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THE USE OF SURVEYS IN POLICY FOR NATURAL RESOURCES
WITH APPLICATIONS TO MICHIGAN'S PIGEON RIVER COUNTRY STATE FOREST

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by

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The Use of Surveys in Policy for Natural Resources with Applications to Michigan's Pigeon River Country State Forest*

by

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Introduction

During the 1960's and 70's, opinion polls came into wide use in the United States. Major polling organizations have refined their techniques so well that surveys can be done at a day's notice. If an event of national concern takes place, people's opinion of that event, or the decisions which lead to it, can be reported the next day in the newspapers. Weekly magazines such as Newsweek do their own nationwide polls on the most important issues of each week. On a smaller scale, there are interest groups, government agencies and officials, and researchers who do their own surveys on issues which concern them. The results of these surveys are reported in newspapers, nationwide magazines, the Congressional Report, Journals and technical reports, just to name a few. It appears that everyone is exposed to surveys and survey results in some way. What, then, is the effect of these surveys on our public decision-makers and particularly on the policies which they make? There is much evidence, some of which will be cited later in this paper, that public officials use surveys quite often and in different ways. Since public policy can affect all of us, people should be concerned about how that policy is made, and that includes how surveys are made and used.

This paper examines methods frequently used in surveys which are designed to gather information on citizens' opinions toward various

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policy issues. Others have studied problems of designing and conducting opinion surveys (Hyman, 1950). Our purpose is to analyze these survey methods in terms of their potential effects on public policy. Readers who may do surveys themselves will hopefully gain insights into the appropriateness of different designs for their purposes. A case study will be cited throughout the paper which involves a state forest in Michigan. It is an example where a survey was used directly in public decision-making. Many other examples will be used to illustrate alternative types of survey design.

The Role of Public Surveys

The U.S. government, comprised of its many levels, branches, agencies, and committees, is charged with looking after the public interest. But just what is "the public interest?" Is there any single, concisely defined group which we can identify as the public? When we are concerned with government policies aimed at specific problems, the definition of the public to be served changes with the problems to be faced. In these cases, public spending or regulation is being directed at a particular sub-group of the population. Therefore, there are many publics which exist and we must be careful to define which public we are referring to when discussing the public interest.

Beyond defining which sub-group of the population we are concerned with, there is the problem of measuring their interests, opinions and attitudes. The opinion poll or survey is a widely-used instrument for this purpose. However, the types of surveys which are used vary greatly and it can be shown that different types of surveys will result in dif-

ferent people's preferences being counted. When the results of a survey are used in public policy decisions, a political choice is being made by the choices of survey design. For example, an environmental agency may decide where to spend its dollars based on survey results showing what people feel is the pollution problem they are most concerned about. However, it may be that the problem causing the most concern is the problem which is already receiving the most attention (in terms of spending) from the agency.

Since people are usually unaware of where current spending is directed, they may have little feel for where the marginal dollar should be spent. Even if they had an opinion on where the marginal dollar should be spent, they may not have been asked that question. For instance, responding that "industrial air pollution" is the number one pollution problem is not the same as responding "spend more money to alleviate industrial pollution." This type of survey question also has no consideration of trade-offs involved in spending decisions.

People may prefer to have more money spent on national defense and none on pollution abatement if that were the trade-off involved. It can be seen that the type of question used, as well as the group of people questioned, can have an effect on where spending occurs in our government. Therefore, the choices of who and how to survey are, in fact, political choices of who will be represented in a political spending decision.

While it is unlikely that any single survey will be the sole basis for government decisions, there is much evidence to suggest that government decision-makers are paying close attention to the results of major surveys. In 1977, representatives from five major polling organizations

were invited to speak before the Subcommittee on Economic Growth and Stabilization of the Joint Economic Committee (U.S. Congress, 1977). Senator Humphrey stated that "a better grasp of public attitudes, opinions and expectations is crucial to the work of this and all the other committees of Congress." He added that he hopes "that we will get a solid reading on what the public thinks the Government is doing right and what it is doing wrong concerning these important economic issues."

While major surveys are usually used as indicators of very general moods and sentiments of the population, smaller surveys are often done at the request of various government agencies. These surveys focus on particular problems that the agency is concerned with. Since there are so many different types of surveys being used, it may be useful to identify the ways in which they can differ.

There are three major areas within survey design which can have an effect on the final results of any survey or poll. The first is the choice of <u>who</u> to survey. The analyst has a particular group in mind as the target of the survey. It may be the "general public" or it may be a political, socio-economic or other subgroup of the population. The second area of survey design is the choice of <u>how</u> to survey. This involves different methods of asking questions and different techniques for measuring responses. The third area is the choice of <u>aggregation</u> technique. Individual responses must be compiled and summed into a reasonable number of categories and their weights must be decided upon by the analyst. Each of the three areas will be discussed with respect to their effect on whose interests are represented in the survey process.

Choosing Who to Survey

When the boundaries of a survey are chosen, those within the boundaries will have representation while those outside are not represented, even though they may be affected by political decisions made by the group within. While voting boundaries possess this same characteristic, they are at least constant over time. Unlike voting boundaries, the survey boundary can be changed as the group of interest to the analyst changes. Sometimes the voting boundary is used, as when a Congressman surveys his/her constitutents on various issues before Congress. Other times a particular geographic or interest group may be relevant for the analyst.

Also different from the representation present in voting procedures is the fact that not everyone is counted in the survey process. Some type of selection technique must be used to narrow the number of respondents to a manageable level. Random choice of respondents within a group is often used. For example, people may be chosen at random from a voter register or from a phone book. However, regardless of the randomization technique that is used, there are ways in which the selection of respondents will result in a selection of whose preferences are to count. If the voter register is used, then people who are most likely to register to vote (higher income, higher education), will also be the people represented in the poll. In a college town, temporary student residents may not be on the voter register, yet they may be part of the relevant public for the analyst. Temporary residents should not be necessarily excluded merely because the analyst found the voter register to be the most available source of respondents.

In some cases, instead of random selection, a specifically defined group is chosen which is thought to be representative of a larger group. Such was the case in a survey which took place in Michigan. The Michigan Department of Natural Resources (DNR) was adopting a land management plan for the Pigeon River Country State Forest (PRCSF) in the northern part of the state. The agency was using the goal programming technique to allocate the available resources in the most optimal way. In order to use this technique it is necessary to rank the various uses of the forest in order of importance. The DNR decided that it was necessary to get public input into this ranking procedure. Therefore, a survey was done asking people to rank the uses of the forest according to their preferences for them. The DNR faced the problem of deciding who to survey in this case. Some believe that as a State agency, the public of interest to the DNR should be the residents of the State of Michigan. However, as a Natural Resources agency making land management decisions on a State forest, their public of interest may be the users of that forest only. Alternatively, all the local residents who may be affected by the decisions might be the relevant public. It is not obvious just who "the public" should be. In this case the Michigan DNR chose to survey the Pigeon River Advisory Council (PRAC, a citizen group) and other local organizations such as the Chamber of Commerce and private hunting clubs in the area. These are specifically defined groups, not random collections of individuals, who are thought to be representative of a larger public. Unfortunately, the members of these established groups are likely to have many of the same interests and are probably not representative of the general population of the state. Therefore, the DNR has made a political choice that their larger public which they are interested in is that of local

residents and users of the forest. There is nothing necessarily wrong with such a decision, but it should be made known that a political choice has been made and not just a technical decision of survey design. In the case of the Michigan DNR, the analyst was aware of the political nature of the decision.

Choosing A Survey Method

There are two elements of the actual administration of a survey which can have an effect on the results. One is the type of question which is used in the survey. The respondent may be asked to rank several alternatives according to importance or preference. Alternatively, the question may just ask if the respondent agrees or disagrees with a statement made. Open-ended questions are also used where the respondent may answer in his/her own words.

The second element is the manner in which the questions are asked. The three techniques most often used are mail, telephone and personal surveys. Often there is a combination of these where an advance contact is made by mail or telephone and then the actual survey is done in person.

With the telephone survey, only those segments of the population which have telephones will be surveyed, and if a phone book is used to obtain respondents, then only those people with listed numbers will be represented. While a great majority of people have phones with listed numbers, the analyst must be careful that those not included in this group are all members of a particular socio-economic class (e.g., all very rich or very poor). The choice of a sample frame must be related to the political objective of the program.

Depending on the persistence of the interviewer, a telephone survey will tend to represent more heavily those people who spend time at home than those with irregular home schedules. It is also possible that a particular member of the household (i.e., the housewife) will be the more frequent respondent to telephone surveys, since they are more often at home.

The mailed questionnaire can also result in unanticipated problems for the analyst. As Moser and Kalton (1972) point out, the responses on the returned questionnaire have to be accepted as final. It can't be discerned if more than one person actually filled in the answers or if the respondent discussed the questions with someone else before answering. It can't be known whether the respondent was unclear as to the meaning of certain questions and therefore answered randomly just to fill in the blanks. Any additional reactions to questions, outside of what is written down, will not be known (Moser and Kalton, pp. 260-261). These limitations would be especially relevant for respondents with low levels of education or when a survey is unusually complicated.

Possibly the most important problem with mailed surveys is not getting an adequate return rate. But of more interest here is not just the return rate, but whether certain groups within the population are more likely to return mailed surveys than other groups. Heberlein and Baumgartner (1978) have done a comprehensive study on the factors which affect response rates to mailed questionnaires. The number of contacts that the analyst made with the respondents was the overwhelmingly important factor. Contacts include introductory or lead letters, the actual questionnaire, and any follow-up letters. The second important factor was issue saliency, i.e., whether

the respondents were interested or concerned about the issues in the questionnaire. It is not surprising that people who feel they have the most to gain or lose on a particular issue will be the most willing to express their opinion on that issue. Heberlein and Baumgartner also point out that "attitude questions often involve a response choice in which the individual may be ambivalent or undecided about the alternatives. Such cognitive exertion may be sufficient cost to the respondents to deter some from completing the questionnaire" (p. 460). However, this means that the analyst must be careful when interpreting the results from a survey. To take a hypothetical example, suppose a questionnaire asks, "how concerned are you about water pollution? Very concerned; Somewhat concerned; Not very concerned; Not concerned at all." If 80% of the questionnaires are returned, the results might be that 30% said "very concerned," 30% said "somewhat concerned," 20% said "not very concerned," and 20% said "not concerned at all." These results could be reported as "a majority of the public is concerned about water pollution." However, suppose that the 20% of the respondents who did not return the questionnaire were people who were not concerned at all and therefore did not bother to fill out the survey. Then what "the public" actually feels will have been misrepresented. Of course, there is no way of knowing what the non-respondents actually feel on an issue, but Heberlein and Baumgartner's finding on issue saliency should be considered if a survey has a very low return rate. In particular, gross statements about "what the public feels" should be avoided.

In general, Heberlein and Baumgartner's study found that to increase returns, the analyst could either lower the costs involved in completing and returning a questionnaire (e.g., postpaid return envelopes, forms which

are easy to fill out), or increase the motivation of the respondent to overcome the cost barrier. It was found that a monetary incentive was significant in increasing the initial response rate (as opposed to increasing the response rate after follow-ups). This incentive may be effective for getting returns from low income respondents, especially if the incentive is high enough. If it is only a small amount of money offered it may just make the survey appear more important if someone is willing to pay for responses.

The important point from these findings is that certain subgroups of the population may be more likely not to return questionnaires, which could lead to under-representation of these groups in the sample. Depending on what the results are used for, this lack of representation can lead to poor political choices. An example is a survey of Dartmouth, a fast growing college town, which was done to get an expression of "community opinion" (Dartmouth-Community Opinion Survey, 1973). The report stated, "As an aid to selectmen in making wise decisions and to assist them in setting priorities for spending, here are some of the indications as to how residents of Dartmouth responded to the questionnaire." The survey was to find out what the most adequate and inadequate community services and facilities were. However, only 15% of those surveyed returned the questionnaire. Male responses almost doubled female responses and about half of the respondents were 40-64 years of age. A great majority had 12 or more years of education and almost all owned their own home (which seems rare for a college town). Yet the report called this "a fine sampling basis for obtaining local opinions." Based on the characteristics of the respondents, it is doubtful that college students are represented at all. If these results are used to guide public spending on new community facilities and services, then a

political choice has surely been made as to who will have influence on those political decisions. It is very possible that the "selectmen" feel that property owners should have more weight in deciding where public money should be spent, but then such a political value judgement should be stated rather than implying that decision will be made based on the "community's opinion."

In the case of the Pigeon River Country State Forest, one of the Ranking surveys was mailed to the Pigeon River Advisory Council members. A self-addressed, stamped envelope was provided, as well as a short introduction explaining the purpose of the study. Previous to the mailing, the Council had been addressed in person regarding the upcoming survey. This is a case where issue saliency is obvious. These people would not be members of the Council if they were not deeply interested in the PRCSF. Of the 17 surveys mailed to the members, 13 were initially returned. After 3 weeks, a second contact was made by postcard reminding those who may not have returned their survey to please do so. One additional survey was returned, bringing the total to 14. The survey was relatively complicated and that may account for the non-responses. An 82% return rate was considered very good, however. There is no reason to believe that an identifiable sub-group of this council (e.g., all hunters or all non-local members) had been left out by making this a mail survey).

The personal interview is the preferred method of most analysts for doing a survey. Of course, there are trade-offs in the convenience and lower costs of telephone and mailed surveys which have to be considered before deciding to sue personal interviews.

Doing a survey in person allows the interviewer to interact with the respondent. In this way misunderstandings about the questions are more likely to be avoided. The problem of non-responses can also be lessened, since contacts can be made until the desired number of surveys are completed. The personal nature of the interview does remove the safeguard of anonymity from the respondent however. Pressures may then exist to not appear naive or uneducated, and perhaps to answer without a sufficient amount of time to think. The person doing the interview (their appearance and manner) will be largely responsible for the ease which the respondent feels while answering.

Time of Surveys

Another aspect of survey methodology which can have an effect on the results is the timing of the survey. There are two timing effects that should be considered as factors. The first is the timing of the survey in relation to the entire decision-making process. It will make a difference in the final policy whether the public is included in the beginning when alternatives are first being suggested, or in the end when a final alternative is being approved (Erickson and Davis, 1975). In the Pigeon River Country State Forest case, the respondents were allowed to rank alternative uses of the forest, but they were not involved in the decision of what uses to include in the survey. Therefore, a particular use of the forest may not have been on the list to be ranked. While it would be ideal to be able to include public input at all stages of decision-making, this is not always possible and choices must be made. An agency can become so encumbered by efforts to "include the public" as to become ineffective (Libby, 1980). Finding the "optimum" amount of public input is a political issue, however, and not a technical one alone.

The second timing effect involves when the survey is done in relation to the state of current events. The PRCSF is a case that has been in and out of the news over the last 10 years or more. The issue has primarily been a battle between environmentalists wanting to preserve the endangered elk herd and oil companies over rights to use the forest. The Detroit Free Press (Michigan's largest newspaper) has regularly covered the events, including the court cases, and has written several editorials on why the PRCSF should be protected from the oil interests. As is the case in marketing, the more exposure a point of view has, the more likely it is that people will reflect that point of view in a survey. If the price of oil went to $5 a gallon and people were made aware that there was untapped oil in the PRCSF, their response to a survey on preferred land uses may be different. It is not so much a question of whether these polls are measuring the public's attitudes correctly as it is a question of whether government representatives should be basing policy decisions on the results of such surveys. Earl Shorris (1978), in his short article entitled "Market Democracy, The World According to Gallup," has pointed out that constant reactions by politicians to opinion polls will lead to instability in government. In the political arena, many issues must be considered at once, all involving different interest groups and different time horizons. When political actors begin to respond to surveys of "what the public wants", then single-issue politics will be the rule. Schmid and Birch (1980) have asked "whether the survey question can ever approach the political reality where choices are grouped, comprised and traded off. The usual survey question presents choices as if each were to be decided on its own merits" (p. 5). This is one aspect

of what Schmid and Birch call the policy validity of surveys. The factor of timing and grouping becomes crucial when surveys are used in the political arena.

Question Wording

Question wording here means the type of words that are used in a question. The most obvious problem occurs when words are unfamiliar to the respondent. If a question is asked which uses long, uncommon words, the respondents with lower education levels will have difficulty understanding what is being asked and accurately expressing their opinions. Such questions may lead to a large number of "don't know" responses which would leave the higher educated group with more representation.

Problems can also arise with ambiguous, misleading or slang words. Words have different meanings and connotations to different people. The analyst must be sure that the intended meaning is conveyed to the respondents or the results won't be meaningful. If the PRCSF case, the various uses of the forest were listed as follows for the respondent to rank.

Big Timber
Fiber Timber
Developed Recreation
Dispersed Recreation
Vehicular Recreation
Elk
Big Game
Small Game
Oil and Gas
Other Minerals
Fish
Research Areas
Rare and Endangered Species

While short definitions or labels may appear simplier and easier to handle, they may also be ambiguous. For example, some of the labels presuppose a certain knowledge by the respondent. "Big game" and "small game" may be familiar categories to hunters, but non-hunters may not know

which animals are included in which category. "Big timber" and "fiber timber" are not ambiguous to a forester, but to others such labels may be meaningless. A person who wishes to walk through a colorful forest in the fall might not have any idea whether "big" or "fiber" timber is desired. The respondent may even be offended by the use of such a technical term and might decide not to answer truthfully, if at all.

The Order of Questions

It has been documented that the order in which questions are presented is a factor in determining the responses. This is especially true for telephone or personal interviews since the respondent cannot see all the questions before answering any one of them. In a mailed survey, Moser and Kalton (1972) have pointed out that information provided in a later question may be used in answering an earlier one (p. 260). This may or may not be a problem depending on the purpose of the survey. It is certainly true that information from earlier questions will be used in answering later ones also. More important than just additional information from other questions is the influence that this information has on the respondent. If the additional information just adds more "facts" so that the respondent can make a more informed judgement, this probably wouldn't interfere with the purpose of the survey. However, if the additional information persuades the respondent to think that a "correct" answer exists which is different from his/her own, then the analyst would not be getting a true measure of the respondent's preference or opinion.

Other ways that question order can have an effect have been demonstrated by Carpenter and Blackwell (1977). They did an analysis of variance on the results from varied question ordering on each of four different types of surveys. The ANOVA results "showed persuasive position effects for three of the four scaling metrics" (p. ii). The most variation resulted from criterion effects, which are the effects of rating any given item on the scores for subsequent items (i.e., the criterion for evaluation of an item would be influenced by the foregoing item or items, either by the specific content of the item or merely its presence or absence).

The study that the authors used was a nationwide survey of attitudes of adults toward wild and domestic animals and their treatment by man. On a "scale 0-10 certain items" type of survey, they found that when an item is first in the list, the lack of evaluative reference points results in the assignment of extreme values (either high or low). As the item's position was varied down the list, the scores progressed to the alternate extreme. With a "modified magnitude estimation" technique the respondents were asked to rate 16 animals on a scale from 0 to 100 points, according to how much they liked them. They were to assume that a deer was worth 50 points. The authors found that animals received their lowest score when in the first 4 positions and the highest score in the last 8 positions. This suggests that it took at least 3 to 6 animals before a criterion for evaluation was established. Perhaps the first few animals were evaluated with reference to the deer, but then these first items became the references for later items. Overall, the order effects resulted in a great deal of variation in the original ranking.

In a later survey done by the Pigeon River Advisory Council, two different types of ranking methods were used. The first method asked the respondents to rank order the various uses of the forest according to their preference for them. The list was slightly different from the one used the first time the survey was done. The second method employed a ratio scale for ordering preferences, as opposed to an ordinal scale. This method had the number 100 already assigned to the preference for maintaining an elk herd. The elk herd was used as a benchmark since previous surveys showed this use to be near the middle of a ranking of uses. In relation to that value of 100, the respondents were then to assign numbers for their preferences for other uses. The same list of uses was presented in the same order with a "100" to the left of the use "Maintenance of an Elk Herd." The results of the first survey showed elk ranked seventh among the uses. (Table 1). The second, however, showed elk number twelve of a total of 15 uses. This was by far the largest difference in rank that any use showed between the two surveys. It would appear that using elk as a benchmark affects its place in the overall ranking. Considering the controversy surrounding the survival of an elk herd, this result is significant. Elk have been labelled "incompatible" with both big timber and developed recreation by resource specialists. Both of these uses were ranked far ahead of elk by the ratio scale method, while the ordinal scale method resulted in developed recreation being below elk and big timber being only one place above elk.[1] While a policy-maker could justify making elk a

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[1]These results are meant to be suggestive rather than definitive, because other potential differences between the two surveys could not be controlled.

priority use in the forest from the results of the ordinal scale method, it would be difficult to do so from the results of the ratio scale method. In fact, elk was ranked relatively close to oil and natural gas and other minerals in the results from the ratio scale.

Carpenter and Blackwood say that the criterion effect could probably be overcome by acquainting respondents with full or partial lists of the items before evaluations are to be made. The surveyor could also provide three or four "throwaway" items at the beginning of the list. Another suggestion is to randomize the order of presentation among surveys so that the position effects are also randomized.

The findings of Carpenter and Blackwood clearly show that two different surveys dealing with the same issue can result in two different measures of "public preferences." It is not possible to say that a particular question ordering is the "correct" one. As with the other factors which influence survey results, the analyst must be aware that these problems exist and that by choosing a particular survey design, the analyst is choosing to weigh certain people's preferences more than others (e.g., choosing to give greater weight to the first four items in a ranking survey). If the analyst is making these types of political choices, then those choices should be open to review and debate by people, just as any political choice should be.

The Type of Question Used

The type of question refers to the form of the question and what responses are available for the respondent to choose from. Moser and Kalton have said, "for virtually every conceivable question, there are several possible and theoretically acceptable forms: in choosing between them, knowledge of

the survey population and subject matter, common sense, past experience and pilot work are at present the surveyor's main tools" (p. 308). Using these tools should lead the analyst to a choice of question form which is most appropriate for the analyst's purpose. But these tools will not lead to a choice of a "correct" measure of the "public's opinion." Rather, they will lead to different aspects of the opinions of different publics. Preferences and opinions are multi-dimensional and any particular question will serve to bring out just one dimension of those preferences. The different question forms can be analyzed as to which dimensions each form serves to emphasize.

Open-Ended Questions. If the respondent is free to answer a question in his/her own words, then the question is open-ended. Allowing a respondent to choose his/her own method of expression is felt to lead to truer representation of opinion or preference. Countering this argument is the one which says that people are not good at expressing their preferences unless they are allowed to choose among various responses. Polls of the type which ask "What do you feel is the most pressing problem facing our society?" and allow the respondent to answer freely often get different results than a survey which asks, "Which of the following problems facing our society do you feel is the most pressing? Inflation, Crime, Unemployment, Pollution, etc." (e.g., Harris & Assoc., 1971). There may be a problem listed which the respondent didn't think of when answering freely, yet may be very concerned about. It might be hypothesized that people with lower education levels would have more difficulty answering the open-ended questions. Schuman and Presser (1977) have found that question form makes the least difference in responses for the most educated groups. The authors

were testing the assumption of "form resistant correlations" which says that even if marginals cannot be trusted due to question form uncertainties, associations between variables are not subject to this same instability. They found that the assumption of form resistant correlations must be rejected when open and closed versions of the same basic item are considered. Since they found form affects the less-educated groups more, the form becomes a self-selection procedure -- i.e., it is not a random experiment anymore.

It is also likely that issues which receive the most media attention will most often be cited in open-ended questions. Thus the timing of the survey would be extremely important in these cases. Also, special interest groups with the resources to make the public aware of their issue cited more often in these types of polls. Therefore, those groups with the most money and influence on the media may receive more weight in a political decision which uses open-ended polls as a basis for "what the public wants."

Even if open-ended questions were better ways of getting people to state their true opinions, there are trade-offs in convenience which the analyst must consider between open-ended and forced choice questions. It is very difficult to aggregate diverse responses to a question into a reasonable number of categories. A set of rules must be developed which will determine what "type" of response goes into what category. For example, problems dealing with air and water pollution, nuclear wastes, congestion, land use and overpopulation might all be categorized as environmental problems as opposed to other categories such as crime, drug abuse, inflation, etc. Such a gross categorization scheme could be misleading with respect to where public spending should be directed. Members of Congress could use such results as "justification" for spending on whatever types of environ-

mental problems they were interested in. If people want to be represented in public decision-making they should be concerned about the survey techniques which are used to measure their opinions.

Forced Choice Questions. As mentioned earlier, forced choice questions have the advantage of convenience over open-ended questions. They are more convenient for respondents, which should lead to higher return rates, and they are also more convenient for the analyst in terms of aggregating results. Obvious problems with the forcee choice questions include not offering a wide enough array of questions and "leading" people to respond in certain ways by the choices which are available.

While the list of responses should not be so long as to deter the respondent from reading all of them or to confuse the respondent, it must be long enough to cover most choices that are actually available. Surveys should also include the possible responses of "No opinion," Don't know," or "Not relevant." This would keep people from answering questions that really do not measure their true opinions. People may still be reluctant to say "I don't know" or "I have no opinion on that" but these choices should at least be available.

Ordinal Ranking Surveys. The ordinal ranking survey was introduced earlier when discussing the two surveys given to the Pigeon River Advisory Council. The ordinal system involves presenting the respondent with a list of items and then asking for a ranking of the items according to some specified criteria. The criteria may be how much the respondent likes each item, how important each item is (to the respondent, to the nation, to the region, etc.), or perhaps how deserving each item is for additional public spending. By definition, the ordinal ranking can only reveal the

order of preference. It can say nothing about the interval between successively ranked items, nor indifference between two items.

The results of most ranking surveys will show how important the respondents feel different items are. But as with the forced choice questions which ask "how concerned" people are with various items, these surveys are not necessarily useful for directing public spending. While people may feel a public program is very important, they may not feel that any more money needs to be directed to it. That is, the question of where the marginal dollar should be spent will not have been addressed. There are few people who would say that national defense is not important, but there are many who feel we should not spend any more money on it. (Chamberlain, 1975; State of the Nation, 1974) Therefore, it may well be that the fifth or tenth most "important program" is where people would like to see more government spending (e.g., Michigan Public Opinion Survey, in Kimball, et. al., 1977).

To try to overcome this problem, the analyst can include a second type of question which asks the respondent to indicate whether "more, less or the same" amount of money should be spent on each item. There are two potential problems which should be noted with respect to this type of question. First, there is no constraint on the amount of money which can possibly be spent. The respondent is free to answer "more" for every item. There is no explicit warning that doing so would lead to increased taxes. Thus, the tendency is for people to allocate more money to programs than they would actually be willing to pay for. In the Michigan Public Opinion Survey (Kimball, et. al., 1977), statewide there was no item which a majority of people said should receive less public spending. Perhaps

there is no desire for spending cuts, but there is evidence in Michigan which shows an inconsistency in these views. In the 1980 election year there were three tax cut proposals on the ballot, yet there can't be government spending without government taxation. The failure to recognize the connection between taxing and spending is probably the reason for survey results which say "tax less" but "spend more."

The second problem with this type of question is that knowledge or lack of knowledge of what is currently being spent on each item can affect whether people answer "more, less or the same." In one environmental survey (Ottinger, December 20, 1969) the sample was divided in two, and half of the respondents were given a card showing the percentage of the federal budget now being spent for various purposes. The card included: Defense -- 44%; Health, Labor and Welfare -- 28%; Agriculture -- 2%; Education 2%; Natural Resources -- 1%. The effect of supplying this information as to current federal budget allocations was to increase by six percentage points the support for spending on natural resources. It could be expected then that environmentalists would like to have this information supplied on such a survey. If they have the resources to do so, they have an access to a form of political power. It would result in extra "weight of public opinion" for the environmental issues.

Ratio Scale Surveys. If more information is desired than just the ordinal ranking of public issues, a ratio system can be developed which can give some indication of the size of intervals between successively ranked items. A ratio scale measures relative values, not absolute values. Thus, it can say how many times more or less one item is preferred than another. A ratio scale may require that some initial value be assigned to one of the items. Then the other items are compared to that benchmark.

The ratio method can supply more information to the analyst than the ordinal method, but there is more chance that people will become confused when trying to state their preferences on a ratio scale. Hamblin (1976) includes the following suggestions for experiments using magnitude scaling in order to increase construct validity:

1) Use a standard (benchmark) whose level or value does not impress the respondent as being either extremely low or extremely high.
2) Present alternative items which are likely to be both above and below the standard.
3) Call the standard a number like "10" that is easily multiplied and divided.
4) Assign a number to the standard only and leave the respondent free to decide what he/she will call the other items. Don't label the minimum and maximum for the respondent.
5) If possible, vary the standard among respondents or repeat the survey using a different standard, for it is risky to decide the form of a magnitude function on the basis of data obtained with only one standard.
6) Randomize the order of presentation, although it is usually helpful to start with items which are not likely to be extreme and thus are easier to judge.
7) Use a group of respondents large enough to produce a stable median. Twenty to thirty will be large enough to obtain parameters which vary plus or minus five percentage points.

It can be seen that there are many ways that a ratio scale survey can be done which would result in misleading measures of preferences. Therefore, the person designing the survey has the power to influence the results. This is true with regard to any type of survey. The analyst can only strive for internal and construct validity within any survey technique. Further normative choices still must be made.

Assumption of Initial Rights Position. In some of the types of questions mentioned thus far, and especially in the types to follow, the status of the respondent with respect to what rights are possessed is a

crucial variable. There is an implied distribution of property rights imbedded in the type of question that is used. For example, a question may ask the respondent to allocate a government budget in some way. This is different than asking how much extra taxes would the respondent be willing to pay to enhance particular government programs. In the first case, either through previous payment of taxes, or perhaps because of the ideology of democracy, the respondent holds the right to have an influence on public spending. In the second case, the respondent must pay for that right. The amount of money delegated to any program through these two types of questions is likely to be very different. There are other distinctions between these two types of questions which will be brought out below.

Yet another status of property rights would be where the respondent has a right to a certain level of provision of public goods (e.g., water recreation on a river) and would have to be compensated if an alternative use were to impair that right. Any values of the public good which result from this willing to sell type of question are likely to be different yet from the results of the two types of questions before.

Explicit and Implicit Trade-Off Questions. Many surveys ask for people's preferences for government spending on various programs. Since government budgets are finite, more spending in one area requires a trade-off for less spending in some other area. While these trade-offs are always present implicitly, they are not usually considered by the respondents to surveys unless the question requires them to do so. Failure to consider budget constraints and trade-offs among spending categories can create problems of interpretation for a public decision-maker.

Surveys which have implicit trade-offs can be of many types. They may be open-ended or forced choice questionnaires which ask for people's preferences for community or government services. In these cases, even the fact that government spending must occur is implicit rather than explicit. The consequences and trade-offs resulting from that government spending are also implicit. For example, the Indiana Survey (Gordon, et. al., 1973) presented a list of community services and asked which ones were desirable to the respondents. Yet, it was never specified how these services were to be supplied, nor how they were to be paid for. The respondents have not been asked to compare government spending in this area with any alternatives. As Birch and Schmid (1980) pointed out, when results such as these are used for political influence "there is often a suggestion that the named item should continue or increase while some unnamed item is reduced. Political choice of budget allocations may be influenced by who has the resources to do a single item survey and call attention to a particular item" (p. 305).

In some surveys, the trade-offs are explicitly stated. When asking for opinion on Proposition 13, the Gallup Poll asked if people favored tax cuts even if it meant a reduction in certain government services, (Gallup, 1978). Although the exact amount and nature of the trade-off involved was still unknown, the respondent had to at least recognize that trade-offs were necessary.

"Budget pie" surveys are sometimes used to measure people's preferences for areas of public spending. Asking people to budget a finite amount of money among alternative public programs is one way to force people to consider the trade-offs which are inherent in public spending decisions. The

budget pie may be presented graphically as an actual "pie", and then respondents are asked to divide the pie into pieces which represent the allocations of the budget to some set of goods or services (McIver and Ostrom, 1976). Alternatively, the respondent can be asked to distribute the budget in terms of percentages. The various goods and services would be listed and the respondents would be asked to state what percentage of the budget should be spent on each item. The requirement that the responses added up to 100 percent must also be included.

It is very possible that people with lower education levels would find the graphic presentation much easier to understand than the numerical presentation. Working with percentages and making sure they all add up to 100 percent might keep some people from ever completing the questionnaire.

In general, the budget pie survey will be an easier task for those people who are familiar with the budgeting concept and with government budgets especially (e.g., more educated; males more than females, perhaps). These people will be able to better express their preferences on such a survey. Additional information can be included with the survey which can assist those people unfamiliar with budgets. As learning occurs, however, a different set of preferences will be counted than if the additional information had not been included.

Implicit in the budget pie survey is the assumption that people understand how public <u>spending</u> results in actual <u>outputs</u> of goods and services, i.e., they understand the production functions and how money is converted to performance in the public sector. The categories of the budget that are presented to the respondent are also relevant here. A person may allocate extra money to the "health care" category in order to increase aid to elderly

people, while in fact health programs for the aged are included under the "welfare" category (Birch and Schmid, 1980). Again, those people with greater understanding of public programs will be better able to have their preferences counted. Since there is a substantial knowledge assumption in most budget pie surveys, McIver and Ostrom point out that for certain populations under certain conditions, the budget pie is ideal, but for others it is improper.

Another type of survey where trade-offs are implicit is the willingness-to-pay survey. In this case the analyst is asking the respondent to allocate personal personal finances rather than government monies. The characteristics of a finite budget and therefore trade-offs among areas of spending are also present in the individual's case. This means that the individual msut be reminded that showing willingness to pay for one good or service means reduction in spending on something else. Therefore, if the "budget pie" concept is missing from the survey there is likely to be misrepresentation of preferences.

By asking people what they would be willing to pay for a particular public program, the analyst may hope to "justify" an increased tax for that purpose. People may say they "favor" certain programs or are "concerned" about certain problems, but this does not mean that they would be willing to pay for the support of the program. Therefore, it is hoped that through asking willingness-to-pay, a truer measure of preferences for areas of public spending can be obtained.

Willingness-to-pay surveys are also used to derive values for non-market goods. Unfortunately, there are some problems inherent in using a willingness-to-pay survey. The most obvious is that what people say

they are willing to pay may not correspond at all to what they would pay if they had to.

A Louis Harris survey (1971) points out that changing the question from "what would you be willing to pay" to "what would you pay" can make a difference in the results. This problem may stem from putting people in a hypothetical situation that they are not familiar with. For example, never having paid for a good such as environmental quality, people have no past experience on which to base their response.

Also, many respondents may not be familiar with the good being considered. If a survey is asking for willingness to pay for wilderness recreation, those respondents who have never participated in wilderness recreation have no basis to compare this good with other goods they may be familiar with. If a particular good is not familiar to a socioeconomic group (e.g., wilderness recreation and low-income urban residents), then members of that group may have a particularly difficult time articulating their preferences.

The results of this type of survey may also be misleading because the respondents are only asked to consider one area where they would be willing to spend more money. This is related to the previous discussion regarding trade-off questions, only in this case it is the individual's spending that is being considered rather than the government's spending. A problem also exists in proceeding from individuals' willingness to pay to conclusions as to the proper level of public spending. Analysts at the Westwater Research Centre (Westwater, 1973) commented on the results of a poll which showed that about half of the respondents would be willing to pay an additional fee for cleaning up the river. They stated, "This may be an expression of concern

reflecting current popularity of environmental issues more than a careful appreciation of the goals of public spending."

Many of the questions surrounding the validity of the consumer's surplus concept apply to the validity of the willingness-to-pay survey. If people actually had to pay for items which they currently receive free, then each consumer of that item would have to reallocate spending across all the items in his/her budget. How such reallocations would affect price levels and quantities of goods sold, cannot be predicted in advance. Thus, there is no way of telling whether each person would actually end up paying what they said they were willing to pay for a particular item. This may be particularly true when they see what others are actually paying. While there is probably some amount that people would pay, it is impossible to predict in advance what that value is.

Another factor in the willingness-to-pay survey which can affect the results is the method of payment that is specified in the question. In Sinden's (1973) study on valuation of water-based recreation, he asked both the willingness to pay an entrance fee to an area and the willingness to travel an extra distance to a particular area. He found that people were more willing to travel extra distances than they were willing to pay entrance fees. The author suspected that respondents did not give true responses to the entrance fee game because they felt that true responses would lead to an extra fee being charged the next year.

Walsh, et. al., (1978) used a survey to measure benefits for improved water quality. Two different methods of payment were used which were through increasing sales tax and through increasing the water bill. The results showed that respondents were willing to pay more for improved water

quality when the method of hypothetical payment was an increase in sales tax. The authors felt this may have resulted from perceived inequities between the two methods of payment. Everyone, including tourists, must pay a sales tax whereas only property owners pay the water bills.

Randall, et. al., (1974) used four different methods of payment in deriving "benefits of abating aesthetic environmental damage." These were a sales tax game, an electricity bill game, a monthly payment game, and a user fees game. It was felt that different subgroups of the population would be familiar with different methods of paying for environmental improvement and therefore the different groups should be surveyed using the vehicle of payment most familiar to them. For example, residents of the area were asked to play the sales tax and electricity bill games, while tourists and recreationists were given the user fees survey. A third subgroup, the residents of Indian reservations in the area, were asked to play the monthly payment game, which was based on a single monthly payment with no particular vehicle for payment specified. The total bid from the sales tax game was on the order of four times greater than the total bid from any other game. The importance of choosing an appropriate method of payment can be seen from this study. Recreationists coming to this area may overstate their bids if asked to play the electricity bill game. They would be assured that regardless of their bid, they would never actually have to pay it. Thus, the weight of their preferences would be "inflated" by this technique.

The above discussion contains two apparent factors which can influence the respondent. These are whether the methods of payment are fair, and whether an incentive exists to engage in strategic behavior. In the first case, as represented by the Walsh study, respondents are willing to pay what

they consider a fair share, as long as everyone else pays their fair share. In the second case, the respondents see a strategy for not having to pay at all, hoping that everyone else will pay for them.

Sometimes the survey will be designed to try and keep the respondent from knowing the actual purposes of the survey. In these cases, the respondent is usually asked questions about a hypothetical issue similar to the one actually being considered. However, Paul (1971), in analyzing such a survey, states that "It is difficult to see how reliable answers can be obtained to questions whose assumptions contradict reality because their purpose is being sedulously concealed from those questioned" (p. 316). Thus, the analyst faces the problem of doing a realistic survey which gives people a motive for lying, or doing an unrealistic survey whose results are difficult to intrepret. One suggestion for avoiding these problems is to specify to respondents that the only way to obtain the item (whether it be environmental quality, recreational areas, educational systems, etc.) is through the bids of respondents. Further, it should be specified that each "consumer" of the good would pay for it on a similar basis (Randall, et. al., 1974). This should reduce the effect that the free rider characteristic of public goods has on understatement of willingness to pay. However, it also incorporates a particular political value judgement.

The degree of aggregation of the categories of choice can also be a factor in willingness-to-pay surveys. If a broad category such as "environmental quality" is used, the people who would only be willing to pay for some <u>part</u> of environmental quality (e.g., clean air, but not clean water) will be lumped with people willing to pay for many aspects of environmental quality.

When a decision has to be made on whether to spend scarce public funds on water pollution programs or air pollution programs, the result of such a survey will not serve as a very useful guide. On the other hand, categories can be too disaggregated, increasing the chances of leaving a particular good out. Therefore, in the Walsh, et. al. study (1978), the definition of "recreational enjoyment" was left up to each individual respondent since any definition of water-based recreation activities provided by the interviewers might have omitted an activity for which the respondent would be willing to pay. Groups with unique recreational interests (e.g., whitewater canoeing, kayaking) would be especially prone to underrepresentation if the categories of choice were not complete.

The differences in rights positions between willingness to pay and willingness to sell questions was discussed earlier. Randall, et. al., used both versions of these questions in their study. The willingness to sell question was, "If you owned the environment and therefore had the right to insist on its preservation, would you be willing to accept X dollars per month rental payment from the coal-electricity industry if the environment was damaged as shown (in the following photographs)?" The authors note, however, that compensation games like this one are not based on behavioral patterns routine to the respondents. Thus, the responses may be unreliable.

These two different measures of "value" which are derived from these games are known as equivalent and compensating variation. In theory, and in empirical studies, the compensating variation is always greater than the equivalent variation (Brookshire, et. al.). In the Randall, et. al., survey 61% of the respondents answered that the infinite amount of compensation would have to be paid to them for damage of their environment. The authors

felt that these results did not indicate that literally no finite sum would be sufficient, but rather that the respondents "would demand compensation sufficiently high that the industry would find abatement less expensive than paying compensation" (p. 19). These results could have profound implications for policy making. If public officials decide that the right to a clean environment is held by the public, then this type of study would indicate about abatement regulation should be mandatory. However, the trade-offs which would be forthcoming from such a policy have not been considered by the respondents of this survey.

While there are many shortcomings of willingness-to-pay surveys, Randall, et. al. have offered suggestions for approaching an internally valid survey design. These include:

- there must be realism -- credibility in the hypothetical situation. This can be achieved by test items which have properties similar to those in the actual situation.
- the situations posited must be concrete rather than symbolic.
- test items should involve institutionalized or routinized behavior, where role expectations of respondents are well defined.
- where the behavioral predispositions under study are affected by attitudes about a number of different things, the test instrument must be designed to focus upon those attitudes which are relevant.
- in bidding games for public goods, the test must be designed to avoid effects of the free rider problem which encourages non-revelation or misrepresentation of preferences.

While these suggestions may lead to a valid survey design, they do not necessarily lead to greater policy validity. If a policy maker is going to use bidding games as guides for public choices, then trade-offs in the public spending area must be presented to the respondents. Care must be taken to find if a particular interest group in the population has had its preferences weighted more heavily by any given bidding game.

Aggregation and Reporting of Survey Results

The aggregation of responses to open-ended questions was discussed earlier. When respondents answer in their own words, the responses are likely to vary widely. The analyst must decide which of the different responses to group together into a category. This involves making normative decisions about whose preferences are going to be lumped together with others. There is also the trade-off between getting disaggregated (many categories), well defined expressions of preference and having a reasonable number of categories to work with. When reporting the results of a survey, it is easier to make general statements if the categories are more aggregated.

The simplest results to aggregate are those from dichotomous response questions where the respondent is only allowed to answer "yes or no," "agree or disagree," "concerned or not concerned," etc. These questions can say nothing about the intensity of preferences. One respondent may agree intensely while another midly disagrees, yet their preferences are weighted equally when the results are reported.

When a third category of "don't know," "no opinion," or "not sure" is included with the dichotomous responses, the reporting of results can

be even more misleading. The results of one Harris poll were reported by the Washington Post (April 29, 1969). The headline of the article said, "Public Backs ABM, but Many Have Doubts." The actual results of the survey were 47% agreed to go ahead with the anti-missile system, 26% disagreed and 27% were not sure. Thus, even though the "disagree" and "not sure" responses taken together are greater than the "agree" responses, the newspaper said that the public "backs" the ABM. In fact, in a later question which said, "We could have used the $7 billion better for education, health, housing and poverty needs at home," 49% agree while 31% disagreed. A great deal of political influence may have been generated by a headline which only considered the results of one question in the survey.

While greater disaggreation of categories of choice can allow a truer indication of preferences by the respondents, the results are often not reported in their disaggregated form. The effect of disaggregating the scale is to reduce the support for the two extreme positions. People are more likely to respond that they are "somewhat concerned" or that they "mildly disagree" rather than answer "very concerned" or "strongly disagree." When the results of a disaggregated scale survey are used for political influence, the mild and strong responses are often aggregated and reported as just "support" for one position or another. In a survey which was entered into the Congressional Record (Mondale, 12/16/69), it was stated that 82% of the public was interested in conservation. However, this was an aggregation of the actual indication of interests which was "a great deal -- 48%; some interest -- 34%."

In a ratio scale surveys (including willingness-to-pay and budget pie types), decisions must sometimes be made about whether to discard extreme responses. The advantage of using the ratio scale is that intense preferences can be measured, and therefore a decision to throw out extreme responses may negate this advantage. However, the ability for a respondent to influence the results intentionally is much greater with a ratio scale survey. If a respondent feels that his/her interests can be furthered through survey results, then the ratio scale facilitates the ability of the respondent to influence those results. The analyst can only use judgement and qualitative interviewing in deciding whether extreme responses are actual measures of intense preference or merely fabricated responses intended to influence further policy.

When aggregating survey results involving dollar sums, the analyst must ask whether a dollar to one person has the same meaning as a dollar to another person. Consider the case where there are equal dollar bid sums for two projects, but one project is used by a few rich persons and the other project by many poor persons. It requires a value judgement then, to allocate a budget between these projects. Regardless of the tool used for aggregation, the analyst faces a value judgement when choosing that tool.

Conclusions

It has been documented that surveys are being used by many different people for many different purposes. Surveys are often used as guides for public decision-making. At times the decision-makers have conducted their own surveys and in other cases the results of a previous, non government survey are referred to. Too often, the results are taken as unambiguous, true

measures of "what the public wants." It has been shown that there are many different publics with multidimensional preferences which can be measured and aggregated in a variety of ways. Therefore, different survey designs will result in different measures of public preferences. None is more "correct" than another and all can be equally valid in their construction. However, some may be extremely misleading as guides to public policy making. This is particularly caused by the single-issue nature of most public opinion polls. The respondent's attention is focused on one issue and trade-offs are seldom considered. There are many issues which people are "somewhat concerned" about, and when asked about any one of those issues independent from other issues, the respondent is likely to express a desire for the government to act on that issue. The respondent may even express a willingness to pay for a particular good or service, even if he/she has only a mild preference for it. This is because trade-offs between spending scarce funds are not being considered by the respondent. Even if a survey does try to deal with the problem of trade-offs, it is impossible to present every alternative that a given dollar could be spent on in the government's budget. If an alternative has been left out which is important to the respondent, then that respondent's preference for the left out alternative will not be counted.

There is a potential problem that any interest group which has the resources to conduct a single-issue survey will have an access to political power. Groups without the resources may not have their preferences counted. This will depend on how politicians and public officials use the various surveys. The Pigeon River Country State Forest case illustrates this. The ratio scale survey resulted in a much lower priority for

maintaining the elk herd than the ordinal scale survey. One DNR official who saw these results told the members of the Pigeon River Advisory Council that they should take the results home and burn them before the oil companies got hold of them. This official had testified in the court case earlier and said that if the oil companies had the results of the ratio scale question, they would claim that "even the members of the PRAC don't feel that the elk are more important than oil and natural gas." This, of course, just points out that the oil companies could have done this survey and used the results to their own advantage. Surveys can be constructed, aggregated and used in many ways to give political power.

Some correlations have been suggested between socio-economic groups in society and their positions on different issues. In general, the more educated show more support for conservation programs (Mondale, 12/16/69). The affluent, the college educated and the people under 30 are more willing to allocate public money to natural resources (Ottinger, 12/20/60). The less educated, blue collar occupations and those who farm or were raised on farms are more use-oriented toward natural resources, (Carlson, 1976). These types of relationships should be investigated further, since they would facilitate studying how the different survey designs favor certain groups' preferences. Surveys involve using samples of the population, and if the sample or question format favors a particular socio-economic group, then the survey may favor the preferences of a particular interest group.

Since polls are having at least some impact on public decision-making, it is important that each part of the public becomes aware of how certain polls may misrepresent their interests. Survey rules, just like voting rules, will have an influence on whose preferences count. However, unlike voting

rules, survey rules are made up without any public debate, and can be entirely different from survey to survey, depending on who is conducing the survey. People should become aware of how the different survey designs favor revelation of different people's preferences, and should become involved in making the survey rules so that their preferences will be counted.

Post Script on Pigeon River Country State Forest

It has been over two years since the Michigan DNR began working on a land management program for the PRCSF. It is now at the stage where five management alternatives have been sent out to citizens who have expressed an interest in the PRCSF to the DNR. These alternatives will also be sent out to newspapers who hopefully will report on them and generate further interest. The DNR is asking for comments on the five alternatives and has attached a sheet for replies from the people on their mailing list. It was made clear that these replies would not constitute "votes" for any alternative, but would only be considered as useful input when the final decision is made.

During the past two years, the DNR has been in and out of court with the oil companies who wish to drill in the PRCSF. The most recent decision was in 1979 when the State of Michigan Supreme Court ruled 4-3 against allowing the oil companies to use 10 permits which had previously been issued. However, this decision only applies to those 10 permits and does not prohibit the oil companies from applying for new permits. In order for the DNR to deny any new permits, impairment of natural resources (under the Michigan EPA, Act 127, Public Acts of 1970) must be shown to occur from the drilling. As a result of the lengthy legal battles that have gone on over establishing "impairment of natural resources," Senate Bill 1119, the

hydrocarbon development act of 1980, was introduced. Among other things, this bill define "significant adverse impact" on natural resources and therefore define criteria by which the DNR can either grant or deny drilling permits. The general consensus is that under SB1119, drilling will be allowed in the PRCSF. However, the bill still must pass the Michigan House and be signed by the Governor before it will take effect. The bill has received strong support in the House, but the Governor has indicated that he would veto the bill in its present form. In light of the support the bill has received, environmentalists reached a compromise with the oil companies in November, before SB1119 could be passed. That compromise was then approved in bill form by the House Economic Development and Energy Committee, and passed both the House and Senate in early December. The Governor has indicated he will sign this bill. In light of this action, drilling is expected to begin in January in the PRCSF. However, the DNR and environmental groups are allowed to review the drilling plans, to monitor their effect on woods, streams and wildlife in the forest, and to bring suit if the agreement is violated. The bill also calls for the oil companies to pay for a study to identify the drilling sites that are least disruptive to wildlife and recreational activities (Detroit Free Press, 12/5/80).

When drilling does take place in the PRCSF, the impact on either the forest or the land management plan is predicted to be minimal. An official of the DNR has reported that the elk population had increased to a sufficient level to be able to survive any oil drilling. While none of the five management alternatives offered for comment includes oil drilling as a use of the forest, the addition of drilling would alter the plans very little. The people most affected by drilling in the PRCSF are those who derive value

from knowing that a true wilderness still exists in Michigan. They may be hikers who would be severly disappointed to come upon an oil rig during a solitary walk in the woods. On the other hand, they may be people who never intend to visit the PRCSF, but derive a value from knowing that the untouched beauty is still there. To report on one final survey (Gannett News Service, 1980), a statewide telephone poll of 801 registered voters showed 47% were opposed to more oil and natural gas drilling in state wilderness areas such as the PRCSF. Forty-three percent were in favor of more drilling, and the 3% sampling error could mean the sides are even on this issue. Ten percent responded that they were not sure. Of interest is that strongest opposition came from those 18-29 years of age, 67% to 35%, which may indicate a stronger concern for the future.

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