 58 percent are satisfied with the present level of expenditure, think too much is spent, have no opinion, or gave no answer to this question. Fifty-two percent of trout fishermen preferred to have trout stocked in streams, and 36 percent preferred stocking in lakes. The management activity most frequently selected as needing to be increased to meet future fishing needs was "lake and stream improvement," followed by "research on improvement of fishing," then "warmwater fish stocking" and "buying public fishing sites" mentioned with equal frequency in third and fourth places, and finally "law enforcement" and "trout stocking."

INTRODUCTION

Fish management programs are influenced to an important extent by the desires of the license-buying public. These desires are usually expressed through mail, contact with field representatives of conservation departments, resolutions by sportsmen's organizations, etc. It is often suspected that these avenues of public expression provide a biased picture of the attitudes of the entire fisherman population. Dissatisfied people are more likely to register opinions voluntarily than are satisfied people. Groups which purport to represent the entire public may actually be special-interest groups. Methods of sampling which provide unbiased estimates of public opinion have become highly developed in fields such as the social sciences, and these methods may be adapted to problems in natural resource management. For example, estimates of public opinion have been obtained by mail questionnaire for deer hunting regulations in Michigan (Eberhardt and Murray, 1960) and fisherman satisfaction in Minnesota (Bonde, 1961). Fishing pressure and harvest in Wyoming have been estimated by means of mail questionnaires (McLeod, 1957[1]); fishing participation and expenditures in the entire United States and in Minnesota, by means of personal interviews and mail questionnaires (U. S. Fish and Wildlife Service, 1961; Scheftel, 1958); and type of fishing in Pennsylvania, by questions included on fishing license applications

[1] McLeod, W. (1957) A method for determining statewide fishing pressure and success in Wyoming. M.S. thesis, Univ. of Wyoming.

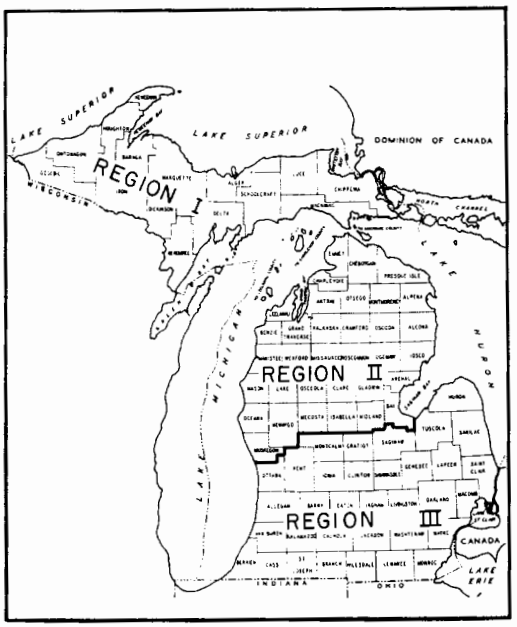

FIGURE 1.—Regions of the state of Michigan maintained for administrative purposes by the Michigan Conservation Department.

(Miller, 1961). The Outdoor Recreation Resources Review Commission based an important part of its evaluation of outdoor recreation participation and demand on personal interviews of a representative sample of American adults (Mueller, Gurin, and Wood, 1962).

The pilot survey of opinions, which is the subject of this report, was conducted in order to assess public opinion on several fish management practices, and to study the sampling characteristics of the angler population in Michigan. The population sampled was made up of persons who purchased a resident or nonresident fishing license in 1961. Not included in the survey were persons under 16 years of age and wives of resident fishing license buyers, who may fish without purchasing a license. Samples of opinions were obtained from trout fishermen and nontrout fishermen in each of the three regions into which the state is divided for administrative purposes by the Conservation Department (Figure 1). The regional analysis of data was based on where fishermen bought their licenses, not where they lived. The "trout fishermen" group includes many individuals who fish for species other than trout. The "nontrout fishermen" group, however, does not include any individuals who fish (legally) for trout.

METHODS

It was not possible to obtain a simple random sample of fishing license buyers in Michigan because no list of licensees is maintained by the Conservation Department. A complete list of fishing license dealers was available, however, and each dealer retains duplicate copies of all licenses sold by him during the current year. Consequently, a two-stage sampling design was adopted for this survey in which dealers are the primary sampling units within which fishing license buyers are subsampled.

Total sales of licenses in 1960 were used as an estimate of 1961 sales for each dealer. No distinction was made among the three types of licenses handled: resident annual, nonresident annual, and nonresident temporary. The list of license dealerships was divided into four parts corresponding to the three Administrative Regions of the Conservation Department and dealers residing outside the state. Within each of these four parts, dealers were listed alphabetically by county, by city within county, and by dealer's last name within city. Approximately 958,000 fishing licenses were sold during 1960 by approximately 4,116 dealers, so in order to divide the dealers into a desired number of strata (about 100), consecutive dealers on the sampling list were grouped until their accumulative 1960 sales approximately 9,580 licenses. This procedure produced stratification on a geographical basis.

The few Michigan fishing license dealers in Wisconsin were grouped with those in Region I. All of the Region I dealers plus most from Alcona County in Region II plus the Wisconsin dealers made up 9 strata. Region II dealers, less most of Alcona County's and a few of Wexford County's dealers, made up 26 strata. All of Region III's dealers plus a small number from Wexford County in Region II plus a few out-of-state dealers made up 58 strata. The rest of the out-of-state dealers made up 3 more strata. This constituted a total of 96 strata, 4 short of the anticipated

100. This shortage apparently resulted from a dropout of license dealers between 1960 and 1961. Dealers in business in 1960 who subsequently dropped their accounts had been removed from the 1961 list before it was used for this sampling. License sales as totaled from our dealer list were approximately 3 percent short of recorded sales in Region II and 5 percent short of recorded sales in Region III and out-of-state dealerships. This resulted in 1 less stratum than anticipated in Region II and 3 less than anticipated in Region III. However, fishermen who bought 1960 licenses from dealers who later went out of business would have to buy 1961 licenses from alternative dealers. Thus this discrepancy in license sales in our list did not affect the sample licensees.

Each dealer was given a probability of selection proportional to his 1960 fishing license sales. Two dealers were selected randomly from each stratum. The numbers identifying the 1961 fishing licenses assigned to each of these dealers were obtained from central files maintained for accounting purposes. Beginning at a random starting point, license numbers were systematically selected across each dealer's 1961 license quota at an interval equal to one-sixth of his 1960 fishing license sales. Thus from each dealer a subsample with estimated size of 6 fishermen was selected. If a particular dealer sold more licenses in 1961 than in 1960, this subsample might include more than 6 licensees. If he sold fewer licenses in 1961 than in 1960, the subsample would include fewer than 6 fishermen. This sample design gave each fisherman in the population an equal probability of selection. We would expect the total sample, if dealers sold the same number of licenses in 1961 as in 1960 and if all fishermen selected responded, to include 96 strata $\times$ 2 dealers per stratum $\times$ 6 fishermen per dealer, or 1,152 replies. However, fishing license sales declined by 2.77 percent from 1960 to 1961; thus the sample should include an average of 0.9723 $\times$ 6 or 5.834 licensees per dealer. For the 192 dealers selected in this survey the mean number of questionnaires actually mailed was 5.635. Ninety-five percent confidence limits for the population mean are 5.366 to 5.904, so the discrepancy between expected and actual number of mailings is not greater than would be expected by chance.

Each respondent was asked to indicate whether he had bought a trout stamp in 1961, and the reply to this question was used to distinguish trout fishermen from nontrout fishermen. The individuals selected for the survey were mailed postcard questionnaires. One part of the questionnaire contained instruction and the other part consisted of a detachable reply card upon which the questions were printed. Respondents were directed to check only one answer to each question except number 6.

The following questions were asked:

1. Do you think your fishing luck in 1961 was: *Good, Fair, Poor?*
2. Did you buy a 1961 trout stamp in addition to your regular $2.00 fishing license? *Yes, No.*
3. Do you think that hatchery trout stocked by the Conservation Department improve trout fishing to an important degree? *Yes, No, No opinion.*
4. Do you prefer to have hatchery trout stocked in: *Lakes, Streams, No opinion.*
5. Do you feel that the proportion of the Conservation Department budget now spent on trout stocking is: *Too small, Satisfactory, Too great, No opinion?*
6. Of the following six activities select the two which will **MOST** need to be increased to meet future fish needs; rating the most important as (1) and the second most important as (2). *Warmwater fish stocking, Research on improvement of fishing, Lake and stream improvement, Law enforcement, Buying public fishing sites, Trout stocking, No opinion.*

Question number 6, which contains 7 alternative answers, was printed with the answers in three different serial orders and these three different versions were alternated systematically across the entire sample of license buyers. After the initial mailing, nonrespondents were sent two follow-ups by mail; then a fourth and final attempt was made by mail, telephone, or personal interview to contact those who still had failed to answer. Samples of the questionnaire card and the letters sent to license dealers and to fishermen are available through the authors.

The data from reply cards were analyzed and summarized by The University of Michigan IBM 709 digital computer. Variance estimates were computed following the methods of Kish and Hess (1959). To facilitate these

TABLE 1.—*Distribution of respondents by type of fishermen and geographical region*

Region	Trout fishermen	Nontrout fishermen	Total
I	49	47	96
II	89	167	256
III	131	444	575
Total	269	658	927

computations, the original 96 strata were collapsed into 32 strata.

RESULTS

Sampling characteristics of the angler population

Of 1,082 questionnaires sent out, 927 or 85.7 percent were returned by fishermen. In Table 1 the respondents are classified by region and type of fisherman. The first three contact attempts, made by mail, netted returns of 41.8, 19.3, and 6.8 percent respectively from the 1,082 anglers selected for the survey. The fourth contact attempt, made by mail, telephone, and personal contact, produced returns from an additional 17.8 percent of the fishermen in the sample. Of the questionnaires sent out, 5.7 percent were nondeliverable because of incorrect or insufficient addresses. Only 8.6 percent of the anglers to whom mailings were made presumably received the questionnaire and failed to respond to any of the contact attempts.

For all three mailings combined, 53.5 percent of the returns were received within the first 5 days, 86.3 percent within the first 10 days, and 93.6 percent within the first 15 days. Some questionnaires from the first mailing were returned after as many as 48 days, but we believe that these respondents returned the first-mailing questionnaire in response to the second or third contact attempt.

Of the 1,082 questionnaires sent out, approximately 223 would be expected, on the basis of the ratio of trout stamp sales to total license sales (Table 2), to go to trout fishermen and 859 to nontrout fishermen. However, 269 respondents indicated that they had bought a 1961 trout stamp (a response of 120.6%). This leads us to suspect that some nontrout fishermen indicated that they had purchased a trout stamp and thus were classified erroneously as trout fishermen. Replies from nontrout fishermen totaled 658, or 76.6 percent of the number of questionnaires sent out which would be expected to go to nontrout fishermen. This figure is presumably an underestimate of actual response by nontrout fishermen, for part of this group is classifed erroneously in the sample as trout fishermen.

TABLE 2.—*Comparison of the proportion of trout fishermen in the survey sample with the proportion expected on the basis of license sales in 1961*

	Region			Entire state
	I	II	III	
Percent trout fishermen in survey sample	51.0	34.8	22.8	29.0
Trout stamp sales as percent of total 1961 license sales	44.5	27.2	14.0	20.6

Region I was overrepresented in the responses to the first mailing and Region III underrepresented (Table 3). This presumably reflects a tendency among trout fishermen, who make up a larger part of the population in Region I than in the others and a smaller part in Region III than in the others (Table 2), to respond more readily to the questions contained in this survey; the questions pertained mostly to trout management. In successive contact attempts the representation of Region I declined whereas that of Region III increased, so that in the final sample the representation of the three regions closely approximated the regional distribution of total license sales (Table 3).

Fishermen's opinions

No explanation of Conservation Department programs or fish management practices was given to the fishermen questioned. Thus, the results reflect the opinions of individuals who had not received any special "education"

TABLE 3.—*Percentage contribution of each Region of the state to the total number of responses obtained through each contact attempt. The percentage of total 1961 fishing license sales made in each Region is given for comparison*

	Region			Total
	I	II	III	
First contact attempt	12	29	59	100
Second contact attempt	11	26	63	100
Third contact attempt	8	27	65	100
Fourth contact attempt	6	26	68	100
Total sample	10	28	62	100
Total 1961 license sales	9	29	62	100

TABLE 4.—*Response of fishermen, expressed as percent of total for each category (e.g., trout fishermen in Region I), to the question: "Do you think your fishing luck in 1961 was: Good, Fair, Poor?" (The standard error is given for selected statistics)*

Region	Response			
	Good	Fair	Poor	No answer
Trout fishermen:				
I	8	45	45	2
II	8	46	46	0
III	14	53	31	2
Entire state	11	50	38	1
Nontrout fishermen:				
I	15	37	48	0
II	11	44	43	2
III	13	53	33	1
Entire state	12	50	37	1
All fishermen:				
I	11	41	47	1
II	10	44	43	3
III	13	52	33	2
Entire state	12	49	37	2
Std. error	±0.9	±1.6	±1.8	–

TABLE 5.—*Response of fishermen, expressed as percent of total for each category (e.g., trout fishermen in Region I), to the question: "Do you think that hatchery trout stocked by the Conservation Department improve trout fishing to an important degree?" [answer options were "Yes," "No," "No opinion"]. (The standard error is given for selected statistics)*

Region	Response			
	Yes	No	No opinion	No answer
Trout fishermen:				
I	61	33	4	2
II	76	17	5	2
III	76	6	17	1
Entire state	73	15	10	2
Std. error	±4.0	–	±2.0	–
Nontrout fishermen:				
I	30	11	57	2
II	39	8	51	2
III	33	7	59	1
Entire state	33	7	57	3
Std. error	±1.7	–	±2.1	–
All fishermen:				
I	46	22	30	2
II	51	11	34	4
III	42	7	49	2
Entire state	45	10	43	2
Std. error	±1.6	±1.1	±1.6	–

which would cause their responses to differ from others in the angler population. Tables 4, 5, 6, 7, and 8 summarize the answers to the five principal questions in the survey and afford comparisons among the three administrative regions and between trout and nontrout fishermen. In general, differences among regions are so small as to be of little consequence. The overall pattern of consistency among regional data is evidence that the sampling was representative and that opinions of fishermen do not vary greatly among the three broad geographical areas of the state. Consequently, all further analyses will deal with data representing the entire state as a unit.

Twelve percent of the fishermen reported that their fishing luck in 1961 was good, 49 percent reported it fair, and 37 percent said their luck was poor (Table 4). The responses of trout fishermen and nontrout fishermen were almost identical. (The reader should keep in mind the fact that many trout fishermen fish also for warmwater fish.)

Forty-five percent of the fishermen felt that trout stocking improved fishing, 10 percent thought it did not, and 43 percent had no opinion (Table 5). More than twice as high a percentage of trout fishermen as of nontrout fishermen believed that stocking was worthwhile. Most nontrout fishermen (57%) did not have an opinion on this subject, but only 10 percent of the trout fishermen had no opinion.

Presumably the opinions of trout fishermen on whether hatchery trout should be stocked in lakes or streams are of greater concern than opinions of nontrout fishermen, because only those who purchase a trout stamp can legally keep trout if they catch them. Thirty-six percent of the trout fishermen preferred to have trout stocked in lakes, 52 percent preferred stocking in streams, and the rest had no opinion or gave no answer (Table 6). Thus, a substantial proportion of trout fishermen prefer stocking in each of the water types, with stream stocking being somewhat more popular than lake stocking.

Considering trout fishermen and nontrout fishermen together, relatively few think that too great a proportion of the Conservation Department budget is spent on trout stocking (Table 7). Twenty-four percent think the proportion spent is too small, 23 percent think it satisfactory, and 42 percent have no opinion. Among trout fishermen alone, 42 percent think the proportion spent is too small, but only 16 percent of the nontrout fishermen think likewise. A majority (52%) of the nontrout fishermen have no opinion on this subject. It is significant that only 9 percent of the

TABLE 6.—*Response of fishermen, expressed as percent of total for each category (e.g., trout fishermen in Region I), to the question: "Do you prefer to have hatchery trout stocked in: Lakes, Streams, No opinion?" (The standard error is given for selected statistics)*

Region	Response			
	Lakes	Streams	No opinion	No answer
Trout fishermen:				
I	31	57	10	2
II	33	60	4	3
III	41	44	9	6
Entire state	36	52	8	4
Std. error	±2.5	±3.1	–	–
Nontrout fishermen:				
I	26	20	50	4
II	29	22	45	4
III	29	17	50	4
Entire state	29	18	49	4
All fishermen:				
I	28	39	30	3
II	30	34	31	5
III	32	23	40	5
Entire state	31	28	37	4

TABLE 7.—*Response of fishermen, expressed as percent of total for each category (e.g., trout fishermen in Region I), to the question: "Do you feel that the proportion of the Conservation Department budget now spent on trout stocking is: Too small, Satisfactory, Too great, No opinion?" (The standard error is given for selected statistics)*

Region	Response				
	Too small	Satisfactory	Too great	No opinion	No answer
Trout fishermen:					
I	45	25	8	18	4
II	46	25	10	18	1
III	38	36	4	18	4
Entire state	42	30	7	18	3
Std. error	±3.0	±2.7	±1.5	±2.5	–
Nontrout fishermen:					
I	13	13	7	65	2
II	19	19	12	46	4
III	16	22	8	53	1
Entire state	16	21	9	52	2
Std. error	±1.2	±1.4	±1.2	±2.3	–
All fishermen:					
I	29	19	7	41	4
II	28	21	11	36	4
III	21	25	7	45	2
Entire state	24	23	8	42	3
Std. error	±1.3	±1.4	±0.9	±1.9	–

nontrout fishermen thought expenditures for trout stocking were too great.

Table 8 contains the percentage response to a request to select from a list of six fish management activities the two which will most need to be increased to meet future fish needs. Respondents were instructed to indicate a first and second choice, but 33 percent merely checked two activities without indicating any ranking. To make use of these responses where two activities were selected but first and second choices were not differentiated, the answers to this question were expressed as the percent of respondents selecting various activities as first *or* second choice. For this reason the rows in Table 8 each add up to 200 percent (*i.e.*, each respondent made two selections).

The management activities fell into four distinct groups in order of decreasing frequency of selection by respondents. Each group differs from the others by a greater amount than would be expected on the basis of chance alone (0.05 probability level) but differences within the groups are not statistically significant. Most frequently selected was "lake and stream improvement" (51 percent), followed by "research on improvement of fishing" (35 percent), "warmwater fish stocking," and "buying public fish sites" (28 percent), and finally "law enforcement" and "trout stocking" (18–19 percent).

Standard errors are given in absolute units for important selected statistics in Tables 4, 5, 6, 7, and 8. Approximate 95 percent confidence limits can be constructed by adding to and subtracting from the corresponding point estimates the quantity (2.04 × standard error).

The state population of licensed fishermen is classified on the basis of response to each question and type of fishermen in Figures 2, 3, 4, 5, and 6. These figures are not designed to facilitate comparisons between trout fishermen and nontrout fishermen or between different responses, but rather to provide a visual representation of the makeup, opinionwise, of the angling public. Each segment of these graphs represents a percentage of the total sample of respondents and therefore corresponds to a component of the total licensed angling public. The percentages in Figure 6 add up to 200 percent because each respondent made both a first choice and a second choice (or at least two choices).

DISCUSSION

We found no indication of nonrepresentativeness in the overall sample. Apparently a substantial number of nontrout fishermen erroneously indicated that they had bought trout stamps during 1961 and consequently the sample of trout fishermen is contaminated

TABLE 8.—*Percent of total respondents in each category (e.g., trout fishermen in Region I) selecting various fish management activities as first or second choice in response to the instruction: "Of the following six activities select two which will* **most** *need to be increased to meet future fish needs. . . ." (The standard error is given for selected statistics)*

Region	Fishermen	Lake and stream improvement	Warm water fish stocking	Research on improvement of fishing	Buying public fishing sites	Law enforcement	Trout stocking	No opinion	No answer
I	Trout	57	12	37	31	4	49	2	8
	Nontrout	51	30	47	23	9	17	8	15
	Total	54	21	42	27	6	33	5	12
II	Trout	57	24	28	24	24	39	2	2
	Nontrout	50	33	32	19	15	19	12	20
	Total	53	30	31	21	18	26	8	13
III	Trout	56	17	36	32	19	31	3	6
	Nontrout	48	33	35	31	20	8	10	15
	Total	50	29	35	31	20	14	8	13
Entire state	Trout	57	18	33	29	18	37	3	5
	Std. error	–	±1.9	–	–	–	±2.4	–	–
	Nontrout	49	33	35	27	18	12	10	16
	Std. error	–	±1.6	–	–	–	±1.2	–	–
	Total	51	28	35	28	18	19	8	13
	Std. error	±1.8	±1.3	±1.6	±1.7	±1.4	±1.1	–	–

with a sizable proportion of nontrout fishermen. Differences in opinion between the two groups of fishermen were still apparent, however, and the opinion data for all fishermen combined are unaffected except possibly for a slight overrepresentation of trout fishermen if this group had a higher response rate than nontrout fishermen. True response rates for these two groups cannot be calculated because an undetermined number of nontrout fishermen were identified in the survey as trout fishermen. Approximate 95 percent confidence limits, where calculated for the percentages presented here, ranged from ±3.1 percent to ±8.2 percent for data on trout fishermen, from ±2.4 percent to ±4.7 percent for nontrout fishermen, and from ±1.8 percent to ±3.9 percent for data on all fishermen combined. The ratio estimator used here $(\frac{y}{x})$ is subject to bias which is less than the coefficient of variation of x (Cochran, 1953). These coefficients of variation are 0.0011 for samples of trout fishermen, 0.00066 for nontrout fishermen, and 0.00040 for samples of all fishermen. The approximation to the bias given by Kish and Hess (1959: 426) yielded estimates of 10^{-7} for the ratio 0.73 of trout fishermen answering "yes" to the third item on the questionnaire. For the ratio 0.45 of all fishermen answering "yes" to the same question the bias was approximately 2×10^{-8}. Thus the actual bias appears to be much smaller than the coefficient of variation of x and is in all cases inconsequential.

The percentage response attained from the first three mailings was very similar to that reported by McLeod (1957) and somewhat less than that reported by Scheftel (1958) in fishermen surveys, and similar to that reported by Eberhardt and Murray (1960) for small-game hunter surveys. It was substantially less than that attained in deer hunter surveys by Eberhardt and Murray. Fishermen are a moderately responsive group and the percentage returns from this survey are apparently typical enough to serve as a useful guide in planning similar surveys.

Variances were computed for 24 of the answers to questions included in this survey, under the assumption of simple random sampling. The ratios of the cluster sample variances (Kish and Hess, 1959) to the simple random sample variances indicate the extent to which similar opinions tend to be clustered within dealers, in other words, the extent to which the between-dealers variance exceeds the within-dealers variance. The mean of the 24 ratios was 1.074, with 12 exceeding 0 and 12 being less than 0. Thus, no clustering is discernible.

The total cost of this opinion survey, including salaries, travel, printing, postage, telephone, computer service, etc., was approximately $5,918. This can be broken down into $2,970 overhead, $695 for contacting fishing license dealers, and $2,253 for contacting

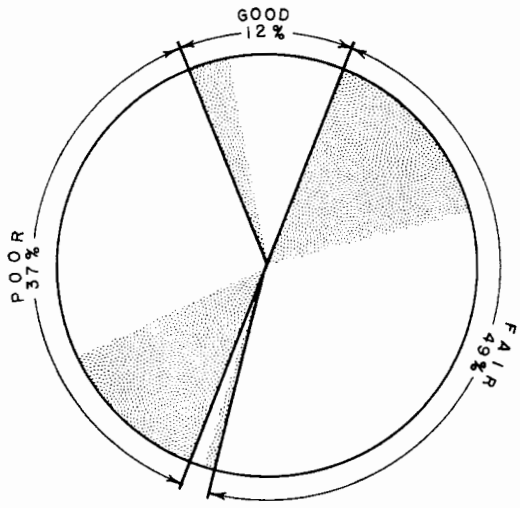

FIGURE 2.—Response of licensed Michigan fishermen to the question: "Do you think your fishing luck in 1961 was *Good*, *Fair*, or *Poor*?" The unlabeled segment of the graph represents those who did not answer the question.

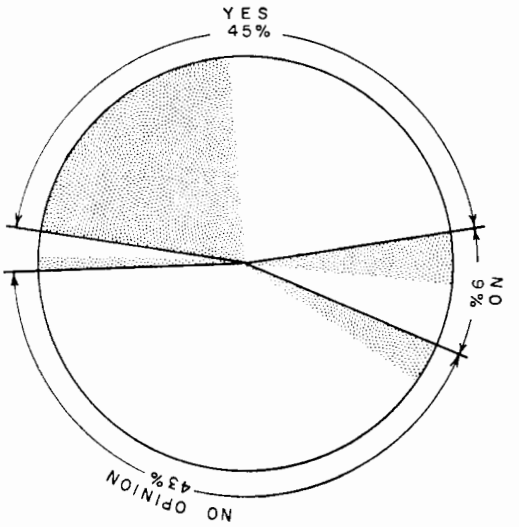

FIGURE 3.—Response of licensed Michigan fishermen to the question: "Do you think that hatchery trout stocked by the Conservation Department improve trout fishing to an important degree?" The unlabeled segment of the graph represents those who did not answer the question.

fishermen. The average cost of contacting a license dealer was $3.62, and the average cost of obtaining a reply from a fisherman was $2.43. Because it is more expensive to sample a dealer than a fisherman and fishermen's opinions are not clustered by license dealers, the conventional method of estimating the optimum number of licensees to sample per dealer in order to minimize the variance for a fixed total cost (Cochran, 1953) would, if followed literally, lead us in future surveys to sample all fishermen from a single license dealer. We would hesitate to adopt such an extreme because we do not know those subject areas in which fishermen's opinions might be clustered by license dealers, and the saving in cost effected by sampling a single dealer would not be great. However, it is obvious that the number of license dealers included in an opinion survey of this type could be substantially reduced below the number sampled here, and the number of licensees sampled per dealer increased accordingly.

Because of the small sample sizes in Region I and, to a lesser degree, in Region II, only large differences in opinion between Regions would be statistically significant. It is obvious that no differences in the group opinions surveyed here, great enough to be of practical importance exist among the three Regions of the state. Of special current interest from the standpoint of fish management is the finding that few people, regardless of whether or not they fish for trout, think that too great a proportion of the Conservation Department's budget is spent on trout stocking. Considering all fishermen together, 24 percent think too little is spent, 23 percent are satisfied with the present expenditure, and 42 percent have no opinion. Among nontrout fishermen, who help to finance the trout stocking program through license fees, 52 percent have no opinion about the current expenditure. Among trout fishermen the desire to have more spent on trout stocking is substantial (42 percent), but not overwhelming. Fifty-eight percent of the trout fishermen are satisfied with the present level of expenditure, think too much is

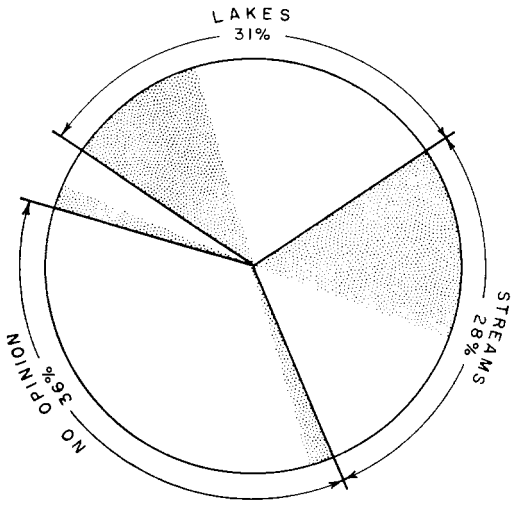

FIGURE 4.—Response of licensed Michigan fishermen to the question: "Do you prefer to have hatchery trout stocked in *Lakes* or *Streams*?" The unlabeled segment of the graph represents those who did not answer the question.

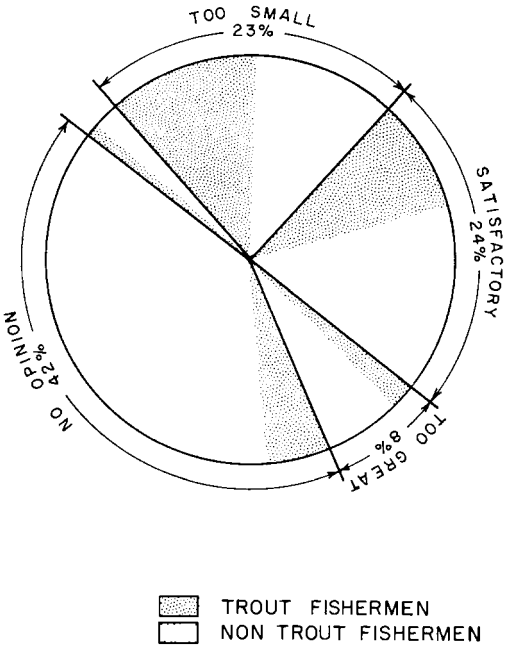

FIGURE 5.—Response of licensed Michigan fishermen to the question: "Do you feel that the proportion of the Conservation Department budget now spent on trout stocking is *Too small, Satisfactory,* or *Too great?*" The unlabeled segment of the graph represents those who did not answer the question.

spent, have no opinion, or gave no answer to the question.

Among trout fishermen, 52 percent preferred to have trout stocked in streams and 36 percent preferred stocking in lakes.

Good general agreement exists in the "trout fishermen," "nontrout fishermen," and "all fishermen" groups between the percentage of respondents who selected trout stocking as an activity requiring expansion to meet future fishing needs (question 6) and the percentage who wanted a greater share of the Conservation Department budget spent on this activity (question 5). Similar agreement was noted between the percentage of respondents indicating that the present level of expenditure for trout stocking is satisfactory or too low (question 5) and the percentage who thought that hatchery trout improved fishing to an important degree (question 3).

The answers given in response to a simple mail questionnaire of this type should not be generalized to any concepts beyond a literal interpretation of the questions. Even when this caution is observed, it is not always possible to determine precisely what respondents mean by their answers. Only 37 percent of the fishermen thought their fishing luck in 1961 was poor, yet it is well established from creel census records that usually on some 50 percent of fishing trips for warmwater species[2] and 50 to more than 80 percent of trips for trout (Latta, 1962;[3] Alexander and Shetter, 1962;[4] Patriarche and Gowing, 1962;[5] Hunt,

[2] Christensen, Kenneth E. Unpublished data from creel census eonducted on 10 lakes by the Michigan Conservation Department, Institute for Fisheries Researeh.

[3] Latta, William C. (1962) The thirteenth annual creel census and progress report, Pigeon River Trout Research Station, 1961. Mich. Cons. Dept., Inst. for Fish. Res. Rept. No. 1647, 34 pp. (Typewritten)

[4] Alexander, Gaylord R., and David S. Shetter. (1962) The twenty-third annual intensive creel census, Hunt Creek Trout Research Station, 1961. Mich. Cons. Dept., Inst. for Fish. Res. Rept. No. 1641, 27 pp. (Typewritten)

[5] Patriarche, Mercer H., and Howard Gowing. (1962) The seventeenth annual report on the Rifle River Area, Ogemaw County, 1961. Mich. Cons. Dept., Inst. for Fish. Res. Rept. No. 1646, 26 pp. (Typewritten)

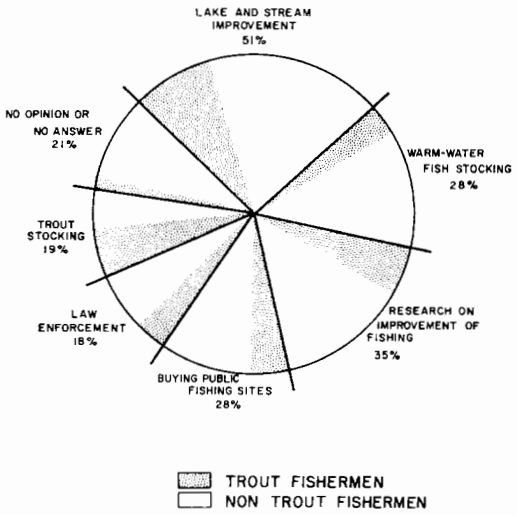

FIGURE 6.—Response of licensed Michigan fishermen to the request: "Of the following six activities select the two which will **MOST** need to be increased to meet future fish needs; rating the most important as (1) and the second most important as (2)."

Data given in the figure are percent of total respondents selecting the various activities as *first* or *second* choice.

Brynildson, and McFadden, 1962) no "keeper" fish are caught. Thus, fair to good fishing luck, in the public mind, must involve values other than catching "keeper" fish frequently, and we are forced to conclude that we do not actually know what the public means by "good," "fair," or "poor" fishing.

Likewise, while we have rather precise estimates of the percentage of fishermen who advocate various fish management techniques as means of meeting future needs, we do not know precisely what the public understands by such terms as "research" or "lake and stream improvement." Some of the names used to designate these activities are also the formal names of administrative units within the Michigan Conservation Department, but we doubt that a significant percentage of the public are familiar with these units or their scope of activity. Spontaneous comments by respondents revealed, for example, that some people associate practically any beneficial practice, including fish stocking and pollution abatement, with "lake and stream improvement." Motor boat regulation and pollution control were spontaneously mentioned in connection with "law enforcement" by some respondents. The public's concept of a complex and technical activity like "research" may bear little resemblance to actual procedures and results. Some fishermen indicated that they did not even know what was meant by "warmwater fish." Within these limitations the answers to the sixth item on the questionnaire provide a very useful measure of general public attitudes towards various fish conservation practices. Most respondents probably are not well enough acquainted with prospective ". . . future fish needs . . ." to make a meaningful judgment in this context– but their answers do reflect current attitudes towards the fishery activities listed. Such attitudes are persistent and consequently the data obtained provide a reliable basis for future planning.

When a choice in program must be made among alternatives which are all compatible with biologically sound management of natural resources, the opinion of the public is an appropriate basis for choice. Unbiased estimates of public opinion, which can be obtained through properly designed surveys, are certainly preferable in a democratic society to the biased estimates provided by many avenues of personal and group expression. If, due to interpretative problems such as discussed above, it is not possible to gain a thorough enough understanding of public opinion to assure an optimum choice in program, the simple postcard survey can be supplemented by a survey based on personal interview. Such surveys require the services of trained interviewers and are usually carried out by contract with established survey organizations.

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ABSTRACT NO. 196

MICHIGAN DEPARTMENT OF CONSERVATION

(Institute for Fisheries Research Report No. 1654)

A SURVEY OF SOME OPINIONS OF MICHIGAN SPORT FISHERMEN

By Gerald P. Cooper, James T. McFadden,

and James R. Ryckman

January 22, 1963

A two-stage sampling design with fishing license dealers as primary sampling units within which licensed fishermen were sub-sampled was used to obtain a sample of opinions on certain fish management practices from resident and non-resident anglers in Michigan.

Fishing license dealers were divided into 96 groups (strata), each consisting of dealers in a restricted geographical area whose combined 1961 license sales totaled approximately 9,580. Two dealers were selected from each stratum with probability proportional to estimated size, i.e., the more licenses a dealer sold, the greater the chance of his being included in the sample. Approximately six fishermen per dealer were mailed post card questionnaires. The sample thus included 192 out of some 4,116 fishing license dealers and, allowing for non-respondents, 927 fishermen out of a total of 926,470. All licensed fishermen were equally likely to be included in the sample. Three mailings plus a fourth contact attempt by mail, telephone, or personal contact yielded responses from 85.7 percent of the 1,082 fishermen to whom questionnaires were sent. Respondents were distributed among the three Conservation Regions in about the same proportion as license sales. There was no substantial difference in opinions among the three Conservation Regions of the state; therefore only state-wide summaries are given in the tables below. Statistics for the "all fishermen" group are weighted averages of those for "trout fishermen" and "non-trout fishermen."

Percentage response to the question: "Do you think your fishing luck in 1961 was: Good, Fair, Poor?" was as follows:

Fishermen	Good	Fair	Poor	No answer
Trout	11	50	38	1
Non-trout	12	50	37	1
All	12	49	37	2

Percentage response to the question: "Do you think that hatchery trout stocked by the Conservation Department improve trout fishing to an important degree?" [answer options were "yes," "no," "no opinion"] was as follows:

Fishermen	Yes	No	No opinion	No answer
Trout	73	15	10	2
Non-trout	33	7	57	3
All	45	10	43	2

Percentage response to the question: "Do you prefer to have hatchery trout stocked in: Lakes, Streams, No opinion?" was as follows:

Fishermen	Lakes	Streams	No opinion	No answer
Trout	36	52	8	4
Non-trout	29	18	49	4
All	31	28	37	4

Percentage response to the question: "Do you feel that the proportion of the Conservation Department budget now spent on trout stocking is: too small, satisfactory, too great, no opinion?" was as follows:

Fishermen	Too small	Satis-factory	Too great	No opinion	No answer
Trout	42	30	7	18	3
Non-trout	16	21	9	52	2
All	24	23	8	42	3

Percentage response to the question: "Of the following six activities select two which will MOST need to be increased to meet future fish needs . . ." was as follows (here percentages add to 200 because each fisherman made two selections):

Fisher-men	Lake and stream improve-ment	Warm-water fish stocking	Research on improve-ment of fishing	Buying public fishing sites	Law en-force-ment	Trout stock-ing	No opin-ion	No an-swer
Trout	57	18	33	29	18	37	3	5
Non-trout	49	33	35	27	18	12	10	16
All	51	28	35	28	18	19	8	13

Few people, regardless of whether or not they fish for trout, think that too great a proportion of the Conservation Department's budget is spent on trout stocking. Considering all fishermen together, 24 percent think too little is spent, 23 percent are satisfied with the present expenditure, and 42 percent have no opinion. Among non-trout fishermen, who help to finance the trout stocking program through license fees, 52 percent have no opinion about the current expenditure on trout stocking. Among trout fishermen the desire to have more spent on trout stocking is substantial (42 percent), but not overwhelming. Fifty-eight percent of the trout fishermen are satisfied with the present level of expenditure, think too much is spent, have no opinion, or gave no answer to the question.

Among trout fishermen, 52 percent preferred to have trout stocked in streams and 36 percent preferred stocking in lakes.

From a list of six fish management activities, fishermen were asked to select the two which will most need to be increased to meet future needs. The six management activities fell into four distinct groups in order of decreasing frequency of selection by respondents. Each group differs from the others by a greater amount than would be expected on the basis of chance alone (.05 probability level) but differences within the groups are not statistically significant. Most frequently selected was "lake and stream improvement" (51 percent), followed by "research on improvement of fishing" (35 percent), "warm-water fish stocking" and "buying public fishing sites" (28 percent), and finally "law enforcement" and "trout stocking" (18-19 percent).

Approximate 95 percent confidence limits were calculated for statistics of special interest and ranged from ±1.8 to ±8.2 percent depending on the population sampled.

Distribution: A and AA