PROSPECTIVE INTERIM LOST USE VALUE DUE TO DDT AND PCB CONTAMINATION IN THE SOUTHERN CALIFORNIA BIGHT

Volume I

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A report of Natural Resource Damage Assessment, Inc. and Industrial Economics, Inc. to the National Oceanic and Atmospheric Administration pursuant to Task Order 56-DGNC-3-50070 of NOAA Contract No. 50-DGNC-1-00007. Norman Meade, Department of Commerce Contracting Officer's Technical Representative

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PROSPECTIVE INTERIM LOST USE VALUE DUE TO DDT AND PCB CONTAMINATION IN THE SOUTHERN CALIFORNIA BIGHT

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Executive Summary

Beginning in the late 1940s and continuing for more than two decades, DDT and PCB's were released into the Los Angeles County sewer system and were eventually discharged through outfall pipes into the Southern California Bight (SCB) off the coast of Los Angeles. These chemicals settled to the ocean bottom, persisting in the sediments there and entering the food chain. The chemicals affected several species of local wildlife and continue to afflict at least four species — bald eagles, peregrine falcons, kelp bass, and white croaker.

The National Oceanic and Atmospheric Administration (NOAA) retained Natural Resource Damage Assessment, Inc. (NRDA) to undertake for the Trustees a study to estimate prospective *interim lost use value* (ILUV), a monetary measure of the compensation due the public as a result of these injuries. For the purposes of estimating prospective ILUV, the relevant time period was specified by the Trustees as 1994 to 2044. Therefore, the estimate of damages provided by this study does not include value for injuries occurring before 1994 and assumes that the affected species will recover naturally by 2044.

Given the specified injuries to the four species of SCB wildlife and the natural recovery time frame, NRDA determined that the best-available method for estimating prospective ILUV was contingent valuation (CV), a survey-based, economic methodology commonly used to construct economic values for a wide array of tangible and intangible objects. The theoretical foundation for developing valuation measures using contingent valuation is the same as that underlying <u>all</u> economic valuation regardless of whether the valuation is based on market transactions or non-market valuation techniques. In a CV study, as in all forms of economic valuation, the analyst observes a choice made by an individual and, from knowledge about that choice, constructs an estimate of economic value.

NRDA designed and implemented a CV study following best-available practices for survey design and administration. The object of choice described in the survey was presented in a referendum format in which respondents were given the opportunity to vote *for* or *against* a government program financed by a one-time income tax surcharge on California households. The program would reduce the time period for recovery of the four affected species from fifty to five years, *i.e.*, recovery would occur by 1999.

The aggregate estimate of prospective ILUV obtained from the study is $575 million (with a standard error of $27 million). This estimate is obtained by multiplying a per household ILUV estimate of $55.61 by the 10.3 million California households in the population to which the CV survey was designed to be extrapolated. The statistical approach used to obtain the per household estimate of value is a non-parametric maximum likelihood procedure developed by Turnbull (1976) which yields a lower bound on the sample mean. The resulting estimate was adjusted for respondents who did not pay California taxes by treating the *for* votes of non-taxpaying respondents as votes *against* the program.

The CV study on which this estimate is based is the culmination of an extensive program of instrument development — including focus groups, cognitive interviews, small pretests, and pilot studies — conducted over the course of 32 months, beginning in August 1991 and ending in March 1994, when the survey instrument was finalized. The main survey was administered over the next five months by Westat, Inc., one of the country's most respected survey research firms. Westat completed 2,810 in-person interviews with a random sample of English-speaking California households, achieving a response rate of 72.6 percent.

The reliability of contingent valuation surveys may be gauged by the questionnaire development, the survey implementation, and the properties of the results. In the current study,

the questionnaire development and the administration of the main CV survey adhere to the best standards in the disciplines of environmental economics and survey research. Our survey methodology was evaluated by comparison with the recommendations of the NOAA Panel on Contingent Valuation. The final approach adheres to NOAA recommendations or demonstrates that the approach used in the main survey is superior.

In order to assess the reliability of the results, relationships between respondents' choices and the following five groups of variables were examined: (1) the cost of the program; (2) respondent economic characteristics; (3) respondent preference-related and demographic characteristics; (4) respondent evaluations of the injuries and of the program to mitigate those injuries; and (5) respondent interest in, use of, and proximity to the affected natural resources. For both the pairwise approach recommended by the NOAA Panel and a multivariate approach, the variables hypothesized to be positively or negatively associated with the probability that respondents voted *for* the accelerated recovery program were found to be consistent with prior expectations. All measures with clear, expected relationships to respondents' preferences were statistically significant determinants of their choices. The judgments drawn from the multivariate model about the importance of particular variables in explaining respondents' choices are generally unaffected by modifications to the format used to represent these variables. For those variables which showed some sensitivity, the final specification remained the preferred model.

Qualitative data from the survey provided evidence that respondents paid attention to the survey and took the choice opportunity seriously, that respondents' decisions reflected their perceptions of and preferences for the object of choice, and that their choices were not influenced by extraneous factors. In particular, responses to the open-ended questions which asked respondents why they made specific choices suggest a good understanding of what the

program would accomplish and what it would cost.

The final basis for judging the reliability of this CV study relies on a demonstration that respondents are sensitive to the scope of the injury. This demonstration of sensitivity to scope is a key requirement of the NOAA Panel on Contingent Valuation for determining whether the results of a CV study are reliable enough for use in the estimation of natural resource damages. A second survey instrument (referred to as the *scope* instrument) was designed and administered in parallel with the main survey instrument (referred to as the *base* instrument) used to estimate the damages presented above. The scope instrument was identical in most respects to the base survey instrument with the exception that the injuries to the two bird species were excluded and natural recovery was described as taking place over 15 years rather than 50. To permit complete comparability between the results, these two survey instruments were randomly assigned and administered to two independent samples of respondents. The choices made in the two samples and the values constructed from those choices are significantly different, with the estimated lower-bound mean substantially smaller for the reduced set of injuries.

§ 1 Introduction

§ 1.1 The Initial Charge to Natural Resource Damage Assessment, Inc.

Natural Resource Damage Assessment, Inc. (NRDA) was retained by the National Oceanic and Atmospheric Administration (NOAA, hereafter, the Trustees) on May 6, 1991, to assist the Trustees in the preparation of a natural resource damage assessment.[1] The Trustees provided to NRDA a set of injuries to resources within the South Coast, an area near Los Angeles, geographically defined as lying within and along the northern part of the Southern California Bight (SCB).[2] NRDA was charged by the Trustees to undertake a study that would yield an estimate of *prospective* (*i.e.*, forward-looking) *interim lost use value* (ILUV) for losses due to these injuries to natural resources caused by DDT and PCB's released into the South Coast, where *interim lost use value* is defined as the amount of money required to compensate the public for injuries to natural resources.

The time period of the injuries relevant for the estimation of ILUV is the time between the onset of injuries resulting from the discharge or release of the hazardous substance(s) and the time the affected resources are fully restored to their baseline conditions. *Prospective* interim lost use implies that the time period does not encompass injuries that have occurred prior to a specified date. In the context of this study, the date specified by the Trustees was March-August, 1994.[3] Prospective ILUV was to be estimated with reference to a specific natural recovery scenario, provided to NRDA by the Trustees, in which all injured resources would be

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[1] Other trustees involved in this assessment of damages are three State of California agencies and the U.S. Department of the Interior.

[2] The Southern California Bight is usually defined as that body of water lying within the curve of the California coastline between Point Conception and the California-Mexico border. For a more general description of the Southern California Bight and its resources, see Dailey, Reish, and Anderson (1993).

[3] The main study field period; see Chapter 7.

returned to their baseline conditions over a 50 year time period.[4]

NRDA was instructed to assure that the method selected for estimation of prospective ILUV was consistent with the court opinion in *Ohio v. the United States Department of the Interior*[5] (hereafter, *Ohio*) overturning the Department of the Interior's (DOI) hierarchy of use values:

> Option and existence values may represent "passive" use, but they nonetheless reflect utility derived by humans from a resource, and thus prima facie, ought to be included in a damage assessment. [p. 464]

The *Ohio* Court stated that passive use value is a proper component of a natural resource damage claim.[6] Restated in economic terms, the court's opinion is that all aspects of a natural resource that give rise to well-being (*i.e.*, utility) derived by individuals are proper components of a damage claim. Thus, the appropriate measure of damages is the loss in *total* value due to the natural resource injuries.

Lost total value has been termed by many as the sum of use and nonuse (or equivalently, passive use) value. Whether one adopts the heuristic thinking of total value as the sum of use and nonuse, the most important feature of total value—consistent with the *Ohio* Court's definition of *use* to include passive use—is that it reflects all sources of value attached by individuals to a natural resource. Thus, the *Ohio* Court's definition of use (as equivalent to the sum of direct use and passive use) is labeled *total value* or, its equivalent in our framework,

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[4] As noted, this 50 year natural recovery period and the injuries during that time that were to be valued were provided by the Trustees. NRDA was advised by the Trustees that the actual recovery period might differ from that specified and that the injuries we were directed to value were not necessarily all the injuries that occurred or all the injuries for which the Trustees would seek compensation.

[5] *Ohio v. U.S. Department of Interior*, 880 F.2d 432 (D.C. Cir. 1989).

[6] The *Ohio* Court's term "passive use" plus what is known as "direct use" combine to form what is known as "total economic value". Total economic value forms the basis for the interim lost use value presented in this report.

interim lost use value.

§ 1.2 Estimation Approach

NRDA's study was designed to estimate prospective interim lost use value, the amount of money required to compensate the public for losses due to natural resource injuries resulting from DDT and PCB contamination in the SCB between March-August, 1994 and 2044, the time at which the resources were specified to be fully restored to their baseline conditions. Based on a consistent, welfare-theoretic definition for compensation,[7] NRDA estimated a lower-bound, monetary measure of required compensation. This measure is the aggregate of prospective total values lost by eligible California households as a result of the injuries.

§ 1.3 Contingent Valuation Method

NRDA determined that the best-available method for estimating total value, given the specified injuries and natural recovery time frame, was *contingent valuation* (CV). Contingent valuation is a survey-based, economic methodology that can be used to construct economic values for a wide array of tangible and intangible objects. CV is most often applied to the economic valuation of *public goods*, such as the value of improved air and water quality, and has been used for this purpose by numerous state and federal government agencies.

The concept of contingent valuation was proposed by Cirancy-Wantrup (1947). The first reported application was Davis (1963), which valued recreation in Maine. Since 1963, the number of published contingent valuation studies has grown rapidly with applications not only

[7] See Chapter 3 for a discussion of this definition.

to environmental goods but also to other types of public goods.[8] The Carson *et al.* (1994) bibliography lists over 1600 studies and papers on contingent valuation. A large part of the growth of contingent valuation can be attributed to the use of contingent valuation by government agencies such as the U.S. Forest Service and the U.S. Environmental Protection Agency and by international organizations such as the World Bank and the Inter-American Development Bank. Currently, applications can be found from over forty countries.

The theoretical foundation of CV is the very same foundation underlying *all* economic valuation regardless of whether the valuation is based on market transactions or non-market techniques (*e.g.*, the travel cost method used to value recreational activities).[9] In all forms of economic valuation, the analyst constructs an economic value from an observed choice and from knowledge of the circumstances of that choice. All other things being equal, greater knowledge of the choice improves the validity of the constructed value. CV gives an analyst control over the choice presented to the survey respondent and over the circumstances in which the choice is framed. Other valuation methods usually rely on recorded past choices which require that the analyst make assumptions about features of the choice beyond his or her knowledge and control.

The design and administration of the CV survey described in this report were guided by multiple considerations including the Arrow *et al.* (1993) *Report of the NOAA Panel on Contingent Valuation* (hereafter, NOAA Panel), experience with past natural resource damage assessments,[10] experience in public policy evaluations involving non-market public goods, and other research conducted by the principal investigators.

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[8] See Portney (1994) for a brief review of the history of contingent valuation.

[9] See Chapter 3 for further discussion of CV's theoretical foundation.

[10] For example, see Carson *et al.* (1992).

As part of the development of rules for natural resource damage assessment under the Oil Pollution Act, Thomas Campbell, the NOAA General Counsel at the time this study was initiated, formed a panel of social scientists to evaluate the reliability of CV for measuring passive use values. The NOAA Panel was co-chaired by Nobel Prize winning economists Kenneth Arrow and Robert Solow. Other members of the panel included three prominent economists—Edward Leamer of the University of California, Los Angeles, Paul Portney of Resources for the Future, and Roy Radner of Bell Laboratories—and the Director of the Survey Research Center at the University of Michigan, Howard Schuman.

The NOAA Panel concluded:

> In Section IV above, we identify a number of stringent guidelines for the conduct of CV studies. These require that respondents be carefully informed about the particular environmental damage to be valued, and about the full extent of substitutes and undamaged alternatives available. In willingness to pay scenarios, the payment vehicle must be presented fully and clearly, with the relevant budget constraint emphasized. The payment scenario should be convincingly described, preferably in a referendum context, because most respondents will have had experience with referendum ballots with less-than-perfect background information. Where choices in formulating the CV instrument can be made, we urge they lean in the conservative direction, as a partial or total offset to the likely tendency to exaggerate willingness to pay.
>
> The Panel concludes that under those conditions (and others specified above), CV studies convey useful information. We think it is fair to describe such information as reliable by the standards that seem to be implicit in similar contexts, like market analysis for new and innovative products and the assessment of other damages normally allowed in court proceedings. [Arrow *et al.*, 1993; p. 4610]

Many of the NOAA Panel's guidelines restate best-available practices pertaining to CV survey design and administration, while a few are novel. In Chapter 4 of this report, we detail these guidelines; and in Chapters 5 and 7, we discuss the implementation of certain of these guidelines along with the other best-available practices implemented in this study.

This study also relies on additional information developed to gauge the soundness of the estimates derived from the CV survey, including (1) tests of various statistical hypotheses, (2)

qualitative analysis of the data (*e.g.*, interviewers' evaluations of the survey's administration), and (3) the results of a split-sample test designed to evaluate the sensitivity of respondents' choices to the "scope of the environmental insult" (as suggested by the NOAA Panel).

§ 1.4 Peer Review

Richard C. Bishop, Trudy A. Cameron, and Alan Randall served as the primary peer reviewers for the overall study. Norman Bradburn, Norbert Schwarz, and Edward Tufte served in other various advisory capacities.

§ 1.5 Organization of Report

Chapter 2 describes the releases of DDT and PCB's into the marine environment of the Southern California Bight, the injuries caused by those releases, and the natural recovery process (as supplied to NRDA by Trustee representatives). Chapter 3 presents an overview of the economic concepts underlying monetary measures of value and describes the conceptual framework upon which this study is based. Chapter 4 describes the contingent valuation approach used for estimating interim lost use value and, using the NOAA Panel report as a template, addresses issues concerning the design and implementation of CV surveys and the reliability of their results.[11] Chapter 5 outlines the design and development of the two survey

[11] Some confusion exists over the term *reliability* as applied to the results of a CV survey. As used by the *Ohio* Court and in the NOAA Panel report, the reliability of a measure is the degree to which it measures the theoretical construct under investigation. However, in the empirical social sciences, this preceding definition pertains to *validity*, whereas reliability is defined as the extent to which the variance of the measure is not due to random sources and systematic sources of error. While we believe that it is important to keep the distinction between validity and reliability clear, to avoid confusing readers who are unfamiliar with the social sciences, we follow the usage of the *Ohio* Court and the NOAA Panel and use the term *reliability* to refer to the degree to which CV surveys measure the theoretical construct under investigation.

instruments (referred to as *base* and *scope*[12]) used in the main study, beginning with focus groups and ending with the fielding of the main study survey. Chapter 6 describes section-by-section the wording, format, and presentation in the base and scope questionnaires. Chapter 7 discusses the administration of the main study survey, including the sample design, interviewer training and supervision, quality control, completion rates, sample weights, and data entry. Chapter 8 discusses the qualitative survey data including responses to questions pertaining to respondents' choices and respondents' perceptions of the program described to mitigate the injuries as well as to interviewer debriefing questions. Chapter 9 discusses the statistical framework for the analysis and, within that framework, presents the quantitative results of the analysis. Chapter 10 presents the results of a test for sensitivity to the scope of the injuries. Finally, Chapter 11 presents the aggregate estimate of prospective interim lost use value.

§ 1.6 Title of Report and Study

The title of this report is *Prospective Interim Lost Use Value Due to DDT and PCB Contamination in the Southern California Bight*. Hereafter, for brevity, this report will be referred to as the *Lost Use Value Report* and the study on which it is based as the *Lost Use Value Study*.

[12] The *base* survey instrument was used as the basis for our estimate of prospective ILUV, while the *scope* survey instrument was used (along with the base version) in a test for sensitivity to the scope of the injuries. See Chapters 5, 6, 9, and 10.

§ 2 Injuries

§ 2.1 Introduction

The injuries valued in the Lost Use Value Study were provided to NRDA by Trustee representatives.[13] Those injuries related to the impacts of DDT and PCB's on the South Coast populations of Bald Eagles, Peregrine Falcons, White Croaker, and Kelp Bass. The description of the injuries and the context in which the injuries were placed were supplied by Trustee representatives or taken from commonly available public sources and verified by the Trustees.[14]

The Trustees stated at the outset of the study that modifications of the injuries to be valued should be expected; and, consequently, the study was designed to accommodate such changes. Because of these modifications, the description of injuries presented in the main study *base* questionnaire differed from those in some of the earlier, developmental versions.

The description of injuries appearing in the main study questionnaire was reviewed and approved by the Trustees prior to beginning the main study field period. The remainder of this chapter summarizes the injury description, including the context in which the injuries were placed, provides relevant excerpts from the main study questionnaire, and details the time frame for the valuation. Unless noted otherwise, the discussion pertains only to the injuries as they were described in the main study base questionnaire.

§ 2.2 Characterization of Injuries

The injury description did include all technical information available or conveyed to

[13] As noted in section 1.1, the injuries presented to respondents in the main study base questionnaire are not necessarily exhaustive of either the set of all injuries caused by these releases of DDT and PCB's or the set of injuries for which the Trustees will seek compensation.

[14] The exact wording used to convey this information to survey respondents is presented in Chapter 6 and in Appendix A.1.

NRDA by the Trustees. As a practical matter, it is not possible to convey to respondents all the technical details of any given injury. Nor is it necessary to provide such details. What needs to be conveyed to a given respondent are the aspects of the injury that are relevant for that respondent's choice. Thus, one of the goals in designing the questionnaire was to describe to each respondent as completely as possible the information relevant to his or her choice.[15]

In addition to concerns about the relevance of information provided to the respondent, there is also a need for simplicity and brevity in conveying the injury to respondents. The relevant content and appropriate level of detail in the injury description of the main study questionnaire were re-evaluated throughout the development of the questionnaire. When alternative characterizations of the injuries were available, the characterization which provided the more conservative[16] view of the injury was selected.

§ 2.3 Releases into the Southern California Bight

The description in the questionnaire of the releases of DDT and PCB's began with a statement that these two chemicals are found in the sediments on the bottom of the ocean off the Palos Verdes Peninsula.[17] The DDT came to be located in the sediments as a result of DDT manufacturing activities beginning in the late 1940's when a factory manufacturing DDT discharged waste DDT into the Los Angeles County sewer system. This waste DDT passed through a sewage treatment facility and was eventually discharged into the ocean through the treatment facility's outfall pipes. PCB's released by other sources also entered the marine

[15] See Chapter 5 for further discussion of this issue.

[16] That is, the characterization that would tend to cause no effect or that would tend to cause a respondent to vote *against* the offered program.

[17] A map showing the location and size of the deposit was shown to respondents. The main study base map and card set can be found in Appendix A.1.

environment through the sewer system. In the 1970's, sending DDT and PCB's into the ocean through the sewer system was stopped.

§ 2.4 Contact with Natural Resources Other than Sediments

Small animals that live in the sediments absorb the DDT and PCB's as they feed in the sediment layer. When these animals are eaten by larger animals, the DDT and PCB's become bio-available to a wider group of animals, including two species of fish, White Croaker and Kelp Bass, and two species of birds, Bald Eagles and Peregrine Falcons. When enough DDT and PCB's accumulate in the bodies of the White Croaker, Kelp Bass, Bald Eagles and Peregrine Falcons, the chemicals impair the ability of these four species to reproduce. In the area of the deposit of DDT and PCB's, White Croaker and Kelp Bass produce fewer young than elsewhere along the California coast. In the 1950's, eagles and falcons in this area had trouble producing young primarily due to thin egg shells and, consequently, populations of these birds in the South Coast area disappeared. When adult falcons and eagles have been brought to the area from outside under controlled conditions, generally the newly introduced birds have not been able to hatch their eggs. Scientists believe that these reproduction problems are caused by the deposit of DDT and PCB's in the sediments off the Palos Verdes Peninsula.

§ 2.5 Injuries Presented in Main Study Questionnaire

As indicated above, the description of injuries in the main study questionnaire focused on injuries to the South Coast populations of four species: the Bald Eagle (*Haliaeetus leucocephalus*), Peregrine Falcon (*Falco peregrinus anatum*), White Croaker (*Genyonemus lineatus*), and Kelp Bass (*Paralabrax clathratus*). It also provided a description of potential

substitutes for the injured resources. The following summary provides verbatim the excerpts pertaining to the injuries from the main study questionnaire:[18]

> Many species of fish and birds live off the South Coast. Four of these species are having problems producing young.
>
> Two species of fish are having problems producing young in one place off the South Coast. These are White Croaker and Kelp Bass.
>
> Two of the many species of birds living along the South Coast also have reproduction problems. They are Bald Eagles and Peregrine Falcons.
>
> Many scientists have studied why these four species of fish and birds are having reproduction problems along the South Coast but not elsewhere along the California coast. They agree that these reproduction problems are caused by a deposit of two chemicals that are trapped in the sediment on the bottom of the ocean. These chemicals are DDT and PCBs.
>
> The . . . scientists I mentioned earlier have conducted studies of the effect of this deposit. They know that DDT and PCBs can build up in the bodies of some fish and birds when the food they eat has these chemicals in it. According to the scientists, the only animals that are affected by this deposit are the four species I told you about.
>
> They have found that the amount of DDT and PCBs in these two types of fish is so small that people would have to eat fish from this one area . . . on a regular basis to be harmed.
>
> Fifteen years ago, the deposit of DDT and PCBs was also causing reproduction problems in several other species that sometimes feed in the area. However, these other species gradually recovered and now reproduce normally. Their recovery over the past 15 years was the result of a natural process. This process gradually covers the contaminated sediment on the ocean bottom with new sediment that is uncontaminated by DDT and PCBs. The deeper the contaminated sediment is buried, the more these chemicals are removed from the food these species eat.
>
> Although these chemicals now no longer affect other species, they continue to affect the four species I told you about. Once the chemicals are buried deeper under clean sediment, these four species will also recover.
>
> Until recently, there was no way to speed up this natural process. However, a procedure has now been developed to cover chemical deposits like this. If the State does not implement this program, nature will do the same thing, but it will take longer, 50 years instead of 5. That is, an additional 45 years.

[18] See pages 5-17 of the main study questionnaire in Appendix A.1 for the full presentation of the injuries.

§ 2.6 Time Frame for Valuation of Injuries

As indicated above, the questionnaire presented two alternatives for the recovery of the injured resources. The first alternative was natural recovery, which would take place over the next fifty years.[19] The second alternative, a recovery accelerated by covering up the described chemical deposit, would lead to recovery to baseline conditions in five years from "now" or 45 years earlier than that with natural recovery.[20] The respondent was presented with a choice between these two alternatives — the respondent was asked if he or she would vote *for* or *against* a program that would reduce the level of injuries occurring during the 50 years of natural recovery to the lesser level occurring in the five years of accelerated recovery. (Hereafter, this program is referred to as the accelerated recovery program.)

When based on this choice, the estimates of interim lost use value are prospective and do not include values for any of the injuries occurring before March 1994, *i.e.*, the injuries that predate the program, since the program would not prevent those injuries. Furthermore, estimates of prospective interim lost use value do not include values for the injuries which will occur in the five-year period of accelerated recovery despite the program. By definition, there will be some injuries until the end of the first five years even with the accelerated recovery program. Since these injuries occur with or without the program, value for them is not included in estimates of prospective ILUV provided by the Lost Use Value Study. However, since the accelerated recovery program will prevent some of the injuries in the first five years as compared to natural recovery, the value of those prevented injuries are included in the estimates.

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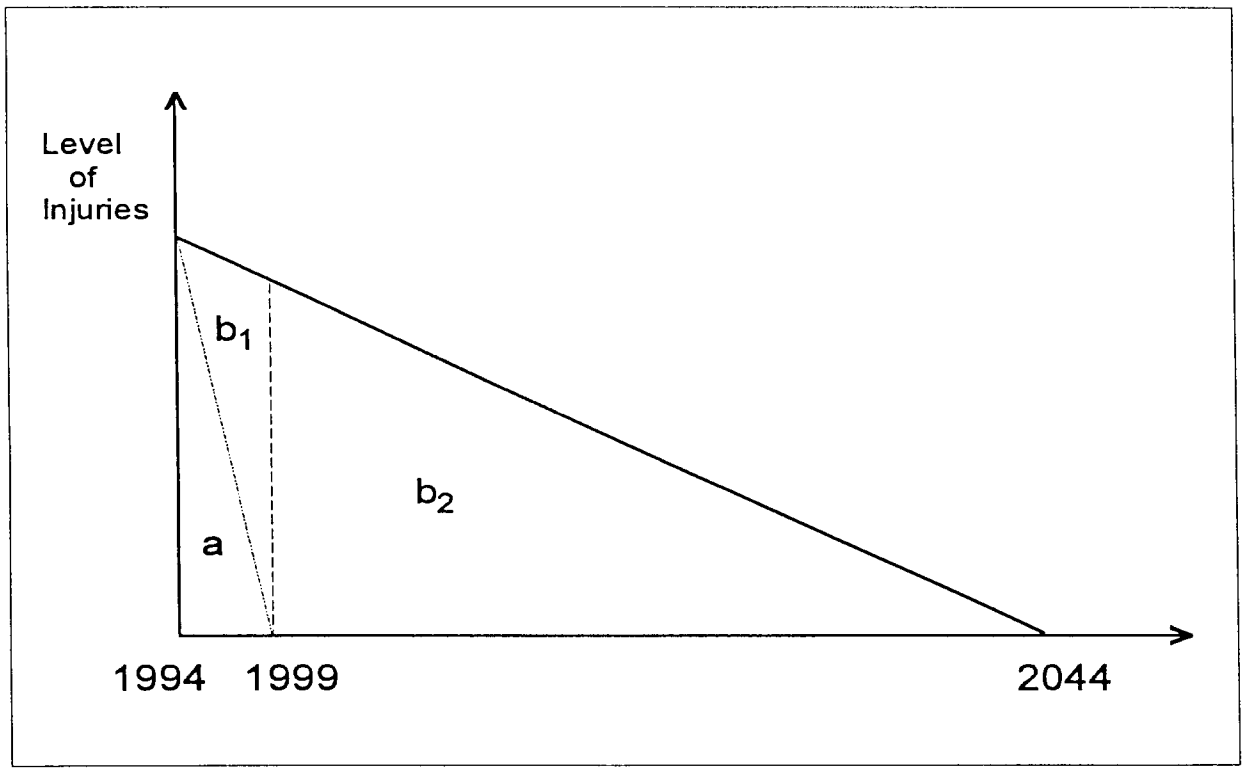
[19] As noted earlier, this recovery time was provided by Trustee representatives.

[20] The Trustees have not indicated that they will actually implement such a program; the purpose of this program was to provide a plausible means of reducing the recovery time from 50 years to five years and thereby reducing the injuries.

The relationship between the two recovery alternatives is depicted graphically in Figure 1. For natural recovery, the relative size of the injuries is represented by the area $a + b_1 + b_2$. For accelerated recovery, the area $b_1 + b_2$ represents the relative size of the injuries prevented, and the area a represents the residual injuries which occur despite the accelerated recovery. As noted above, injuries before 1994 are not considered.

Figure 1



§ 3 Economic Theory of Interim Lost Use Value (ILUV)

§ 3.1 Introduction

This study measures *prospective* interim lost use value (ILUV), a monetary measure of the public's losses due to natural resource injuries occurring over a pre-defined period.[21] This measure corresponds to the compensation the public would freely accept in return for permitting a loss in well-being due to injuries to natural resources.[22] In this chapter, we discuss the theoretical foundation of prospective ILUV—the economic concept of value—and how prospective ILUV should *ideally* be measured.

Almost 50 years ago, the modern economic theory of consumer behavior provided a definition for monetary measures of economic value.[23] An important step in the theoretical development that led to this definition was the recognition that an individual's choices in markets revealed that individual's preferences. Today, this choice-based theory of preference is a part of most graduate textbooks in microeconomics.[24]

The economic concept of value stems from individual choices that involve trade-offs—something is foregone to obtain something in return. Defining this trade-off in a particular way allows the analyst to construct a measure of economic value for the *object of choice*. Objects of choice may be either quite general or very specific and include the usual array of

[21] When the specification of the time period for damage assessment excludes losses due to past injuries, we have referred to this portion of ILUV as *prospective* interim lost use value.

[22] This is supported by the view of the *Ohio* Court where, during its discussion of contingent valuation as part of a damage assessment (section XIII of the opinion), it stated: "The purpose of such an assessment is to ascertain the amount of compensation due the public for an injury to the public's natural resources . . ." (p. 481).

[23] See Samuelson (1938 & 1948), Little (1949), and Houthakker (1950) for an early discussion of choice and revealed preference. At about the same time, J.R. Hicks wrote several papers defining the theory underlying monetary measures of economic value. See Hicks (1939 & 1943).

[24] For example, see Varian (1992).

tangible goods and services that we associate with market transactions. It is important to recognize that objects of choice do not have to occur in specific measurable quantities, as apples or loaves of bread do. They can range from services, such as a plane trip to a particular city, to broadly described states of the world, such as experiencing a chronic disease or enjoying a scenic vista. As the object of choice becomes more *intangible*, it can become more difficult to define units in which to measure its quantity. Fortunately, to construct measures of economic value from people's choices, the analyst does not need to describe these choices using neatly divisible units. Rather, to construct economic value, all that is needed is a clearly identified (*i.e.*, well-defined) object of choice and a specified consequence that results from the choice. Further, because economic values are constructed from individual choices, the circumstances describing the context in which these choices are made will be important to value measures. Taken together, the *object of choice* and the *circumstances of choice* fully embody the *choice elements* from which the analyst constructs values.

To provide a foundation for this chapter's later discussion of the measurement of interim lost use values, the definition of economic value in relation to the trade-offs associated with a choice is first discussed. After discussing how the rights to objects of choice can influence these value measures, this chapter describes the properties of economic values and how the measurement of ILUV imposes specific requirements on the construction of those values.

§ 3.2 Economic Concept of Value

§ 3.2.1 Background and Definition

The term *value* is used variously in everyday language as well as in many academic disciplines. Used as a verb, value conveys judgments of importance; as a noun, values can

mean standards for evaluating behavior or factors contributing to personal or social well-being. Moreover, in each of these possible uses of the term *value*, there is clearly discretion in what each person describes as his or her values. In economics, however, value has a specific technical meaning; to define value in economics there must be a choice where something is given up to obtain something else, *e.g.*, an individual gives up a dollar to get a lottery ticket. Economists assume that people are able to consider objects of choice and, given their individual preferences, order them. Modern treatments of micro-economic theory now begin with choices as the basis for describing people's preferences.[25]

When a choice implies a consideration of alternatives, it defines a trade-off. The underlying economic theory of choice suggests that what is selected *must* be at least as desirable (from the perspective of the individual making the choice) as the alternatives that were not selected. Hence, the choice implies that the chosen object is at least *as good* (or *as valuable*) as what is given up. Thus, to assign a monetary measure of value to an object of choice does not require that people have dollar values for every conceivable object of choice in their consciousness. Rather, when a choice is made, the alternative that is foregone defines a <u>lower</u> bound for the value of the object selected. This lower bound is expressed in whatever units correspond to the alternative foregone. For example, if an individual chooses to give up a certain sum of money to obtain an object, that monetary payment represents a lower bound on the object's value to that individual given the circumstances of the choice. If the individual chooses to forego leisure time in order to obtain the object, its value would be denominated in leisure time. If the analyst wishes to determine how much the foregone leisure time is worth in money, (*i.e.*, to monetize the leisure foregone), additional assumptions would be required.

[25] See Kreps (1990) for a discussion of how choice can be used as a primitive concept and the relationship between this logic and the usual development of consumer demand theory.

§ 3.2.2 Constructing Monetary Measures for Economic Trade-offs

To monetize economic value, the foregone alternative (defined by an individual's choice within a specified trade-off) must be expressed in dollars. Unfortunately, this monetization has sometimes created misconceptions. For example, it has been suggested that economic values are confined to prices observed in markets. These misconceptions arise because many people commonly think of the monetary measure of economic value as a *price*—if a widget sells for $6 in a market, then $6 must be its value. This view is misleading, however. When a person buys a widget the analyst only learns that it is worth at least $6 to the buyer. He or she might be willing to pay much more than $6 if necessary to get the widget. Markets do offer opportunities for people to make choices but, it is these choices and the circumstances relevant to them, that permit construction of the underlying economic values, not the market prices *per se*.

Any time a person makes a choice and a trade-off is defined, an economic value may be constructed. Of course, the existence of trade-offs does not guarantee that the analyst is aware of all of the elements of the choice, including the consequences of the decision and the alternatives foregone in favor of an individual's observed choice. Ideally, to construct a value, the analyst would have complete knowledge of the choice elements. When information is incomplete, as is usually the case with indirect methods for valuing natural resources (discussed below), the analyst must supplement what is known about the choice elements with assumptions.

Formal definitions of a monetary measure of economic value require a specified assignment of rights (*i.e.*, some degree of control over the object of choice resides with a specified individual or group of individuals). The assignment of rights is essential to a choice because each choice involves receiving something and, in return, giving something up. Thus, we can define this implicit trade-off in two ways: (1) giving something up to receive the chosen

object, which corresponds to the willingness-to-pay (WTP) concept, or (2) receiving something to give up the object, which corresponds to the willingness-to-accept (WTA) concept. The first of these measures, WTP, is relevant when the individual does not have rights to the object of choice, while WTA is relevant when he or she does.

WTP and WTA are the fundamental monetary measures of value in economics. *All* economic valuation can be shown to correspond to one or the other. In a situation involving a WTP choice, the economic value of the object of choice is constrained by the *wealth* of the individual (*i.e.*, the personal possessions that an individual can give up). Thus, while an individual may in theory be willing to give up all of his or her wealth to obtain some highly desired object of choice, the upper bound on an individual's economic value for the object is constrained by how much wealth each person has and is able to give up.

Constraining the economic value of an object of choice to available wealth does not arise in a situation involving a WTA choice. Here the item to be valued (or object of choice) is something the individual already possesses (*i.e.*, the relevant right resides with that person) and the item is a part of his or her possessions. The trade-off requires the specification of *something* the individual will freely accept in exchange for the object of choice. Because, in this situation, the object of choice is already part of the individual's possessions, the *something* an individual will freely accept in return for that object is not constrained by that individual's wealth. Thus, the monetary value of an object of choice constructed from either a WTP or WTA choice can differ.

To describe more formally the connection between trade-offs and monetary measures of WTP and WTA, consider a simple choice relevant to each. In the case of WTP, the choice is the opportunity to acquire something. Objects of choice can be very general. For example, the

object offered could be an improvement in air quality or it could be a different pattern of community land use. In this latter example, WTP is the maximum amount of money each individual would be willing to give up to avoid having a particular pattern of land development. The development may be on land the individual does not own, but nonetheless influences his or her activities or well-being. If we observe choices where the individual can attain the object by foregoing less than the maximum amount that he or she is willing to pay, the amount foregone is a *lower* bound on WTP.

WTA involves a different type of choice. Here we consider a person agreeing to give up the object of choice in exchange for an increase in monetary wealth. Selling anything places people in this choice situation. In the land development example, one way a WTA choice would arise is if the individual owned the parcel required for the development. Since the individual requires something to voluntarily agree to give up the parcel of land, the measured economic value of the parcel could be different in this WTA setting.

Examples are of course not limited to land. When people accept a job (*i.e.*, sell their labor services), sell a house or a car, or agree to permit a neighbor to modify his or her house so it would then block part of a scenic view, the choices involve a WTA trade-off and, hence, allow the construction of an economic value for the object of choice given up. If the choice posed to the individual involves a monetary payment in exchange for the object of choice, then the compensation payment provides the basis for constructing the monetary value of the object of choice. If the payment to the individual is greater than the minimum that the individual would be willing to accept, then the payment is an *upper* bound on WTA. If the payment should happen to be the minimum amount the individual would accept to give up the object, then that amount is WTA.

The assignment of rights specified by the circumstances of the choice determine which measure (WTP or WTA) is the appropriate basis for specifying the monetary measures of economic value.[26] To proceed from these definitions to actual measurement approaches requires further assumptions to which we now turn.

§ 3.2.3 Economic Values

In order to construct a monetary measure of the current value of an object (given either a WTP or WTA trade-off), the analyst must: observe a choice relevant to the object of interest; understand the circumstances of that choice; and link the choice outcome to monetary implications. The *circumstances of choice* include the assignment of rights, the alternatives foregone/accepted, the choice mechanism, the certainty associated with the choice outcome, and other features of the choice relevant to the individual's decision-making.

The assignment of rights, discussed above, refers to the degree of control the individual has over the object of choice. In the case of very simple private goods, such as a painting, the individual either owns the painting (*i.e.*, possesses all relevant rights to the painting) or does not own the painting (*i.e.*, possesses no rights). In the case of some public goods, such as local parks, a person may possess a right to use the park, but each individual is not free to sell the park.

The list of alternatives foregone/accepted pertains to both WTP and WTA choices. In the case of a WTP choice, the alternatives foregone represent those objects in the possession of the individual that are given up to obtain the object of choice. On the other hand, in a

[26] It is generally accepted that for frequently traded market goods subject to price changes, differences between WTP and WTA may be small (see Willig, 1976). However, for quantity changes in public goods, the differences between WTP and WTA can be quite large (see Hanemann, 1991).

WTA choice, the alternatives accepted represent those objects not in the possession of the individual that are accepted in return for the object of choice.

The choice mechanism is the institution or set of rules that provides the structure for the execution of the choice. For frequently traded private goods (*e.g.*, milk), the choice mechanism is often an established market, while for infrequently traded goods with few buyers and sellers (*e.g.*, large construction projects), the choice mechanism may be a negotiated contract between a buyer and a seller. In the case of public goods, such as increased fire protection, the choice mechanism may be a local referendum.

The certainty associated with the choice outcome refers to the perceived certainty from the individual's perspective about how likely it is that the object of choice will be obtained/given up and the alternatives foregone/accepted. For example, when a person votes to have his or her property taxes raised to support improved fire protection, he or she has some idea in mind about how likely it is that he or she will receive improved fire protection.[27] The degree of certainty may affect each person's choice and thus the value an analyst can construct based on that choice.

Finally, other features of the choice relevant to the individual's decision-making are usually a composite of other factors specific to each decision. One important factor in this category (discussed below) concerns whether the choice in question is part of a sequence of choices and where in that sequence the choice in question is placed.

Absolute control by the analyst over the circumstances of choice would greatly facilitate this process of value construction when using indirect approaches[28] (sometimes referred to as

[27] Some individuals may also form perceptions about the precise amount of tax they will be required to pay and base their vote on their expected payment.

[28] The term *indirect* is used with revealed preference because the choices used to construct economic values for non-marketed resources are observed. The object of choice and circumstances of choice must be specified as assumptions by the analyst based on what is known about the types of resources involved and what can be observed.

revealed preference methods); however, analysts are unable to exercise such control. Revealed preference approaches, such as the travel cost method, use observed past choices and attempt to gather all relevant information (*i.e.*, elements of the choice) pertinent to those past choices. Because (a) all of the pertinent elements of past choices can *never* match exactly the choice involving the object we currently wish to value (*i.e.*, at the very least, time has elapsed since previous decisions), and (b) the records of past choices are often incomplete, the analysis usually rests on important assumptions that are introduced to make past choices relevant for the current valuation. For example, in the context of valuing natural resources with the travel cost method, an analyst could observe recreational uses of a particular beach and then make assumptions about all pertinent choice elements that lead an individual to use the beach for recreation. These assumptions would include such things as: what each individual perceived as his or her costs to use the beach;[29] how much each person used the beach; what they might have considered as substitutes; and, perhaps most importantly, whether there would be reasons for individuals to be concerned about the status of the beach beyond the observed pattern of past use.

Concerns for the status of the beach beyond direct use give rise to what has been called passive use. Since individual concerns giving rise to passive use are not observable from behavior,[30] analysts choosing to employ revealed preference approaches assume by default that passive use contributes nothing to the total economic value. This follows because the choices recorded in a revealed preference format are confined to situations with direct use of the resource.

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[29] For example, the costs of a trip to the beach could include the vehicle operating costs and the time costs associated with the travel. The measurement of the time costs also requires assumptions about how the time would otherwise be used. If the person had the opportunity to work for pay, the appropriate cost might be the wage rate. If not, further assumptions would be required to define the relevant cost.

[30] Some individuals never go to a particular beach, but are concerned about its status. Simply observing patterns of beach use alone would overlook these passive use concerns.

Thus, the revealed preference approach to valuing a natural resource has several important limitations. First, as suggested above, it can only use choices that can be observed and recorded; for instance, in the above example, the object of choice is limited to observed recreational use. Second, and equally important, the metric it uses to quantify the object of choice is restricted to what can be conveniently measured.[31] Continuing the travel cost example, the object of choice implied by a decision involving recreation at a beach is typically quantified by analysts using indirect methods such as the number of trips made to the beach during a recreation season. Finally, since the analyst's definition of the object is derived solely from observed past behavior, which can only reflect direct use, revealed preference approaches (by design) measure only a *portion* of total economic value when passive use concerns are present; observable actions provide an incomplete picture in that they only measure a particular use value.

This conclusion follows from a closer examination of what is implied when recreation trips are used as the exclusive basis for describing an individual's interest in the beach. If the goal is to measure the economic value of the beach, then the analyst has imposed a potentially false equivalence — the observed trips are equated with the way each person is assumed to conceive of the beach as an object of choice. What is actually observed, decisions about recreation trips in a given time period, <u>must</u> be interpreted by the analyst as providing a complete record of the circumstances of choice for the beach. If the concern involves the beach as a natural asset, decisions to use it at a particular time offer only one type of choice involving the beach.

[31] This arbitrary unitization (*i.e.*, expressing the object of choice in some unit of measurement) leads to a corresponding arbitrary *value* unitization (*e.g.*, dollars per beach visit). Unitization is not required by the economic definition of value; rather, it is performed at the will of the analyst and may be irrelevant to the circumstances underlying the actual choice made by the individual.

The nature of this distinction can be seen in the following example. Suppose that an oil spill sufficiently contaminates the beach so that it can no longer be used by the public. In this case, the ideal choice would involve a negotiated WTA compensation (discussed further below) for the temporal pattern of injuries due to the spill and each individual would evaluate the complete object of choice as it is known to him or her (*i.e.*, the temporal pattern of the injuries). In contrast, by using the individual's past recreation decisions as equivalent to this ideal choice, the analyst is assuming that the relevant object of choice for the injuries to the beach is confined to an observable measure, the trips to the beach that would be precluded by the temporal pattern of injuries. Using the revealed preference approach, economic values are constructed from choices comparing objects of choice with and without the opportunity to take these trips, <u>not</u> objects of choice with and without the injuries. Hence, observed behavior necessarily limits what can be inferred about people's values.

An alternative approach that does not rely on the objects of <u>past</u> choices as proxies for an object to be valued at present is one that offers individuals an object constructed to be identical (or as identical as possible) to the object the analyst seeks to value. This approach is embodied in *contingent valuation* (CV). Two issues are important to this approach. The first is the degree to which the object offered corresponds with the object for which the analyst wishes to construct a value. Because this approach permits control by the analyst over the elements of choice, the degree of correspondence can be very close and the object and circumstances of the choice can be structured so that the choice provides information from which the *total* economic value of the offered object may be constructed.

The second is the degree to which individuals making the choice accept the financial responsibility for the consequences of these choices. Because individuals make the choice in the

context of a survey, it is critical that individuals accept the responsibility for the consequences of their choice. That is, in a WTP context, they should accept the responsibility for making the financial payment should they wish to obtain the object offered. Or, in a WTA context, they should be willing to forego the object of choice should they receive a compensatory payment. To ensure such acceptance on the part of the respondent, the offered choice—including the assignment of rights, alternatives foregone, choice mechanism, and the certainty associated with the choice outcome—must be plausible.

§ 3.2.4 Reliability of Monetary Measures of Economic Value

Since all monetary measures of economic value are constructed by analysts from people's choices, it is natural to ask whether there are ways to evaluate the validity (reliability)[32] of what has been measured. Attempts to judge validity necessarily rely on indirect evaluations. In the case of revealed preference methods, an economic value derived from observations of people carrying out an action that is hypothesized to be related to a natural resource (*e.g.*, taking a trip to the beach) is assumed to be valid by economists because an action took place. That is, an individual chose to use the beach. Clearly, if the assumptions linking the observed behavior to the object of choice (*e.g.*, recreational beach use) are correct, the action signals an individual's interest in the beach. But, one should not assume the economic value constructed from this choice represents a total value. People taking the observed actions may not necessarily interpret the elements of choice in the way the analyst has assumed. Nor is it guaranteed that assumptions made by the analyst regarding the elements of the choice are true. At best, the object of choice that can be valued from such observations is the specific action observed. Moreover, the fact

[32] See Chapter 1, footnote 11.

that a choice was actually made by someone does not validate a measure of economic value derived from it. It simply reflects the relationship between the actual choice and the constructed economic value.[33]

Like revealed preference approaches, external validation of CV estimates of value must also rely on indirect evaluations. The validity (reliability) of CV estimates of interim lost use value is addressed in the next chapter.

§ 3.3 Interim Lost Use Value, Negotiation, and Damage Assessment

Constructing a valid monetary measure of the public's losses due to the injuries to natural resources resulting from releases of DDT and PCB's requires that these injuries be conveyed in a *credible* choice context with *recognized* consequences. The appropriate choice is one that permits the construction of a *total* economic value. An *ideal* choice would be one in which each member of the public (acting through agencies that serve as trustees) would agree to "permit" a pattern of injuries, restoration, and recovery. This choice defines the trade-off desired by isolating what must be given to each person (monetary compensation) for him or her to freely forego the object of choice (in this case, the resources in their baseline states). Each person's acceptance of compensation implies an upper bound on economic value for the object of choice.

This description of ILUV is analogous to what would be sought if the trustees for the natural resources and those responsible for the injuries could *negotiate* a payment in advance to assure that people's losses would be compensated. Such a negotiation might be similar to actual negotiations one might observe between local political jurisdictions and private parties seeking to site unwanted facilities (*e.g.*, land fills) within the jurisdiction. In these idealized

[33] For an overview of these issues in the context of a travel cost model, see Bockstael, McConnell, and Strand (1991) and for a critique of the assumptions used in such models, see Randall (1994).

negotiations, public officials, acting on behalf of the public, and the private party wishing to locate a facility negotiate a monetary payment sufficient to compensate the public for disamenities that will be brought about if the proposed facility is sited.

It is difficult within the framework of a CV study to construct a WTA choice that directly parallels the choice and trade-offs described by the negotiation example. The elements of such a choice would require people to envision a well-defined set of injuries, restoration, and recovery *before* the injuries have taken place. This complete package would need to be offered as a choice in advance of the actual injuries to capture fully the intention of the negotiation metaphor. To implement this WTA choice in a CV survey for a natural resource injury that has already occurred, it would be necessary to ask respondents to imagine a situation where they were offered a choice that would allow them to prevent the actual injury before it happened. In essence, one would be designing a survey instrument that asks the respondent to mentally travel back in time to a point just prior to the event that caused the injuries and pose to the respondent a WTA choice.

§ 3.3.1 Defining Credible Economic Choices

In order to ensure that respondents take the choice in a CV survey seriously, it is highly desirable that the mechanism by which the object of choice would be provided and the payment obligation be plausible. In practice, it is very difficult to design a survey that makes a "time traveler" choice (described above) credible to the respondent.[34] For this reason, CV surveys have tended to use two alternative approaches to the construction of measures of economic value

[34] This is why the NOAA Panel advises against using the "conceptually correct" measure "of the minimum amount of compensation that each affected individual would be willing to accept" (Arrow *et al.*, 1993; p. 4603). The Panel also noted that the WTP approach (used in this study) is "the conservative choice" (Arrow, p. 4608).

for natural resource injuries. In the first approach, the object of choice is presented as a program to prevent *future* injuries; these injuries are described identically to the actual injuries in question. For example, the economic value for injuries caused by an oil spill might be measured from the choices people make when those injuries are presented as the anticipated result of not implementing a prevention program. In the second approach (and, as Chapter 4 describes, the form adopted for this study), the object of choice is portrayed as a program to alter the recovery of the injured resources. In this instance, the program enables the resources to return to their baseline (*i.e.*, original) conditions more quickly than they would if nature took its course.

The requirement that a CV survey offer respondents a credible choice has two key implications. First, it shifts the focus of the object of choice from the existing resource injuries to the ways a program might address those injuries (*i.e.*, how the resources might be returned to their baseline states). Second, to define a trade-off, the choices involving the program must have consequences for the people asked to make a decision about the program. Imposing consequences for respondents that result from their choices (*i.e.*, requiring them to forego something in return for the program) changes the perspective from compensation, or WTA, to WTP.

Both of these implications—the shift in focus and in valuation perspective—modify the elements of the choice and thereby affect the economic value measure in such a manner that it would yield a lower bound on prospective ILUV, not an upper bound. The first implication imposes limits on the program designed to influence a set of injuries (*i.e.*, the program must be credible), and the second alters the presumed rights for the resources. The injuries have already taken place and are continuing to occur. Hence, the individual cannot usually be placed in a

situation where the *anticipated* losses from those injuries can be offered to him or her as a plausible choice (as in the "time traveler" choice referred to earlier). This implies that the object of choice offered is the alteration of the time path to recovery. Control of that outcome requires a payment and, thus, a WTP perspective. Coupled with this perspective is the income constraint (here used synonymously with wealth) — a constraint on how much of an individual's income can be part of the trade-off defined by each person's choice at the time that choice is offered. While these adjustments are compromises serving to introduce limitations in the monetary measure of economic value, the direction of their impacts is consistent and known — they generally serve to <u>understate</u> the monetary measure of economic value.

The ideal choice, described by the trustee–responsible party negotiation prior to the injury, has implications for how a WTP choice provided in a CV survey should be implemented. Three issues are especially important: (1) the role of the information provided to CV survey respondents, (2) the importance of sequencing objects of choice as part of measuring monetary values for any particular object, and (3) the role of nesting as a logical issue in defining the object of choice.[35] Each of these is discussed below.

§ 3.3.1.1 The Role of Information

It has been suggested that since respondents to contingent valuation surveys would not know about the injuries to the resource of interest if not given information about them during the interview, providing that information induces value in people who do not value the

[35] The term "embedding" has often been used to refer to a variety of unrelated phenomenon in the literature. It sometimes is used to refer to a relationship between one object of choice and other objects that could be complements or substitutes. In this usage, the discussion often deals with the impact of changes in sequence in these objects and its effect on constructed economic values. A second usage relates to natural groupings or aggregations of particular objects of choice with appropriate subsets nested in more encompassing categories. In what follows, the first usage will be addressed as issues in sequencing and the second, as nesting. For a discussion of these issues, see Carson and Mitchell (forthcoming).

resources. Under this view, only those individuals who know of the resource in its baseline state and of the injuries *prior* to a contingent valuation interview could experience a loss in well-being and be considered in a total value ILUV calculation. This argument is incorrect. For example, when one considers how negotiation prior to an event that causes injuries would take place, it is natural to conclude that any negotiated compensation would require information be provided to the public prior to a decision. The anticipated pattern of injuries must be known for individuals to freely agree to permit the losses arising from injuries to natural resources (*i.e.*, the interim lost use). However, the public would not necessarily be expected to know any relevant aspects of the object of choice prior to the time they are offered a choice as part of the negotiation. It is reasonable to conclude that the issue of prior information would extend to all negotiations. For example, the public may not be aware of all disamenities they would experience if a landfill were sited in their locale; however, before agreeing to a compensation package they would want to be informed. The same logic holds for damage assessment.

When the object of choice is a program to affect the recovery of the injured resources and the terms of the economic trade-off involve a WTP rather than WTA perspective, the information requirements are not altered. Relying on this type of WTP choice does not dictate a change in, or allow the analyst to ignore, the elements upon which the ideal choice is based. Rather, the choice used for value estimation should mimic as closely as possible the ideal choice and this requires that the public be informed.

§ 3.3.1.2 Sequencing

On occasion, it has been argued that the choice posed in a CV survey designed to estimate the total value of injuries to natural resources should be placed in a sequence of other

choices.[36] That is, the choice designed to value the injuries of interest would follow a choice designed to value another object (*e.g.*, the provision of homeless shelters). Since the order in which an object is valued is one circumstance of the choice, the value constructed from a particular choice will depend on that choice's order in the sequence (*e.g.*, if a choice is offered later in a sequence, this generally increases WTA and lowers WTP).

As noted above, the ideal choice envisions the public receiving negotiated compensation for losses experienced until the affected resource is fully restored. Elements of this ideal choice do not entail asking the public to select among alternative public projects (*e.g.*, homeless shelters); nor do they require them to participate in the allocation of public funds among other private or public goods.

While sequencing effects might be important conceptual issues in developing monetary measures of the economic value of investments to preserve new natural areas, they are irrelevant to damage assessment. For instance, consider a market example where someone approaches you to buy your car but, before you negotiate the price of the car, the party wants to negotiate a price for your house which you don't want to sell. It is hard to see how such negotiations would develop a more reliable measure of the economic value of the car given the very different elements of choice.

§ 3.3.1.3 Sequencing with Nested Objects of Choice

Sequenced decisions involving nested objects of choice, assumed to be larger or smaller along some scale, change the circumstances of choice and therefore the constructed values. For example, if natural resource injuries in question pertain to a single oil spill, that object of choice

[36] For example, see Kemp and Maxwell (1992).

could be nested in injuries from the set of all oil spills. This set would contain the spill in question along with others. Sequenced decisions with nested objects of choice are not relevant for the assessment of interim lost use. In a negotiation framework, where compensation for injuries is negotiated prior to the injuries occurring, decisions involving larger injuries are simply irrelevant.[37]

§ 3.4 Summary

The monetary measure of total economic value introduced here and applied in subsequent chapters to the quantification of ILUV corresponds to the conventional measure of economic value defined over fifty years ago. At that same time, the link between people's preferences and the choices they made was explicitly recognized. Adaptations of that theory to situations involving non-market valuation started with choices giving rise to *observable* actions. However, these observable actions often provide an incomplete picture of how natural resources enhance people's well being. This is because they focus only on a subset of the people (users) who might care about the resources in ways that lead to observable actions and don't capture any other reasons why people might be concerned about the resources.

The logic underlying the measurement of *ILUV* requires a method that can capture all of the reasons why people would be concerned about injuries to the affected resources. In the ideal situation, they would be presented with a choice involving a specific pattern of future injuries, natural recovery from those injuries, and a possible program of restoration. Their choices would provide information that describes the losses people would experience as a result of these injuries and would necessarily be part of a negotiation between the trustees for the resource and the

[37] Nesting objects of choice is relevant to testing the sensitivity of respondents to the scope of the injury. See Chapter 4 for a discussion of the NOAA Panel guideline on testing the sensitivity to scope.

private party who desires to "use" the resource in a way that would lead to injuries. This negotiation logic is consistent with the requirement that ILUV be based on compensation and implies that WTA is the appropriate valuation perspective.

Frequently, this ideal WTA choice framework cannot be implemented in practice. Nonetheless, the choice used for value estimation should mimic as closely as possible the compensation required by the public to accept the temporal pattern of injuries. The negotiation perspective clarifies the degree to which respondents should be informed. It would be inappropriate to expand the set of injuries to include the possibility of other losses not actually being offered, thereby nesting the injuries actually under evaluation in a larger context, because the larger set of injuries would be outside the domain of relevant negotiation. Likewise, the negotiation terms would not be contingent upon decisions made by other parties to enhance or reduce the other types of resources available to people. Simply stated, the decision, out of necessity, to adopt a WTP perspective for damage assessment, does not imply that one must adopt all the trappings of a WTP framework suited to the valuation of new public goods.

§ 4 Measurement of Interim Lost Use Value (ILUV)

§ 4.1 Introduction

Building on the theoretical framework presented in Chapter 3, this chapter discusses in more detail the approach chosen to measure prospective interim lost use value (ILUV) — the contingent valuation (CV) method. An overview of the format of the CV questionnaire used in the Lost Use Value Study is provided as a foundation for the following discussion on the issues concerning the reliability of CV estimates of ILUV.[38] The NOAA Panel report is used as an organizing template in this latter discussion. Finally, this chapter systematically addresses within the context of this study each of the NOAA Panel's specific recommendations.

§ 4.2 Choice of Approach

The task of quantifying the compensation required by the public for the losses due to injuries to natural resources was addressed at a conceptual level in section 3.3:

> Constructing a valid monetary measure of the public's losses due to the injuries to natural resources resulting from releases of DDT and PCB's requires that these injuries be conveyed in a *credible* choice context with *recognized* consequences. The appropriate choice is one that permits the construction of a *total* economic value. An *ideal* choice would be one in which each member of the public (acting through agencies that serve as trustees) would agree to "permit" a pattern of injuries, restoration, and recovery. This choice defines the trade-off desired by isolating what must be given to each person (monetary compensation) for him or her to freely forego the object of choice (in this case, the resources in their baseline states). Each person's acceptance of compensation implies an upper bound on economic value for the object of choice.

This framework implies that interim lost use value corresponds to the compensation required by the public for losses due to injuries to natural resources, and that this compensation can be measured by the sum of the monetary payments individuals would require to freely accept the

[38] See Chapter 1, footnote 11.

loss in well-being brought about by the injuries. In practice, to meet this conceptual objective, we must ask two questions: (1) can we, as analysts, observe an actual historical choice where the elements of that choice match the ideal choice described above? and, (2) can we construct a total value that corresponds to ILUV from those observations of individuals' choices?

Section 3.3 suggested that the ideal conceptual choice for damage assessment can be understood through a metaphor — how the trustees and the responsible party would negotiate a compensation payment in advance of the release giving rise to the injuries. While one might find in the historical record examples of such negotiations in other situations, to our knowledge, no such prior negotiation occurred with respect to the injuries of concern in this damage assessment. It was also noted in Chapter 3, that the task of constructing a credible WTA-choice, paralleling the negotiation metaphor, was deemed problematic and a choice based on WTP for an alteration in the time path to natural recovery was adopted instead. One could ask whether there exist historical choices corresponding to the WTP-choice adopted for the Lost Use Value Study. To the best of our knowledge, no such historical choices exist.[39]

As indicated earlier, the approach adopted for the measurement of required compensation due to injuries to natural resources in the Southern California Bight was contingent valuation (CV). We now turn to a discussion of this methodology.

§ 4.3 Contingent Valuation Method

The contingent valuation method was first proposed in 1947 and its first reported

[39] As noted, numerous problems arise whenever one attempts to use revealed preference approaches to estimate total value. The most serious problem arises from the fact that the object of choice can only be defined by the historical choices that pertain to observable outcomes (*e.g.*, recreation), and the analyst must select one such outcome as the basis for the value construction. This necessarily results in an object of choice with attributes that imply the constructed value corresponds only to use value.

application was by Davis (1963) in his Harvard Ph.D dissertation on the economic value of recreation in the Maine woods.[40] Additional applications of the method to various public goods and studies of its methodological properties were conducted in the 1970's and 1980's both in the United States and, increasingly, in other countries. A review of the theoretical and empirical basis of contingent valuation at the end of this period is presented in Mitchell and Carson (1989). A recent contingent valuation bibliography (Carson *et al.*, 1994) contains over 1600 references to books, articles, and reports on the method.

The CV method has increasingly become accepted for measuring the benefits of policy actions and thereby used to inform public policy decision making. In 1979, the Water Resources Council included CV as one of three recommended methods for determining the benefits of federal water and related land resource projects. Since that time, various federal and state agencies have used the method for policy purposes and, as mentioned, it has been recognized by the *Ohio* Court and the NOAA Panel (Arrow *et al.*, 1993) as a method capable of providing useful information for the evaluation of natural resource damages.

The contingent valuation method uses the same logic that underlies the definition of the monetary valuation concepts discussed in Chapter 3, that is, choice. In CV studies, choices are posed to people in surveys; analysts then use the responses to these choice questions to construct monetary measures of value. The specific mechanism used to elicit respondents' choices can take a variety of forms, including asking survey respondents whether they would purchase, vote, or pay for a program or some other well-defined object of choice. It can also be a direct elicitation of the amount each respondent would pay (WTP) to obtain an object of choice or the amount each respondent would accept in compensation (WTA) to give it up.

[40] See Portney (1994) for a brief history of contingent valuation.

When used for damage assessment, a contingent valuation survey presents each individual with an opportunity to make a choice, where the object of choice is usually a plan or program to prevent the relevant injuries or to restore the affected resources to their baseline conditions and thereby mitigate the relevant injuries. The context for that choice can be any setting that is regarded as credible by survey respondents. Because the elements of the choice can be presented in some detail to each respondent, there is no need to rely on historical choices and impose the assumptions required to link those choices to the object to be valued.[41] Rather, in damage assessments relying on CV, respondents' choices are directly linked to the object of choice (*e.g.*, through a specified restoration or prevention program that addresses the relevant injuries), thereby enabling the analyst to construct the appropriate measure of *total* value.

In a CV survey, respondents are presented with material which can be described as three separate (but integral) components:

1. The key elements of a CV survey are the object of choice and the circumstances of the choice (including the method proposed for each individual to pay or receive compensation, the time period over which the object or decision is relevant, the relationship of the object to available substitutes, and other elements of the choice relevant to decision-making). When using CV to construct ILUV, the object of choice can be a program or a set of activities to restore the injured natural resources to their baseline conditions. To understand the program, each respondent must understand the nature of the resources, the character of the injuries to those resources, and any natural recovery process that might influence how these injuries would be mediated in the absence of undertaking the program.

2. After the description of the *object* and *circumstances of choice*, the CV survey elicits a <u>choice outcome</u> which can be used to construct each individual's total value for the object of choice that has been presented. The choice can be a direct elicitation for a single value or repeated questions for an interval estimate of the value. In all cases, it will describe a *specific choice mechanism* and elicit choice information used

[41] See Chapter 3 for further discussion of the nature of the assumptions required when the analyst utilizes indirect or revealed preferences approaches to construct values for objects of choice.

to construct value.

3. Because individuals have different preferences and face different constraints, questions are also asked about respondents' attitudes, social characteristics (*e.g.*, age, education, gender, race, etc.) and economic characteristics (*e.g.*, income).

We noted in Chapter 3 that an ideal CV choice is one that is framed in a WTA context in which a respondent is offered the opportunity to consider a situation where the injuries had not yet occurred and to choose how much compensation would be required to permit the time path of recovery associated with the injuries. Because the injuries in the South Coast have already occurred over a period of years, the only way to implement this approach would be to ask the respondents to assume that they could mentally travel back in time to before the injuries occurred. Such an approach is difficult to convey in a way that induces respondents to accept financial responsibility for a program to respond to the injuries. Rather than pursue the WTA framework, we have relied upon monetary values constructed from a contingent valuation choice based on WTP for a program that would speed-up the natural restoration of the injured resources. For reasons explained in Chapter 3, a WTP choice provides a lower bound for values that would have been constructed from a WTA choice.

§ 4.4 Format of a Contingent Valuation Survey

In Chapters 5 and 6, we review the design and format of the main study survey, but a working knowledge of the survey's structure is useful as a basis for understanding the issues of CV reliability that we discuss later in this chapter. Thus, this section provides a brief introduction to the structure of a CV survey in general and the instrument used in the Lost Use Value Study in particular.

The first part of our CV survey introduces the general topic of the survey. The topic had been described to each potential respondent in an advance letter and by the interviewer in the course of seeking the respondent's participation.[42] Following this initial description, the CV survey introduces the specific topic of the survey and then provides the information describing the elements of the choice. From this point CV surveys and general public opinion surveys differ in fundamental ways.[43] CV surveys typically focus on a single situation which is described in some detail. In a damage assessment, the elements of choice that are presented include a carefully worded description of the natural resource and the injuries. As noted above, this description presents the resource and injuries so that the respondent will perceive his or her relationship to available substitutes and other factors relevant to the individual's choice.

The description of the resources and injuries is followed by a description of the plan or program — a set of activities that can be undertaken to hasten the recovery of the natural resources to their baseline conditions. The description of the program includes a discussion of the program's activities, how they will be implemented, and the method of payment. The information about the program coupled with a description of the nature of the resource injuries define the object of choice. The survey then turns to the circumstances of the choice: the disposition of rights to the resources in their baseline conditions, a description of how the choice will be made (*i.e.*, the choice mechanism), and what must be foregone to obtain the object. In the WTP setting of this survey, the respondent faced a simple choice: give up a specified dollar amount in a one-time tax payment in return for the object of choice (a program that will

[42] The advance letter stated: "Westat, Inc., a survey research firm, is helping the State of California conduct a study about the opinions of Californians on issues facing the state today such as education, the environment, and crime"; see Appendix C.2.2. The interviewer's pre-scripted introduction essentially repeated the information contained in the advance letter; see Appendix C.2.1.

[43] Typical of public opinion surveys are those conducted for newspapers which ask respondents a few questions about each of a number of current public issues and political figures.

accelerate recovery of the resource) or keep the money and continue to experience the losses associated with the injuries until natural recovery occurs fifty years from now.

The survey uses a referendum as the mechanism to elicit choices. This mechanism provides the respondent with the opportunity to articulate his or her choice by voting *for* or *against* the program, where voting *for* implies getting the program and having the financial burden of paying the tax, while voting *against* implies retention of the money corresponding to the tax amount and continuance of the time profile of injuries associated with natural recovery. This choice mechanism was adopted for a number of reasons.[44] This mechanism is consistent with the mechanisms frequently used in California to decide public issues; and, is familiar and credible for these types of activities. Furthermore, it satisfies the incentive-compatibility conditions required for truthful responses; that is, it meets the condition that respondents evaluate the elements of choice in the same way they would an actual referendum.[45]

Questions that provide information about each respondent's evaluation of the object of choice follow the elicitation of a respondent's choice. They help gauge whether the respondent understood and perceived the information as intended and collect information about the reasons that motivated the reported choices.

Following this series of "debriefing questions," we offered the respondents who voted *for* the program the opportunity to reconsider their decision. Later in the survey, respondents who were still in favor of the program were asked how difficult it would be for them to pay,

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[44] The NOAA Panel states (Arrow, p. 4606): "Both experience and logic suggest that responses to open-ended questions will be erratic and biased. However, the referendum format, especially when cast in the willingness to pay mode — 'Would you be willing to contribute (or be taxed) D dollars to cover the cost of avoiding or repairing environmental damage X?' — has many advantages."

[45] A voter has an economic incentive to cast a truthful vote on a ballot proposition as long as he or she thinks the government can provide the object of choice described and that the government will indeed levy the tax stated if the object of choice is provided. The voter is better off voting yes if the object of choice is preferred to paying the tax increase and voting no if it is not.

given the highest tax amount for which they voted, and how strongly they felt about their vote. Respondents indicating that it would be "very difficult", "somewhat difficult", or who said that they were "not sure" how difficult it would be to pay, or indicating that they were "not too strongly", or "not at all strongly" in favor of the program, or "not sure" how strongly they favored the program, were given another opportunity to change their vote. In accordance with conventional practice, the survey concludes with demographic questions.

§ 4.5 Issues of Reliability Raised by the NOAA Panel

The *Ohio* Court stated,

> On remand, DOI should consider a rule that would permit trustees to derive use values for natural resources by summing up all reliably calculated use values, however measured, so long as the trustee does not double count. [p. 464]

The Court's statement pointing to the *reliability* of calculated values has stimulated a wide discussion of the validity[46] one would attach to measures of total value (ILUV) obtained using CV. As noted in Chapter 1 and above, a panel of experts was formed to help NOAA address the *reliability* of CV for damage assessment. In this section, we examine some general issues raised by the Panel report and discuss briefly other issues raised about the state of CV research and judgments on its reliability and validity.

§ 4.5.1 Calibration

The Panel's discussion of reliability issues begins with the consideration of the calibration of CV estimates of total value. The Panel report notes that,

> The contingent valuation method has been criticized for many reasons and the Panel believes that a number of these criticisms are particularly compelling.

[46] Bear in mind the distinction between reliability and validity; see footnote 11 in Chapter 1.

> Before identifying and discussing these problems, however, it is worth pointing out that they all take on added importance in light of the impossibility of validating externally the results of CV studies. It should be noticed, however, that this same disadvantage must inhere in <u>any</u> method of assessing damages from deprivation of passive-use. It is not special to the CV approach although, as suggested in section I, there are currently no other methods capable of providing information on these values. [Arrow, p. 4603]

The Panel, seemingly troubled by the fact that it is impossible to externally validate a CV study, referred to the literature on comparisons of hypothetical and real willingness to pay experiments, citing among others, Seip and Strand (1992) and Duffield and Patterson (1991). These two particular studies use a charitable contributions choice mechanism[47], and compare willingness to contribute to particular environmental programs elicited using a "CV like" approach with requests for actual payments. The Panel reports that in the Seip and Strand study "self-reported willingness to pay was significantly greater than 'actual' willingness to pay." The Panel then states "These studies suggest that the CV technique is likely to overstate 'real' willingness to pay" and "Clearly more experiments would be useful" (Arrow, p. 4604).

The Panel's call for studies does not explicitly acknowledge the fact that a large set of studies already exists. Indeed, the set of studies that attempt to compare willingness to pay valuations derived from CV surveys with those derived from "actual" market behavior is quite large and the results quite disparate.[48] Depending on the selection of studies providing comparisons, one can conclude that self-reported willingness to pay is less than, greater than, or equal to "actual" willingness to pay. Adding to the potential for confusion is the fact that many, if not all, of the existing studies fail to control for all the elements of choice. For example, it is often the case that the object of choice valued is different across choice situations

[47] The results of the studies are consistent with the recognized properties of the charitable contributions format as an inappropriate incentive structure for measuring either "self-reported" willingness to pay or "actual" willingness to pay.

[48] See Carson, Flores, Martin, and Wright (1994) for an overview of these studies.

(*i.e.*, the object of choice may not be the same in the "actual" choice as it was in the "CV" choice). In addition to problems of consistency in the object of choice, many of these studies fail to control for: (1) differences in the institutional setting within which the choice is cast, (2) differences in the informational context used, and (3) differences in the incentive-compatibility attributes of the value elicitation. An important aspect of this last issue concerns whether people accept the implied financial responsibility associated with their CV response(s).

Meaningful comparisons of "actual" and "stated" (or CV) choice results require consistency in the choice elements characterizing each set of decisions. Discrepancies between the two situations call into question comparisons of the WTP estimates derived from each source of choice information. Moreover, there is no reason to expect that ratios of the WTP estimates from "actual" and "stated" choice studies provide meaningful calibration factors for adjusting ILUV estimates obtained from CV studies.

Nothing in economic theory supports the belief that willingness to pay valuations derived from CV surveys produce higher values than actual market transactions when object and circumstances of choice are consistent (*i.e.*, they are for the identical commodity under identical informational, institutional, and incentive-compatible payment schemes). Without theoretical justification for calibration, one may be inclined to turn to the existing body of empirical studies. However, no studies which meet the NOAA Panel guidelines have been conducted that compare CV estimates of ILUV derived from CV studies to comparable studies estimating actual WTP. Without these studies, there is no reason to believe that CV estimates of ILUV would be greater than actual WTP. Moreover, even if a case could be made on the basis of such studies to calibrate a WTP measure of ILUV, there remain questions about such an adjustment. As noted earlier and confirmed by the Panel, WTA-compensation is the appropriate measure of ILUV.

WTP already provides a lower bound on WTA.[49] Any arbitrary rule that would lower estimated WTP would lead to a larger discrepancy between WTP and the ideal measure of damages. Thus, it would be improper to "calibrate" downward measures of ILUV obtained from the CV study discussed here.

§ 4.5.2 Scope - Inconsistency with Rational Choice

The Panel notes that some CV studies produce results that appear to be inconsistent with the assumptions of rational choice:

> Usually, though not always, it is reasonable to suppose that more of something regarded as good is better so long as an individual is not satiated. This is in general translated into a willingness to pay somewhat more for more of a good, as judged by the individual. Also, if marginal or incremental willingness to pay for additional amounts does decline with the amount already available, it is usually not reasonable to assume that it declines very abruptly. [Arrow, p. 4603]
>
> Evidence of this kind has multiplied (see Kahneman and Knetsch, 1992, Desvousges *et al.*, 1992, and Diamond *et al.*, 1992). Desvousges' result is very striking; the average willingness to pay to take measures to prevent 2,000 migratory birds (not endangered species) from dying in oil-filled ponds was as great as that for preventing 20,000 or 200,000 birds from dying. Diminishing marginal willingness to pay for additional protection could be expected to result in some drop. But a drop to zero, especially when the willingness to pay for the first 2,000 birds is certainly not trivial, is hard to explain as the expression of a consistent, rational set of choices. [Arrow, p. 4604]

The Panel's concern over the underlying rationality of values expressed for objects of choice in CV studies has led to what has become known as a *test for responsiveness to scope.*

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[49] The NOAA Panel states,

> The conceptually correct measure of lost passive-use value for environmental damage that has already occurred is the minimum amount of compensation that each affected individual would be willing to accept. Nevertheless, because of concern that respondents would give unrealistically high answers to such questions, virtually all previous CV studies have described scenarios in which respondents are asked to pay to prevent future occurrences of similar accidents. This is the conservative choice because willingness to accept compensation should exceed willingness to pay, if only trivially; we say more about other biases below [Arrow, p. 4603].

It is reasonable to ask: what does responsiveness to scope mean? Unless one is prepared to make specific assumptions about people's preferences for the object of choice, the only implication one can draw from rational decision-making is that the economic value of a "large" amount of the object of choice should not be less than the value of a "small" amount of the same object. Moreover, what is "large" and "small" is dependent upon individual preferences. As a result it may not be a simple matter to establish what is "small" and what is "large" even for the types of goods bought and sold in markets. For example, would an individual considering a grouping of 40 cans of beer and 2 bottles of wine view that grouping "larger" than a grouping containing 20 cans of beer and 8 bottles of wine?[50] Now consider a more intangible object of choice; for example, consider the issue of beach amenities provided by a week's rental of a beach house. Will a larger house located one row back from the ocean provide more beach amenities than a smaller house located in the first row on the ocean? Thus, responsiveness to scope cannot be evaluated without knowing whether people perceive the choices to be *different* and their relative evaluation of large and small.

In its simplest form, a test of scope would vary the nature of the injuries to a natural resource and measure whether the values obtained from a different set of injuries were different from the values obtained for the original set. A comparison of the original set to one described as larger would have to be understood by those surveyed *to be* larger. Similarly, comparisons of the original set of injuries to a smaller set would be expected to yield a reduced WTP for that smaller set of injuries when they are perceived by those surveyed to be smaller. The Panel expresses its desire for such demonstrations by stating,

> . . . some form of internal consistency is the least we would need to feel some confidence that the verbal answers correspond to some reality. [Arrow, p.

[50] See Kreps (1990), p. 23.

4604]

As part of the Lost Use Value Study, we designed and conducted a formal test of scope along the lines noted above. The design of the scope test is discussed in Chapters 5 and 6, and the results are presented in Chapter 10.

§ 4.5.3 Sequencing and Substitutes — Implausibility of Responses

The Panel noted a belief maintained by some that individual responses to some CV surveys are implausible (*i.e.*, too large) and that even if the responses seem plausible given the preferences and possible income of the individual, aggregating the values over large populations (as might be the case in estimating total value losses for the purpose of a damage assessment) results in implausibly large values. The Panel states,

> One can envision many possible types of environmental damage -- oil spills or groundwater contamination in many different locations, visibility impairment in a variety of places, and so on. Would the average individual or household <u>really</u> be willing to pay $50 or even $5 to prevent each one? This seems very unlikely, since the total resulting willingness to pay for all such programs could easily become a very large fraction of one's income or perhaps even exceed it. In other words, even if the willingness to pay responses to individual environmental insults are correct if only one program is to be considered, they may give overestimates when there are expected to be a large number of environmental problems. [Arrow, p. 4605]

Our response to this concern is straightforward. Chapter 3 provided the rationale for conceptualizing the choice relevant to the measurement of ILUV as a negotiation. Given these choice elements, the appropriate measurement framework for required compensation precludes sequencing. The only legitimate approach for constructing values in a damage assessment is one that focuses on the relevant resources and injuries, and a program to prevent those injuries or to accelerate the recovery of the affected resources to their baseline conditions. Respondents' choices about the program must be informed in a way that would be consistent with negotiation

of the terms for required compensation and, as demonstrated in section 3.3.3, would not include sequencing but would include relevant information about substitutes. For example, in this survey, immediately prior to the choice questions, respondents are reminded of the relevant substitutes.

§ 4.5.4 Budget Constraints

The Panel notes that values derived from CV surveys could be influenced by respondents' lack of awareness of their budget constraints, or a perception that their budget is not *meaningful* to their responses. The Panel states,

> Even if respondents in CV surveys take seriously the hypothetical referendum (or other type of) questions being asked them, they may respond without thinking carefully about how much disposable income they have available to allocate to all causes, public and private (see Kemp and Maxwell (1992), for instance). Specifically, respondents might reveal a willingness to pay of, say, $100 for a project that would reduce the risk of an oil spill; but if asked what current or planned expenditures they would forego to pay for the program, they might instead re-evaluate their responses and revise them downward. [Arrow, p. 4605]

There are three points to make with regard to the Panel's concern regarding respondent's cognizance of budget constraints. First, it may be that the concern of the Panel is not with the respondent's awareness of budget constraints *per se*, but a belief that some respondents to CV surveys do not always perceive the financial responsibility implied by their answers. In daily market transactions, economists do not question the awareness of budgets constraints, since it is assumed that consumers are aware of their financial responsibilities. Similarly, if respondents to CV surveys believed they were financially responsible for their answers, specific questions about respondents' awareness of their budget constraints would not be relevant. Accordingly, we placed a high priority on creating a plausible context for respondents to make a decision about whether they would vote to pay the stated tax amount for a program to speed up the

recovery of the injured resources in order to ensure that respondents perceived that a personal financial responsibility was associated with their answers. In Chapters 5 and 6, we discuss the features of the survey that serve this purpose.

Second, the Panel provides no empirical evidence to support the notion that consumers making routine consumption decisions and daily purchases have in mind the category of expenditure that they plan to reduce when they make such purchases. Thus, it seems unreasonable to expect a respondent to a CV survey to be able to describe in detail such explicit consumption trade-offs when deciding how to vote in a CV referendum.

Third, the Panel notes that the issue of budget cognizance is related to,

> . . . the problem identified immediately above where individuals fail to think of the possible multiplicity of environmental projects or policies they might be asked to support. [Arrow, p. 4605]

This view, that at the time respondents face the choice posed by the CV survey, they should have in mind specific requests for payments for public goods other than the services of the injured resource, is inconsistent with WTA-compensation identified in Chapter 3 as the appropriate conceptual framework for natural resource damage assessment.

§ 4.5.5 Information Provision and Acceptance

The Panel notes that CV surveys must provide respondents with information that specifies clearly, and in an understandable way, the nature of the program being offered. The Panel is concerned about the understandability, plausibility, and acceptance of such information by the respondent. The Panel states,

> If CV surveys are to elicit useful information about willingness to pay, respondents must understand exactly what it is they are being asked to value (or vote upon) and must accept the scenario in formulating their responses.
>
> . . . even when CV surveys provide detailed and accurate information about the

> effects of the program being valued, respondents must accept that information in making their (hypothetical) choices. If, instead, respondents rely on a set of heuristics ("these environmental accidents are seldom as bad as we're led to believe," or "authorities almost always put too good a face on these things"), in effect they will be answering a different question from that being asked; thus, the resulting values that are elicited will not reliably measure willingness to pay. (p. 4605)

A great deal of effort was devoted to instrument development to ensure that respondents would understand the information about the speed-up program and its effects. Chapters 5 and 6 describe these efforts.

The Panel also states that respondents "must accept the scenario in formulating their responses" (p. 4605). The Panel's concern is that a lack of acceptance may lead respondents to believe they are choosing an object other than the one the analyst intends to value. While the CV designer should seek to make the information plausible, and therefore believable (Mitchell and Carson, 1989), it is unrealistic and unnecessary to make it an absolute requirement that all respondents accept without question the information provided. For example, it may very well be the case, particularly in a scope test which has to use a version of the injuries that do not accord completely with the facts of the situation, that the information provided is at odds with other information that may be known to the respondent. Sometimes, respondents may have strong beliefs regarding relevant issues (*e.g.*, the ability of ecosystems to recover). In these cases, there is little prospect for presenting alternative evidence contrary to these beliefs that would lead to a complete change in respondents' beliefs.

In order to avoid accepting respondents' choices based on an object other than the one the analyst intends to value, it is necessary to incorporate questions about respondents' level of acceptance of the information presented in the survey so that differences in beliefs can be

integrated in the analysis.[51] Questions we used in this survey to collect this information are discussed in Chapter 6.

Thus, provided the CV designer has been successful in designing a credible choice, differences in the degree of acceptance of the information describing the object of choice by some respondents should be treated as a natural part of the way people respond to new information. It can be dealt with through the use of a multivariate function describing the factors influencing respondents' choices. Moreover, some lack of acceptance can be helpful in analyzing survey responses. For example, if some respondents believe injuries to a resource were less severe than described in the survey, they should be less willing to vote *for* the restoration program. This is a testable hypothesis that can provide indirect information that can be used in testing the construct validity of the responses. It can produce a conservative bias and, as noted, offers an indirect test of scope.

§ 4.5.6 Extent of the Market

The Panel believes the population of individuals that should be surveyed for damage assessment purposes is determined legally. The Panel states,

> Suits for environmental damages are brought by trustees on behalf of a legally definable group. This group limits the population that is appropriate for determining damages even though individuals outside of this group may suffer loss of passive and active use. [Arrow, p. 4605]

We have no reaction to the Panel's legal interpretation, but simply underscore the Panel's economic judgment that individuals outside of any legally defined group could be willing to make a financial commitment and therefore a choice that would relate to the construction of

[51] This approach was employed in Carson *et al.*, (1992).

economic values for the losses due to injuries to natural resources.[52]

§ 4.5.7 Warm Glow

The Panel notes a belief held by some that responses to CV choice questions may not reflect the value of the object respondents were asked to consider but rather, the value of "giving to a good cause". The Panel states,

> This has led these critics to conclude that individuals' responses to CV questions serve the same function as charitable contributions -- not only to support the organization in question, but also to feel the "warm glow" that attends donating to worthy causes (see Andreoni, 1989). [Arrow, p. 4605]

To explain observed charitable contributions, Andreoni formulated a specific model to describe people's preferences. He hypothesized that each person's contributions to a charity may well have two separate influences on that individual's level of well-being. The first enhancement would come from some increased level of a public good brought about by the contribution. For example, charitable contributions made to the local volunteer fire department for the purchase of new fire fighting equipment might reduce the anticipated response time and thereby increase the public good known as fire protection which can be enjoyed by all, not just those who made contributions. The second influence does not have a public component and pertains only to the individual making the contribution. For example, I may increase my personal well-being because I simply enjoy giving money to fire fighters and this enjoyment has nothing to do with the enhanced fire protection my contribution may bring about.

Andreoni hypothesized that a dollar of a person's contributions enhances well-being *twice* — once through the public good effect (*e.g.*, increased fire protection) and second through this private effect (*e.g.*, enjoying the act of giving to fire fighters). He described the second effect

[52] See Chapter 11 for discussion of this issue in the context of this study.

as *warm glow*. In his model, the decision to contribute was for *one* specific type of charitable contribution (such as the example of local volunteer fire departments used above), not a contribution to any "good cause" as those who have used his framework out of context have suggested. Since the private component (the second term, as we have described his model above) pertains to a specific contribution, not any contribution, the original Andreoni conception of warm glow has no immediate generalization to all contributions.

Others have broadened Andreoni's original hypothesis regarding things that increase an individual's well-being, to say that any contribution to any charity provides an equivalent private enhancement of well-being (warm glow). This of course could only be true if the contributions to all causes were considered by people to be perfect substitutes for each other. That is, one would be indifferent between making contributions to the local fire department, one's church, or the local SPCA. Casual introspection suggests that the perfect substitution assumption may be suspect. It is our view that the hypotheses regarding preferences and well-being that underlie the generalized model of warm glow (*i.e.*, the model of perfectly substitutable contributions) rely on anecdotes and have not been subject to rigorous empirical tests. Moreover, in this CV study contributions are not elicited; rather, choices are offered at specified tax amounts. The notion that a large number of individuals would receive warm glows from paying taxes or voting to raise their taxes requires one to suspend belief in information about people's expressed concerns over much of the modern history of the state as a taxing authority.

Even if the anecdotes reflect general reality and all the hypotheses regarding the well-being enhancements one derives from making contributions were true (i.e., the warm glow component did exist and all contributions were perfect substitutes), would these hypotheses negate the values the analyst constructs from CV studies? Or, would the hypotheses have any

bearing on how one should design the choice situation in a CV study? The answer to both questions is *no*. To understand why, one need only return to the choice elements identified in the trustee-responsible party negotiation metaphor developed in Chapter 3. The public is not making a monetary contribution at all. Rather, the desired valuation concept to be measured is *monetary compensation*. As noted in Chapter 3, WTP provides a conservative measure of this compensation. What is relevant to its measurement is the individual's decision to accept financial responsibility by stating a vote for the proposed program. There is no contribution involved and thus warm glow is irrelevant.

§ 4.6 NOAA Panel Survey Design and Administration Guidelines

The report of the NOAA Panel describes a detailed set of survey design and administration guidelines. Some of these are novel suggestions. The majority are standard practice for conducting any high quality survey research and can be found in high quality CV surveys. The Panel notes,

> In this section we try to lay down a fairly complete set of guidelines compliance with which would define an ideal CV survey. A CV survey does not have to meet each of these guidelines fully in order to qualify as a source of reliable information to a damage assessment process. Many departures from the guidelines or even a single serious deviation would, however, suggest unreliability *prima facie*. [Arrow, p. 4608]

We have carefully examined each of the Panel's suggestions, many of which are consistent with our standard practice (see Carson *et al.*, 1992). When the suggestion represents a novel departure from this standard practice, an examination of the proposal was conducted as part of our instrument design. These particular instances concerned recommendations where we could find little theoretical or empirical support in the literature. On the basis of that examination, which involved a major development effort to test the assumptions which underlie several of the

recommendations, we have chosen in some instances to differ with the specific procedure recommended by the Panel. In every case, however, we paid careful attention in designing the survey for this study to address what we interpret as the Panel's underlying concern.

§ 4.6.1 Summary of Panel Guidelines

In this section we list the 23 survey design guidelines that are potentially applicable to a CV survey such as this one.[53] We implemented 20 of these guidelines, a few of them with qualifications. Of the others, we believe there are good reasons why two of them do not need to be implemented and the third is not applicable to our survey. Listed below are the specific NOAA Panel recommendations implemented in this CV survey and the text (taken verbatim from the NOAA Panel report) describing the nature of each. In the following section we present the reasoning behind each of the recommendations we do not implement or that we implement with qualifications.

Conservative Design — Implemented:

> Generally, when aspects of the survey design and the analysis of the responses are ambiguous, the option that tends to underestimate willingness to pay is preferred. A conservative design increases the reliability of the estimate by eliminating extreme responses that can enlarge estimated values wildly and implausibly.

Elicitation Format — Implemented:

> The willingness to pay format should be used instead of the compensation required because the former is the conservative choice.

Referendum Format — Implemented:

> The valuation question should be posed as a vote on a referendum.

[53] Two of Panel guidelines do not apply to survey design issues. These are a recommendation that critical features of a CV survey be pre-approved by both sides in a legal action and the government undertake the task of creating a set of reliable reference surveys.

Personal Interview — Implemented:

The Panel believes it unlikely that reliable estimates of values could be elicited with mail surveys. Face-to-face interviews are usually preferable, although telephone interviews have some advantages in terms of cost and centralized supervision.

Sample Type and Size — Implemented:

Probability sampling is essential for a survey used for damage assessment.[54] The choice of sample specific design and size is a difficult, technical question that requires the guidance of a professional sampling statistician.

Minimize Nonresponses — Implemented:

High nonresponse rates would make the survey results unreliable.

Reporting — Implemented:

Every report of a CV study should make clear the definition of the population sampled, the sampling frame used, the sample size, the overall sample non-response rate and its components (e.g., refusals), and item non-response on all important questions. The report should also reproduce the exact wording and sequence of the questionnaire and of other communications to respondents (e.g., advance letters). All data from the study should be archived and made available to interested parties (see Carson et al., (1992), for an example of good practice in inclusion of questionnaire and related details; as of this date, however, the report has not been available publicly and the data have not been archived for open use by other scholars).

Cross-tabulations — Implemented:

The survey should include a variety of other questions that help to interpret the responses to the primary valuation question. The final report should include summaries of willingness to pay broken down by these categories. Among the items that would be helpful in interpreting the responses are:

Income,
Prior Knowledge of the Site,
Prior Interest in the Site (Visitation Rates),
Attitudes Toward the Environment,
Attitudes Toward Big Business,
Distance to the Site,

[54] The following footnote is taken directly from the Panel report: "This need not preclude use of less adequate samples, including quota or even convenience samples, for preliminary testing of specific experimental variations, so long as order of magnitude differences rather than univariate results are the focus. Even then, obvious sources of bias should be avoided (*e.g.*, college students are probably too different in age and education from the heterogeneous adult population to provide a trustworthy basis for wider generalization)".

Understanding of the Task,
Belief in the Scenarios, and
Ability/Willingness to Perform the Task.

Accurate Description of the Program or Policy — Implemented:

Adequate information must be provided to respondents about the environmental program that is offered. It must be defined in a way that is relevant to damage assessment.

Adequate Time Lapse from the Accident — Implemented:

The survey must be conducted at a time sufficiently distant from the date of the environmental insult that respondents regard the scenario of complete restoration as plausible. Questions should be included to determine the state of subjects' beliefs regarding restoration probabilities.

Careful Pretesting of a CV Questionnaire — Implemented:

Respondents in a CV survey are ordinarily presented with a good deal of new and often technical information, well beyond what is typical in most surveys. This requires very careful pilot work and pretesting, plus evidence from the final survey that respondents understood and accepted the main description and questioning reasonably well.

Checks on Understanding and Acceptance — Implemented:

The above guidelines must be satisfied without making the instrument so complex that it poses tasks that are beyond the ability or interest level of many participants.

Yes/No Follow-ups — Implemented:

Yes and no responses should be followed up by the open-ended question: "Why did you vote yes/no?" Answers should be carefully coded to show the types of responses, for example: (i) It is (or isn't) worth it; (ii) Don't know; or (iii) The oil companies should pay.

Pretesting of Photographs — Implemented:

The effects of photographs on subjects must be carefully explored.

Pretesting for Interviewer Effects — Implemented:

An important respect in which CV surveys differ from actual referenda is the presence of an interviewer (except in the case of mail surveys). It is possible that interviewers contribute to "social desirability" bias, since preserving the environment is widely viewed as something positive. In order to test this possibility, major CV studies should incorporate experiments that assess

interviewer effects.

Reminder of Undamaged Substitute Commodities — Implemented:

Respondents must be reminded of substitute commodities, such as other comparable natural resources or the future state of the same natural resource. This reminder should be introduced forcefully and directly prior to the main valuation question to assure that respondents have the alternatives clearly in mind.

Present Value Calculations of Interim Losses — Implemented with Qualification:

It should be demonstrated that, in revealing values, respondents are adequately sensitive to the timing of the restoration process.

Deflection of Transaction Value — Implemented with Qualification:

The survey should be designed to deflect the general "warm-glow" of giving or the dislike of "big business" away from the specific environmental program that is being evaluated. It is possible that the referendum format limits the "warm glow" effect, but until this is clear the survey design should explicitly address this problem.

Alternative Expenditure Possibilities — Implemented with Qualification:

Respondents must be reminded that their willingness to pay for the environmental program in question would reduce their expenditures for private goods or other public goods. This reminder should be more than perfunctory, but less than overwhelming. The goal is to induce respondents to keep in mind other likely expenditures, including those on other environmental goods, when evaluating the main scenario.

Burden of Proof — Implemented with Qualification:

Until such time as there is a set of reliable reference surveys, the burden of proof of reliability must rest on the survey designers. They must show through pretesting or other experiments that their survey does not suffer from the problems that these guidelines are intended to avoid. Specifically, if a CV survey suffered from any of the following maladies, we would judge its findings "unreliable":

- A high nonresponse rate to the entire survey instrument or to the valuation question.
- Inadequate responsiveness to the scope of the environmental insult.
- Lack of understanding of the task by the respondents.
- Lack of belief in the full restoration scenario.
- "Yes" or "no" votes on the hypothetical referendum that are not followed up or explained by making reference to the cost and/or the value of the program.

Temporal Averaging — Not Implemented:

> Time dependent measurement noise should be reduced by averaging across independently drawn samples taken at different points in time. A clear and substantial time trend in the responses would cast doubt on the "reliability" of the finding.

"No-answer" Option — Not Implemented:

> A "no-answer" option should be explicitly allowed in addition to the "yes" and "no" vote options on the main valuation (referendum) question. Respondents who choose the "no-answer" option should be asked nondirectively to explain their choice. Answers should be carefully coded to show the types of responses, for example: (i) rough indifference between a yes and a no vote; (ii) inability to make a decision without more time or more information; (iii) preference for some other mechanism for making this decision; and (iv) bored by this survey and anxious to end it as quickly as possible.

Steady State or Interim Losses — Not Applicable:

> It should be made apparent that respondents can distinguish interim from steady-state losses.

§ 4.6.2 Discussion of Panel Guidelines

In this section we discuss the seven recommendations which we did not implement or implemented with qualification.

§ 4.6.2.1 Steady State or Interim Losses — Not Applicable

The recommendation that "It should be made apparent that respondents can distinguish interim from steady-state losses" is not applicable to the Lost Use Value Study. It is not entirely clear how the Panel implicitly defined *interim* and *steady state* losses, but the following quote from the Panel's report provides some guidance:

> Typically, environmental damages from oil spills or similar accidents are severe for some period of time -- weeks, months, or sometimes a few years -- and gradually are reduced by natural forces and human efforts to a low or possibly even zero steady state level. In some circumstances, passive-use losses derive only or mostly from the steady state conditions; thus, if passive use value

> derives from species diversity, even a considerable loss of birds or mammals which does not endanger the species will give rise to no loss in value. [Arrow, p. 4608]

We conclude from the above statement that the Panel associates *interim* losses with injuries of short duration, for example, injuries that last for only a few years, while *steady state* losses are associated with injuries that continue for periods of time in excess of a few years.

We use italics for the Panel's expression *interim* losses to underscore the fact that the definition of *interim* loss we are attributing to the Panel is not coincident with the definition of interim lost use normally employed in damage assessment and employed in the Lost Use Value Study. In damage assessment, interim lost use is not time-qualified; that is, it does not pertain exclusively to injuries of a short duration, but is the term used to define losses due to injuries during the interim from onset of injury to complete recovery of the resources to what would be their baseline conditions.

As noted in Chapter 2, the releases in question and associated injuries began more than 40 years ago; and conservative estimates of natural recovery suggest that a return to baseline conditions is well into the next century. Therefore, there is no reason to believe that these are short duration losses that the Panel would classify as *interim*. Since there are no *interim* losses as defined by the Panel, there is no reason to query respondents about such losses.

§ 4.6.2.2 Present Value Calculations of Interim Losses — Qualification

The Panel suggests that respondents should be adequately sensitive to the timing of the restoration process. The context in which this recommendation is placed implies that the Panel was considering the *short-term* effects of oil spills and the potential for a fairly rapid recovery. For example, in introducing this issue, the Panel observes:

> Typically, environmental damages from oil spills or similar accidents are severe

> for some period of time — weeks, months, or sometimes a few years — and gradually are reduced by natural forces and human efforts to a low or possibly even zero steady state level. ... CV surveys accordingly have to be carefully designed to allow respondents to differentiate interim from steady state passive-use loss, and, if there is interim passive-use loss, to report its present value correctly. [Arrow, p. 4608]

This explanation makes clear that to the extent the Panel's concerns are relevant to our CV questions, they are satisfied by the framework. There are two reasons for this conclusion. First, our objective is to measure prospective ILUV, assuming full restoration. When a respondent chooses the proposed program, there are no steady state passive use losses. Second, the injuries associated with the Southern California Bight do not conform to the "short-term" oil spill framework envisioned by the Panel's guidance.[55]

§ 4.6.2.3 Deflection of Transaction Value — Qualification

As noted earlier in this chapter (section 4.5.7), in the absence of any rigorous tests we believe the concept of "warm glow" as developed by Andreoni is irrelevant to a CV survey such as the one described here. What is relevant in this context is the Panel's suggestion that the respondent's attention should be focused on the specific injuries to natural resources and away from expressions of general preferences for improving the environment. We placed a high priority on this requirement in designing the instrument for the Lost Use Value Study. Two features in particular — the use of the referendum format and an income tax payment vehicle — serve to enhance the realism of the choice situation and therefore help to deflect any transaction value.

[55] Furthermore, the panel's framework may not apply to all or any oil spills either. In any event, whether the short-term "oil spill" framework of the Panel applies is an empirical issue.

§ 4.6.2.4 Burden of Proof: Limitations on Yes/No Follow-up Questions — Qualification

The Panel calls for open-ended inquiries to allow respondents to explain their reasoning in answering the CV choice questions. Their recommendation must be considered in light of the literature in psychology on the reliability of introspection questions that ask respondents to explain how they arrived at their reported attitudes. This research indicates that although people generally have good insights into their likes and dislikes and can report those attitudes well, the process underlying their thinking is more difficult to elicit. The literature suggests three guidelines for efforts to collect this information. All three were incorporated in our main study questionnaire when respondents were asked about the reasons for their choices.

First, requests for explanations of choices should be treated as containing "traces" (not specifics) of the cognitive processes leading to a respondent's decision. In short, one should not expect to obtain a detailed, fully accurate explanation of all the reasons why an individual made a particular choice. Second, these introspective questions should be placed after all important choice questions, because some literature indicated they can be disruptive. Finally, no attempt should be made to request a respondent's view of his or her choice in comparison with the choices that would be made by others.

§ 4.6.2.5 Alternative Expenditure Possibilities — Qualification

In its recommendations, the Panel says,

> Respondents must be reminded that their willingness to pay for the environmental program in question would reduce their expenditures for private goods or other public goods. This reminder should be more than perfunctory, but less than overwhelming. The goal is to induce respondents to keep in mind other likely expenditures, including those on other environmental goods, when evaluating the main scenario. [Arrow, p. 4609]

Insuring that respondents understand and consider in their deliberations the consequences

of the choices they make in response to a CV question is our standard CV practice. We believe this quote reflects the Panel's concern with this same understanding and consideration of consequences. In the current study, we emphasized to the respondent the financial responsibility associated with votes *for* the program at a point immediately before the voting choice questions and gave the respondent an opportunity to reconsider his or her vote at a later point in the survey after further emphasizing the respondent's financial responsibility implied by the choice.[56]

§ 4.6.2.6 Temporal Averaging — Not Implemented

The Panel suggested that "time dependent measurement noise should be reduced by averaging across independently drawn samples taken at different points in time." One might interpret the Panel's proposal to mean that the identical final CV survey (*i.e.*, the survey as it stands after all design work is completed and pilot testing accomplished) should be administered to a random sample of the target population on at least two occasions, separated from each other by an unspecified period of time. Estimates of lost total value calculated from these surveys would then be averaged. On the basis of specific instrument development work described immediately below, which found no evidence for "time dependent measurement noise" for CV surveys with design characteristics similar to the present one, we did not implement this recommendation.

We replicated the Exxon Valdez oil spill (EVOS) CV survey more than two years after it was originally fielded.[57] The Exxon Valdez study, reported in Carson *et al.*, (1992), was

[56] See Chapter 6 for further details.

[57] The questionnaire was slightly amended to reflect the change in the timing of the survey in relation to the oil spill.

reviewed by the Panel and used by them as an example in describing several of the key elements in their recommendations. More generally, the spill represented a large disaster at a particular point in time, an occurrence that is likely to be characteristic of the types of incidents that the Panel felt would benefit from temporal averaging. Because the EVOS instrument is closely comparable to the present questionnaire in its design and implementation, it was an appropriate vehicle to use to examine the issue of time dependent measurement noise and several other Panel suggestions.

The EVOS replication was conducted for us as part of the instrument development for the Lost Use Value Study by the National Opinion Research Center (NORC) of the University of Chicago in May-July, 1993.[58] The interviews were conducted in-person with a probability sample of adults chosen from 34 counties throughout the United States. An empirical test of the hypothesis that the pattern of votes *for* and *against* a program to prevent a future "Exxon Valdez" type oil spill in Prince William Sound has changed over the two year period between the first and the second administrations of the EVOS instrument is presented below. On the basis of these results we find no empirical support for the recommendation to temporally average results from our current study.

The Exxon Valdez CV instrument has the same structure as the present survey: general attitude questions at the beginning, description of injuries and then a program that would prevent them, referendum format, tax payment vehicle, for/against responses to different tax amounts, follow-up questions, and opportunities for the respondents to change their votes. Like the present survey, it was conducted in-person by professional interviewers. The specific text read to the respondents was as follows:

[58] NORC is a nationally recognized professional survey research organization. Chapter 5 and Appendix B.1 contain further discussion of the NORC survey and its findings.

Because everyone would bear part of the cost, we are using this survey to ask people how they would vote if they had the chance to vote on the program.

We have found some people would vote for the program and others would vote against it. Both have good reasons for why they would vote that way.

Those who vote for say it is worth money to them to prevent the damage from another large spill in Prince William Sound.

Those who vote against mention concerns like the following:

Some mention that it won't protect any other part of the country except the area around Prince William Sound.

Some say that if they pay for this program they would have less money to use for other things that are more important to them.

And some say the money they would have to pay for the program is more than they can afford. (PAUSE)

Of course whether people would vote for or against the escort ship program depends on how much it will cost their household.

At present, government officials estimate the program will cost your household a total of $___. You would pay this in a special one time charge in addition to your regular federal taxes. This money would only be used for the program to prevent damage from another large oil spill in Prince William Sound. **(PAUSE)**

If the program cost your household a total of $___, would you vote . . . **(READ CATEGORIES AND CODE ONE ONLY)**

For the program, ... 1
Against the program, ... 2

NOT SURE 8

The blank tax amounts ($__) were randomly assigned to one of four dollar amounts ($10, $30, $60, or $120).

The most direct test of the influence of time (*i.e.*, the lapse between the original EVOS survey in the late winter of 1991 and the replication using the NORC survey in the summer of 1993) is provided by evaluating whether time influenced the distribution of *for* and *against* choices in responding to the offered program. In 1991, 51.5 percent of the sample (N=1,043) voted for the oil spill prevention program compared with 52.7 percent of the 1993 NORC

sample (N=300). This difference is not statistically different (p=0.714).[59] Table 4.1 reports the distribution of *for* and *against* votes at each of the four tax amounts used in the EVOS instrument. For each amount, the differences between the EVOS responses and the NORC responses were not statistically significant.[60]

Table 4.1 Comparison of Votes at Different Tax Amounts for the EVOS and NORC CV Surveys

CHOICE	EVOS [*1/91—4/91*]	NORC [*5/93—7/93*]
Tax = $10	(N=264)	(N=87)
Vote For	67.4%	67.8%
Vote Against	32.6%	32.2%
	χ^2=0.005; p=0.946	
Tax = $30	(N=267)	(N=66)
Vote For	51.7%	56.1%
Vote Against	48.3%	43.9%
	χ^2=0.406; p=0.524	
Tax = $60	(N=255)	(N=81)
Vote For	50.6%	49.4%
Vote Against	49.4%	50.6%
	χ^2=0.036; p=0.850	
Tax = $120	(N=257)	(N=66)
Vote For	34.2%	33.3%
Vote Against	65.8%	66.7%
	χ^2=0.019; p=0.890	

[59] The p-value is a simple value used to describe the test results. As a rule, hypotheses tests adopt a specific significance level (often 5 percent). This significance level specifies the probability of incorrectly rejecting a "true" null hypothesis. Thus with the selection of 5 percent significance level, one would be accepting the chance of making mistakes 5 percent of the time this test was repeated with exactly the same hypotheses and type of information. The p-value computes what the level of significance would have to be adopted to reject the hypothesis.

[60] In all cases, the null hypothesis of comparable distribution of responses cannot be rejected at the conventional levels of confidence.

§ 4.6.2.7 No-Answer Option — Not Implemented

The NOAA Panel included a recommendation that CV surveys explicitly offer respondents a third, "no-answer" option. In its rationale for this recommendation, the Panel points out that in national split-sample experiments, large numbers of people take the "don't know" option when it is offered as an answer option to typical attitude questions. The Panel was concerned that there may be a comparable percent of respondents in contingent valuation surveys who give WTP responses when forced to do so but whose answers do not reflect meaningful opinions on the issue. In addition, the Panel suggested that an explicit would-not-vote option in a contingent valuation instrument would better simulate real referenda where voters always have the opportunity of not voting.

Implementing the "would-not-vote" recommendation in the contingent valuation context has a potentially serious cost: the loss of choice information from a portion of the sample. An alternate view to the one expressed by the Panel holds that this sacrifice is not necessary, because most or all of those who take an offered "would-not-vote" option are in fact capable of making a meaningful voting decision. This view holds that offering the would-not-vote option encourages respondents to "satisfice" rather than to expend the effort necessary to give considered responses.[61]

In a CV interview, by the time people reach the point of voting, they have received a great deal of information about the issue and most are likely to be able to make a decision one way or the other if the study is well designed. In such a study, if a person cannot make a decision, he or she is not pressured to do so by a CV interviewer, who is instructed to accept "not sure" answers whenever they are offered to a voting question.

[61] See Appendix B.1 for a discussion of this perspective.

We used a split-sample design with the NORC survey described earlier to examine whether the lack of a would-not-vote option biases the findings of a CV survey in the ways the Panel suggested. This type of test,[62] where one random sub-sample receives one treatment and another random sub-sample receives a different treatment, is a standard procedure used by survey researchers to determine whether variations in question wording or context affect responses (Schuman and Presser, 1981; Turner and Martin, 1984). Professional interviewers from NORC administered four versions of the EVOS instrument.[63] Respondents were assigned randomly to the four treatments. Here we compare two of these treatments: the standard version of the EVOS instrument[64] and a would-not-vote version. The standard version offered only the for/against options; the would-not-vote version was identical to the standard version in every way except at the willingness-to-pay questions where it explicitly offered a would-not-vote option in addition to the for/against options. In both treatments, interviewers accepted "not sure" responses if the respondent expressed this point of view.

This test yielded three main findings. First, the percent who took the would-not-vote option when offered was 9.3 percent. This is considerably lower than the average of about 25 percent expected by the NOAA Panel. An additional 8.4 percent in the would-not-vote version said they were "not sure" how they would vote, which is close to the 6.7 percent who said they were "not sure" in the standard version.

Second, when those respondents who chose the would-not-vote option were counted as

[62] Sometimes called a "split-ballot" test.

[63] We used the EVOS instrument because it used a design very similar to the present survey and was fully field-tested and ready to administer whereas the instrument for this study was still in the development stage. The only modifications we made in the Alaska instrument were those required by the tests.

[64] This is the version we used earlier to compare with the original EVOS findings to test the need for temporal averaging.

voting against the program (a conservative assignment), the two treatments resulted in virtually identical voting patterns. One comparison, displayed in Table 4.2, shows that the proportion of the respondents voting in favor of the program to protect Prince William Sound was nearly identical regardless of whether or not the would-not-vote option was offered. It appears that virtually all of those who take the would-not-vote option would otherwise have voted against the program.

Third, to explore whether offering the would-not-vote option improved data quality by eliminating respondents who lacked meaningful opinions, we assessed how well we could predict respondents' choices (*i.e.*, a vote *for* or a vote *against*) using their attitudes and beliefs (*e.g.*, how effectively they felt the escort ship program prevented oil spills, how much they supported programs to protect wilderness areas), demographic characteristics such as income, and characteristics of the choice they were given (*e.g.*, the amount of tax their household would have to pay). If omitting the would-not-vote option led some respondents to select vote *for* or vote *against* choices in a haphazard manner, then voting decisions should be predicted less well by these various factors than when the would-not-vote option is included. This turned out not to be the case: the set of predictors explained the choices just as well when the would-not-vote option was offered as when it was omitted. A complete discussion of this analysis is contained in Appendix B.1.

Table 4.2 Effects of Not Vote Option — Composite Across Tax Amounts

Choice	Standard Version	Would Not Vote Option Offered
Tax = $10	(N=87)	(N=82)
Vote For	67.8%	73.2%
Vote Against	32.2%	26.8%
	χ^2=0.581; p=0.446	
Tax = $30	(N=66)	(N=87)
Vote For	56.1%	49.4%
Vote Against	43.9%	50.6%
	χ^2=0.662; p=0.416	
Tax = $60	(N=81)	(N=73)
Vote For	49.4%	45.2%
Vote Against	50.6%	54.8%
	χ^2=0.269; p=0.604	
Tax = $120	(N=66)	(N=80)
Vote For	33.3%	38.8%
Vote Against	66.7%	61.3%
	χ^2=0.459; p=0.498	

This result is inconsistent with the Panel's logic and consistent with an alternative position that offering the would-not-vote option is undesirable because it encourages respondents who would otherwise vote against the program to take an easy out and accept the would-not-vote option. If our test had found that offering the would-not-vote option significantly lowered CV willingness-to-pay values or improved the quality of the data we would have used that format in this study. Because it did not, we concluded that there were no grounds for following the Panel's recommendation in this particular case.

§ 5 Development of the Survey Instruments

§ 5.1 Introduction

The survey instrument for the main study was developed over 31 months, beginning in August 1991 and ending in March 1994, when the final instrument was put into the field. During this development period, the NOAA Panel released its report. While many of the considerations posed by that report reflected our standard practice,[65] by endorsing certain design options, the report mandated serious consideration of several other issues. Chief among these was sensitivity to scope for which we developed a second survey instrument, identical to the first except for the injury description and other wording dependent on the injury description.[66] We refer to the first instrument as the *base* version and to the second as the *scope* version. The final versions of these two instruments were used to examine whether respondents' choices were sensitive to the size of the injury. The discussion that follows focuses on the development of the base instrument, unless otherwise specified.

As discussed in Chapter 4, the central portion of the survey instrument describes the elements of the choice including the description of the object of choice and circumstances of the choice.[67] The mechanism by which each respondent was given the opportunity to state a choice was a referendum where the respondent was asked to vote *for* or *against* a program (*i.e.*, the object of choice) to speed up the affected species' recovery from the described effects of DDT and PCB's. Given the elements of choice described in the survey, respondents' decisions can be used to construct a measure of prospective interim lost use value (ILUV). Other questions

[65] See Carson *et al.*, (1992).

[66] The scope version (see Appendix A-2) also includes an extra question, C-23, that asks respondents if they would consider the problem caused by the two chemicals to be more serious if Bald Eagles and Peregrine Falcons were also affected.

[67] See Chapter 3 for a discussion of the choice framework.

preceding and following the presentation of the choice questions ask about respondent attitudes, familiarity with the chemicals and the deposit, understanding of the choice elements, and personal characteristics. During the interview, show cards, maps, and diagrams are shown to respondents to help convey the information presented verbally by the interviewers.[68]

In this chapter, we discuss the development of the main study survey instruments with a particular focus on the development of a credible description of the object of choice and circumstances of the choice.[69] Throughout this development process, we followed the basic objectives outlined in section 4.3 of Chapter 4 and those discussed below.

§ 5.2 Objectives of the Instrument Development

We conducted an extensive program of instrument development for this study. The first stage involved exploratory work, primarily through focus groups. In the next stage, a first draft of the questionnaire was continually revised while testing it in a series of cognitive interviews followed by several small field pretests. During the third stage we conducted a series of pilot surveys, as well as additional cognitive interviews and several more pretests. The draft instrument was peer reviewed during this third stage by specialists in information design theory, resource economics, psychology, and survey research. Throughout each stage of this process, we followed established survey research practices to ensure the reliability of the final results.[70] Later in our work, we conducted a similar development program for an instrument for the scope test.

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[68] Reproductions of the graphic sets can be found in Appendices A-1 (base) and A-2 (scope).

[69] See Appendices A-1 and A-2 for copies of the base and scope survey instruments, respectively.

[70] The reader is reminded that in this report we use the term "reliability" in the legal sense of "dependable", "trustworthy". This is similar to the term "validity" as it is used in the survey research literature (*e.g.*, Mitchell and Carson, 1989).

In the development process we sought to have the instrument meet the following objectives: the instrument should be

1. consistent with economic theory;
2. comprehensible to respondents;
3. focused on the set of defined injuries;
4. plausible in regard to the choice mechanism; and
5. perceived overall as neutral by the respondents.

The first objective was to develop an instrument that was consistent with the economic theory outlined in Chapter 3. Specifically, the instrument was designed to enable a monetary measure of economic value to be constructed from a well-defined choice regarding the specified set of natural resource injuries. Further, as Chapter 3 discussed, even though the ideal elements of choice cannot always be implemented in practice, the formulation of these elements should nonetheless mimic as closely as possible the condition appropriate to the compensation required by the public to permit the temporal pattern of injuries.

The second objective is a basic survey research goal — that respondents from all educational levels and varied life experiences comprehend the language, concepts, and questions used in the survey.

The third objective was to have the respondents focus on only the defined set of injuries. This objective required carefully describing the specific injuries and their recovery time in such a way as to minimize the possibility that respondents would envision a more extensive or less extensive set of injuries. The presentation of the injuries was guided by our findings during instrument development.[71] We used open-ended debriefing questions and follow-up questions to monitor our success in meeting this goal. Follow-up questions were used to evaluate the relationship between respondent choices and those instances when the respondent apparently

[71] As noted in Chapter 2, the set of injuries to be valued was provided by Trustees representatives and the injuries as described in the final survey instruments were reviewed by the Trustees prior to the fielding of the main study.

envisioned injuries which differed in some way from the set described in the instrument. As noted above, we also tested whether respondents were sensitive to the size of the injury by administering two versions of the instrument to split samples.[72]

Our fourth objective was to design a plausible choice mechanism. Even if a respondent understands the choice, he or she will not take it seriously if it is not plausible. To this end, we used a referendum mechanism: each respondent was asked to make a decision as to whether he or she would vote for or against a program that, if adopted, would cost his/her household a specified amount in addition to what the household already pays for other public goods and household expenses. A large number of other design decisions to enhance plausibility will be noted in this and the following chapter. For example, describing the State as the sponsor helped enhance the referendum's realism and the State's intent in conducting the survey was explained in such a way that respondents would find it reasonable to be asked about how they would vote given the particular set of injuries described to them.

Perceived neutrality was the fifth goal: respondents should not perceive the purpose of the interview as the State's promotion of a particular choice. To this end, we took care to avoid bias in the wording and the sequence of the material, and we encouraged respondents to consider a number of reasons why they might not want to vote for the program.

In addition to the objectives discussed above, we followed a conservative strategy when faced with instrument design choices where there was no apparent correct choice based on the facts, theory, methodological considerations, or the recommendations of the NOAA Panel report. In these cases, we chose the design alternative that, if it had any effect on the respondent, would tend to <u>reduce</u> the likelihood of a vote *for* the program.

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[72] See Section 5.7 for a description of the *scope* version.

§ 5.3 Instrument Design — Stage 1

The design work for the survey began in August of 1991 with a series of five focus groups in different locations throughout California.[73] The location and dates of these five groups are listed in Table 5.1.[74] The focus group sites were used to recruit participants from several different areas in Los Angeles,[75] San Diego, and San Jose.

Table 5.1 Stage 1 Focus Groups

Focus Group	Location in CA	Date Conducted
1	Burbank/San Fernando Valley	August 6, 1991
2	Torrance	August 7, 1991
3	San Diego	August 19, 1991
4	San Jose	August 20, 1991
5	Torrance	August 21, 1991

Focus groups are group discussions, lasting, in our case, about two hours in length. The group discusses topics introduced by a moderator who leads the discussion (Greenbaum, 1993). The goal of the discussion is to obtain information from the participants. Focus groups have often been used to learn about how people think about commercial products or political candidates. They are also used to improve survey design. Although those who choose to participate in focus groups are not a random sample of the public, information learned from the groups can be checked later in the instrument development process by conducting pretest and

[73] Focus groups were just one of several techniques used during instrument development.

[74] We conducted an additional set of nine focus groups in 1993 (see Table 5.7) during the design of the scope instrument.

[75] The two Torrance groups were recruited from different areas, one south of the facility and the other north.

pilot interviews in the field.

In the case of designing contingent valuation questionnaires, focus groups offer the opportunity in the early stages of design to explore participants' beliefs, attitudes, and knowledge about the survey's subject matter, and to obtain the participants' reactions to possible scenario elements (Desvousges, Smith, Brown, and Pate, 1984). For this study we wanted to learn what knowledge respondents might have about the particular chemical deposit and its effect; what beliefs they held that might affect their responses; and how plausible they found possible elements of the choice we could use in the questionnaire.

The focus groups for this study were conducted in facilities designed for focus group research. For example, all of the facilities had an observation room where researchers could discreetly observe the discussion through a one-way mirror. Eight to 12 participants were randomly recruited by the focus group facility staff either from their own databases or randomly from local telephone directories. For their time, the participants were paid the standard fee recommended by the facility .

We provided the recruiters with a screening questionnaire to recruit people in certain age, education, and sex categories and to filter out any persons who had previously taken part in any focus group. We typically used quotas to ensure that the group included a balanced number of men and women, a range of ages, and a range of educational attainments. To reduce the chance that those who agreed to participate were especially interested in the discussion topic, the screener described the purpose of the group in general terms: "On (date), we are holding a group discussion to gather area resident opinions on a current state public issue."

So that we could learn the participants' pre-existing views about the subject matter of the survey, the specific subject matter—the DDT/PCB deposit and its effects—was only revealed,

later in the session, after an initial discussion. The conversations were tape-recorded, and the audio tapes were transcribed for further analysis.

Most focus group participants had heard of DDT and some of PCB's; most had not heard of the particular DDT/PCB deposit being discussed. The wildlife injuries were plausible to many, as was the concept of bio-magnification up the food chain. There was a rather widespread knowledge that DDT causes eggshell thinning. The idea of a program to cover the contaminated sediment showed promise of being plausible, but various concerns were raised that would have to be addressed in the survey instrument, such as a fear that it would stir up the sediment, a concern that it would not be effective, distrust of the State's ability to carry it out, and a desire to know whether something like this had been done elsewhere. Some participants made comments indicating that they would not be willing to pay for this for a variety of reasons, including a belief that taxes were too high already and that the affected species would eventually recover naturally. Hearing about the effects of DDT and PCB's in fish raised concerns in some participants' minds that the chemicals posed a health threat to humans.

§ 5.4 Key Design Issues

The focus groups helped us to assess the instrument design we had in mind, what information was important to present during the interview, and which potential sources of misunderstanding required addressing in the instrument's wording to avoid biasing the findings. On the basis of this information and decisions about a number of important design issues, the initial draft of the survey instrument was developed. These design issues involved the specific choice mechanism, the elicitation method, the nature of the payment vehicle, the number of years over which payments would be collected, the sequence in which the choice elements were

presented, whether to offer respondents a specific "not vote" alternative in asking the willingness-to-pay question, whether to present the damages as part of a sequence with other goods, the choice of substitutes, quantity of information presented, and visual aids.[76] These decisions were subjected to peer review at several points during the design process. A brief discussion of these decisions follows.

Choice mechanism. We framed the choice for the respondent as a referendum voting decision where the respondent was asked to state how he or she would vote on a well-defined object of choice at a specified tax amount. In a national contingent valuation survey (Carson *et al.*, 1992) and in the present study, we have found most respondents easily comprehend a referendum vote decision and take this type of voting question seriously. Voting on ballot propositions concerning government policies has a long history in American politics. In California propositions are frequently placed on the ballot at the state and local level in California. Political mechanisms of this kind have desirable theoretical attributes that CV surveys are well suited to realize since they are able to provide key information about the good and its provision in a controlled setting that optimizes respondent attention and comprehension.[77] The referendum model has been widely adopted by CV practitioners and, as noted in Chapter 4, was endorsed by the NOAA Panel (Arrow *et al.*, 1993; p. 4608).

Elicitation method. We used a binary, discrete-choice elicitation question which states a tax amount and then offers respondents the choice to vote for or against the program.[78] This type of question is easier for respondents to answer than an open-ended question that asks them

[76] Some design decisions were made at later stages in the instrument development process. The decisions discussed here all pertain to the final instrument.

[77] See Mitchell and Carson (1989; pp. 94-97) for a discussion of the relationship between a CV referendum and actual referenda on this point.

[78] The NOAA Panel preferred this format to the open-ended alternative (Arrow, p. 4612).

for the exact amount they are willing to pay for the program (*i.e.*, object of choice). Furthermore, people usually make decisions for most goods they purchase in this take-it-or-leave-it manner. The referendum context generally provides respondents with an incentive to vote *for* if they would rather implement the program and pay the amount specified and to vote *against* if they would rather not pay the amount specified.

A second, binary discrete-choice question followed the first. Those who initially voted *against* were asked to make a decision about a lower amount, and those who initially voted *for* were asked to make a decision about a higher amount.

Payment vehicle. The payment vehicle specifies how the respondent would pay for the object of choice. The link between the payment vehicle and the object must be plausible and credible, and it should bring the relevant budget constraint to mind.[79] We chose our payment vehicle—an additional amount on the respondent's next year's state income tax—because that is the way Californians pay for many public services provided by the State including those they vote to tax themselves for in actual state referenda. Respondents were told that the survey was being conducted for the State; our preliminary work found that most respondents accepted this way of paying for the program. Furthermore, this payment vehicle has the additional attribute of strongly invoking a budget constraint, as our design work indicated that many Californians were reluctant to increase their income taxes.[80]

Length of payment. A single, lump-sum payment was used in this study because the accelerated recovery program would take place in a single year and respondents pay income taxes on a yearly basis. This is a conservative strategy, as it forces respondents to confront the

[79] See sections 4.3 and 4.5.1 of Chapter 4 and the NOAA Panel Report (Arrow, p. 4609).

[80] Coincidentally, the survey went into the field approximately five weeks prior to the due date for California State income tax returns.

financial implications of their decision without having the option of paying the amount in installments over the course of several years.

For or against elicitation question. Our instrument uses a standard format for CV referendum questions where respondents are offered two voting options: *for* or *against*.[81] Those who volunteered that they were "not sure" were recorded as such. The answers of respondents who would not vote were recorded by the interviewer (who was instructed to accept such answers as valid without further probing).

Tax amounts. We used five different initial tax amounts : $10, $25, $80, $140, and $215. The corresponding lower, second tax amounts asked of those who voted *against* at the first amount were: $5, $10, $45, $80, and $140, respectively. For those who voted *for* at the first amount, the second amounts asked about were: $25, $45, $140, $215, and $360, respectively. We chose the tax amounts to help increase the precision of the estimate of mean willingness to pay from the responses to the base survey instrument and to provide reasonable statistical power in testing whether there is a difference between the willingness to pay distributions for the base and scope versions of the survey instrument.

Description of substitutes. People typically have a range of natural resources that they can enjoy, so that if one is not available they can use another substitute resource. To be valid, a CV scenario should describe the resource to be valued in the context of relevant substitutes.[82] In our instrument, we presented information about a number of potential substitutes which are listed here and described in the next chapter. These substitutes and their analogue in our scenario included: (1) various other social problems that respondents might want to spend more

[81] See Chapter 4 for a discussion of an split-sample test we conducted using a contingent valuation survey similar to this one to measure the effects of offering an explicit *no-vote* option.

[82] See Chapter 4 and Arrow (p. 4605).

tax money to solve (i.e, actions that are alternatives to addressing the problems caused by the DDT/PCB deposit), (2) uninjured members of the same fish species currently living elsewhere off the South Coast, and (3) uninjured members of the same fish and bird (latter in base only) species living elsewhere in California and the U.S. We also reminded respondents that members of other species of fish and birds live off the South Coast.

In the base instrument, substitutes would be needed only for an interim period until, as a result of natural processes, the four species completely recover in fifty years. In the scope version, the recovery time for the two fish was described as fifteen years. The credibility of these predictions was reinforced by mention of the recovery of other local species. The base version also described the increases in the numbers of the two bird species everywhere else in the United States. Respondents who received the base instrument were also told that consideration was being given to reclassifying the Bald Eagle and Peregrine Falcon from endangered to threatened in some parts of the country, including California. Finally, respondents were forcefully reminded just before the voting questions that some of the affected species are common elsewhere and that they all will recover on their own in fifty years.

Quantity of information. The information provided was chosen to convey the key elements of the choice (such as the information our development work showed was necessary to avoid possible misconceptions on the part of the respondent), and the amount presented was as much as we believed could be presented without harming the quality of the interview. In order to avoid overload and respondent fatigue, we paced the flow of information and used visual aids and questions to maintain respondent interest.

Visual displays. In-person interviews commonly use show cards to provide respondents with a visual representation of some of the material which the interviewer presents verbally.

In the main study instrument, we used show cards to display lengthy lists of answer categories for closed-ended rating scale questions and to display line drawings and tables to illustrate various features of the information provided. We also used larger drawings in a separate booklet of maps and diagrams for the same purpose. In order to evaluate their ability to effectively communicate information without bias, we pretested these materials and subjected them to peer review at several points during the instrument development process.

§ 5.5 Instrument Design — Stage 2

In March, 1992, we began to test a draft instrument in one-on-one interviews[83] using cognitive interviewing techniques (Jobe and Mingay, 1989).[84] Our aims were to see whether the spoken text flowed smoothly when administered and whether the respondents understood the wording and the visual aids and regarded the choice they were asked to make as credible.

After further refining the survey instrument, a small number of professional interviewers administered it under field conditions: face-to-face in the homes of respondents who were not paid to take the interview. The survey firm contracted to conduct the surveying for this study was Westat, Inc., a firm headquartered in Rockville, Maryland.[85] As shown in Table 5.2, this took place in two pretests during May and June of 1992. We debriefed the interviewers after each pretest and revised the instrument on the basis of their comments as well as on the responses of the pretest respondents to the survey questions.

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[83] Respondents were paid to come to an interview room provided by market research firms in various locations throughout California. We continued to conduct occasional cognitive interviews to assess new drafts at various points throughout the rest of the study, particularly between Pilots II and III.

[84] The cognitive techniques that proved to be the most useful were the retrospective think-aloud and probing techniques.

[85] Westat, one of the nation's largest survey research firms, has extensive experience conducting large in-person surveys for federal and state agencies. See Appendix C-1 for a copy of Westat's brochure.

Table 5.2 Pretests of the Base Questionnaire

Pretest	Field Period	Sample Size
1	May 16-21, 1992	57
2	June 5-14, 1992	48

The basic framework of the interview, such as the way we described the injuries and the program to accelerate recovery, showed sufficient promise to justify moving to the pilot testing stage.

§ 5.6 Instrument Design — Stage 3

Throughout the instrument development process, we worked to simplify the language and presentation to minimize the instrument's cognitive burden. During the stage 3 period, the survey instrument underwent many revisions as we conducted a series of pilot tests. The wording was improved. Information was added to prevent the repetition of the mis-impressions of prior respondents. The sequence of material was altered so that the material flowed naturally and held the respondent's interest.

We also performed several other important tasks during this stage: (1) we revised the instrument three times to accommodate changes in the number of the species survey respondents were asked to consider in the object of choice, (2) we conducted several split-sample tests to examine the effects of possible design features, and (3) we considered the implications of the NOAA Panel's recommendations on contingent valuation which became available after Pilot II. In particular, two issues discussed by the NOAA Panel resulted in the addition of another development stream to the questionnaire development process during this stage. This second development stream, roughly contemporaneous with Pilot III, examined interviewer influence

on respondent answers and the effect of a would-not-vote option.

§ 5.6.1 Pilot Surveys

Beginning in July 1992, four pilot surveys were conducted over a period of 16 months. Pilot surveys usually differ from pretests in that they use more formal sampling techniques and larger samples. A larger number of interviewers are involved and the longer field period makes it possible to reach a greater diversity of respondents. As a result, pilot surveys provide a more detailed basis for evaluating how well the interview works in the field. Although the pilot sampling procedures are adequate for instrument development purposes, they are less rigorous than those used in the final survey.[86]

§ 5.6.2 Sampling and Administration for Pilots

Table 5.3 presents basic information about each pilot. The samples were designed to represent the non-institutionalized population of California age 18 years and over. Westat's trained listers canvassed and listed the dwelling units in 75 locations (segments) in ten randomly selected Primary Sampling Units (PSU's).[87] From these listings, a specified number of dwelling units were randomly selected and fielded for each pilot. With the exception of Pilot I,[88] the interviewers conducted a screener interview to select one respondent for the interview. The selection of the respondent was made from all individuals in the household who met the

[86] The final survey was based on a more rigorous design, extensive call backs, and a refusal conversion program which led to a much higher response rate. See Chapter 7 for more on sampling for the final survey.

[87] These were: San Diego, San Bernadino/Riverside, Los Angeles City, Los Angeles County, Orange, Kern, Greater Sacramento area, San Francisco Bay area, Sonoma, and Del Norte/Humboldt.

[88] A formal screener was not used in the first pilot; rather, at each selected dwelling unit, the interviewers were instructed to use a statement provided on the cover of the survey questionnaire to identify eligible respondents.

eligibility requirements: age 18 or older and owning, renting, or contributing toward the rent or mortgage of the home. In general, no attempt was made to convert refusals, and only a limited number of callbacks were made.

Table 5.3 Pilot Studies I, II, III and IV

Pilot	Field Period	Sample Size	No. of species	W-1 Design Amounts	Special Features
I	7/92	332	6	$10, $45, $80, $215	First full field test of the draft instrument.
II	8/92 to 9/92	460	6	$10, $45, $80, $215	Split-sample design comparing: a) 50 versus 150 year natural recovery period and b) two alternative placements of a single debriefing question.
III	7/93 to 8/93	324	5	$10, $45, $80, $215	Response rate test with split-samples targeted for low and high response rates.
IV	10/93 to 11/93	473	5	$10, $25, $45, $80, $215	Reversed the order in which the natural recovery and speed-up program had previously been presented, with natural recovery option presented second.

Westat conducted the data collection for each pilot using standard procedures. The interviewers attended a two-day training conducted by Westat personnel. The interviewers and the other field staff were not informed of the survey's intended use in litigation. The survey was represented as a study the State of California was conducting to learn how California citizens felt about increasing their taxes to pay for the accelerated recovery program.[89] It was

[89] There is reason to believe that response rates are higher for government sponsored surveys.

emphasized to the interviewers that there were no right or wrong answers to the voting (or any other) questions and that the goal of the study was to find out what people really felt about the topic.

For each pilot study, after the field administration of the survey was completed, Westat assembled a representative selection of about ten interviewers for a one-day debriefing session conducted by a senior Westat administrator and observed by Robert Mitchell and/or Stanley Presser. During these sessions, the interviewers were encouraged to report what sections of the survey worked well, what sections needed improvement, and any suggestions they had for wording and other types of presentational improvements.

§ 5.6.3 Pilot I

Pilot I was the first full field test of the base instrument. The debriefed interviewers reported that the scenario and the graphics held most respondents' interest, and respondents seemed to take the choice seriously. The interviewers identified problems with the wording at various points, including the first sequence of questions in Section B, which asked respondents to reveal what they had in mind about certain topics when they voted. The interviewers made numerous suggestions for improving the wording which yielded subsequent changes. In this and the following pilots and pretests, we also gained insight into how well the questionnaire was working by reviewing the answers to the open-ended questions and spontaneous comments; in both cases, interviewers were instructed to record them word-for-word as closely as possible throughout the questionnaire. Finally, the analysis of the data from the closed-ended questions was considered during revisions.

Among the changes incorporated in the Pilot II version were the addition of a prologue

that, to encourage respondents to make their own judgments, presented the interview as a common practice of the State to discover public sentiment on various programs the State might conduct; a statement that the affected bird species do not migrate (which addressed the belief held by some that birds elsewhere might be helped by the program); a similar statement about the fish; information that the population of sea lions had increased greatly during the last 15 years (to underscore the fact that they are not an endangered species); and a complete revision of the first eight questions in Section B.

In addition to implementing the wording changes listed above, we made a number of changes in the show cards. For example, we dropped as redundant a show-card we used in Pilot I that summarized information about the birds' reproductive success (Card D) and, in an attempt to improve communication in other parts of the instrument, we added show cards that listed all the species affected by the deposit (Card G1) and the reasons why the respondent might want to vote against the program (Card G2). The two maps showing the past sediment buildup and the natural recovery option were redesigned to identify the contaminated sediment layer better and to convey in a clearer fashion the progressive increase in sediment depth over the fifty-year natural recovery period.

§ 5.6.4 Pilot II

Pilot II evaluated the changes made to the instrument as a result of Pilot I and two special issues. The first concerned the length of the natural recovery period. Because there was uncertainty about the length of the recovery period, two different treatments were fielded in this pilot to explore what effects changing the recovery period would have on the scenario's plausibility. The scenario for one sub-sample used a fifty year recovery period; a comparable

sub-sample used the same scenario except that the recovery period was 150 years. From the interviewer debriefings and an examination of the verbatims and responses to relevant questions, we found, overall, that respondents accepted the longer time period as credible. We concluded that we could, if necessary, lengthen the time period should such a change be needed.

Comparing the W-1 response for the 50 and 150 year treatments using a probit equation where the slope parameter on the log of the W-1 amount is allowed to vary by treatment, we found an insignificant but suggestive differences ($p=0.121$), using a one-sided asymptotic t-test between the two treatments. Dropping the respondents who did not pay California taxes (an issue discussed at some length in Chapter 9), we find that the null hypothesis of no difference between the two treatments would be rejected at $p=0.058$. Controlling for those who thought the issue of chemical contamination in question A-1d was "extremely important" or "very important" and letting the coefficient on the A-1d dummy variable vary with the treatment allows one to reject the equivalence of the slope parameters on the log of the W1AMT at $p=0.016$ for the full sample and at $p=0.007$ after dropping the respondents who did not pay California taxes.[90]

The second issue we evaluated with a split-sample design explored the effects of the placement of the open-ended, follow-up question asked of respondents who voted *for* the program. The question asked what the program would do that made them willing to pay for it.[91] One sub-sample received placement 1 which put this question <u>between</u> the first voting question and the second voting question. Another sub-sample received placement 2 in which the

[90] A-1d is a key preference question asked in the survey before any aspect of the injuries or the accelerated recovery program is described. As a result, the response to it would not be influenced by which treatment the respondent received.

[91] See question W-6 in the main study survey instrument, Appendix A-1.

follow-up question was asked after the respondent had answered both the first and the second voting questions. At issue was whether the immediate proximity of the follow-up question to the first vote question in placement 1 would reveal different insights into the respondents' valuations than placement 2. We were also interested in whether placement 1 would affect respondents' answers to the second voting question in some systematic way, such as by making them more self-conscious about their WTP responses.

We assessed the effect of placement 1 on the answers to the open-ended, follow-up question by comparing them for the two sub-samples and found no difference. As for the effect of placement 1 on the follow-up question, we found no statistically significant differences ($p=0.752$) in the percentage of people who voted for or against the program in the two placements. However, when Westat debriefed the Pilot II interviewers, some reported that they found the immediate "why" follow-up question interfered with the flow of the interview: the follow-up question did not seem to follow the initial question as naturally in placement 1 as it did in placement 2.

These findings led us: (1) to ask the "why" follow-up question after the respondent had answered both WTP questions (placement 2) since the alternative offered no advantage and posed some disadvantages, and (2) to encourage interviewers in the main survey to carefully record any spontaneous comments respondents made when they answered the WTP questions.

§ 5.6.5 Pilot III

The third pilot was the first full field test after the Trustees directed that we drop the Brown Pelican from the list of affected species and value the recovery of five species (two fish, two birds, and one mammal). Other changes made to the instrument as a result of Pilot II were:

1) reworded questions A-1 and A-2 to make them easier for respondents to understand, 2) added language to clarify that the fish are only affected in one area, 3) clarification of the meaning of "sediment", 4) reassurance that the program would not stir up the existing sediment during the process of covering it, 5) clarification of the timing of the two options, and 6) a reworded B-6 to avoid having respondents think the question referred to the interviewer rather than the interview. We modified the scenario introduction further to enhance accountability by telling respondents that they would be asked later in the interview to explain why they felt the way they did about the program.[92] We also simplified the question sequence about the Channel Islands, simplified the description of how DDT and PCB's affect wildlife and further modified questions B-1 through B-3. Finally, the show cards underwent changes designed to better communicate both the endangered and the non-endangered character of the five species.

§ 5.6.6 The Ballot-Box and No-Vote Option Study

At the same time that we were designing and implementing Pilot III, we were examining in a separate development stream whether two issues raised in the NOAA Panel Report should be implemented in the main survey we were designing for this study. One of these issues, described in Chapter 4, was whether CV surveys should offer, in addition to the *for* and *against* options in the voting questions, a would-not-vote option. The second issue was whether secret balloting should be used to avoid interviewer influence.

The results of development work on the would-not-vote option were presented in Chapter 4; the Panel's recommendation that CV surveys include this option was one of the few recommendations we did not implement. The findings of the ballot box survey we conducted

[92] Studies show (see Krosnick, 1991, for a review) that respondents are most likely to put more effort into their responses when they believe they will be held accountable for justifying their answers.

to test for interviewer effects was deferred to the present chapter because of the Panel's recommendation that major CV studies should assess interviewer effects.

Because of prior commitments on the part of Westat and the need for quick resolution of this issue at a time when the instrument for this study was still in development, we chose to resolve these issues by conducting the appropriate surveys with a fully developed instrument whose design was comparable to that used in this study and that could be administered to a non-California sample by the National Opinion Research Center (NORC) of the University of Chicago. This instrument was the Exxon Valdez Oil Spill (EVOS) damage assessment survey.[93] As described in Chapter 4, the use of the EVOS survey instrument provided an additional benefit: confirming the temporal stability of CV natural resource damage estimates obtained from this type of CV survey.

§ 5.6.6.1 Design and Implementation of the Surveys

Four new versions of the EVOS instrument were created to test how the would-not-vote and secret ballot procedures affect the WTP amounts and data quality in a CV survey that closely resembles the one used in this study.[94]

Version I represented the standard version of the EVOS instrument and is virtually identical to the instrument used in the original Exxon Valdez study (Carson *et al.*, 1992).

Version II, the ballot box version, was identical to the standard version except that it offered respondents the opportunity to vote in secret. After administering the elicitation question at the first (and only in this version) voting question, the interviewer was instructed to hand the

[93] See Carson *et al.*, (1992) for a complete description of the study.

[94] A full description of these may be found in NRDA (1994).

respondent a paper ballot with the text of the question written on it and places for the respondent to mark his or her choices. In this version the choices were the same as Version I — for or against. After voting, the respondent was instructed to seal the ballot in an envelope provided by the interviewer, and then to place the sealed ballot in a wooden, locked, ballot box. The paper ballot was coded so it could be matched with the correct questionnaire at NORC's headquarters.

Version III, the would-not-vote version, was identical to version I except that an explicit would-not-vote option was added to the for/against categories.

Version IV, the ballot box/would-not-vote version, included both the novel features of versions II and III. Otherwise, it is identical to the standard version.[95]

Within each treatment, four cost forms were used. As illustrated in Table 5.4, each cost form used a different set of dollar amounts as the cost of the prevention program. When the first WTP question was asked, depending upon the cost form of the questionnaire (A, B, C, or D), the respondent was told the cost was $10, $30, $60, or $120 dollars, respectively. If the respondent voted *for* the program, the second voting question was asked with a higher amount than in A-15, either $30, $60, $120, or $250, which amount depending on the cost form. If the respondent voted *against* the program, the second voting question was A-17 which incorporated a lower amount than in A-15, either $5, $10, $30, or $60, which amount depending on the cost form. Since the two ballot-box versions did not use a second voting question, the cost forms of questionnaire versions II and IV used only a single dollar amount and not a second amount, lower or higher.

[95] The results from these surveys, also reported in Chapter 4, draw on comparisons between the standard version I and the ballot box and would-not-vote versions II and III. Appendix B.1 discusses the version IV results.

Table 5.4 Tax Amounts for the Voting Questions

	A	B	C	D
A-15 (Versions I, II, III, IV)	$10	$30	$60	$120
A-16 (Versions I, III)	$30	$60	$120	$250
A-17 (Versions I, III)	$5	$10	$30	$60

As noted earlier, the National Opinion Research Center (NORC) administered this survey.[96] None of the NORC field personnel who worked on this study were told that this study might be used in litigation.[97] During the field period, only a few higher-level staff in NORC's Chicago office knew of the intended use of this study.

We conducted two pretests of selected versions. In the first pretest, 64 interviews were conducted in the field with questionnaire versions II and IV. After modifications, version II was pretested a second time in 26 interviews.

The field work for the main survey used a probability sample of adults chosen from 34 counties throughout the United States.[98] This main sample was designed according to standard procedures although, due to time constraints, the selection of PSU's was determined by the availability of sample and sufficiently experienced field personnel. The 28 interviewers who worked on the study were trained in Arlington, Illinois on May 23-24, 1993. The interviews for the study were conducted over an eight-week period from May 26 to July 17, 1993. A total

[96] A report on the methods used in this study is contained in NORC (1993).

[97] This study was entitled the National Issues Study; and in dealing with NORC personnel, we referred to this effort by that name.

[98] For a more extensive description of the sampling, see NORC (1993).

of 1182 interviews were conducted for an overall response rate of 73 percent.[99]

§ 5.6.6.2 Pretesting for Interviewer Effects

The issue raised by the Panel was whether the presence of the interviewer in a CV survey such as the one used in this study might lead some respondents to feel pressured to vote in a socially desirable way. The Panel felt this might happen in CV surveys about natural resource damages because protecting the environment "is widely viewed as something positive" (Arrow p. 4611).[100] In order to assess this possibility the Panel recommended that major CV studies conduct split-sample tests using a secret ballot to test for this type of interviewer effect.

We used the same split-sample methodology for this survey as described in Chapter 4 for the would-not-vote study.[101] In what follows, we present the comparison of the standard version, questionnaire version I (N=300), with the ballot box version, questionnaire version II (N=271).[102] A comparison of the answers to the first willingness-to-pay question (the ballot box procedure made it impossible to ask the follow-up, willingness-to-pay question) shows that the overall percentage voting *for* in the standard version is 52.7 percent versus 50.6 percent in the ballot box version. This difference is <u>not</u> statistically significant (p=0.56).

Table 5.5 compares the answers to the first willingness-to-pay question given by respondents in the base and ballot box treatments for each of the four dollar amounts used in the

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[99] The response rate is calculated as 1182 completions divided by 1610 eligible dwelling units. Of the 1841 households in the original sample, 159 were vacant, 56 were not dwelling units, and 16 were non-English speaking households.

[100] On the other hand, increasing someone's taxes for any purpose would be widely viewed as something negative.

[101] Chapter 4 presents the rationale for using the Exxon Valdez survey for this test and describes the procedures used to conduct these tests.

[102] See Appendix B.1 for a discussion of the version which contained both the ballot box and the would-not-vote options.

study. None of the four comparisons shows a statistically significant difference and, for the three higher amounts, the two versions have virtually identical percentages of respondents voting for the program to protect Prince William Sound from a future oil spill. These findings suggest that carefully designed CV surveys using a format and method of administration similar to the present survey and conducted by well-trained professional interviewers can avoid social desirability bias.

Table 5.5 Comparison of Votes at Different Tax Amounts for the Standard and Ballot Box Versions

CHOICE	STANDARD	BALLOT BOX
Tax = $10	(N=87)	(N=74)
For	67.8%	56.8%
Against	32.2%	43.2%
	χ^2=2.092; p=0.148	
Tax = $30	(N=66)	(N=69)
For	56.1%	56.5%
Against	43.9%	43.5%
	χ^2=0.003; p=0.957	
Tax = $60	(N=81)	[N=65]
For	49.4%	50.8%
Against	50.6%	49.2%
	χ^2=0.028; p=0.868	
Tax = $120	(N=66)	(N=63)
For	33.3%	34.9%
Against	66.7%	65.1%
	χ^2=0.036; p=0.849	

We decided to use the standard version in this study because it offers important methodological advantages over the ballot box format and has no disadvantage. First, the standard version permits the use of the follow-up, willingness-to-pay questions which provide

more valuation information. Second, the standard version makes it possible to follow the Panel's recommendation that, after they vote, respondents should be asked questions about why they voted the way they did. This recommendation cannot be implemented if a secret ballot is used (Arrow, pp. 4609, 4613). Third, use of a ballot box would have made it difficult to offer respondents the chance to reconsider their vote at a later point in the interview on the basis of further reflection, a factor we find to be important.

§ 5.6.7 Testing for Dichotomous Choice Response Order Effects

Prior to fielding Pilot IV, we also conducted a set of four split sample tests[103] to explore whether the order of the dichotomous choices in the voting questions which followed the conventional practice of placing the vote *for* before the vote *against* (*i.e.*, "would you vote for the program ... or would you vote against it?") might bias responses toward voting *for*. Three out of the four tests showed that the order of the response categories did not affect how people voted. The marginally significant difference in the fourth treatment indicated that using the unconventional against-for order slightly increased the percent of people who would vote <u>for</u> the program. We concluded that continuing our use of the conventional for-against order was the conservative choice for our survey.

§ 5.6.8 Pilot IV

The survey instrument used in Pilot III was modified into the instrument used in Pilot IV. In addition to what we learned from Pilot III, the changes in Pilot IV reflected the other development efforts described above. The NORC study clarified that it would not be necessary

[103] See Appendix B-2 for a description of these tests.

to modify our instrument to offer would-not-vote or secret ballot options or to change the order of the voting options. Our parallel work on the scope instrument, which we discuss in the next section, required us to modify the base instrument to maintain comparability with the scope version. We also conducted several small pretests of the base instrument prior to fielding Pilot IV (see Table 5.6, pretests 1–4) which helped us to make a preliminary assessment of some of the wording changes.

Among the Pilot IV's wording changes were those influenced by development of the *scope* instrument; an emphasis on the fact that only the five species are injured, and that there are no effects on human health. Greater emphasis was also placed on describing the survey as part of an ongoing effort on the part of the State to learn what people think about new programs. In the scope instrument, this was needed to help legitimate for some respondents why the State was concerned about two fish species.

According to the Pilot III interviewers, some respondents complained that the reasons listed just prior to the voting questions as to why they might want to vote for or against the program seemed out of balance because only one reason *for* was given versus four reasons "against". In order to modify this appearance of imbalance, we reworded the reasons "for" and the shift to the reasons "against," and we reduced the number of reasons to vote against to three in the Pilot IV instrument by integrating the first two into a single reason.

The show cards for Pilot IV used a new drawing of the falcon designed to better differentiate it from the pigeon some interviewers felt it resembled, and we connected the pictures to the names of the species on the card that showed their endangered status (Card F).

We adjusted the order in which some material was presented to prevent the possibility of a non-conservative bias. Specifically, we reversed the order in which we presented the two

action options: in order to be conservative[104], we presented the accelerated recovery program first and the let-nature-take-its-course option last.

We also adjusted the order in which we presented some rating scale categories. With regard to rating scale questions, people are inclined to select alternatives presented early over those presented later (Carp, 1974). Consequently, as a conservative measure, we reordered all of our visually presented rating scale items by listing first the response alternatives that expressed negative attitudes toward programs designed to protect the environment (*e.g.*, questions A-1 and A-2). A fifth design point, $25, was also introduced between $10 and $45. This was done to help determine whether $25 or $45 was likely to be more useful in comparing responses from the base and scope versions of the survey.

§ 5.6.9 Additional Base Pretests

We conducted four small pretests of base versions during the six months prior to fielding the final study. Because we were also conducting pretests of the scope version at the same time, the base pretests were not consecutive, as shown in Table 5.6. Pretests 2 and 4 were conducted prior to Pilot IV, and helped with the design of that pilot. Pretests 7 and 8 occurred later in the design process and pretested, respectively, changes we needed to make in base to ensure comparability with scope and changes associated with the reduction in the number of species from five to four.

[104] Recent research indicates that when a researcher gives people information about two options and asks people to choose between them, the order in which the information is presented may, in some instances, influence choices (Krosnick, Li, and Lehman, 1990). For example, in typical, everyday conversations, people tend to provide less important, background information first, and the more important, foreground information second. Respondents might presume that the interviewer is following such conversational conventions and is providing the information he or she believes is more important after providing the less important information. To the extent that this occurs in this survey, it would lead respondents to make decisions placing greater weight or importance on the information provided later. Thus, respondents might be biased toward endorsing whichever option was described last.

The sampling frame for the base pretests consisted of between 6 and 8 PSU's. Because these pretests were to give us quick field tests of our ongoing revisions, no attempt was made to convert refusals, and the interviewers made few, if any, call backs. Table 5.6 describes each of these pretests and the role it played in our instrument development for this study.

Table 5.6 Additional Base Instrument Pretests

Pretest	Field Period (1993-94)	Sample Size	Role of the Pretest
2	8/14 to 8/22	44	After Pilot III, we changed the instrument in a number of ways, including the sequence of the programs. This was the first of two pretests we conducted to see if further changes were needed before conducting Pilot IV.
4	9/4 to 9/15	57	Second Pilot IV pretest. Among other things, it checked the feasibility of asking a follow-up revision question in the W sequence of questions (Question W-7).
7	11/17 to 11/23	49	Introduction of new language, from a scope draft, intended to better communicate where the species are harmed, that humans are not harmed, and the nature of the substitutes.
8	1/13 to 1/27	116	First use of instrument after dropping sea lions from the set of species affected by the deposit. Also tested revisions in graphics such as Card F.

§ 5.7 Development of the Scope Instrument

We followed the NOAA Panel's recommendation to examine responsiveness to scope by conducting a split-sample test in the main study. One sub-sample's choices for the injuries described in the base instrument (two fish and two bird species with a 50 year natural recovery period) was compared with another sub-sample's choices for the reduced set of injuries (two fish species with a 15 year natural recovery period) presented in a scope instrument.

There are at least three reasons why we compared the base injury scenario with a smaller rather than a larger injury scenario in this study. First, it appeared that evaluating a larger set of injuries would be more complicated and would require more time and higher cost. Second, because the degree to which the injury can be reduced is limited by no injuries, a smaller injury scenario is likely to be a more credible demonstration of sensitivity to scope. Finally, a larger injury would have raised an ethical issue. Respondents tend to regard information they receive during a government-sponsored interview as authoritative. Describing a larger injury would have run the risk of unnecessarily alarming citizens about the state of the environment.

The reduced set of injuries we decided upon for the scope version was the two fish component of the base set of injuries with a natural recovery period of fifteen years. Alternative configurations of species would have faced plausibility problems. Because some respondents were aware of the two birds' place in the local ecosystem, it would have been hard to include just one of them in the reduced injuries. A single fish species injury would have seemed implausible to some respondents.

In this section we describe how we modified the base instrument to create the scope instrument. The primary modification involved the section of the questionnaire that described the injuries. It was also necessary to modify some other sections because we found in the focus groups and pretests that some respondents considered the reduced set of injuries improbably small for the State to be concerned about them. To the extent that respondents held this view, they tended to imagine that the program might do more than just speed up the recovery of the two fish species. As noted above, the changes we made to develop a plausible choice in the scope version also had to be made in the base instrument so that the two would be comparable in every respect except for the size of the injury.

§ 5.7.1 Scope Focus Groups

We began the process of designing the scope instrument in June 1993. During June and July of that year, we conducted five focus groups to explore how we could adapt the base instrument to present a set of injuries consisting of reproduction problems for the White Croaker and Kelp Bass which would disappear in 15 years without the accelerated recovery program. (For convenience, we will refer to these as the scope focus groups.) Because the two bird species were not included, the injuries were described as occurring only in the immediate area of the deposit (marked in red on Map 3 in Appendix A-2) off the Palos Verdes Peninsula. A few months later we conducted four additional focus groups whose participants came from two different demographic groups. Table 5.7 gives the dates and locations of the nine scope focus groups.

Table 5.7 Scope Focus Groups

Focus Group	Location in CA	Date Conducted
1	Santa Monica	June 17, 1993
2	Orange	June 18, 1993
3	San Francisco	June 30, 1993
4	Sacramento	July 1, 1993
5	San Diego	July 2, 1993
6 & 7	San Francisco	October 28, 1993
8 & 9	Los Angeles	October 29-30, 1993

The participants in scope focus groups 1-5, which were held in different parts of California, shared the same mix of personal characteristics as the participants in the base focus groups. Because we already had a base instrument to build on, we bypassed one-on-one

interviews and immediately began group interviews. We first administered a draft scope instrument (through the willingness-to-pay section) verbally to the group as a whole, with the participants recording their answers privately in a response booklet. The WTP dollar amount was varied from group to group. At the end of the group interview, the moderator led a discussion to ascertain the participants' reactions to the scope version and to learn what they felt about particular issues.

Many of the focus group participants did not think reproduction problems in two fish species were worth paying for as long as human health was not affected and the fish were not endangered and would recover anyway in 15 years. Some questioned why the State would conduct a survey about this small an injury. We addressed this by modifying the way we portrayed the circumstances of the survey to imply that the State did surveys like this on possible new programs and this happened to be the program this interview was about. Further, some scope participants focused on the possible human health implications of eating the fish. The level of this concern appeared to be due to the fact that the scope injuries were restricted to fish. In order to minimize this concern, we enhanced the assurances given in the instrument that the fish injuries did not pose a threat to human health.

In October, 1993, we conducted four additional focus groups with homogeneous participants to understand how particular populations react to the scope injury. We recruited women for two groups in San Francisco and minorities for two groups in Los Angeles. Because they had a larger number of participants who voted *for* the scope program, the two Los Angeles groups provided some useful insights about why low income people chose to vote for the program.[105] These participants were particularly concerned about the health implications of

[105] The San Francisco groups were less informative about why people favored the program to prevent the reduced injuries because only two people in each group said they would vote for the program.

eating fish contaminated by the chemicals and distrustful of the government, which led some to believe the injuries were likely to be greater than described. We further revised the instrument to provide stronger, more plausible assurances that human health was not threatened by the situation and that the injuries were limited to those described.

§ 5.7.2 Scope Pretests

Following the first scope focus groups, we conducted a series of four pretests to evaluate various versions of the draft scope instrument as it evolved. Table 5.8 describes each pretest

Table 5.8 Scope Pretests

Pretest	Field Period (1993-94)	Sample Size	Role of the Pretest
1	8/8 to 8/14	44	First field test of the scope instrument.
3	8/25 to 8/30	54	Second test after the first round of revisions. Those who mentioned health in the verbatims tended to be more likely to vote for the program than those who did not.
5	9/18 to 9/25	40	Revisions tested in this pretest focused on improving the plausibility of asking respondents to value speeding up the recovery of two fish species in one local area. They also included a new question (W-7) which offered the respondents the opportunity to change their vote if human health was definitely not affected in the situation.
6	11/17 to 11/23	44	In pretest 3, we continued to find some respondents found it difficult to believe the injuries were restricted to the two fish. After conducting the last round of scope focus groups, we used this pretest to test further revisions intended to better communicate that only the two fish species were affected.

and the role it played. The pretests took place during a six month period beginning while Pilot III (base instrument) was in the field and were interspersed with the base pretests described

earlier. The sampling frame for the scope pretests was the same one used for the earlier base pretests and, as was the case with the base pretests, no attempt was made to convert refusals and the interviewers made few, if any, callbacks.

§ 5.8 Spanish Translation

In California, over 31 percent of people 18 years and over speak a language other than English at home;[106] and, of those who speak a language other than English at home, a large majority speak Spanish.[107] Unfortunately, the available census data did not provide information that would have allowed us to ascertain what fraction of California Spanish-speaking households had someone meeting our sampling criteria who is a fluent English speaker. In the absence of this information and given the relatively large size of the Spanish-speaking population in California, in November of 1993, NRDA retained Aguirre International (hereafter, Aguirre[108]) to prepare Spanish versions of the main study survey instruments. At this stage in our instrument development, we felt that the English version of the survey instrument — that used in Pilot IV— was far enough along to warrant the initiation of this effort.

§ 5.8.1 Survey Development

Aguirre's task was to develop a Spanish translation that not only met the five objectives of the development process outlined above but also accommodated the idiosyncrasies of

[106] *Language Use and English Ability, Persons 18 and Over, by State,* in Education and Language Data for States: 1990 Census, December 15, 1992.

[107] The next two most common non-English languages are Chinese (6.7%) and Tagalog (5.4%), the latter spoken by Filipinos (*Languages Spoken at Home by Persons 5 Years and Above, by State: 1990 Census*, in Education and Language Data for States: 1990 Census, December 15, 1992).

[108] Aguirre has considerable experience developing effective Spanish translations of survey instruments and advising clients on how to implement surveys among Hispanic and other ethnic groups.

California speech patterns and was sensitive to California's Hispanic cultures. The translation had to be understandable to California's Hispanic populations (*e.g.*, Mexicans, Cubans, Nicaraguans) who speak slightly different Spanish dialects, and yet not offend the sensitivities of respondents who may be Spanish language purists. Aguirre's translation also had to be sensitive to cultural differences among California's hispanic populations. For example, those schooled in the U.S. would be accustomed to the presentational format used in the survey instrument (*e.g.*, answer categories, diagrams, and maps), whereas those schooled in Spanish-speaking countries may not be. At each stage in this development process, NRDA worked closely with Aguirre to ensure that the five objectives of the development process were not compromised and to ensure that the essential elements of the choice were not lost in the translation.

The first step in Aguirre's development work was to translate the Pilot IV version of the survey and then to make an independent, reverse translation of this Spanish version back into English. Aguirre conducted group discussions and informal, cognitive interviews to aid in the translation. After the instrument was revised to address inconsistencies between the forward and back translations, Aguirre conducted additional cognitive interviews in various locations that were selected to represent the regional differences in California's immigrant populations. Throughout this second step, the draft translation of the base instrument was continually revised and improved.[109] Aguirre was also asked at this point to translate into Spanish and back into English those sections of the scope version of the questionnaire that differed from the base version and to translate the Pilot IV screener.

[109] In the course of their instrument development work, Aguirre identified an additional complication in conducting this interview in Spanish. Some Spanish-speaking Americans who received their high school education in English and who would choose, because of cultural pride, to be interviewed in Spanish, do not have an adequate command of Spanish for this purpose. Aguirre believed these respondents would be fully capable of taking the interview in English.

During Aguirre's field work, Trustee representatives directed NRDA to omit one of the species from the set of injuries to be valued. This revision so late in the survey development slowed down our work on the translation so that Aguirre had less time than planned to incorporate feedback from their interviewers on their field experiences for pretesting the Spanish base and scope instruments in the field.

Westat's bilingual interviewers conducted the first full field pretest of the Spanish base and scope instruments in late January. Eighteen interviews using the base instrument were collected from January 16 through January 20. Twenty-one interviews using the scope instrument were collected from January 23 through January 27. In most respects the Spanish translation performed well, given the linguistic and cultural complexities of rendering the choice elements into Spanish; but the debriefing showed that additional development work would be needed before the Spanish instruments could be fielded in the main survey. Because of the imminent deadline for delivery of the main study questionnaire, we decided that Spanish versions of comparable quality to the English versions of base and scope could not be readied in time for the field deadline.

As a result of being unable to field Spanish-language versions of the main survey instruments, we treated the Spanish-language speakers like other non-English speakers, *i.e.*, as ineligible for the survey. The issue of survey eligibility is discussed in Chapter 7.

§ 5.9 Final Pretesting

The last pretests for this study were conducted in January and February, 1994. In the case of both the base and scope instruments, a "pre-main" pretest was conducted, after which a few minor changes were made to improve comprehension, and the revised version received

a final pretest before delivering the finished instrument, without further change, to Westat for use in the main survey.

§ 6 Structure of the Main Study Questionnaires

§ 6.1 Introduction

This chapter describes section-by-section the wording, format, and presentation in the base and scope questionnaires used in the Lost Use Value study. All quoted text in this chapter is common to both the base and scope instruments unless otherwise indicated. Both complete survey instruments, including the show-cards and a reproduction of the map-diagram booklet, are provided in Appendices A.1 and A.2.

To avoid self-selection bias from people deciding to be interviewed because of their interest in the specific subject matter of the survey, prospective respondents were told that the State of California was conducting the study to get their "opinion on issues that may concern you such as education, the environment, and crime" (Westat, 1994a). If potential respondents asked for more information about why the survey was being conducted or what it was about, the interviewers were instructed to use only the replies provided on a laminated Q and A card.[110] For example, if asked "Why are you doing this survey?" they were to say: "The study will provide information so State policy makers can understand how people like yourself feel about these issues." If asked a question like, "What is this survey about?", they were to say:

> We are faced with many problems in California today. This study is about some of these problems and issues. Some may be of concern to you, others may not. The study attempts to find out how Californians feel about some of the problems facing the state today.[111]

[110] Some questions and answers (Q & As) to questions we anticipated would be most frequently asked were included in the questionnaire text. The Q & A card (reproduced in Appendix A.3) contained additional Q & As.

[111] This typeface will identify lengthy direct quotations from the language of the questionnaire or interviewer's manual.

§ 6.2 Section A — Introductory Questions

The first set of questions (A-1A to A-1F) in the interview proper asked how important six state-wide issues were to the respondent personally.

> A-1. Let's start by talking for a moment about some issues in California. Some may not be important to you, others may be. First, (READ X'D ITEM[112]), is this issue
>
> SHOW CARD A[113]
>
> not important at all to you personally, not too important, somewhat important, very important, or extremely important? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; RE-READ STEM AS NECESSARY.)[114]

This, and the following series of problems (A-2 described below), encouraged the respondent to think about a broad range of current policy issues as a reminder that speeding up the recovery of the affected species is just one of many public goods. Two — "reducing crime" and "improving education" — reminded the respondent of issues that are of great concern to some Californians at the present time. "Finding ways to reduce state taxes" was chosen to remind the respondent of the linkage between state programs and the level of state taxes.[115] "Maintaining library services" represented one of a range of local community spending issues. "Reducing air pollution in the cities" was an environmental issue not directly related to coastal natural resources while "protecting coastal areas from oil spills" was directly related.

Question A-2 shifted the respondent's attention to the fact that the state spends money

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[112] Any questionnaire text in capital letters is an interviewer instruction and is not read to the respondent.

[113] These instructions cue the interviewer to show Card A. This card lists five answer categories from "not important at all" to "extremely important". See Appendix A.1.

[114] Following standard survey practice to minimize response order effects, the order in which the six items were asked was randomized. The interviewer was instructed to begin with the item marked "X". Each item had an approximately equal chance of being asked first.

[115] Highlighting taxes helps address the NOAA Panel's recommendation to deflect "warm glow" motivations (Arrow *et al.*, 1993; p. 4609).

on various programs, both non-environmental and environmental. The respondent was asked to say whether he or she wanted the state to reduce, increase, or have the amount of money the State was spending on these programs "stay the same". One environmental program directly related to the injuries, "protecting endangered wildlife species", was included in this series.[116]

> A-2. The State of California spends money on many programs for many different purposes. I'm going to read a list of some of these programs. For each one, I'd like you to tell me whether you think the money the State is spending on these programs should be
>
> SHOW CARD B[117]
>
> reduced a great deal, reduced somewhat, stay the same, increased somewhat or increased a great deal. First, (ITEM)? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; REPEAT ANSWER CATEGORIES, AS NECESSARY.)

§ 6.3 Section A — Description of the Elements of Choice

The presentation of the elements of choice, which began at this point, provided the circumstances of the choice relevant to the decision the respondent would later be asked to make — to vote *for* or *against* the accelerated recovery program (*i.e.*, the object of choice). Among the material included was a detailed description of the injuries, their cause, how long it will take the affected species to recover with and without the accelerated recovery program, and how the program would work.

The interviewer training for this study emphasized reading this material in a way that would maintain respondent interest and enhance comprehension. The interviewer's manual summarized this emphasis:

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[116] The other programs involved: new state prisons, public transportation in Los Angeles, pay raises for professors at state universities, homeless shelters, and lifeguards at state beaches.

[117] This card lists five answer categories from "reduced a great deal" to "increased a great deal". See Appendix A.1.

> This survey differs from most of the surveys you may have conducted because a central portion of the questionnaire has you read a narrative to the respondent. The narrative material is illustrated by maps and show cards which you show the respondent. Reading this type of material requires a somewhat different approach than reading regular question material: in effect, in presenting the material, you have to tell a story. Throughout our earlier pretests and pilot studies, we have found that the text goes smoothly and that most respondents find the material interesting.
>
> The narrative material is intended to provide the respondents with information about the situation on which they are asked to vote in questions W-1 through W-3. **It is crucial that the respondent listen carefully to what you are reading so that he/she can make an informed decision when responding to these questions.** Because of the volume of material you will be reading, there is a risk that some respondents will become bored or disinterested at some point during the interview. You should do your utmost to keep the respondent's attention throughout. You will find the maps and show cards and pointing out certain features in them helpful in this regard. Of particular importance is how you present the material. It should be read in a manner that is conversational and interesting. To do this, you need to make use of effective "body language" and use a tone of voice and manner that is interesting to listen to. Avoid reading in a monotone or conveying the impression that you are bored. [Westat, 1994a; p. 4.6]

At places noted in the text the interviewers showed the respondents visual aids. These materials were designed and pretested to help the respondents visualize important aspects of the scenario and to help them understand the material that was being read to them. The visual aids consisted of two sets of booklets that were spiral bound for ease of use by the interviewers. For the base survey set, one booklet, measuring 11 ½" x 14", contained six color visual aids;[118] and the second, measuring 8 ½" x 11", contained fifteen show cards printed in black and white on light cardboard stock. When administering the scope version, the interviewers used a separate but comparable set of visual aids modified to fit that scenario.[119]

Turning now back to the survey text, after question A-2, a transition was made to

[118] These consisted of three maps and three diagrams; for interviewer convenience, all the maps and diagrams were referred to as *maps*.

[119] To help the interviewers avoid inadvertently using the wrong set of visual materials, all base materials had blue covers and all scope materials had yellow covers.

introduce the respondent to the subject matter of the survey. This was done in two steps. The first introduced a credible rationale for why the respondent will be asked whether he or she would vote to tax his/her household for a program such as the one presented in the survey. The interviewer says:[120]

> These are just a few[121] of the things the State of California spends tax money on. Proposals are sometimes made to the State for new programs. The State does not want to undertake new programs unless taxpayers are willing to pay for them. One way for the State to find out about this is to give people like you information about a program so that you can make up your own mind about it.

In order to help avoid creating the impression that there was a preferred response to the choice questions, the respondent was told that people responding to this type of interview had different views about the program. Specifically,

> In interviews of this kind, some people think the program they are asked about is not needed; STOP [122] others think it is. We want to get the opinions of both kinds of people.

At this point in the interview a question was asked to involve the respondent:

> A-3. Have you ever been interviewed like this before to get your opinion about whether the State should or should not spend tax money for a particular purpose?

The second step in the transition introduced the specific program the respondent was asked about later in the interview. Wording was used that emphasized the routine nature of this type of inquiry:

> In the past, people have been asked about various types of programs. In this interview, the particular program I am going to ask you about involves two

[120] The textual material in the questionnaire (see Appendix A.1) is often presented in very short paragraphs to help the interviewers keep their place. This convention has not been maintained in this chapter to save space.

[121] Words are underlined throughout the interview text at places where the interviewers were instructed to emphasize words to help convey the passage's meaning and to hold the respondent's interest by making the narrative interesting.

[122] A stop sign symbol was an instruction to the interviewers to pause before continuing.

types of ocean fish and two types of birds [*two types of ocean fish*].[123] These fish and birds [*These fish*] are producing fewer young than normal in one particular area.

Respondents were next given an overview of what to expect in the interview. In order to encourage thoughtful consideration of their decision, they were told in advance that they would be asked to explain their choice.[124]

First, I will tell you about what is happening to them. Then, I will tell you about the cause. Then, I'll ask you whether or not you think anything should be done about this. I will also ask you to tell me why you feel the way you do.

The interviewer next showed the respondent two maps: Map 1 located the South Coast in relation to the rest of California, and Map 2 showed the South Coast in more detail, including the location of the former DDT plant and the deposit on the ocean bottom off the Palos Verdes Peninsula.

SHOW MAP 1

Here is a map of California. The situation I am going to tell you about is located along this one part of the California coast, the South Coast ↑.[125]

[**base only**] This area includes the ocean here ↑, the shore here (↑ TRACE SHORELINE) and also these islands ↑, the Channel Islands.

STOP UNTIL R IS FINISHED LOOKING AT MAP 1

SHOW MAP 2

[123] Variants in wording in the scope version will be presented in italics and brackets. Longer differences in wording will be noted in the text.

[124] This technique of inducing accountability at the start of an interview has been shown to promote optimal respondent effort. See Tetlock (1983).

[125] This upward arrow symbol is an instruction to the interviewer to point to the relevant feature on the map or card.

In order to provide a break in the narrative, respondents who were not interviewed in Los Angeles or Orange County were asked A-4, and those interviewed in Los Angeles or Orange County, A-5.

A-4. Have you ever lived in Los Angeles County or Orange County?

A-5. How many years have you lived in this county?

After identifying the geographical area of concern, the text described the affected species.

A-6. Many species of fish and birds [*of fish*] live off the South Coast. Four [*Two*] of these species are having problems producing young [*producing young in one place off the South Coast*].

[**base only**] I'll describe these reproduction problems beginning with the fish. Two species of fish are having problems producing young in one place off the South Coast.

[**both base and scope**] These are White Croaker and Kelp Bass. This card shows what these fish look like.

SHOW CARD C[126]

STOP UNTIL R IS FINISHED LOOKING AT CARD

The Kelp Bass is sometimes called Calico Bass. Unlike some species of fish, these two do not travel up and down the coast but generally stay in one place where they live and breed.

SHOW MAP 2 AGAIN

Please look at the place marked in red on the map. It is near Los Angeles harbor between Santa Monica Bay and San Pedro Bay. This is the place where scientists have found that the White Croaker and Kelp Bass produce fewer young than elsewhere. However, as millions of these two fish live in other places along the California coast, neither species is in any danger of becoming extinct.

The information about how many other White Croaker and Kelp Bass live along the

[126] This card showed black and white line drawings of each fish. This format was chosen as a conservative way to inform respondents about what each species looks like.

California coast informed respondents about an important "undamaged substitute commodity".[127] The next portion of the instrument, which described the injuries to the two birds species, appeared only in the base instrument. It described the nature of their reproductive problems and how these problems were limited to just the species of these birds located in the South Coast.

> Two of the many species of birds living along the South Coast also have reproduction problems.
>
> SHOW CARD D[128]
>
> They are Bald Eagles and Peregrine Falcons. These eagles and falcons along the South Coast tend to stay there all year long. Back in the 1940s, about 24 pairs of Bald Eagles and 20 pairs of Peregrine Falcons were successfully hatching their eggs in the South Coast. STOP
>
> By the 1950s, the eagles and falcons in this area were having trouble producing young, mostly because their egg shells were too thin and the chicks did not hatch. As a result, the local populations of Bald Eagles and Peregrine Falcons disappeared from the South Coast.
>
> About ten years ago, scientists began bringing adult falcons and eagles from outside the South Coast and releasing them on some of the Channel Islands. The scientists hoped these birds would be able to reproduce naturally and re-establish themselves in the area. Thus far, however, these birds have usually not been able to hatch any of their eggs. STOP
>
> SHOW MAP 2 AGAIN
>
> Unlike the White Croaker and the Kelp Bass, which only have problems in this place (TO PLACE MARKED IN RED ON MAP 2), these birds are having reproduction problems everywhere they live along the South Coast (TRACE SHORELINE), including the Channel Islands . STOP

[127] See NOAA Panel recommendation (Arrow, pp. 4608-4609).

[128] This card contains line drawings of the Bald Eagle and Peregrine Falcon.

In accordance with the NOAA Panel's recommendation (Arrow, 1993; p. 4609), several different checks on respondent understanding and acceptance of the scenario were used in this survey. One type of check was a question like the following which gave the respondent the chance to clarify any part of the injury description by having it repeated:

> **[both base and scope]** A-7. Is there anything I have told you about these four fish and bird [*two fish*] species that you would like me to repeat?

The answer categories to A-7 were "yes" or "no". Those who answered "no" were skipped to section A-8.[129] Those who said there is something they would like to have repeated are asked an open-ended question:

> A-7A. What is that?

This is the first of several questions in the survey which required the interviewers to record the words used by the respondent in answering the question. The interviewers were instructed to record on the questionnaire what the respondent said as closely as possible, asking the respondent to pause, if necessary, so an answer or comment could be completely transcribed. The importance of accurately recording the comments in this interview, both the answers given in response to specific questions like this and remarks made by the respondent at any other place during the interview, was emphasized in the training and in the interviewer's manual (Westat, 1994a; pp. 4-15).[130] During training the interviewers practiced recording verbatims. For recording the verbatims, as for recording the responses to all questions, the interviewers were instructed to use a ball point pen.

The interviewers were instructed to use nondirective probing techniques to clarify respondent answers to open-ended questions when the answers were vague or did not adequately

[129] See survey instruments in Appendices A.1 and A.2 for skip patterns.

[130] The interviewers who conducted this study were already familiar with verbatim recording as a result of their general training as Westat interviewers.

answer the question. Such probing is a standard survey procedure used to refocus respondent's attention on the question. It requires the interviewer to find a way to get the respondent to elaborate or think about an incomplete or irrelevant answer without influencing the content of an answer. The interviewers were restricted to using only probes similar to those on the list of standard probes or probes specified for particular questions.[131]

The material that followed immediately after A-7A appeared only in the base instrument, as it described the endangered status of the two birds. (The fact that the two fish species were not endangered had already been made clear in both instruments.) This material described the current[132] status of these birds in California and other states, and the population increases both birds have been experiencing everywhere else but in the South Coast. This material and the information that the birds were being considered for reclassification from endangered to threatened provided respondents with information about undamaged substitutes (Arrow, pp. 4608-4609) for the South Coast Bald Eagles and Peregrine Falcons. We used two show cards, E and F, to help convey this information.

SHOW CARD E (STOP)

As you can see on this card, the two species of fish are not in danger of becoming extinct and are therefore not listed as endangered. However, the eagles and falcons I told you about are listed as endangered by the State of California. At present, these birds are also listed as endangered in most of the other states where they live.

SHOW CARD F

This card compares how these birds are doing in the rest of California and the

[131] Chapter 5 of the interviewer's manual (Westat, 1994a) is devoted to probing.

[132] As of the time the main study field effort began (March 8, 1994).

rest of the United States ⬆ with how they are doing along the South Coast ⬆.

STOP UNTIL R IS FINISHED LOOKING AT CARD F

As you can see, in the rest of California and in the rest of the United States, these birds are increasing ⬆ in number. For example, at present, most of the 100 or so pairs of Bald Eagles that live in other parts of California ⬆ are successfully hatching young. Because the eagles and falcons are increasing in these areas ⬆, consideration is being given to reclassifying them from endangered to threatened in some parts of the country, including California.

Along the South Coast, however, the eagles and falcons are not increasing ⬆. This is because no eagles have hatched young on their own and only rarely have some Peregrine Falcons been able to do so. STOP

At this point the material is again common to both base and scope and a transition is made from a description of the injuries to their cause.

Many scientists have studied why these four species of fish and birds [*two fish species*] are having reproduction problems along the South Coast but not elsewhere along the California coast. STOP

Some of these scientists work for the Federal Government, others work for the State, and others are independent researchers at California universities. They agree that these reproduction problems are caused by a deposit of two chemicals that are trapped in the sediment on the bottom of the ocean. STOP These chemicals are DDT and PCBs.

Next, two prior knowledge questions were asked, and a definition of DDT and PCB's and their common uses were provided.

A-9. Before today, had you heard anything at all about DDT?

A-10. How about PCBs? Had you heard anything about them before today?

(As you may know,) DDT is a pesticide that was developed during World War II. It was found to be a cheap and effective way to kill insects like mosquitos. PCBs are chemicals that were developed around the same time and were used in electrical transformers and for other industrial purposes.

The next portion of the narrative described how the deposit of DDT and PCB's was formed. Map 3 included an inset which enlarged the deposit area and showed the location of the sewage treatment plant and the DDT plant. The fact that the DDT plant went bankrupt and was torn down is emphasized to avoid having respondents protest that it is not fair for them to pay for the injuries because the company is responsible.[133]

SHOW MAP 3

This big circle (TO BIG CIRCLE) is a blow-up of this small circle (TO SMALL CIRCLE.) The place marked in grey (TO GREY AREA IN BIG CIRCLE) shows the location of the deposit of DDT and PCBs on the ocean floor that causes the problems I have described. This deposit (TO GREY AREA) is about five miles long and two miles wide. STOP

The biggest source of these chemicals was a factory, located here , which was at one time the world's largest producer of DDT. Over a period of thirty years, beginning in the late 1940s, this factory sent tons of waste DDT into the Los Angeles County sewer system where it went to this sewage treatment plant and was released with other treated wastes into the ocean through these underwater sewer pipes.

A smaller amount of waste PCBs from other sources also went out the sewer pipes in the same way. STOP Back in the 1940s, 50s, and into the 1960s, there was little recognition that DDT and PCBs could affect fish and wildlife [*fish*]. When this became clear in the 1970s, sending these two chemicals into the ocean through the sewers was stopped. The federal government also severely restricted the use of both DDT and PCBs. As a result, the DDT factory in Los Angeles went bankrupt STOP and was torn down. STOP

SHOW MAP 3 AGAIN

Even though no new DDT or PCBs have been put into the sewers for about 15 years, the old DDT and PCBs located in the grey area (TO GREY AREA) have continued to affect the four species of fish and birds [*the two fish species in the one place I told you about*].

[133] The NOAA Panel recommended that the survey be designed to deflect the "dislike of big business" (Arrow, p. 4609).

> Here's how this happens. Because these two chemicals do not dissolve in water, they gradually fell to the ocean bottom. Once they reached the bottom, they remained there trapped as part of the sediment.

A portrayal of the deposit's stability over time was included in the scenario because our pretesting found some respondents imagined that ocean currents or earthquakes might disperse the contaminated sediment over a larger area.

> This sediment — made up of things like sand and dirt — is very stable. It lies more than a mile offshore under water more than 100 feet deep where there are no strong ocean currents. Therefore, the contaminated sediment has remained in this location ⬆, for over 15 years, where it is slowly being covered by new, uncontaminated sediment.

The next question asked the respondent if he or she had prior personal knowledge of this deposit. We used a follow-up question, A-11A, to obtain information to check if the respondent had this particular deposit in mind.

> A-11. Before today, had you heard anything about the DDT and PCBs that are located in this particular place? (⬆ TO GREY AREA)
>
> A-11A. What have you heard? [OPEN-ENDED]

The next portion of the scenario described how the deposit of DDT and PCBs caused the injuries.

> A-12. The federal, state, and university scientists I mentioned earlier have conducted studies of the effect of this deposit ⬆. They know that DDT and PCBs can build up in the bodies of some fish and birds [*some fish*] when the food they eat has these chemicals in it. According to the scientists, the only animals [*fish*] that are affected by this deposit are the four [*two*] species I told you about. This is because they all feed [*they live and feed*] in this particular place.

The following material described how DDT and PCB's move through the food chain. In the base instrument, Card G illustrated this process. In the scope instrument, a parallel card (Card D) which showed only the lower portion of the base instrument's Card G (as only this portion was relevant to the two-fish scenario) was used. To accommodate the different

diagrams, each version used somewhat different wording to describe how the affected species absorb DDT and PCBs into their bodies. In the base instrument, the wording was as follows:

SHOW CARD G

This drawing shows how this happens.

STOP UNTIL R HAS HAD A CHANCE TO LOOK AT CARD G

These ▲ are small animals that live in the sediment on the ocean bottom. When they get food from contaminated sediment, they absorb DDT and PCBs into their bodies. When they are eaten by other larger animals, like this fish which is feeding on the bottom ▲, the DDT and PCBs can be absorbed into the body fat of the larger animals.

(As you know,) This also happens when larger fish eat the smaller fish ▲, when birds like this ▲ eat contaminated fish, or when birds like this ▲ eat other birds that have eaten contaminated fish.

REMOVE CARD G

Although the amount of DDT and PCBs in the bodies of the four species is high enough to affect their ability to reproduce, the amount is not enough to affect the adult fish or birds in any other way.

In the scope instrument, the wording was as follows:

SHOW CARD D

This drawing shows how this happens.

STOP UNTIL R HAS HAD A CHANCE TO LOOK AT CARD D

These are small animals that live in the sediment on the ocean bottom. When they get food from contaminated sediment, they absorb DDT and PCBs into their bodies. When they are eaten by the White Croaker and Kelp Bass, the DDT and PCBs are absorbed into their body fat. When the fish have a high enough level of DDT and PCBs in their bodies, their ability to reproduce is affected.

REMOVE CARD D

Although the amount of DDT and PCBs in the bodies of the two fish is high enough to affect their ability to reproduce, the amount is not enough to affect the adult fish in any other way.

At this point in the scope instrument, the respondent was reminded that the fish were not in danger of becoming extinct and that many substitutes of these species were available elsewhere along the California Coast.

As I mentioned earlier, these fish are not in danger of becoming extinct because of the millions of White Croaker and Kelp Bass along the California Coast that are not having reproduction problems.

A parallel statement about the fish was not included in the base instrument at this point because respondents had already been reminded that the fish were not in danger of extinction in text unique to that instrument.[134]

The next part of the narrative (in both base and scope) provided assurances that the fish injuries do not threaten human health. Early pretesting had identified this as an important concern that needed to be explicitly addressed in the scenario and we had worked on how to do this throughout the instrument development process. This is the first of several places where an assurance was explicitly provided.[135]

Some people are concerned that eating White Croaker or Kelp Bass contaminated by these chemicals might harm humans. This is an important question, so the scientists have studied it carefully.

SHOW MAP 3 AGAIN

They have found that the amount of DDT and PCBs in these two types of fish is so small that people would have to eat fish from this one area (TO AREA MARKED IN RED) on a regular basis to be harmed. Fortunately, commercial

[134] See A-8 Appendix A.1, p. 8.

[135] See the discussion of questions A-16 and W-7 in this chapter.

fishing companies do not catch Kelp Bass, and the State has banned all commercial fishing for White Croaker in that area. Thus, the affected fish are not sold in markets or restaurants.

The State has also issued notices to local fishermen warning them about eating White Croaker and Kelp Bass caught there, and this warning is posted on signs. Therefore, it is extremely unlikely that these fish could cause any harm to humans. STOP

The next part of the narrative enhanced the plausibility of natural recovery by referring to other species affected by the deposit that had already recovered. It then explained how the natural process has worked. This explanation was illustrated by Map 4 which depicted how new uncontaminated sediment had begun to cover the contaminated layer beginning in the mid-1970's. This description was identical for base and scope with the exception of the speed with which the new sediment was described as covering the contaminated sediment. In base, the contaminated sediment was described as being buried by one foot of uncontaminated sediment by 1994; in scope, the 1994 depth was given as two feet. The greater depth in the scope version was required to describe the faster (15 years versus 50 years) natural recovery period.

Fifteen years ago, the deposit of DDT and PCBs was also causing reproduction problems in several other species that sometimes feed in the area. However, these other species gradually recovered and now reproduce normally.

Their recovery over the past 15 years was the result of a natural process. This process gradually covers the contaminated sediment on the ocean bottom with new sediment that is uncontaminated by DDT and PCBs. The deeper the contaminated sediment is buried, the more these chemicals are removed from the food these species eat.

SHOW MAP 4

This drawing shows how this natural process works. These little dots are things like sand and dirt that fall through the water and settle on the bottom. The orange layer is the sediment contaminated with the DDT and PCBs .

STOP UNTIL R IS FINISHED LOOKING AT MAP 4

Once the flow of DDT and PCBs into the sewers was stopped in the 1970s , a layer of new, uncontaminated sediment began to cover the contaminated layer. By 1994 , it had buried the contaminated layer about one foot [*two feet*] deep . This is deep enough so that there are no DDT and PCBs left in the water.

Although these chemicals now no longer affect other species, they continue to affect the four species I told you about. These species are more exposed to these chemicals than the other wildlife because of their feeding habits. [*This is because, unlike the other species, everything they eat comes from the ocean bottom in this one place where they live year round.*] Once the chemicals are buried deeper under clean sediment, these four [*two fish*] species will also recover.

The program to accelerate recovery is presented first, followed by the natural recovery option.

Until recently, there was no way to speed up this natural process. However, a procedure has now been developed to cover chemical deposits like this. A proposal has been made to use this procedure here, to speed up the recovery of the four fish and bird [*two fish*] species I told you about. The State wants to find out how people feel about this. STOP

The next map illustrates how new, clean sediment would be placed on the ocean floor without disturbing the existing sediment, a concern expressed by some respondents in our pretests.

SHOW MAP 5

This picture shows how a speed-up program would work. This is the existing layer of sediment that covers the contaminated layer one foot [*two feet*] deep. A boat like this would drop three [*two*] more feet of new, clean sediment down to the ocean floor without disturbing the sediment already there. This would cover the contaminated sediment under a total of four feet of clean sediment . Once they are covered by four feet of clean sediment, the DDT and PCBs would be removed from the food these species [*the White Croaker*

and Kelp Bass] eat. This is because none of the animals they eat live this far beneath the ocean floor.

To enhance the credibility of the program to cover the contaminated sediments and to avoid having respondents believe the accelerated recovery program might benefit the local economy by creating jobs, the Army Corps of Engineers is described as the agency that would carry it out. The total time period until recovery to baseline conditions is described as five years.

> The State would pay the cost to drop the three [*two*] feet of clean sediment on the contaminated location. This program would be carried out by the Army Corps of Engineers which has successfully done this elsewhere. It would take one year to complete. Once this is done, it will take four more years for the animals I told you about to reproduce normally. So, within five years, these fish and birds [*these fish*] would be reproducing normally.

The narrative was broken at this point by question A-13 which gave the respondent the opportunity to ask questions about how the accelerated recovery program would work. Those who said they had questions were asked a follow-up, open-ended question, A-13A.[136]

> A-13. Do you have any questions about how this would work?
>
> A-13A. What are they? [OPEN-ENDED]

A box in the interview provided the interviewer with clarifying answers to two questions which some respondents had asked during our pretesting: why doesn't the State remove the sediment from the ocean floor instead of covering it? and, where does the sediment come from?[137] Here, as elsewhere, if the interviewers were asked questions for which they had not been provided with answers, they were instructed to tell the respondents: "I don't know the answer to that question, but I will write it down because the researchers want to know what

[136] This, and questions A-7 and A-15, served as a check on understanding and acceptance (Arrow, p. 4609) of the scenario itself.

[137] See page 16 (base) and page 13 (scope) in Appendices A.1 and A.2, respectively.

questions people have about this."[138]

The interviewer then described the natural recovery process.

> A-14. If the State does not implement this program, nature will do the same thing, but it will take longer, 50 [*15*] years instead of 5. This drawing shows how this will happen.
>
> SHOW MAP 6

Map 6 was a diagram that showed how the contaminated layer would be gradually covered with four feet of uncontaminated sediment over a fifty year period. In the scope instrument, the diagram illustrated the same process but over a fifteen year period. The interviewer pointed to various parts of the diagram during the narrative.

> This is 1994 ⬆. Over the coming years, as the new, uncontaminated sediment continues to fall, the contaminated layer will get buried deeper and deeper. ⬆ Fifty [*Fifteen*] years from now, around the year 2044 [*2009*], the contaminated sediment will be buried under four feet of clean sediment ⬆. As I mentioned, this far under the ocean floor, the DDT and PCBs would be removed from the food the four fish and bird [*two fish*] species eat.
>
> The two fish and two bird [*two fish*] species I told you about will then have fully recovered from their reproduction problems. Thus, instead of the 5 years it would take for these species to recover if the State implements the speed-up program, with natural processes it would take 50 [*15*] years ⬆. That is, an additional 45 [*10*] years.

The next question again solicited respondent questions with a follow-up, open-ended question.

> A-15. Is there anything else you would like to know about either the speed-up program or the natural recovery process?
>
> A-15A. What else would you like to know? [OPEN-ENDED]

To avoid having the respondents think this particular program must have value because

[138] Q and A's Not in Questionnaire card. See Appendix A.3.

the State had chosen to interview them about it, the respondent is reminded that he or she is one of many people who are being asked about various types of programs. Then the respondent was told that we want to know how he/she would vote if the program were on the ballot in a California referendum.[139]

> A-16. I mentioned earlier that the State has asked people about various types of new programs. We are now interviewing people to find out how they would vote if this program to speed up recovery were on the ballot in a California election.

The payment vehicle for this study was the California income tax. The payment frequency was a one-time payment that would be in addition to what the respondent already paid in state income taxes.[140] Our use of a one-time household payment emphasized the monetary obligation of the respondent and is conservative relative to any payment plan that would allow the household to pay over the course of several years. The assurances that this would be the only payment and that it would go into a special fund helped to address respondent concerns, revealed in our pretesting, that the State would continue the payment indefinitely and/or use the money for other purposes.

> Here's how it would be paid for. California taxpayers would pay a one time additional amount on their next year's state income tax to cover the cost. This is the only payment that would be required. It would go into a special fund that could only be used for the program to cover the contaminated sediment. The program would only be carried out if people are willing to pay this one time additional tax. STOP

At this point in the narrative, immediately before the willingness-to-pay questions, the interviewer summarized the object of choice. Possible reasons to vote against the program were

[139] As noted in Chapters 4 and 5, the referendum format is the elicitation framework recommended by the NOAA Panel (Arrow, p. 4608).

[140] If a respondent who has had taxes withheld from a paycheck asks whether this additional tax would be withheld from the paycheck, the interviewers were instructed to say "yes" (Westat, 1994a; p. 4.57).

also presented to enhance the credibility of the choice and to reinforce previous assurances that a vote against the program is an acceptable answer.[141]

> There are reasons why you might vote for the speed-up program and reasons why you might vote against.
>
> The speed-up program would make it possible for each of the four species [*two fish species*] to reproduce normally in the South Coast 45 years [*in the place near Los Angeles 10 years*] earlier than if natural processes take their course.

The reasons to vote against were listed on a card to enhance their communication and emphasize their importance. The first reason reiterates that the injuries are restricted to the four [*two*] species of wildlife in the South Coast and that they are reversible within a 50 [*15*] year time span. The reiteration of reversibility, a major theme in the scenario, is a forceful reminder of substitute commodities as recommended by the NOAA Panel (Arrow, pp. 4-57).

> On the other hand,
>
> SHOW CARD H [*E*]
>
> this deposit does not harm humans and the four [*two fish*] species will recover anyway in 50 [*15*] years. STOP

The second reason to vote against explicitly reminds respondents that there may be other issues that are more important to them that may compete with any money they might want to spend on the accelerated recovery program.[142]

> Your household might prefer to spend the money to solve other social or environmental problems instead. STOP

[141] In the question-by-question instructions for this part of the interview, the interviewer's manual reminded the interviewers about the importance of presenting this and the following material — which includes the willingness-to-pay questions — in a neutral tone and giving the respondent as much time as he/she wants to examine the material and answer the questions (Westat, 1994a; p. 4.57).

[142] As noted earlier, a number of alternative public goods were specifically brought to the respondents' attention at the beginning of the survey (see questions A-1 and A-2 in section 6.2).

The third reason is that the amount may be more than the household wants to spend for what the accelerated recovery program would accomplish. This wording was chosen to make the respondent feel comfortable choosing to vote either *for* or *against* the program even if the respondent believes others regard it as socially desirable to vote a particular way.

> Or, the program costs more money than your household wants to spend for this. STOP

REMOVE CARD H [*E*]

§ 6.4 Section W — Choice Questions

The next section begins by telling respondents how much the program would cost their household. Respondents were randomly assigned one of five versions of the questionnaire which differed only by the tax amount (*i.e.*, $10, $25, $80, $140, or $215) the household would pay if the program were to be approved.[143] This dichotomous choice (*for* or *against*) for a particular level of taxation is recommended by the NOAA Panel (Arrow, p. 4612).

> At present, the program to speed up the covering of the contaminated sediment is estimated to cost your household a total of $(ONE OF FIVE AMOUNTS). Your household would pay this as a special one time tax added to next year's California income tax.

The interviewers were told that "household" has the same meaning as it had in the Household Screener[144] and that if the household had more than one person who paid California income tax, the amount would be split among the taxpayers in the household. If the respondent asked a question about this, the interviewers were instructed to say: "Think of this amount as a total amount for your household" (Westat, 1994a; p. 4.59).

---

[143] The same tax amounts and split-sample methodology were used in the base and scope versions.

[144] See Appendix C.2.1.

We developed a skip record, which folded out from a back page of the questionnaire, to help the interviewers accurately recall the respondent's vote pattern for use in later places in the interview where either the question sequence depended upon how the respondent had voted or the question required the interviewer to insert the highest amount the respondent had previously voted for.

The first choice question, W-1, asked the respondent to make a decision about the object of choice — to vote *for* or *against* the accelerated recovery program given the specified cost to his/her household.[145] To make the decision as realistic and as immediate as possible, the choice was posed in terms of an election being held "today".

UNFOLD SKIP RECORD

W-1. If an election were being held today and the total cost to your household would be a one time additional tax of $(ONE OF FIVE AMOUNTS), would you vote for the program to speed up recovery or would you vote against it?

For the reasons described in Chapter 4, two answer categories were explicitly offered to the respondent: *for* and *against*. In order to avoid the possibility of pressuring respondents who don't have an opinion at this point, the interviewers were trained to accept other responses, such as "don't know," "not sure," or "would not vote," as valid answers for this question and to record them as "not sure" without probing (Westat, 1994a; p. 4.59).

The interviewers were also told to handle any attempts by the respondent to ask them what they (the interviewer) thought about the question (W-1) by saying:

> We want to know what you think. Take as much time as you want to answer this question. (PAUSE) We find that some people say they would vote for, some against; which way would you vote if the plan cost your household

[145] The interviewer's manual (Westat, 1994a; p. 4.57) warned the interviewers that a few respondents may look to them for cues as to how they should vote at this point, and reminded them that "in fact, it doesn't matter at all whether people say 'yes' rather than 'no' to these questions or vice versa." The interviewers were instructed to use a neutral tone and an unhurried manner.

$____? [Westat, 1994a; p. 4.59]

Depending on how the respondent said he or she would vote at W-1, the interviewer asked a follow-up, choice question about a higher (W-2) or lower (W-3) amount. The amount was lower for respondents who said *against* or *not sure* to W-1; and, higher for respondents who said *for*. As shown in Table 6.1, each of the five tax amount versions used a different set of follow-up amounts.

Table 6.1 Tax Amounts by Version and Question

Version	W-1	W-2 (if yes to W-1)	W-3 (if no/not sure to W-1)
1	$10	$25	$5
2	$25	$45	$10
3	$80	$140	$45
4	$140	$215	$80
5	$215	$360	$140

The introduction to each of the follow-up WTP questions explained that it was being asked because "engineering cost estimates" could be different than originally thought, a rationale respondents generally found plausible in our pretesting.[146]

> W-2. It is possible that the final engineering cost estimates for the program would be higher than this. If this turns out to be the case and your household would have to pay a one time additional tax of $(ONE OF FIVE HIGHER AMOUNTS) instead of $(AMOUNT GIVEN AT W-1), would you vote for or against the program?
>
> W-3. It is possible that the final engineering cost estimates for the program would be lower than this. If this turns out to be the case and your household would have to pay a one time additional tax of $(ONE OF FIVE LOWER

[146] The interviewers were told that the follow-up choice question "will enable researchers to get a more accurate picture of the amount of money, if any, a person would be willing to spend for the recovery program" (Westat, 1994a; p. 4.59).

AMOUNTS) instead of $(AMOUNT GIVEN AT W-1), would you vote for or against the program?

Depending on the respondents' answer to the W-1—W-3 question sequence, they were asked an appropriate follow-up question to ascertain why he/she voted that way, a procedure specifically recommended by the NOAA Panel (Arrow, p. 4609). Those who voted *against* for both the first and second, follow-up WTP question were asked:

W-4. Did you vote against the program because it isn't worth that much money to you, or because it would be somewhat difficult for your household to pay that much, or because of some other reason?

We chose this way of asking why the respondent voted against to encourage respondents to feel comfortable giving answers they might otherwise be hesitant to offer such as that they couldn't afford to pay for the program. The interviewers had a specific instruction at this point to record verbatim all "other" answers to W-4.

All respondents who answered questions W-1—W-3 with "don't know" or "not sure" were asked W-5:

W-5. Could you tell me why you aren't sure? (BE SURE TO PROBE)

If the respondent's answer to this open-ended question was vague, the interviewer was instructed to use a probe such as: "Can you tell me what it is about the program that made you unsure?"

Every respondent who said he or she would vote *for* the program at either W-1 or W-3 was asked W-6. This question was worded to assess as specifically as possible, without leading the respondent to give one answer or another, why the respondent's household would be willing to pay the proposed amount.

W-6. People have different reasons for voting for the program. Can you tell me what covering the contaminated sediments would do that made you willing to pay for it? [OPEN-ENDED]

Our pretesting revealed that even when the question was worded in this way, respondents

sometimes gave answers that left out information they assumed was obvious to the interviewer from the context of the interview. For example, when some respondents answered W-6 by saying "help the wildlife", further probing showed the wildlife they had in mind were the species described in the interview as affected by the deposit. In order to clarify such vague answers as "help the wildlife", the interviewers were trained to use neutral and nondirective probes[147] whenever respondents gave answers that were not responsive to the question (what would the program do?) or were vague or unspecific. The acceptable probes, the wording for which was provided in the questionnaire for the interviewers' ease of use, were: "Can you be more specific about what you have in mind?", "Anything else?", and "What would (covering the contamination/fixing the problem) do that made you willing to pay for the program?"

After respondents had reflected on the reasons why they voted as they did, they were offered the chance in W-7 to change their vote from *for* to *against*. This, the first of two reconsideration opportunities, was asked of everyone who voted *for* the program at either W-1 or W-3. As previously mentioned, we paid special attention in the scenario to neutralizing a concern held by some respondents that the deposit could harm human health. W-7 specifically raised this concern to make it clear to respondents who continued to harbor it that the program would only speed up the recovery of the affected wildlife. Respondents who had second thoughts and wanted to change their *for* vote for any other reason could also take advantage of this reconsideration opportunity.

> W-7. It is not unusual for some people to vote for the program because they are concerned that these DDT and PCBs may harm human health. Suppose

[147] The trainers instructed the interviewers on this point as follows: "Remember, we want to hear what the respondent has to say, so keep your probes **nondirective** so you don't lead the respondent and **neutral** so you avoid biasing the respondent's answer in some direction. As always, there are no right or wrong answers. We just want to know what the respondent had in mind about this. **It is quite possible the respondent doesn't have anything in mind about this.** If so, the verbatim, after appropriate probing, will make this clear" (Westat, 1994b, p. 8.8).

human health is definitely not affected in this situation and the program would only speed up the recovery of these four species of fish and birds [*two species of fish*]. Would you vote for or against the program if it cost your household $[LARGEST AMOUNT RESPONDENT VOTED FOR]?

§ 6.5 Section B — Perception of Injury, Program, and Interview

The first set of questions in Section B asked the respondents what they had in mind or had assumed about some of the scenario features when they voted on the program.[148] For example, did they believe that natural processes would take about fifty (or, fifteen in scope) years to return things to normal as they had been told? Questions requiring this type of introspective assessment may be unfamiliar to respondents.[149] Answers to such questions, nevertheless, can help us check which features were accepted by the respondents when they voted.

The introductory statement and the first question, B-1, were worded to convey the request for this type of information as clearly and respectfully as possible.[150]

> I gave you a lot of information before you voted. Please think back to a few moments ago when you decided how to vote. We are interested in what you were thinking then.
>
> B-1. First, did it seem to you that DDT and PCBs could cause the reproduction problems I told you about?

The next question in this sequence asked whether the respondent had *accepted* the fifty

[148] The answers to these questions are another type of check on respondent understanding and acceptance of the scenario (Arrow, p. 4609). Each of the several methods we use to check understanding and acceptance has drawbacks; taken together they provide useful information.

[149] Based on our pretest experience with this survey, the interviewers were told that "sometimes respondents wonder why they are being asked questions like this about what they were thinking when they answered the vote questions — after all, they might say, you told them that it would take fifty (fifteen) years, why should they doubt it." The interviewers were instructed to tell such respondents: "We find that some people have different ideas about this. It is important for us to know what you had in mind." (Westat, 1994a; p. 4.71)

[150] In earlier presentations of this material in our pretesting, some respondents resented these questions because they took them to be a quiz.

(fifteen) year natural recovery period as plausible; for this reason, the wording we used was "seem to you".[151] The follow-up question, B-3, asked those who said "no" if they thought it would take a "lot more" or a "lot less" than 50 (15) years. The interviewers were instructed to record verbatim any other type of answers the respondent gave to B-3.

> B-2. When you decided how to vote, did it seem to you that natural processes would take about fifty [*15*] years to return things to normal?
>
> B-3. Did it seem to you that it would take a lot more than 50 [*15*] years or a lot less than 50 [*15 years*]?

Questions B-4, B-5, and B-6 explored the respondent's assumptions about the effectiveness of the program and the payment period.

> B-4. When you decided how to vote, did it seem to you that the speed-up program would be completely effective in solving the reproduction problems within five years?
>
> SHOW CARD I [*F*][152]
>
> B-5. Did it seem that the program would be . . .[153] mostly effective, somewhat effective, not too effective, or not effective at all?
>
> B-6. When you decided how to vote, did you think your household would have to pay the special tax for the program for one year or for more than one year?

The next question asked whether the respondent felt pushed to vote one way or the other by the interview. For those who felt they had been pushed one way or the other, two follow-up questions (B-7A, B-7B) probed which direction and why they felt this way.

> B-7. Thinking about everything I have told you during this interview, overall did it try to push you to vote one way or another, or did it let you make up your own mind about which way to vote?

---

[151] Our development work suggested that words like "plausible" and "reasonable" were not widely enough understood in this context to use in wording these questions.

[152] Card I contained the answer categories for B-5. See Appendix A.1.

[153] Question text that follows ". . ." was presented in the questionnaire as lower case answer categories (interviewers were instructed not to read anything that appeared in upper case); a NOT SURE answer category was also included but not read out loud. See Appendix A.1.

B-7A. Which way did you think it pushed you?

B-7B. What was it that made you think that? (PROBE: "Can you be more specific about what you have in mind?" "Anything else?")

Question B-8 asked for the respondent's assessment of the seriousness of the injuries described in the scenario.

SHOW CARD J [*G*][154]

B-8. All things considered, would you say the fish and bird [*fish*] reproduction problems I told you about in the South Coast are . . . not serious at all, not too serious, somewhat serious, very serious, or extremely serious?

§ 6.6 Section B — Household Recreational Activities

The next eight questions asked about various types of household recreational activities. When five answer categories were used, show cards were used to display the categories; see Appendix A.1 for show cards and the answer categories for questions asked without the aid of a show card.

Now I would like to ask you a few questions about your household's recreational activities.

B-9. In the past five years has anyone in your household gone fishing?

B-10. Is that saltwater fishing, freshwater fishing, or both?

B-11. In the past five years has anyone in your household gone boating?

B-12. Is that saltwater boating, freshwater boating, or both?

B-13. Does anyone in your household like to identify different species of birds?

[154] Card J listed the five answer categories. See Appendix A-1.

SHOW CARD K [*H*]

B-14. How often do you personally watch television programs about animals and birds in the wild . . . very often, often, sometimes, rarely, or never?

SHOW CARD K [*H*] AGAIN

B-15. How often do people in your household go to the beach at the ocean . . . very often, often, sometimes, rarely, or never?

SHOW CARD K [*H*] AGAIN

B-16. How often do people in your household eat fish . . . very often, often, sometimes, rarely, or never?

The last question in Section B asked respondents to indicate the degree to which they thought of themselves as an "environmentalist". If they asked the interviewer what was meant by this term, they were given a standard survey reply to such questions: "Whatever it means to you." (Westat, 1994a; p. 4.83)

SHOW CARD L [*I*]

B-17. On another subject, would you say you think of yourself as an . . . environmental activist, a strong environmentalist, a somewhat strong environmentalist, a not particularly strong environmentalist, or not an environmentalist at all?

§ 6.7 Section C — Respondent Household Experience and Demographic Characteristics

The first series of questions in Section C obtained information about the respondent's household and personal characteristics.[155]

Now, I have just a few questions about your background.

[155] The Household Screener which the interviewer had previously administered to select the main interview respondent also collected additional information. See Appendix C.2.1.

C-1. First, in total, how many years have you lived in California?

C-2. Have you ever been to Catalina or any of the other Channel Islands?

Those who said "yes" to C-2 were asked the next question.

C-3. Was your most recent visit within the past five years?

Everyone was asked C-4.

C-4. Do you intend to move outside California in the next few years?

The next question, C-5, was only asked of respondents who were interviewed in Los Angeles or Orange Counties.

C-5. Do you intend to move outside (L.A./Orange) County in the next few years?

C-6. In what month and year were you born?

The interviewer coded the respondent's answer to the education question, C-7, into one of eleven categories ranging from "through 8th grade" to "doctorate degree".

C-7. What is the highest year of school you completed or the highest degree you received?

C-8. During 1993, how many adults in your household, including yourself, worked for pay?

C-9. How many people live in this household who are younger than 18?

C-10. Do you have children of any age who live outside this household?

C-11. Do you have any grandchildren?

Because pretests showed that some respondents did not include retirement income when they answered the income question, we asked C-12 as a way to remind them of this type of income.

C-12. Did anyone in your household have any income from social security or pensions in 1993?

In the next question, the interviewer had the respondent report his or her household

income from categories listed on a card, a standard survey research device.

> C-13. I'd like you to think about the income received last year by everyone in your household.
>
> SHOW CARD M [J][156]
>
> Adding together all income for everyone in your household, which letter on this card best describes your household's total income for last year — 1993 — before taxes? Please include wages or salaries, social security or other retirement income, child support, public assistance, business income, and all other income.

The next question was asked to identify respondent households that did not have to pay any California income tax. Because the income range covered by the two lowest income categories — $0 to $19,999 — included virtually all California households who might not owe California income tax, C-14 was only asked of households in these two income categories (A or B).

> C-14. Did anyone in your household pay any California income taxes for last year, 1993, either by having taxes withheld from wages, retirement income, or other money received, or by sending money to the State with a tax form?

All respondents were asked about their future household income prospects.

> C-15. If things go as you expect, do you think your household's total income for this year will be about the same as last year, higher than last year, or lower than last year?

§ 6.8 Section C — Strength and Reassessment Questions

This series of questions was only asked of respondents who had said they would vote for the program at one of the amounts in the W-1 to W-3 question sequence and those who had not changed their vote at W-7. They were asked how difficult it would be for them to pay the highest amount they voted *for* and how strongly they favored the program at this cost. Everyone

[156] This card listed 11 income categories ranging from "under $10,000" to "$100,000 or more." See Appendix A.1.

who reported either: (1) that it would be "very difficult" or "somewhat difficult" for his/her household to pay the amount, or (2) that he/she favored the program "not too strongly" or "not at all strongly" was offered a chance to reconsider his/her vote. As displayed below, some questions were repeated in the questionnaire. This repetition was to make the skip patterns more manageable; no respondent was actually asked the same question more than once.

> C-16. Now that we're close to the end of the interview and you have been able to think a bit more about the situation, I'd like to give you a chance to review your answers to the voting questions.
>
> You said you would vote for the program to speed up the recovery of the four fish and bird species [*the two fish*] if it cost your household a one time additional tax payment of $_____.
>
> C-17. How difficult would it be for your household to actually pay $[LARGEST AMOUNT RESPONDENT VOTED FOR] next year if the program passed? Would it be . . . very difficult, somewhat difficult, not too difficult, or not difficult at all?
>
> C-18. Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $[LARGEST AMOUNT RESPONDENT VOTED FOR]?
>
> C-19. How strongly do you favor the program if it cost your household this much money? Would you say . . . very strongly, strongly, not too strongly, or not at all strongly?
>
> C-20. Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $[LARGEST AMOUNT RESPONDENT VOTED FOR]?
>
> C-21. How strongly do you favor the program if it cost your household this much money? Would you say . . . very strongly, strongly, not too strongly, or not at all strongly?
>
> C-22. Why is that? [OPEN-ENDED]

§ 6.9 Section C — Miscellaneous Questions

The following question was only asked in the scope version. It served to inform scope respondents that the particular set of injuries described to them in the scenario was not

definitive.

> **[scope only]** C-23. In this interview I described the effects of DDT and PCBs on the White Croaker and Kelp Bass that live off the Los Angeles coast. Some scientists think DDT and PCBs may still be causing reproduction problems in two other species in the South Coast. These are the Bald Eagle and the Peregrine Falcon. If this turned out to be the case, would you consider the problem caused by these chemicals to be more serious?

In order to measure respondent attitudes about different institutions and groups, we asked the following questions.

> **[both base and scope]** C-24. I'd like to know how much confidence you have in some of the institutions and groups in this country.

SHOW CARD N [*K*][157]

> First, (READ X'd ITEM) . . ., generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . .? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; RE-READ STEM AS NECESSARY.)
>
> a. University scientists
> b. U.S. Congress
> c. Scientists who work for industry
> d. Newspapers
> e. California state government
> f. Large corporations

Because the State of California was identified as the sponsor of the survey, we asked an additional question about how much trust the respondent had in the state government.

SHOW CARD O [*L*]

> C-25. How <u>much</u> of the time do you think we can trust the California state government to do what is <u>right</u>? Would you say . . . always, almost always, most of the time, some of the time, almost never, or never?

The following question measured which method of paying for environmental

[157] This card listed the four answer categories.

improvements, higher prices or higher taxes, the respondent prefers. In our development work we learned that respondents volunteered two other answers with some frequency, so we included those among the answer categories that were not read to the respondent. They were: "neither" and "don't care which one".

> C-26. There are different ways for people to pay for new programs to protect the environment. (STOP) One way is for the government to pay the cost. This will raise everyone's taxes. (STOP) The other way is for businesses to pay the cost. This will make prices go up for everyone. If you had to choose, would you prefer to pay for new environmental programs . . . through higher taxes, or through higher prices?

The next questions in this survey concerned what languages the respondent spoke at home and whether he or she was a United States citizen. Only respondents who answered "no" to C-27 were asked C-27A.

> C-27. Do you usually speak English at home?
>
> C-27A. What language do you usually speak at home?
>
> C-28. Are you a citizen of the United States?

The last few questions are standard items that Westat asks in surveys of this type for validation purposes and to record respondent characteristics that can be observed by the interviewer.

> C-29. What is your full name and phone number, in case my supervisor wants to check my work? (RECORD FULL NAME AND PHONE NUMBER ON RECORD OF ACTIONS. DO NOT RECORD IT HERE.)
>
> INTERVIEWER, PLEASE NOTE THE FOLLOWING ABOUT THE RESPONDENT BY CIRCLING THE NUMBER OF THE CORRECT RESPONSE:
>
> C-30. SEX
>
> C-31. RACE[158]

[158] The race categories, based on the 1990 census categories, were as follows: White, Not Hispanic; White, Hispanic; Black, Not Hispanic; Black, Hispanic; Asian; and Other.

C-32. ENTER R'S ZIP CODE:

C-33. ENTER R'S PSU #:

§ 6.10 Section D — Interviewer Evaluation Questions

The interviewers were asked to give their impressions about certain aspects of the interview by filling out the questions in Section D. We were particularly interested in any information they might provide about any difficulty the respondent might have had in understanding the material. All questions in this section were answered by the interviewers after they left the respondents' homes. The interviewers were told:

> Section D of the questionnaire is designed to provide us with feedback from all interviews. It is crucial to the evaluation effort that you answer all applicable questions as fully as possible. You, as an interviewer, are our most important source of information for evaluating these topics. [Westat, 1994a; p. 4-107]

Questions D-1 to D-6a asked for the interviewers' impression about the interview situation, how the respondent attended to the interview, and the difficulties the respondent may have had.

> D-1. What was the reaction of the respondent as you read through the material beginning with A-3 through A-16? (This is the descriptive material including the maps and charts.)[159]
>
> a. How distracted was the respondent?
> b. How attentive was the respondent?
> c. How well did the respondent understand this material?
>
> D-2. Did the respondent say anything suggesting that he or she had any difficulty understanding either the natural recovery process or the speed-up program?
>
> D-2A. Describe the difficulties. [OPEN-ENDED]
>
> D-3. Did the respondent have any difficulty understanding the vote questions (W-1 through W-3)?
>
> D-3A. Describe the difficulties. [OPEN-ENDED]

[159] The scale included the following categories: extremely, very, somewhat, slightly, not at all, and not sure.

D-4. When you asked the voting questions did you feel the respondent was impatient to finish the interview?

D-4A. How impatient was the respondent?[160]

D-5. How serious was the consideration the respondent gave to the decision about how to vote?[161]

D-6. Not counting you and the respondent, was anyone age 13 or older present when the respondent voted?

D-6A. Do you think the other person(s) affected how the respondent voted or don't you know?

The final question invited the interviewers to make any other comments they wished about the interview. No specific instruction was given about this except that they should "record here any other comments you think would be useful about how the interview worked and how the respondent 'took' the interview." (Westat, 1994a; p. 4.111]

D-7. Do you have any other comments about this interview? [OPEN-ENDED]

[160] The answer categories were very impatient, somewhat impatient, a little impatient, not very impatient, and not sure.

[161] The answer categories were extremely serious, very serious, somewhat serious, slightly serious, not at all serious, and not sure.

§ 7 Main Survey Administration

§ 7.1 Introduction

Westat's administration of the main survey consisted of several distinct steps.[163] A random sample of California blocks was drawn, the individual dwelling units in those blocks were listed, and a random sample of the listed dwelling units was selected. An interviewer's training manual was prepared, and Westat's interviewers attended a three-day training session to ensure consistent and proficient administration of both the base and scope versions of the survey instrument.[164] During the five months of main survey data collection, the interviewers were supervised by regional field supervisors and a field manager. As the interviews were completed, Westat conducted quality control edits and validations. At the end of the data collection, sample weights were constructed. Finally, data sets containing the responses to both close-ended and open-ended questions were prepared. This chapter details each of these steps. As will be seen, three of the NOAA Panel's recommendations implemented in our study pertain directly to survey execution: in-person interviews, a probability sample, and, to the extent possible, minimization of non-response.

§ 7.2 Sample Design

Westat designed the main study sample to represent the population of English-speaking Californians, age 18 or older, living in private residences they own or rent (or whose rent or mortgage they contribute to). A multi-stage area probability sample was designed to give each

[163] Westat, headquartered in Rockville, Maryland, is one of the country's most respected survey research firms. A copy of Westat's corporate brochure can be found in Appendix C.1.

[164] See Chapter 5 for a discussion of the base and scope instruments and Appendices A.1 and A.2 for copies of the base and scope survey instruments, respectively.

residential dwelling unit in California an equal chance of selection.[165] The selection of the sample followed standard procedures for multi-stage area frame designs that have been used for decades by high-quality survey organizations.[166]

At the first stage of selection, all the counties in California were assigned to Primary Sampling Units (PSU's). Many of the PSU's consisted of multiple counties, some of single large counties, and Los Angeles county was divided into two PSU's (the city and the rest of the county). Thirteen PSU's were then selected with probabilities proportional to their 1990 Census population counts.[167] Within the selected PSU's, 652 segments (city blocks, groups of blocks, or Census equivalents in rural areas) were selected with probabilities proportional to their 1990 Census counts of housing units.

§ 7.3 Selection of Dwelling Units

From August 18 to October 9, 1993, Westat's trained listers canvassed the 652 selected segments and listed every dwelling unit (DU) they found.[168] (For those segments with a very large number of DU's, only a "chunk" chosen by Westat's sampling department, with probabilities proportional to its size, was listed.) A random selection of dwelling units was then drawn from the listed DU's by Westat statisticians.[169] The number selected (4,800) was

[165] The Census Bureau's definition of a dwelling unit (DU) was used: a house, an apartment, or group of rooms or a single room occupied as separate living quarters (that is, the occupants do not live and eat with any other person in the structure, and there is direct access from the outside or through a common hall or area). See Westat (1994a).

[166] See Kish (1965).

[167] These were as follows: Del Norte and Humboldt; El Dorado, Placer, Sacramento, and Yolo; Alameda, San Mateo, San Francisco, Marin, and Contra Costa; San Joaquin; Santa Clara; Fresno; Santa Barbara; Ventura; Los Angeles County; Los Angeles City; Orange; Riverside and San Bernardino; and, San Diego.

[168] This procedure is described in Westat's Listing Manual for this study.

[169] The listing process revealed that one of the selected segments contained no dwelling units; hence, the selected DU's come from 651 segments.

determined after estimating rates of occupancy (some DU's will be vacant), eligibility (some won't contain English-speaking adults), and response (some won't cooperate with the request for an interview) so as to yield approximately 3,000 interviews.

At the start of the main study data collection in March, interviewers followed a prescribed probability procedure to sample DU's not recorded by the listers.[170] This procedure corrected, in an unbiased manner, for DU's missed by the listers as well as for any units constructed after the listing was conducted. It produced 21 additional DU's. Thus the total sample consisted of 4,821 dwelling units. These 4,821 DU's were randomly assigned within segments (in a 2 to 1 ratio) to the base and scope samples.[171]

§ 7.4 Interviewer Training

The 59 professional interviewers participating in the study attended a three-day training session held on March 5-7, 1994, in San Diego, CA. All of the interviewers had prior household interviewing experience. The training session was conducted by the study's Project Manager, Susan Rieger, assisted by the Field Director, Field Manager, and three Regional Field Supervisors. The interviewers, field supervisors, and field manager were not informed of the survey's intended use in litigation. The study was referred to simply as the California Issues Study (CIS). Only a small number of senior staff in the Rockville office knew of the intended use and they exercised care to ensure that its purpose was not communicated to the field staff.

The interviewers had been given an initial set of study materials to read before attending training. The training consisted of scripted lectures, exercises, interactive small group sessions,

[170] See Appendix C.2.1.

[171] Cases were also randomly assigned to the five tax amount versions described in Chapter 6.

and role-playing sessions (using prepared scripts) in which one trainee took the role of the interviewer and another played the role of the respondent.[172]

After general introductions, the first morning of the training began with an overview of the CIS study. The discussion then turned to the interviewer's role and a brief description of the interviewer's materials. After a break, the training reconvened for a demonstration interview to show the way the interview was to be administered. That was followed by a detailed discussion of the first of the interviewer's tasks: locating the dwelling unit and selecting a respondent for the main interview. The remainder of the afternoon was devoted to the administration of the main interview. This took place in small groups led by the regional supervisors and the project manager. The key features of the main interview were highlighted; special emphasis was placed on using the visual aids, reading the narrative sections, and following the skip patterns.

The second day of training began with a detailed comparison of the base and scope instruments. They were identified as "Version A" and "Version B" or "blue" and "yellow" (corresponding to their colors), respectively; the words "base" and "scope" were never used with any of the field staff. The interviewers were told that the two versions were being fielded because of scientific uncertainty about the number of species affected. The trainees then broke into smaller groups for two interactive sessions led by the regional supervisors. The first session included lecture and practice with probing techniques. The second session included a detailed group discussion of the screening procedures, the record of actions, and the non-interview report (NIR) form. The discussion was followed by a role-playing exercise. After lunch, the role-playing exercise was completed and the rest of the day devoted to further role-playing.

[172] Westat's training procedures are further described in Appendix C.5.1.

The third day began with a review of the probing exercise (a self-administered test on probing) and administrative procedures. The remainder of the day was spent in role-playing with both versions of the survey instrument. As part of concluding comments, interviewers were instructed to practice administering the two versions of the survey instrument at home before they conducted interviews at sampled DU's.

§ 7.5 Interviewer Supervision

All interviewers reported to one of the three regional supervisors, who in turn reported to the field manager. Supervisors were responsible for conferring with interviewers regularly, reporting on and managing progress, performing quality control edits, and validating interviews.

Interviewers reported to their supervisor by telephone at least once a week. The discussions included a case-by-case review, feedback on quality and production, and planning strategy for the remaining assignment. In addition, the interviewers participated in conference calls with other interviewers and supervisors to share their strategies on gaining cooperation.

Supervisors entered data on interviewing production, time, and expenses into a machine-readable file that was set up to generate field status reports. Supervisors also reported weekly by telephone to the field manager on survey progress, case assignments, and refusal conversion strategies. In addition, the field director had a weekly telephone call with the supervisors and the field manager.

§ 7.6 Quality Control Edits

Interviewers sent their completed questionnaires to their supervisors on a weekly basis. Upon receipt, supervisors were responsible for a comprehensive field edit of the questionnaires

before sending them to the home office for further editing and data entry.[173] The edits, for completeness and accuracy, used the form shown in Appendix C.3. The form covered respondent selection, skip patterns, probing, verbatim recording, and other administrative matters. Results of the edits were discussed with the interviewers.

The edits uncovered 16 cases in which respondent selection within the household was carried out improperly. None of these cases was included in the final data set; they were all counted as non-respondents to the main interview.[174]

§ 7.7 Main Survey Data Collection

The main survey data were collected over a 24 week period, from March 8 to August 23. In the first week of the field period, the Los Angeles Times reported that small amounts of DDT were found in two backyards in an unincorporated area east of Torrance, half a mile from the former Montrose Chemical site.[175] In subsequent weeks, the EPA discovered that the DDT was in larger quantities than expected; various government agencies held three public meetings in the Torrance area; and, more than 30 families were relocated so that the EPA could excavate the DDT-laced soil.

While none of the selected DU's were in this neighborhood, three segments (encompassing 22 selected DU's) were located in sections of Torrance just to the south of this

[173] To facilitate quicker turnaround of the final cases, toward the end of the field period these edits were conducted by staff in Westat's Rockville office.

[174] In another instance, a respondent received an emergency phone call during the administration of section B of the questionnaire; the main interview was temporarily terminated. After consulting with supervisors, the interviewer returned to administer the demographic questions (C-1 through C-15) contained in section C. The section B and the section C questions not administered in the second visit were assigned a value of 9 (for "not ascertained") and the case was included in the final data set.

[175] Los Angeles Times, March 10, 1994, at B3.

neighborhood, and two additional segments (encompassing 13 selected DU's) were located in the city of Carson which is just to the south-east. Given the close proximity of these 35 DU's to a neighborhood where the excavation of DDT was causing intense concern about human health, no attempt was made to administer the main interview there. As a result, the population to which our results apply consists of all English-speaking California households except those near the excavation, which we defined as zipcode 90502 (the location of the excavation) and the four zipcodes sharing a common boundary with it (90501, 90248, 90710, and 90745).

In the beginning of June, an incentive program was introduced to minimize attrition of interviewers and to reward interviewers for completing the more difficult cases that remained. These cases included a large number of initial refusals and cases where it was difficult to find household members at home. The incentive plan, similar to ones Westat had used on other large studies, followed a two-tiered approach. It provided a monetary incentive for total number of cases completed during the data collection period as well as a weekly incentive for cases completed over a set amount for the remainder of the field period.[176]

§ 7.8 Validation of Interviews

The original plan was for supervisors to validate approximately 10 percent of each interviewer's assignment. The cases to be validated were randomly preselected in advance of the field work. Thus, both interviews and non-interviews were validated. For interviews completed after the incentive plan went into effect the validation rate was increased to 100 percent.

Validations were performed by telephone using the form shown in Appendix C.4.

[176] For further details, see Appendix C.5.3.

Validations on cases without telephone numbers were attempted in-person. Problems with interviews conducted by two interviewers were discovered. As a result, all of the cases they were assigned were validated (*i.e.*, 100 percent of the work they completed both before and after the introduction of the incentive plan). This revealed that a total of 30 interviews had not been conducted with residents of the selected dwelling unit. In another 8 cases, the validator was unable to determine whether the interview had been conducted. For many of the 30 failed validations, information about the interview topic was conveyed in the course of conducting the verification. In order to avoid self-selection bias arising from knowledge of the topic, no attempt was made to interview the correct respondent in such instances. In other cases, however, nothing about the topic was conveyed during the validation and, in two of these instances, a main interview was later conducted with the appropriate person. The remaining 36 cases were treated as "other nonresponse".[177] (For further details, see Appendix C.5.4).

§ 7.9 Sample Completion

The outcome of the interviewers' attempts to complete a Screener—designed to collect information on household composition and to select a respondent for the Main Interview—was as follows:[178]

[177] There were also 9 cases to which the two suspect interviewers had assigned various non-response outcomes that validators could not verify. Eight of these were also treated as "other nonresponses". The ninth was coded a refusal, which was the outcome after another interviewer tried to conduct the interview.

[178] A copy of the CIS Household Screener can be found in Appendix C.2.1. The other field materials (*e.g.*, refusal conversion letters, not at home/unable to contact letter, community leader letter, "Sorry I Missed You" card, "No Habla Español" card) used by the interviewers and, when appropriate, mailed to the selected addresses can be found in Appendices C.2.2 to C.2.7.

Screeners Completed	3,391	
Not an Occupied Dwelling Unit	503	
Language Barriers	152	
Refusals	551	*737 eligibility unknown*
Physical/Mental Handicaps	39	
Never Reached	52	
Other Nonresponses[179]	95	
Torrance Area Ineligibles[180]	35	
Other Ineligibles[181]	3	
TOTAL	4,821	

The results from the 3,391 cases where a respondent was randomly selected from the Main Interview were as follows:

Main Interviews Completed	2,810
Refusals	269
Language Barriers	189
Physical/Mental Handicaps	26
Never Reached	54
Other Nonresponses[182]	43
TOTAL	3,391

The response rate is the number of completed main interviews divided by the number of eligible households. Thus, computing the response rate involves making an assumption about

[179] This includes 35 cases that could not be validated; 26 cases where the household moved before the Screener could be administered; 15 cases where the final outcome was unknown (*e.g.*, questionnaire was lost in the mail); 10 cases where the interviewer was unable to gain access (*e.g.*, selected DU was in a locked building); and 9 cases where the correct DU could not be identified due to insufficient listing information.

[180] This consists of the addresses in the five segments near the Montrose site. At the very end of the field period, attempts were made to gather Screener information about the composition of these households, but no respondent was selected to be interviewed for the Main Interview. The information from these Screeners was used in the construction of sample weights as well as to estimate the number of households in the Montrose area. This estimate was subtracted from the estimated total number of California households in order to arrive at the population to which we extrapolated our results (see Section 7.10).

[181] This consists of addresses occupied on a temporary basis by visitors who resided outside of California.

[182] This consists of 16 cases in which respondent selection within the household was carried out improperly, 15 cases in which the household moved before the Main Interview could be administered, 9 cases where the validation confirmed the Screener but not the Main Interview, and 3 cases where the Main Interview could not be administered before the end of the field period.

the eligibility of the 737 occupied dwelling units that were nonresponses to the Screener for other than language reasons. The standard survey practice is to assume the same proportion of these cases was eligible as for those cases whose eligibility was determined (Council of American Survey Research Organizations, 1982), which in this instance is 90.3 percent.[183] Using this approach, the response rate was 72.6 percent: 2,810 divided by [4,821 - (503 + 379 + (0.097 * 737))].[184] That is, in calculating the response rate, we removed from the denominator the 503 addresses that were not occupied DU's, the 379 known ineligible cases (341 language barriers, 35 Torrance area ineligibles, and 3 other screener ineligibles), and 71 additional cases representing our best estimate of the ineligibles among the screener nonresponses.[185]

§ 7.10 Sample Weights

As information about the survey topic was not provided to individuals until after the main interview began, willingness to pay for the program to speed-up the recovery of the affected species could not have directly affected whether or not a household responded. It is possible, however, that other characteristics (*e.g.*, household size or residence in large urban areas) were related to responding/non-responding status. Thus the composition of the interviewed sample could differ from that of the total sample initially chosen. In addition, some parts of the

[183] Of the 3,546 occupied DU's outside of the Torrance area whose status was determined (completed screeners, screener language barriers, and screener other ineligibles), 3,202 (or 90.3 percent) were members of the eligible population (3,546 less the screener language barriers, main interview language barriers, and screener other ineligibles).

[184] The response rate for the base sample was 72.1 percent and for the scope, 73.8 percent, a difference that is not statistically significant. The response rates for each PSU are provided in Appendix C.6. Due to rounding, the over-all response rate is shown in the appendix table as 72.7.

[185] The lower-bound estimate of the response rate, assuming that all of the 737 unknown eligibility cases were in fact eligible, is 71.3 percent.

population may not be represented in a sample either because dwelling units were missed by listers or because individuals who live in a dwelling unit were not reported as living there. This is referred to as undercoverage. Finally, the fact that samples are drawn randomly means that chance processes may cause the sample characteristics to depart from those of the population from which it was drawn. This is known as sampling variability.

In order to limit the impact of sampling variability and reduce the potential for error from nonresponse and undercoverage, sample weights were constructed following standard survey procedures. The sample weights incorporated both nonresponse adjustments and post-stratification to household totals from the 1993 Census Bureau's Current Population Survey (CPS). The nonresponse adjustments were done within groups defined by age of householder, race/ethnicity, and household type (married couple present versus other). The weights of those who responded within a group are increased by a factor that allows them to represent both themselves and the non-respondents within the group. To the extent that respondents are similar to the non-respondents within a group in terms of responses to a survey item, the potential for non-response bias in the corresponding survey estimate is reduced.

The post-stratification involved weighting the sample so it reflected the California distribution of the 1993 CPS on age of householder, race/ethnicity, household type, and geographic area of California. The sample weights of respondents were adjusted so that aggregate totals corresponded to Census figures. This reduces variation from the chance nature of sample selection as well as adjusts for any coverage differences among the groups used for the post-stratification.[186]

[186] The weights also took into account the departures from equal probabilities of selection that occurred in 6 of the 651 segments. In 4 segments, clerical errors meant that households were selected with probabilities that were too large. In 2 other segments, there had been extraordinary growth in population since the 1990 Census. As a result, these 2 segments would have contributed a disproportionately large fraction of the total sample if an equal probability design had

No additional corrections to the data set beyond those implied by the weighting scheme described above have been made because we have assumed that dwelling units chosen for our sample but not interviewed are missing at random with respect to their willingness-to-pay values within the groupings used for the weighting adjustments. This assumption is plausible largely because a household's decision to participate or not participate in our survey was made without knowledge of the survey's subject matter. It is possible that households who are very difficult to find at home or who generally refuse to be interviewed have systematically different willingness-to-pay values, but it is unclear whether the values might be higher or lower. In any event, our response rate is sufficiently high that any non-response effects should be reasonably small.[187]

Due to logistical and time considerations, no foreign language versions of the final questionnaire were used. As a result, non-English speaking households were not eligible to be interviewed.[188] On the basis of the characteristics of a 5 percent sample of the California households from the 1990 Census (the Public Use Microdata Sample), Westat reduced the 1993 CPS estimate of the number of California households to reflect the proportion of that were non-

been followed. It is standard practice in such instances to restrict the number of DU's selected, as well as to trim the weights associated with the cases so as to minimize the mean square error of the results. For further details of the weighting, see Appendix C.5.5.

[187] As the NOAA Panel points out, response rates substantially higher than ours are unlikely to be achieved in contingent valuation surveys (Arrow *et al.*, 1993; p. 4611).

[188] If no one in the household spoke English, but someone spoke Spanish, an attempt was made to send a Spanish speaking interviewer to administer the screener to obtain household information. Once the screener was completed, if it was determined that no eligible household member spoke English well enough to be interviewed, the main interview was closed out as a language barrier. If it was not possible to send a Spanish speaking interviewer to administer the screener, the screener was closed out as a language barrier.

English speaking in the subgroups used for post-stratification.[189] This yields an estimate of 10,347,108 English-speaking California households to which our results may be extrapolated.

§ 7.11 Data Entry

As the questionnaires were received at Westat's home office, the numeric and verbatim responses were entered into separate computer files by the data entry department. The numeric data were entered as they appeared on the questionnaire. The data entry staff was instructed to enter a value of "9" in those instances where the question was blank but should have been asked. The data were entered in batches independently by two persons (that is, there was 100% verification of the data entry). When data entry and validation activities for a batch of questionnaires were complete, an ASCII file containing the numeric responses was electronically mailed to NRDA. The batch of questionnaires and a diskette containing both the numeric response data file and a verbatim response file were sent to NRDA.[190]

Questionnaires arriving at NRDA were logged and filed, and the numeric responses re-entered by NRDA staff. Once a batch was re-entered, that data set was compared with the data set provided by Westat. For each case, a direct comparison was made of the two values for each variable. Differences were reconciled by an examination of the source questionnaire; and a data set was constructed incorporating the reconciled values of the two data sets.[191]

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[189] The total number of California households was estimated to be 11,107,204, of which 10,410,160 were English-speaking. This number was then reduced by 63,052, Westat's estimate of the number of households in the five zipcodes described in Section 7.7.

[190] For a description of how Westat tracked each questionnaire before sending to NRDA, see Appendix C.5.2.

[191] The most common differences were as follows: Westat and NRDA interpreted the handwriting differently for questions that required interviewers to record a number (*e.g.*, psu, zipcode, year of birth); Westat entered a value of "9" and NRDA followed pre-specified decision rules for questions where the interviewers circled more than one answer category (*e.g.*, respondent answered "in between 2 and 3" so interviewer would circle both 2 and 3 or respondent at W-4 would answer both 1 or 2 and make a spontaneous comment that was recorded under "OTHER [SPECIFY]" and thus coded 3); Westat's coders referred to other field material documents (whereas NRDA didn't) when the interviewer failed

Using the reconciled numeric response data set, NRDA corrected skip pattern violations and recording errors.[192] A computer program was written that assigned a value of "9" (categorized as *not ascertained* in the Appendix D.1 tables) to those questions that the respondent was not asked but should have been asked. A value of "." was assigned to those questions which the respondent was asked but should not have been asked. In addition, a separate program was written to treat the less than two percent of the interviews that contained errors at the voting questions (W-1, W-2, and W-3) and the reconsideration questions (W-7, C-17—C-20). These were either recording errors (*i.e.*, the interviewer circled the appropriate answer category on the skip record but not at W-1, W-2, W-3, or W-7) or cases where the respondent changed his or her mind about an answer and the interviewer circled a second answer category without putting a line through the first code that was circled.[193] This cleaned data set was used in the analysis reported elsewhere in this report. Tabulations of this cleaned data set, weighted and unweighted, are found in Appendix D.1.

NRDA staff also re-entered the verbatim responses. The two verbatim response data sets were compared by visually comparing the entries for each question. Inconsistencies were resolved by reference to the source questionnaire, and a data set was constructed incorporating the reconciled responses of the two compared data sets.[194]

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to circle A.M. or P.M., failed to enter correct PSU, didn't check Box 1 or Box 7, or did not code race or sex on the main interview itself; and cases where Westat's coders neglected to enter a value of "9" for questions that were not asked but should have been.

[192] See Appendix C.7 for copies of the recode files (executable in STATA).

[193] If the respondent changed his/her mind after answering a question, the interviewers were instructed to put a line through the first code that was circled and write next to it "RE" (an abbreviation for respondent error).

[194] The discrepancies involved such things as transposed prepositions and pronouns and the linking of spontaneous comments to a page number versus a specific question number.

§ 8 Evaluation of Qualitative Measures of Survey Reliability

§ 8.1 Introduction

This chapter examines the qualitative evidence underlying the quantitative data analysis presented in Chapter 9. In section 8.2, *verbatim* responses to open-ended questions in the base survey instrument are examined. The primary focus is on the elicitation questions recommended by the NOAA Panel that asked respondents to explain their reason(s) for voting *for* or *against* the accelerated recovery program or why they were not sure about how they would vote. While a qualification to that recommendation is noted in Chapter 4,[194] qualitative data from the survey provide evidence that respondents paid attention to the survey and took the choice opportunity seriously, that respondents' decisions reflected their perceptions of the object of choice and their preferences for it, and that their choices were not influenced by extraneous factors, one's confidence in the reliability of the data is increased. Section 8.2 also examines the additional kinds of information respondents requested during the presentation of the injuries and the accelerated recovery program.

In section 8.3, the responses to section B debriefing questions, which provide additional information about how respondents perceived various aspects of the injuries and program, are examined. Section 8.4 explores the characteristics of those respondents who changed their *for* votes to *not for* votes when they were given opportunities to reconsider their initial votes. In section 8.5, interviewer assessments of various aspects of the interview are examined; and finally, section 8.6 presents a summary of our qualitative analysis.

[194] See section 4.6.2.4.

§ 8.2 Examination of Responses to Open-Ended Questions

Several issues are considered in this section: whether respondents understood the choice; whether they took the choice seriously; whether they took relevant factors into account when they made their choice; whether they felt pressured to vote one way or another and, if so, whether there is evidence that this affected how they voted; and whether they were influenced by the presence of other people during the interview. The concern that underlies these issues is the meaningfulness of the respondents' voting choices, a concern that motivated both the NOAA Panel's methodological recommendations and the design and implementation of this study. Before addressing these issues, the method of coding the open-ended, verbatim responses into discrete-response categories is described.

§ 8.2.1 Coding of Open-Ended Questions

Periodically during the description of the injuries and the accelerated recovery program and immediately after the choice questions, the interviewers asked open-ended questions and recorded respondents' answers as completely as possible, word by word, in pen, on the questionnaire. The interviewers were also instructed to record in the same way spontaneous comments made by the respondent at any other time during the interview. The information recorded is referred to as a verbatim response.

The coding of the verbatim responses into discrete categories consisted of three steps. First, open-ended questions were selected for coding: A-7A, A-11A, A-13A, A-15A, W-1, W-4, W-5, and W-6. Second, after an examination of typical comments made in response to these questions in the Pilot IV interviews, coding schemes to categorize the various responses were developed. Next, two coders independently examined the open-ended and spontaneous verbatim

responses for the selected questions, separating them into individual ideas. Once this process was completed, the two coders worked together to negotiate resolutions of any disagreements they had.

In the third stage of coding, another set of two coders independently assigned each of the separate ideas into one of the categories listed in a preliminary coding scheme; after an initial batch of verbatims had been coded, we evaluated the discrepancies between the coders. We subsequently revised the coding scheme to increase precision and clarity. Each coder then independently assigned each of the verbatim ideas to one of the revised categories.[195] Finally, they reconciled any codes on which they disagreed. This sort of procedure is conventionally used by psychologists and other social scientists to do content analysis of open-ended material (Bailey, 1987). The coded values are tabulated in Appendix D.2. and discussed below.

§ 8.2.2 Queries During Presentation of the Injuries and Accelerated Recovery Program

The first section of the interview contained four sets of questions (A-7/A-7A, A-11/A-11A, A-13/A-13A, and A-15/A-15A) that asked respondents if they wanted material repeated or if they had questions about material that had just been presented.[196] Those who said *yes* to the first questions of the pairs were asked to describe what they would like repeated or what they wanted to know. The responses to these questions provide useful information about respondents' reactions as the information on the injuries and accelerated recovery program was

[195] See Appendix C.8 for a copy of the verbatim coding schemata.

[196] Our pretesting indicated that some respondents wanted additional information about the sediment that would be used to cover the contaminated layer, but that the demand for this information was not broad enough to justify presenting these details to everyone and risking information overload. Therefore, we made this information optionally available to respondents by placing scripted responses in boxes at relevant places in the questionnaire (see Boxes 3, 4A, and 4B in Appendix A.1). The interviewers were instructed to read these scripted responses whenever a respondent mentioned these topics or asked questions about them and to record this action by checking the appropriate box.

presented.

Question A-7 was asked after the description of the reproduction problems of the four affected species. When asked if there was "anything that I have told you about these four fish and bird species that you would like me to repeat?," 96 percent said *no*. Of the 62 respondents who said *yes*, and were asked in A-7A what they would like to have repeated, most inquired instead about aspects of the situation that would be described later.[197] For example, 23 respondents wanted to know what had caused the four species' reproduction problems and 28 wanted information about these species' endangerment status.[198] The survey instrument provided information about the cause of the reproduction problem and about endangerment in the very next section of the interview.

The second pair, A-11/A-11A, asked whether respondents had heard anything about the two chemicals that "are located in this particular place."[199] The 146 respondents (8% of the sample) who answered *yes* were asked: "what have you heard?" Approximately 45 percent of these respondents made a clear reference to the DDT/PCB deposit off the South Coast.

Questions A-13/A-13A followed the description of the accelerated recovery program and asked the respondent if he or she had any questions about how it would work. Questions A-15/A-15A followed the description of the natural recovery option and asked the respondent if he or she would like to know anything else about <u>either</u> the accelerated recovery program or the natural recovery option. Approximately 14 percent of all respondents asked questions at A-13A

[197] In some cases, even though A-7 was coded *yes*, and a verbatim response was recorded at A-7A, the comment was clearly not in response to or relevant to the question. These types of comments were not considered in the coding of the A-7A verbatims nor were similar types of comments considered in the coding of A-11A, A-13A, or A-15A.

[198] Respondents either asked questions about members of these species who lived elsewhere or whether the species may become extinct.

[199] Here the interviewers were instructed to point to the location of the deposit on Map 3. See Appendix A.1.

and at A-15A. Over 25 percent of respondents who asked a question at A-13A also asked a question at A-15A. The verbatim responses to these questions are summarized in Table 8.1.[200]

Table 8.1 Verbatim Responses to A-13A and A-15A[a]

QUESTIONS ABOUT...	A-13A (N=257)	A-15A (N=260)
cost of program/paying for the speed-up program	28.4%	53.1%
how the speed-up program would work and its consequences	36.2%	19.2%
other possible ways to speed up recovery	16.3%	4.6%
natural recovery process	NA[b]	11.5%
whether the speed-up program would work	29.6%	18.1%
other	17.1%	14.6%

(a) Percentaging base is the number of respondents who gave a verbatim response to each question. Percentages total more than 100 percent as multiple responses allowed.
(b) This category was not applicable to A-13A.

The coded categories are of three types. As one might expect, the most commonly asked question concerned the cost of the program and, in particular, what the respondent would have to pay. Based on those who gave a verbatim response at A-13A and A-15A, 28 percent asked this type of question at A-13A and 53 percent at A-15A (the latter question asked just prior to the description of the program cost). The second type of query was about various aspects of how one or the other of the alternatives would work, including alternative ways to accelerate recovery. The last type of query often involved expressions of skepticism about whether the accelerated program would actually work. Overall, the number of respondents who asked a question about either the injuries, accelerated recovery program, or natural recovery process at

[200] The same coding categories were used for A-13A and A-15A except that a natural recovery category was added for the latter question.

A-7, A-11, A-13, or A-15 was not large; and the questions they raised generally related to the material in a meaningful fashion.

§ 8.2.3 Did Respondents Take Relevant Factors Taken into Account When Voting?

To increase confidence that the voting choices are reliable, it is desirable that they be related to: (1) what the program would offer, (2) the cost of the program to the respondent's household, and (3) the respondents' preferences for environmental amenities of this sort. Important sources of evidence for these relationships are presented in subsequent chapters. These include the sensitivity of respondents to the size of the dollar amounts they would pay (Chapter 9), the construct validity equation (also discussed in Chapter 9), and the test of sensitivity to the scope of the injury (Chapter 10). Another source of evidence, particularly relevant to the first two items, is the set of respondents' answers to the open-ended, follow-up questions, asked immediately after the choice questions, which gave respondents the opportunity to explain why they made the choices they did. W-4 was asked of those who said they would not vote for the program, W-5 of those who said they were not sure about how they would vote, and W-6 of those who said they would vote for the program at either of the tax amounts they were asked about.

The NOAA Panel recommended the use of such questions and that their answers be carefully coded to show the types of responses (Arrow *et al.*, 1993; p. 4609). They also noted that the open-ended responses should be explained by "making reference to the cost and/or the value of the program". While we have made use of these types of questions in the Alaska survey (Carson *et al.*, 1992) and believe that they provide useful information in this study, in section 4.6.2.4, we called attention to the psychological literature on the reliability of

introspective questions which suggests caution in interpreting these types of responses. There are two reasons why respondents' explanations will not necessarily be a complete accounting of all factors that shaped their judgements. First, a number of psychological studies suggest that people are sometimes unaware of factors that shape their own thinking and actions (*e.g.*, Nisbett and Wilson, 1977), and they sometimes forget about factors that influenced judgments made previously (Lodge, McGraw, and Stroh, 1989). Therefore, we expect some respondents may fail to mention considerations that shaped their voting decisions in this survey.

Second, and perhaps more important for this survey, is that in typical every-day conversations, speakers conform to certain norms or conventions, including the notion that one should not waste time telling someone else what that person already knows (Grice, 1975). In this survey, respondents likely recognized that the interviewers were well aware of all the details of the accelerated recovery program. Therefore, when explaining decisions to vote in favor of the program, respondents may have left out the specific factors that influenced their decisions. Rather, they may at times have simply made general, broad statements (*e.g.*, "the program will help the environment") that were intended to summarize what they have been told but in different words and without being unnecessarily redundant. For these reasons, we expected respondents' answers to the follow-up questions to provide insight into, though not necessarily a complete accounting of, the factors influencing their choices.

W-4, administered to respondents who voted *against* the program at both the first and second choice questions (W-1 and W-3), asked: "Did you vote against the program because it isn't worth <u>that</u> much money to you, <u>or</u> because it would be somewhat difficult for your household to pay that much, or because of some <u>other</u> reason?"[201] These particular response

[201] The format of this question is identical to the comparable question in the Alaska survey (Carson *et al.*, 1992, Question A-18).

categories were offered in the question itself to ease the possible embarrassment some respondents may have felt about saying that they couldn't afford the tax amount asked about. Overall, 15.6 percent of those who answered this question chose the "somewhat difficult to pay" response. The likelihood of giving this response was strongly related ($p < 0.001$) to the tax amount the respondents were asked about in W-1, with twice the percent of respondents at the higher amounts saying they could not afford it than the percent at the lower amounts.

A little over 12 percent gave the first-offered response, "isn't worth that much money", and 74 percent gave a different reason.[202] If the respondent said he or she had another reason, the interviewer was instructed to probe to learn what that reason was. Coders assigned each of the reasons expressed in these "other" verbatim responses into the categories shown in Table 8.2. In order to give a complete picture of the responses, also included in this table (shown in italics) are the answers to the two pre-coded categories.

The most common type of response was the view, held by 51.5 percent of those who answered W-4, that the problem described in the scenario was not that important and/or other problems are more important to them. Respondents who expressed this view mentioned reasons like: the reproduction problems will eventually take care of themselves; the injury is just in one area; and other types of problems concern them more such as the homeless, schools, and crime. As noted above, another 12.5 percent chose the related pre-coded response, "the program isn't worth that much money".[203]

[202] In 15 cases, the interviewer circled more than one W-4 answer category, hence the percentages total more than 100.

[203] The overlap between these two categories is less than 1%.

Table 8.2 Reasons for Choosing to Vote *Against* the Program

W-4. Did you vote against the program because it isn't worth that much money to you, or because it would be somewhat difficult for your household to pay that much, or because of some other reason?	
CODING CATEGORY	PERCENTAGE [N=825][a]
Problem not that important/Other problems more important	51.5%
Somewhat difficult to pay/Cost too high	26.3%
Concerns about program or payment plan design	21.2%
Isn't worth that much money	12.5%
Wants more information	2.1%
Other	9.3%

[a] Percentaging base is the number of respondents who answered W-4 and/or gave a response to "other (specify)". Categories in italics were assigned by the interviewers (*i.e.*, pre-coded answer categories). Percentages total more than 100 percent as multiple responses allowed.

Overall, a third of the respondents mentioned some aspect of the program cost.[204] Twenty-one percent mentioned various concerns they had about the program, such as skepticism about whether it would work or whether the State would really use the money for the stated purpose. (Forty percent of these respondents also gave reasons that involved the cost or the relative unimportance of the program.) The W-4 responses displayed in Table 8.2 and our further analysis of these responses strongly suggest that respondents who voted *against* the program were attentive to the object of choice and to the financial implications of voting for it and that they weighed the object of choice against other concerns when making their decision.

Respondents who said at W-1 that they would not vote for the program or were not sure about how they would vote at W-1 and who, in addition, indicated at W-3 that they were *not*

[204] This includes respondents who spontaneously mentioned some aspect of cost when they were first asked the W-1 question where the cost of the program was first revealed.

sure about how they would vote, were asked W-5: "Could you tell me why you aren't sure?" As shown in Table 8.3, the verbatim responses given by the 99 respondents who were asked W-5 are similar to the reasons respondents gave for voting against the program in W-4. A strong plurality commented that the problem was not that important or other problems were more important to them. Twenty-seven percent said the cost was too high. As one might expect, those in the *unsure* category were more likely than those who voted *against* to mention concerns about the program or the design of the payment plan. They were also much more likely to express a desire for more information. However, only about 2 percent[205] of the total sample mentioned lack of information as a reason for why they were not sure. Thus, it appears that the information provided in the interview was sufficient for most respondents to make a choice.

Table 8.3 Reasons Why *Not Sure* About Program Vote

W-5 Could you tell me why you aren't sure?	
CODING CATEGORY	PERCENTAGE [N=99][(a)]
Problem not that important/Other problems more important	41.4%
Cost too high	27.3%
Concerns about program or payment plan design	31.3%
Wants more information	23.2%
Other	30.3%

(a) Percentaging base is the number of respondents who gave a response to W-5. Percentages total more than 100 percent as multiple responses allowed.

Question W-6, administered to those who voted for the program at *either* W-1 or W-3, asked: "People have <u>different</u> reasons for voting for the program. Can you tell me what

[205] The total of those who gave this reason at W-4 or W-5 divided by 1857, the base sample size.

covering the contaminated sediments would do that made you willing to pay for it?" This wording, which is similar to the wording used for the comparable question in the Alaska study,[206] was designed to help overcome the conversational convention—that one should not tell someone what they already know—by focusing the respondent on the outcome of the program. The interviewers were trained to use neutral and nondirective probes when respondents gave answers that seemed vague or non-responsive to the question to determine whether the respondent had anything more specific in mind.[207]

The W-6 verbatims were coded into the categories listed in Table 8.4. The percentage distribution across the categories for the 907 respondents who answered this question shows that a large majority, 71.9 percent, voted for the program to help the affected species or area by covering up the contaminated sediment. Twenty-two percent mentioned that hastening the recovery process was important to them because they did not want to wait for natural recovery to take place. The third most common (16%) type of reason was expressions of personal interest in the program because it would realize goals that were important to the respondent. These reasons were prefaced by "I" or "we" (*e.g.*, "I am really concerned about those two birds [eagle and falcon]" or "we like the natural environment around us"). Other reasons in this category reflected the respondents' personal interest in water-based recreation activities such as fishing.

[206] Carson *et al.*, 1992, Question A-20.

[207] As noted in Chapter 6, a chapter of the interviewer's manual for this study is devoted to probing (Westat, 1994a).

Table 8.4 Reasons for Choosing to Vote *For* the Program

W-6. Can you tell me what covering the contaminated sediments would do that made you willing to pay for it?	
CODING CATEGORY	PERCENTAGE [N=907][a]
Help affected species and/or the area where they live	71.9%
Hasten the recovery process	21.7%
Respondent personally concerned about environment/wildlife or perceives household would benefit in some way	16.4%
Prevent possible physical harm to respondent or others	13.9%
Feel responsible to help fix this problem	13.6%
Others such as grandchildren or people living in the area would benefit	12.0%
Cost affordable/reasonable	9.8%
Might help other animals/ecosystem	7.5%
Protect environment[b]	1.9%
Other	15.6%

[a] Percentaging base is the number of respondents who gave a response to this question. Percentages total more than 100 percent as multiple responses allowed.

[b] Only includes those for whom no other category was coded.

The reasons coded in the category "prevent possible physical harm to respondent or others" usually involved a desire to avoid the possibility of having to worry, for themselves or others, about catching or eating contaminated fish. We had anticipated that some respondents would continue to be concerned about this despite the assurances they were given during the interview that the fishing ban would prevent harm to humans. This is why the first reconsideration question, W-7, addressed this concern and highlighted that the only outcome of the program would be the accelerated recovery of the four species.[208] Those who had

[208] Other characteristics of those who reconsidered their *for* votes are discussed in section 8.4.

expressed a concern about possible physical harm to humans at W-6 were significantly more likely to change their vote at W-7 compared to other types of respondents ($p = 0.008$).[209] This is reassuring evidence that respondents paid attention to the information conveyed in W-7. Furthermore, none of the spontaneous remarks made at W-7 by respondents who reaffirmed their willingness to vote for the program indicated that they were unwilling to accept the question's premise that only the four species would be helped by the program.

Among the other types of reasons were expressions of personal or collective responsibility to do something about the problem because it was caused by humans (13.6%), and satisfaction that others, such as grandchildren or people living in the area, would benefit from the accelerated recovery (12%). About 10% of the respondents mentioned that the cost was reasonable given what the program would accomplish. Next were those who mentioned that it might help other animals (7.5%).

The most commonly expressed concern was that the presence of the chemicals in the local ecosystem could also affect other, unspecified, creatures. Those who are shown in Table 8.4 as giving a response coded as "protect environment" (1.9%) are those who did *not* clarify this thought by giving any other type of reason in their answer to W-6. Other respondents giving answers coded in this category, as expected, appeared to use this type of comment to refer to what the respondent presumed the interviewer already knew and clarified this with more specific reasons in response to the non-directive probes.[210]

Verbatim responses to W-4, W-5, and W-6 suggest that respondents took relevant factors of cost and the value of the program to them into account when making their voting choices.

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[209] Eighty respondents changed their vote at W-7; see section 8.4 for a more detailed discussion.

[210] The total percent who originally gave reasons (*i.e.*, response before interviewer probed) coded in the "protect environment" category was 17.4 percent.

Moreover, there is very little evidence that respondents who voted for the program did so because they were misinformed about what the program would and would not accomplish. Those who gave a "prevent possible physical harm" answer were more likely to change their vote from *for* to *against* when reminded at W-7 that the human health was not affected. Moreover, only 9 respondents who gave an answer related to possible physical harm did not also give another reason for why they voted *for* the program. Finally, the percentage giving reasons coded as "might help other animals/ecosystem" is small (7.5%), and only four of these respondents gave just this reason. Few of these respondents mentioned the names of other animals they had in mind; instead, they referred to the likelihood the local ecosystem might be generally affected.

§ 8.2.4 Did Respondents Feel Pressured to Vote One Way or Another?

Question B-7 asked respondents whether they perceived that the interview, overall, tried to push them to vote one way or another or let them make up their own mind. Seven percent of the total sample, or 132 respondents, said that they thought the interview had tried to push them or were not sure about this. B-7A asked these respondents: "<u>which</u> way did you think it pushed you?" Of the 132 respondents who answered this question, 101 (5.4% of the total sample) felt pushed to vote *for* the program, 26 (or 1.4%) felt pushed to vote *against*, and 5 respondents were not sure about the direction. All were asked to explain in B-7B: "What was it that made you think that?" Some of those who said they felt pushed to vote *for* had no specific reason in mind, just a generalized "feel" about this. Others in this category mentioned the fact of being presented with all the information about the injuries or being asked the follow-up choice question (W-2/W-3). Those who said they felt pushed to vote *against* were likely to

mention the positive information that the species would recover on their own or Card H (which listed reasons why one might vote against the program).[211]

Table 8.5 shows the relationship between the perceived direction these respondents felt they were pushed and how they had voted at W-1.[212] Those who felt pushed to vote *for* voted

Table 8.5 Voting Patterns by Direction Felt Pushed

Direction Felt Pushed	Voted *For*	Voted *Not For*
Pushed *For* [N=101]	43.6%	56.4%
Not Pushed [N=1707]	40.8%	59.2%
$\chi^2_{(1)} = 0.31$; p = 0.579		

Direction Felt Pushed	Voted *For*	Voted *Not For*
Pushed *Against* [N=26]	19.2%	80.8%
Not Pushed [N=1707]	40.8%	59.2%
$\chi^2_{(1)} = 4.93$; p = 0.026		

for the program with virtually the same frequency (p=0.579) as the 92 percent of the sample who said they felt the interview let them make up their own mind. This is consistent with the interpretation that although they believed they may have felt some pressure, they did not seem to be influenced by it. In contrast, there is a significant difference (p=0.026) between those who felt pushed to vote *against* the program and the rest of the sample, with those who felt pushed to vote *against*, voting against more often than those who felt the interview let them make up their own mind.

[211] See Appendix A.1.

[212] Two respondents changed their vote after B-7 was asked. See Table 8.8 in section 8.4.

§ 8.2.5 Were Respondents' Choices Influenced by Others?

In order to avoid distractions, interviewers were instructed to refrain from conducting interviews with other persons present. However, in a number of cases, living arrangements were such that someone else was present during some or all of the interview. Frequently, these were young children in the respondent's care. In order to differentiate these cases from those where teenagers or adults were present, the interviewers were asked in D-6 to report whether anyone age 13 or older was present when the respondent voted. The answer was positive in 22 percent of the interviews. Judging from interviewer remarks recorded on the questionnaires, almost all of these individuals were other household members.

In question D-6A, the interviewer was asked whether he/she thought the other person(s) affected how the respondent voted. In almost 90 percent of the cases where someone age 13 or older was present while the respondent voted, the interviewers judged that there was no effect. There were 15 cases (less than one percent of the total sample) where the interviewer said he/she believed that the other person present did have an effect and 26 cases where the interviewer indicated that he or she did not know. We examined the D-6a and D-7 verbatim comments for these cases. Whenever influence was mentioned, it was almost always by another household member.

§ 8.3 Section B Debriefing Questions

Respondents were asked to make a choice between a program to accelerate recovery, which would occur in five years and cost their household a specified amount in higher taxes, and natural recovery, which would occur in fifty years and not cost their household anything more in higher taxes. As the NOAA Panel pointed out, the reliability of respondents' choices depends

on the degree to which they accepted or believed certain basic assumptions underlying the choice. For example, to the extent that some respondents did not believe that the accelerated recovery program would be effective, their choices would tend to under-represent their value for accelerating recovery. This is because they believed the program would be less helpful in accelerating recovery than we had intended them to believe. The reverse would be the case if some respondents believed that natural recovery would take longer than the 50 years. In this case, their choices would be based on the assumption that a longer than intended stream of benefits would be created if the program were implemented. As the NOAA Panel commented (with reference to what happens when respondents do not accept information of this type): "in effect they (the respondents) will be answering a different question from that being asked." (Arrow, p. 4605).[213]

During our research, we devoted a great deal of effort to developing a program that would be perceived by as many respondents as possible to be both effective in accelerating recovery and targeted to the specific injuries. The presentation of the natural recovery option received a similar amount of attention to also make it as credible as possible. As we will show in this and following chapters, the available evidence indicates that we were quite successful in this regard. Nevertheless, given the diversity of respondent experiences and levels of trust in information they receive from the government, the choice perceived by *some* respondents differed somewhat from the one that was described to them.[214]

The data examined here are from a series of questions asked at the beginning of Section B of the survey to check on respondent acceptance of several elements of the choice, including

[213] Mitchell and Carson (1989; pp. 249-252) discuss this issue at length.

[214] The effect that lack of acceptance has on estimates of WTP is investigated in Chapter 9; the effect tends to lower our estimates.

two key items, the length of time that natural recovery would take, and the effectiveness of the program to accelerate recovery. These questions asked respondents what they had in mind about these choice elements when they voted. As noted in Chapter 6, this type of introspective assessment may be unfamiliar to respondents, so these questions were carefully designed to avoid misunderstandings (*e.g.*, respondents taking them as an invitation to speculate about the topic of the question instead of reporting what they had been thinking at the time they decided how to vote).[215] The wording we finally adopted appeared to have overcome most of these problems.

§ 8.3.1 DDT/PCB's and Reproduction Problems

The first debriefing question, B-1, asked if it seemed to the respondent that "DDT and PCB's could cause the reproduction problems I told you about." Almost all the respondents accepted this basic premise, with 94 percent answering *yes*. Those who said *no* (2.7%) or *not sure* (3.7%) were disproportionately likely to be among those voting *not for* the program ($p < 0.001$).

§ 8.3.2 Length of Natural Recovery

The next question, B-2, asked about a key feature of the natural recovery: how long respondents had assumed it would take. Seventy percent said they had assumed that it would take about 50 years when they decided how to vote. Because we were interested in whether

[215] As noted in Chapter 6, the interviewers were told that "sometimes respondents wonder why they are being asked questions like this about what they were thinking when they answered the vote questions — after all, they might say, you told them that it would take fifty years, why should they doubt it." The interviewers were instructed to tell such respondents: "We find that some people have different ideas about this. It is important for us to know what you had in mind" (Westat, 1994a; p. 4.71.).

their beliefs differed significantly from this time frame, those who said *no* or *not sure* in response to B-2 were asked in a follow-up question, B-3: "Did it seem to you that it would take a lot more than 50 years or a lot less than 50?" Table 8.6 summarizes the B-2/B-3 responses. Some respondents (6%) said they assumed recovery would take a lot more than 50 years. Others (15%) said they believed recovery would take a lot less time than this. About 9 percent expressed other views, which consisted mainly of expressions that no one could know for sure about the time frame or the belief that it would take just a little more or a little less than the 50 years.[216] Those who felt natural recovery would take a lot more than 50 years were significantly more likely to vote *for* the program ($p < 0.001$); and those who felt natural recovery would take a lot less than 50 years were significantly less likely to vote *for* the program ($p < 0.001$).

Table 8.6 Respondents' Assumptions About Length of Natural Recovery[a]

COMBINED RESPONSES TO B2/B3	PERCENTAGE [N=1849]
A lot more than 50 years	6.3%
About 50 years	69.8%
A lot less than 50 years	15.0%
Other/Not sure[b]	8.9%
TOTAL	100%

[a] Percentaging base is the number of respondents who answered B-2.

[b] Those who said "other" or "not sure" to B-3.

[216] Seventeen of these "other" views clearly indicated a direction of the divergence from the 50 year natural recovery period and were recoded into the *lot more* or *lot less* categories.

§ 8.3.3 Effectiveness of Accelerated Recovery Program

Another key respondent assumption examined in section B was how effective the respondents believed the accelerated recovery program would be in solving the reproduction problem within five years. Question B-4 asked: "When you decided how to vote, did it seem to you that the speed-up program would be completely effective in solving the reproduction programs within five years?" Those who said "no" or "not sure" in response to this question were asked in B-5 which of four degrees of effectiveness they thought the program would accomplish. Table 8.7 summarizes the B-4/B-5 responses.

Table 8.7 Respondents' Perceptions About Effectiveness of Program

COMBINED RESPONSES TO B-4/B-5	PERCENTAGE [N=1848][a]
Completely effective	52.4%
Mostly effective	11.0%
Somewhat effective	24.7%
Not too effective	6.2%
Not effective at all	2.6%
Not sure	3.1%
TOTAL	100%

[a] Percentaging base is the number of respondents who answered B-4.

As shown in the table, 52% percent indicated, that when voting, they thought the program would be completely effective. Another 11 percent of the sample thought the program would be "mostly effective" and a quarter said "somewhat effective". Only nine percent held serious doubts about its effectiveness (answering either "not too effective" or "not effective at all") and an additional 3 percent expressed uncertainty about its effectiveness. Given potential respondent concerns about the possible effects of earthquakes or ocean currents on the deposit

and their general skepticism about government promises, this level of acceptance is reassuring. As shown in Chapter 9, respondents who did not think the program would be completely or mostly effective were less likely to vote *for* the program.

Further insight into the effects of nonacceptance can be gained by looking at nonacceptances at both B-1 and B-5. A total of 198 respondents (10.7% of the sample) didn't accept that DDT and PCB's could cause the injury (B-1) and/or believed that the accelerated recovery would be "not too" or "not" effective or both. Only a few of these respondents (14 of 198) chose to vote *for* the program.

§ 8.3.4 Length of Payment

Question B-6 asked respondents whether they thought their households would have to pay the special tax for the program "for one year or for more than one year?" Sixty-three percent said one year, while 28 percent said they had doubted that it would be just one year when they voted. This level of skepticism about the promise that the State would only require a one-time payment reflects the frequently cynical views expressed by participants in focus groups and in pretesting. Here again, as will be shown in Chapter 9, this lack of acceptance is associated with a lower willingness to pay for the program as one might expect if respondents believed the object of choice actually entailed a higher cost than was described to them.

§ 8.4 Reconsideration of *For* Votes

Three questions included in the survey instrument gave respondents an opportunity to change their votes. In each case, only respondents who voted *for* were offered these opportunities. The first reconsideration opportunity was presented in W-7, which appeared

immediately after the choice questions. Respondents were told to "suppose human health is definitely not affected" and the program would only help the four species of fish and birds. W-7 then asked: "Would you vote for or against the program if it cost your household [the highest amount the respondent had voted for]?"[217] While this question focused on the human health issue, it also offered respondents who wanted to reconsider their vote for other reasons an opportunity to do so.

The other two reconsideration questions, C-18 and C-20, were asked much later in the interview of only respondents who had voted *for* the program (and who had not changed their vote at W-7). They were based on certain types of answers to preceding "filter" questions. First, all respondents who voted *for* the program at W-7 were asked in question C-17 how difficult it would be for their households to pay that amount next year if the program passed.[218] Most respondents said it would not be "difficult at all" (36.7%) or "not too difficult" (33.3%) for them to pay. Twenty-one percent said it would be "somewhat difficult" and 7 percent said it would be "very difficult." The 234 respondents who gave the last two responses as well as the 13 who were unsure at C-17 were given an opportunity to reconsider their vote at C-18.

Those who indicated that paying for the program would not be *somewhat* or *very difficult* for their household were asked, in a second filter question (C-19), how strongly they favored the program at the highest tax amount that they had previously voted for.[219] Those who said

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[217] As noted in Chapter 6, to help the interviewers keep track of how people voted and the highest amount voted for, the instrument had a fold-out skip record where the interviewer recorded how the respondent voted on W-1 to W-3. They also recorded the response at W-7 on the skip record so they could refer back to it at Box 8.

[218] The response to question C-17 is strongly associated ($p < 0.001$) in the expected way with the amount asked in W-1.

[219] Those who had just been given the chance to change their vote in C-18 were also asked the same strength question at C-21 if they did not reconsider their vote at C-18. Combining the responses to both of these identically worded questions shows that most of the respondents who chose to vote *for* the program favored the program at that tax amount "very strongly" (25%) or "strongly" (55%), while about 18% favored it "not too strongly" and just one percent

they favored the program "not at all strongly" (N=8) or "not too strongly" (N=101) were given an opportunity to reconsider their vote at C-20. To be conservative, we counted those who said *not sure* to any of the three reconsideration questions (W-7, C-18, or C-20) as having changed their vote to *against*.[220] These combined categories (*i.e.*, *against* or *not sure*) are referred to as *not for* the program below.

Table 8.8 summarizes the reconsideration results. A total of 105 people, 11.5 percent of those who originally voted *for* the program, changed their votes from *for* to *not for*. Most respondents (N=80) who changed their vote did so at the first opportunity offered, W-7. One respondent volunteered at question C-21 (which asked about how strongly the respondent favored the program) that he or she no longer favored the plan at all so he or she was counted as having changed his/her vote.

Table 8.8 Respondents Who Changed Vote from *For* to *Not For*

AT QUESTION ...	AGAINST	NOT SURE
W-7. Suppose human health is definitely not affected in this situation and the program would only speed up the recovery of these four species of fish and birds. Would you vote for or against the program if it cost your household $(highest amount respondent voted for)?	64	16
C-18. Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $(highest tax amount respondent voted for)?	8	13
C-20. *Same wording as C-18.*	2	1
C-19/C-21 "Doesn't favor plan"	1	0

"not at all strongly."

[220] This is consistent with how we treat those who said *not sure* to the original voting questions in Chapter 9.

There are various distinguishing characteristics of those respondents who changed their votes. Respondents in the lowest three income categories were almost twice as likely to change (p=0.003) as other respondents providing initial *for* votes. Other categories of respondents who were more likely to switch include those who in A-2E favored reduced spending on protecting endangered wildlife (p=0.002), those who in B-4/B-5 thought that the plan would not be completely or mostly effective (p=0.003), and those who thought that natural recovery would take much less than 50 years (p=0.003). Similar significant patterns of an increased propensity to change were observed among households which did not engage in saltwater recreation, bird watching, or watching television nature shows.

§ 8.5 Interviewer Evaluations

Another source of information about whether respondents understood the voting choice is the series of questions in section D which the interviewers answered shortly after completing the interview. The items listed in D-1 asked the interviewers to assess the respondent's reactions "as you read through the material beginning with A-3 through A-16." This is the portion of the interview that presented the elements of the choice, such as the nature of the injuries, their cause, the accelerated recovery program, and the natural recovery process. Table 8.9 shows the interviewer ratings for how well the respondent understood this material and also for how distracted and attentive the respondent was during the presentation. The interviewers rated 28 percent of the respondents as understanding this material "extremely" well and 59 percent "very" well for a total of 87 percent in these two categories. Only one percent were rated as understanding it only "slightly" or "not at all," and the remaining 12 percent as understanding it "somewhat." Very low percentages of respondents were said to be "extremely" or "very"

distracted (2%) during the presentation and/or "slightly" or "not at all" attentive (1%) to this material.

Table 8.9 Interviewer Evaluation of Respondent Reaction to Choice Elements

D-1 Items	Extremely	Very	Somewhat	Slightly	Not at all	Not Sure
How distracted was the R?	0.3%	1.6%	8.6%	19.9%	69.1%	0.1%
How attentive?	27.0%	58.5%	12.8%	1.0%	0.3%	0.0%
How well did the R. understand this material?	27.5%	59.0%	11.8%	1.0%	0.1%	0.3%

Question D-2 asked if the respondent had said anything that suggested he or she had any difficulty understanding either the accelerated recovery program or the natural recovery process. A total of 46 respondents (or 2.5 percent of the total sample) were identified as having had a difficulty of some sort. Of those said to have had a difficulty, only 13 gave a *final for* vote.[221] The interviewers were asked in an open-ended question, D-2A, to "describe the difficulties". From the interviewers' descriptions, many of the difficulties appeared to be overcome to the interviewer's satisfaction.

Other section D questions asked for the interviewer's impression of the respondent's reaction to the choice questions (W-1 through W-3). D-3 asked if the respondent had *any* difficulty understanding them and, if so, to describe the difficulties (D-3A). Thirty-nine respondents (2% of the total sample) were identified in this category, of whom 13 were *final for* voters at the W1AMT asked about. The difficulties described by the interviewers for these 13

[221] In what follows, references to *final for* votes refer to those who did not revise their original vote *for* the program at a later point in the interview. Those identified as having difficulty at D-2 were more likely ($p < 0.001$) to change their vote.

respondents included hearing problems, minor misunderstandings that were subsequently clarified, or reiterating respondent questions about aspects of the program.

On the basis of the set of interviewer evaluation questions we have just explained—D-1A, D-1B, D-1C, D-2, and D-3—there are 120 respondents, representing 6.5 percent of the sample, who may have had a problem understanding or responding to the choice questions.[222] This is a rather inclusive measure because, as we mentioned, some of these people may not have had a problem. For example, the mere fact of being identified by the interviewer in D-2 as having difficulty understanding the injuries or program, does not necessarily mean that the difficulty interfered with a respondent's ability to make a meaningful choice. Do these cases contribute to an overestimate of our estimate? An examination of the data suggests that they do not. First, they represent a relatively small fraction of the sample. Second, they are much more likely to change an initial *for* to a *not for* vote during the three reconsideration opportunities ($p < 0.001$). Third, as we will see in section 9.5, after taking the reconsidered answers into account, the amount of money this group of respondents is willing to pay for the program is substantially lower than the rest of the sample.

Another factor that might affect a respondent's understanding of the choice is whether he or she was impatient to get through the interview. Questions D-4 and D-4A asked the interviewer to rate the degree of impatience the respondent had when he or she was asked the voting questions. The vast majority of the respondents (83%) were not thought to be impatient, and another 8 percent were rated as "not very" impatient or only "a little" impatient, for a total of 91 percent. Five percent were said to be "somewhat" impatient, and 3 percent said "very"

[222] We define this inclusive variable, PINTPROB, as being equal to 1 if ([D-1A=1 or D-1A=2; "extremely" or "very" distracted] or [D-1B=4 or D-1B=5; "slightly" or "not at all" attentive] or [D-1C=4 or D-1C=5; "slightly" or "not at all" understand injuries and program] or [D-2=1; respondent indicated difficulty understanding injuries or program] or [D-3=1, respondent indicated difficulties understanding vote questions]) and 0 otherwise.

impatient.

Interviewer ratings of "how serious was the consideration the respondent gave to the decision about how to vote" (D-5) can be used to examine another goal of this study: to develop a plausible choice mechanism which the respondents would take seriously. As shown in Table 8.10, 81 percent of the total sample were thought to have given the matter "very" or "extremely" serious consideration. Only about 2 percent or 41 cases were rated as giving it only "slightly" or "not at all" serious consideration. These respondents were somewhat less likely to give a *final for* vote; however, although this difference is suggestive, it is not quite statistically significant (p=0.102)

Table 8.10 Interviewer Evaluation of the Seriousness of Respondent Consideration of the Voting Decisions

Question D-5	Extremely	Very	Somewhat	Slightly	Not at all	Not Sure
How serious was the consideration the R. gave to the decision about how to vote?	25.0%	55.8%	16.0%	1.8%	0.4%	0.4%

§ 8.6 Summary

The pattern of responses to the various open-ended questions we considered in this chapter were consistent with those one would expect if respondents were paying attention to the material and evaluating the object of choice as intended. The answers to the questions about why they made their voting choices (W-4 to W-6) referred to relevant features of the accelerated recovery program such as its cost and what the program would accomplish. These answers help provide insight into the reliability of the voting choices, one of the topics also examined in Chapter 9. The respondents' reasons for their choices are not used in that chapter's quantitative

analysis, however, as they are too closely associated with the choice variable used as the dependent variable in the multivariate choice function.

The debriefing questions in Section B of the survey obtained information about the degree to which respondents accepted various features of the injuries and the accelerated recovery program. These included the role of DDT and PCB's in causing the injuries, the length of natural recovery, the effectiveness of the accelerated recovery program, and the duration of the special tax for the program. Overall, the number of respondents who did not accept the scenario, such as not believing that the DDT and PCB's could cause the injuries, or that the accelerated recovery program would not be effective, is small. These respondents, as well as those who thought they would have to pay for the program for more than one year, are less likely than the rest of the sample to vote *for* the program; hence, the resulting effect of a lack of acceptance of these features tends to decrease willingness to pay. These issues are further examined in sections 9.5 and 9.6 of Chapter 9.

An important feature of our design was to offer the respondents who voted *for* the program opportunities to reconsider their choices. This was done both shortly after they voted (W-7), and later after they had more time to consider the implications of their choices (C-17 to C-21). Those who gave a W-6 verbatim response related to "possible physical harm" as well as the small number of respondents who the interviewers identified as potentially problematic were more likely to reconsider and change their *for* vote to an *against* vote than the rest of the sample. The principal measure of respondent choices used for the analysis in Chapter 9 is based on these final choices.

The principal finding of our analysis of the interviewer debriefing questions in Section D of the survey was that there was very few cases where the interviewers identify possible

problems with respondents' attentiveness, comprehension, and impatience. Those who the interviewers identified as problematic had a substantially lower willingness to pay than the rest of the sample. The interviewer debriefing questions are used in a more detailed analysis in section 9.5 of Chapter 9.

§ 9 Analysis of Choice Questions

§ 9.1 Introduction

This chapter presents a lower-bound estimate of prospective interim lost use value (ILUV) constructed from respondents' choices in the base survey instrument and examines the relationship between those choices and other variables measured by the survey.[223] In section 9.2, two choice measures are summarized, one based on the responses to the W-1 choice question and the other based on the adjusted responses to that question after respondents were given opportunities to reconsider their vote *for* the accelerated recovery program. Section 9.3 introduces the non-parametric (Turnbull, 1976) statistical framework used in our analysis and discusses the statistical properties associated with measures of central tendency for the willingness-to-pay (WTP) distribution. Section 9.4 provides an estimate of the lower-bound mean value for the sample.

In section 9.5, bivariate relationships between the choice measures and other variables measured by the survey are examined. Cross-tabulations of the primary choice measures with specific types of variables recommended by the NOAA Panel are included in this section. In section 9.6, construct validity is examined using a multivariate counterpart to the evaluations reported by individual variables in section 9.5. Section 9.7 examines the implications of setting all respondents who said that they did not pay California income taxes to *against* program votes. Finally, in section 9.8, the results of the analysis are summarized.

[223] Chapter 10 compares the choices made in the base and scope surveys, and Chapter 11 applies population weights to the choice data analyzed in this chapter to arrive at our estimate of prospective ILUV.

§ 9.2 Defining Choice Measures

The principal choice question in the survey was W-1, which asked respondents if they would vote for or against the accelerated recovery plan if it cost their household a pre-assigned tax amount. Respondents were randomly assigned to one of five different W-1 tax amounts: $10, $25, $80, $140, or $215. This W-1 tax amount will be referred to as W1AMT. Responses to the W-1 choice question by W1AMT are shown in Table 9.1a.[224]

Table 9.1a W-1 Response by W1AMT

W1AMT	For	Against	Not Sure
$10	59.4%	35.3%	5.3%
$25	51.4%	42.6%	6.0%
$80	37.0%	54.5%	8.5%
$140	31.7%	60.8%	7.5%
$215	24.7%	68.8%	6.6%

In the analysis that follows, the *against* and *not sure* categories (displayed in the last two columns of Table 9.1a) are combined into a single *not for* category; this coding is referred to as the **W1** choice measure.[225] Table 9.1b displays the percentages of *for* and *not for* responses to **W1** by W1AMT. Based on these percentages, a $\chi^2_{(4)}$ test (126.39) clearly rejects the null hypothesis ($p < 0.001$) that the percent *for* does not systematically vary with W1AMT.

[224] The sample marginal distributions for the discrete response questions in the base survey instrument are provided in Appendix D.1.

[225] All choice measure variables are denoted in bold capital letters.

Table 9.1b W1 Choice Measure by W1AMT

W1AMT	For	Not For
$10	59.4%	40.6%
$25	51.4%	48.6%
$80	37.0%	63.0%
$140	31.7%	68.3%
$215	24.7%	75.3%
$\chi^2_{(4)} = 126.39$; $p < 0.001$		

A choice measure defined only by W-1 responses (*e.g.*, the **W1** choice measure defined above) results in what is referred to as *single-bounded* interval data. That is, if a respondent votes *for*, we know that the respondent's willingness to pay for the program is bounded from below by W1AMT (*i.e.*, the respondent is willing to pay at least W1AMT.) If the respondent gives a *not for* answer, we assume that the respondent's willingness to pay is bounded from above by W1AMT (*i.e.*, the respondent may be willing to pay some tax amount below W1AMT or may not be willing to pay anything at all).

Respondents who voted *for* the program at W-1 were then asked about a pre-assigned, higher tax amount (W2AMT) in the follow-up choice question, W-2; those who voted *not for* (*i.e.*, voted *against* or were not sure about their vote) at W-1 were asked about a pre-assigned, lower tax amount (W3AMT) in the follow-up choice question, W-3. The five sets of tax amounts used in the W-1, W-2, and W-3 questions are shown in Table 9.2.

Table 9.2 Tax Amount by Version and Choice Question

Version	W-1	W-2	W-3
1	$10	$25	$5
2	$25	$45	$10
3	$80	$140	$45
4	$140	$215	$80
5	$215	$360	$140

Combining responses from W-1, W-2, and W-3 results in what is often referred to as *double-bounded* interval data (Hanemann, Loomis, and Kanninen, 1991). This term is used because combining the response to the first question with that to the second question locates the respondent's WTP in a tighter interval (*i.e.*, below W3AMT, between W3AMT and W1AMT, between W1AMT and W2AMT, or above W2AMT) rather than simply above or below W1AMT.[226] We will refer to the choice measure based on the combined responses to W1, W2, and W3 as **WDB**.

In this chapter, the results based on the single-bounded interval data are presented. As the analysis of the double-bounded data yields similar conclusions to that based on the single-bounded data, the double-bounded results are presented only in footnotes and in Appendix F tables.

Respondents who voted *for* the program at either W-1 or W-3 were offered opportunities to change their vote.[227] The first opportunity to do so was in question W-7, and the second in the C-17 to C-21 question sequence administered in the final section of the interview.

[226] This approach ignores the bias, typically downward, that theory suggests may be present in the second response. This bias may occur due to strategic incentives to misrepresent preferences introduced by the second question and because the second question may change the perceived characteristics of the object of choice.

[227] See sections 6.4, 6.8, and 8.4.

Revising the **W1** choice measure (defined above) to take into account those respondents who reconsidered their *for* vote results in a second choice measure; this choice measure is referred to as **W1CH**.[228] Because only respondents who voted *for* the program were given an opportunity to change their votes, **W1CH** is, by construction, a more conservative choice measure than **W1**.

Table 9.3 displays the **W1CH** choice measure by W1AMT. Based on these percentages, a $\chi^2_{(4)}$ test (126.93) rejects the null hypothesis ($p < 0.001$) that the **W1CH** choice measure does not systematically vary with W1AMT. The **W1CH** choice measure is used for most of our analysis in this chapter (and the following chapter) as it represents the respondents' final choice.

Table 9.3 W1CH Choice Measure by W1AMT

W1AMT	For	Not For
$10	55.9%	44.1%
$25	46.3%	53.7%
$80	32.9%	67.1%
$140	26.5%	73.5%
$215	22.3%	77.7%
$\chi^2_{(4)} = 126.93$; $p < 0.001$		

§ 9.3 Statistical Framework for Analysis[229]

The final selection of a summary statistic is always a professional judgment that reflects the relative importance of different properties of the estimator given the goals underlying the

[228] The respondent's last *for* response to W-1, W-2, or W-3 was modified from a *for* to *not for* based on his/her answer to W-7 and the relevant components of the C-17 to C-21 question sequence. The small number of respondents who voted *for* to the W2AMT (asked about in W-2) but later reconsidered their vote, changing it to a vote *not for*, were treated as *not for* votes in constructing the **W1CH** choice measure, even though it is possible that some of these respondents would still have been willing to pay the W1AMT tax amount.

[229] See Appendix E for a more technical description.

analysis. Our objective is to develop an estimate of the prospective ILUV for the losses arising from the natural resource injuries described in Chapter 2. In situations where decisions must be made regarding design features or choices of statistical assumptions, we have adopted, within the economic framework necessary for measuring aggregate ILUV, the NOAA Panel recommendation as a desired philosophy for making these types of judgments: "Generally, when aspects of the survey design and the analysis of the responses are ambiguous, the option that tends to underestimate willingness to pay is preferred" (Arrow *et al.*, 1993; p. 4612).

The summary statistic we have chosen as an estimate of prospective ILUV is based on the Turnbull (1976) non-parametric, maximum likelihood (ML) estimator for interval-censored data. The Turnbull estimator uses respondents' choices to construct an interval estimate for the latent willingness to pay implied by each respondent's choice. As noted above, an individual's answer to a single question will distinguish either a lower or an upper bound for his or her WTP. By combining respondents' choices, we obtain estimates for the relative frequency of responses at different WTP intervals, $(0, W1AMT_i)$ and $(W1AMT_i, \infty)$, where $W1AMT_i$ is one of the five W-1 tax amounts administered to the different sub-samples. The first pair, $(0, W1AMT_i)$, defines the interval identified by $W1AMT_i$ as an upper bound and, the second pair, $(W1AMT_i, \infty)$, with $W1AMT_i$ as a lower bound. The six intervals or "steps" defined by W1AMT are: (1) \$0 to \$10, (2) \$10 to \$25, (3) \$25 to \$80, (4) \$80 to \$140, (5) \$140 to \$215, and (6) above \$215.

Two summary statistics, related to the sample mean, can be defined based on the Turnbull estimates of the fraction of the sample in each of the six intervals. The first of these we will refer to as the lower-bound mean. It is calculated by first assuming that the fraction of the sample estimated to be in each interval has a willingness to pay value equal to the lower end-

point of the interval[230] and then estimating the ordinary sample mean. The second of these summary statistics is the upper-bound mean. It is calculated in a similar manner by placing the fraction of respondents estimated to be in an interval at the high end-point of the interval and then calculating the ordinary mean.[231] The unobserved sample mean is always bounded below by the lower-bound mean and above by the upper-bound mean if there are identical subsamples at each of the tax amounts asked.[232]

It is important to recognize that any estimate of the sample mean which is lower than the Turnbull lower-bound mean estimate or higher than the Turnbull upper-bound mean estimate is inconsistent with the observed choices made by respondents.[233] Without additional statistical assumptions,[234] any observed choice measure is uninformative about where, within the two Turnbull bounds, the sample mean lies. The most conservative assumption which is consistent with the observed choice measure is that the sample mean is equal to the Turnbull lower-bound

[230] For instance, if 20% of the sample is estimated to be in the interval $10 to $25, the lower-bound mean is calculated by assuming that this 20% of the sample is willing to pay exactly $10.

[231] The upper-bound mean is potentially infinite unless reasonable additional assumptions (such as no respondent would be willing to pay more than some fraction of his or her income) are imposed.

[232] This statement is true irrespective of the particular tax amounts used to define the intervals, although the particular tax amounts used can influence how much *less* the lower-bound mean is than the sample mean and how much *greater* the upper-bound mean is than the sample mean. Random assignment of respondents to tax amounts will result in subsamples at each tax amount which are approximately equivalent in finite samples. The standard error of the lower-bound estimate reflects possible variation in this estimate due to sampling variability.

[233] In this regard, it can be seen that the Turnbull estimate of the distribution encompasses parametric estimates of the sample mean which are consistent with the observed choices.

[234] It is common practice in the literature to assume a specific parametric functional form to describe the shape of the WTP distribution. Assuming a particular distributional specification such as the log-normal is usually equivalent to assuming how the fraction of respondents estimated to be in each Turnbull interval are arrayed within that interval. An estimate of the sample mean derived using a parametric functional form will be sensitive to the specific parametric distributional form assumed (and particularly the shape of the right tail associated with that parametric distribution). One strategy for reducing this sensitivity to the assumed parametric distribution has been to use the median as a measure of the central tendency for the estimated distribution as this measure. However, from the perspective of the economic theory underlying the measurement of aggregate ILUV discussed in Chapter 3, the mean is clearly the preferred measure.

mean.[235]

§ 9.4 Univariate (Turnbull) Estimation of Lower-Bound Mean WTP

Table 9.4 reports the Turnbull estimate for the WTP distribution using the **W1CH** choice measure. Note that the third column in Table 9.4 (labeled "Probability of Voting *For* at Upper-Bound") is simply the estimated fraction of those in Table 9.3 who would vote *for* the program at each W1AMT. The elements in the table describe the intervals defined by W1AMT and respondents' choices. For example, we know a respondent's willingness to pay for the accelerated recovery program is greater than or equal to $10 if the respondent voted *for* the program at $10. If, on the other hand, a respondent voted *against* the program at $10, we know that the respondent's willingness to pay is less than $10 and possibly $0.[236] Likewise, for a respondent who was asked about $80, a vote *against* the program implies that the respondent's willingness to pay for the accelerated recovery program lies somewhere in an interval from $0 to $80, while a vote *for* implies a maximum willingness to pay of at least $80. In this way, we can classify each respondent's willingness to pay into an interval depending on the W1AMT the respondent received.

[235] The lower-bound mean recognizes that the lowest point in an interval is the threshold trade-off isolated by respondent choices.

[236] We assume that no respondent would demand compensation for implementing the accelerated recovery plan; that is, that no respondent has a negative WTP.

Table 9.4 Turnbull Estimate of WTP Distribution and Lower-Bound Mean: W1CH Choice Measure [N=1857]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Change in Density
$0	$10	0.559	0.441
$10	$25	0.463	0.096
$25	$80	0.329	0.134
$80	$140	0.265	0.064
$140	$215	0.223	0.042
$215	∞	0.000	0.223

Log-Likelihood . . . . . -1155.65
Estimate of lower-bound mean $63.24
Standard error of the estimate $2.54

It is important to recognize that the Turnbull estimator does not assume that a respondent who votes *against* at $80 is willing to pay $0; rather, the Turnbull estimate for the intervals of the WTP distribution identified by W1AMT can be thought of as being sequentially built up. The fraction of respondents voting *for* at $10 identifies the probability of voting *for* the accelerated recovery program at the upper bound (0.559) and the first entry in the change in density column is the percent of respondents voting *not for* (0.441 = 1.000 - 0.559). The fraction of respondents (0.463) voting *for* at the second tax amount, $25, defines the percent willing to vote *for* at least $25 and the percent (0.096) willing to vote *for* amounts between $25 and $10. This latter percent is calculated by taking the difference between the percent willing to vote *for* $10 (*i.e*, 0.559) and the percent willing to vote *for* $25 (*i.e.*, 0.463). This difference (0.096) appears in the second row of the change in density column. Likewise, the percent willing to vote *for* at $80 defines the percent willing to vote *for* at $80 shown in the third column (0.329) and the difference (0.134) between the percent willing to vote *for* at $25 and $80 defines the

percent willing to vote *for* an amount between $25 and $80 and is displayed in the fourth column. The rest of the table is built up in an analogous fashion.[237]

The lower-bound estimate of the mean, $63.24, is obtained by assuming that all of the fraction of the sample estimated to be in a particular interval falls at the lower end of that interval.[238] For example, respondents who voted *against* at $10 and thus fall into the [$0—$10] interval are assumed to have a willingness to pay of $0. Respondents who voted *for* at $215 and thus fall into the [$215—∞] interval are assumed to have a maximum willingness to pay of $215. The standard error of the estimated mean is fairly small, $2.54, indicating reasonable precision in this estimate.[239]

§ 9.5 Bivariate Relationships Including NOAA Panel Cross-Tabulations

The NOAA Panel recommends that summaries of the responses to the "primary valuation" question (for our survey, embodied in the **W1** and **W1CH** choice measures) be broken down into categories to facilitate interpretation. The recommended categorical items include income, prior knowledge of the site, variables related to prior interest in the site such as visitation rates, distance to the site, attitudes toward the environment, attitudes toward big business, understanding of the task, belief in the scenario, and ability/willingness to perform the

[237] The numbers in the change in density column are the actual parameter estimates from the Turnbull model. Note that because the sum of the changes in density estimates must equal one, the last change in density (0.223) is not directly estimated but rather is calculated as one minus the sum of the first five changes in density. The z-statistics for the five change in density parameters estimated by the Turnbull procedure are 17.18, 2.59, 3.71, 1.92, and 1.35. The calculation of the standard error for the lower-bound mean estimate is described in Appendix E.

[238] The lower-bound estimate of the mean is calculated by multiplying the lower bound of the interval column by the change in density column and then summing these amounts. In this instance, [$0 x 0.441] + [$10 x 0.096] + [$25 x 0.134] + [$80 x 0.064] + [$140 x 0.042] + [$215 x 0.223] = $63.24.

[239] The corresponding estimate for the double-bounded choice measure taking account of changes, **WDBCH**, yields a somewhat higher lower-bound estimate of the mean of $67.69 (s.e. $2.92) and is displayed in Table F.7 in Appendix F.

task.

This recommendation is addressed in three ways. In this section, we report the cross-tabulation results for responses to questions designed to address each of the recommended items with the choice measures, **W1** and **W1CH**. These cross tabulations test whether the *for* and *not for* choices are influenced by each of the variable's responses. Second, for illustrative purposes, we consider one at a time how a subset of these factors would influence the Turnbull estimate of the lower-bound mean. Third, we present a multivariate analysis in the following section which addresses both a subset of the items recommended by the Panel and others hypothesized to influence respondents' choices.

Table 9.5 describes the specific source of the information used in each of the cross-tabulations. In most cases, these correspond to questions in the main study survey. In a few cases, the measure was constructed using two or more variables measured by the survey. The table also includes a short descriptive summary of the information and an indication of whether the source of the information directly (D) or indirectly (I) measures the item identified by the Panel. As shown in the table, the survey instrument contains multiple variables for some of the Panel's recommended items.

Table 9.5 Description of Sources of Information for Cross Tabulations

Recommended Information	Source	Category[a]	Description
Income	C-13	D	Total household income before taxes in 1993
Prior Knowledge of Site	A-11	D	Heard about the DDT and PCB deposit off South Coast
Prior Interest in the Site	C-2 C-3	D	Have visited Catalina or other Channel Islands; Most recent visit in last five years
	Saltwater Recreation[b]	I	Saltwater boating, fishing, or going often to the beach
	B-13	I	Bird watcher

Recommended Information	Source	Category[a]	Description
Attitudes Toward the Environment	A-1b A-1e A-2e	D	Reducing air pollution in cities; Protecting coastal areas from oil spills; Protecting endangered wildlife species
	B-17	I	Respondent's self-evaluation on environmentalist scale
Attitudes Toward Big Business	C-24f	D	Confidence in large corporations
	C-24c	I	Confidence in scientists who work for industry
Distance to the Site	SOUTH COAST PSU's	D	Location of respondent's residence in PSU's comprising affected South Coast area
	FARNORTH PSU's	D	Location of respondent's residence in PSU's north of San Francisco Bay area (farthest area from that affected)
Understanding of the Task	D-1c	I	Interviewer evaluation of respondent's understanding of material presented in A-3 through A-16
	D-2	I	Interviewer evaluation of respondent comments indicating difficulty in understanding natural recovery or accelerated recovery program
	D-3	I	Interviewer evaluation of respondent understanding of voting questions
Belief in the Scenario	B-1	D	Respondent agrees DDT and PCBs could cause reproductive problems
	Natural recovery: more time[c]	D	Respondent judgment about timing of natural recovery
	Natural recovery: less time[c]	D	Respondent judgment about timing of natural recovery
	Accelerated Recovery Program: works[d]	D	Respondent judgment about effectiveness of accelerated recovery program
	Accelerated Recovery Program: not works[d]	D	Respondent judgment about effectiveness of accelerated recovery program
	B-6	D	Respondent judgment about limit of special tax to single year
Ability/Willingness to Perform Task	D-4	I	Interviewer evaluation of whether respondent impatient to complete interview

Recommended Information	Source	Category[a]	Description

(a) "D" indicates a *direct* connection between the question and the information sought in the NOAA Panel's recommendation and "I" designates an *indirect* connection.

(b) SWATREC indicates participation in saltwater recreation in the form of fishing or boating in the last five years (B-9 and B-11, respectively) or often going to the beach (B-15).

(c) Questions B-2 and B-3 are used to construct (0,1) indicator variables for whether respondent felt natural recovery would take MORETIME or LESSTIME.

(d) The PWORKS variable (describing whether the program works) is formed by combining those answering "yes" to "completely effective in solving the reproduction problem in five years" in B-4 with those answering "mostly effective" in the B-5 follow-up question. These responses were coded as 1 and 0 otherwise. The PNOTWORK variable describing an ineffective program was formed by setting B-5 responses corresponding to "not too effective" or "not effective at all" equal to 1 and 0 otherwise.

Table 9.6 summarizes the cross-tabulation results, including the p-values, for the **W1** and **W1CH** choice measures.[240] For the cross-tabulations shown in the table, the null hypothesis is whether the distribution of responses *for* and *not for* the accelerated recovery program is affected by the categories used to describe each of the matched source variables. For example, in the case of income, the null hypothesis concerns whether respondents' choices are affected by the reported income category. The reported p-value is the probability that the test result would call for incorrectly rejecting a "true" null hypothesis of no association between the choice measure and the source variable. The last column in the table reports the decision — assuming a p-value of 0.05[241] — that would be made about differences in the distribution of responses between *for* and *not for* choices (using both the **W1** and **W1CH** choice measures) and the categories in each of the information variables. The label "R" indicates that the null hypothesis

[240] See Appendix D-3 for a presentation of each of the cross-tabulation tables.

[241] Three p-values are commonly used for deciding whether to reject/not reject statistical hypotheses: 0.10, 0.05, and 0.01. Of these, 0.05 is perhaps the most commonly used criteria. The p-value of 0.10 tends to be used in smaller samples where there is less statistical power to test a hypothesis or when there is a lower risk involved in rejecting the null hypothesis when it is true. A p-value of 0.01 is sometimes used when there is a higher risk involved in falsely rejecting the null hypothesis. Using the statistic's actual p-value, it is possible to evaluate how sensitive this decision is to the selection of a particular p-value.

was rejected (thus implying some association between choices and the information variable), and "N" indicates that the null was not rejected (hence suggesting no association).

Table 9.6 Cross-Tabulation Summary

Recommended Information	Source[a]	Choice Measure	p-value[b]	Reject/Not Reject Hypothesis of No Association
Income	C-13	W1	0.00	R
		W1CH	0.01	R
Prior Knowledge of Site	A-11	W1	0.04	R
		W1CH	0.03	R
Prior Interest in the Site	C-2	W1	0.28	N
		W1CH	0.90	N
	C-3	W1	0.25	N
		W1CH	0.07	N
	Saltwater Recreation	W1	0.00	R
		W1CH	0.00	R
	B-13	W1	0.00	R
		W1CH	0.00	R
Attitudes Toward Environment	A-1b	W1	0.00	R
		W1CH	0.00	R
	A-1e	W1	0.00	R
		W1CH	0.00	R
	A-2e	W1	0.00	R
		W1CH	0.00	R
	B-17	W1	0.00	R
		W1CH	0.00	R
Attitudes Toward Big Business	C-24c	W1	0.66	N
		W1CH	0.60	N
	C-24f	W1	0.46	N
		W1CH	0.34	N
Distance to Site	SCOAST	W1	0.02	R
		W1CH	0.03	R
	FARNORTH	W1	0.01	R
		W1CH	0.01	R
Understanding of Task	D-1c	W1	0.13	N
		W1CH	0.09	N
	D-2	W1	0.68	N
		W1CH	0.24	N

Recommended Information	Source[a]	Choice Measure	p-value[b]	Reject/Not Reject Hypothesis of No Association
	D-3	W1 W1CH	0.17 0.68	N N
Belief in Scenario	B-1	W1 W1CH	0.02 0.01	R R
	Natural Recovery: More Time	W1 W1CH	0.00 0.00	R R
	Natural Recovery: Less Time	W1 W1CH	0.00 0.00	R R
	Accelerated Recovery Program: Works	W1 W1CH	0.00 0.00	R R
	Accelerated Recovery Program: Not Effective	W1 W1CH	0.00 0.00	R R
	B-6	W1 W1CH	0.00 0.00	R R
Ability/Willingness to Perform Task	D-4	W1 W1CH	0.00 0.00	R R

(a) The source is the question number in the main survey unless otherwise indicated; see preceding table. Refused/not sure/not ascertained categories have been set to missing for the source variables and excluded from the cross-tabulations.

(b) The p-value is the probability level estimated for a Type-I error for a χ^2 statistic using a cross-tabulation of the choice measure and the recommended information variable.

These cross-tabulations permit a simple test of association between respondents' choices and three different types of information. The first type relates to the characteristics and attitudes of respondents. Here we would expect to see differences in the choice measures with respect to at least some respondent characteristics. These results suggest that in each group of variables, except *attitudes toward big business* and *understanding of the task*, at least one measure in the group is significantly related to the choice regarding the accelerated recovery program. These

include variables with direct economic interpretations such as income (C-13), as well as measures of activities that might be hypothesized to be related to the injured resources, such as participation in various forms of saltwater recreation, and identifying bird species (B-13). The choice measure used in the cross-tabulation, **W1** or **W1CH**, does not influence this conclusion.

Environmental attitudes are consistently related to differences in the decisions about the program. These include those variables from survey questions asked before the program and injuries are described (A-1b, A-1e, and A-2e) and a later question which asks for a general self-evaluation on an environmentalist scale (B-17). Attitudes toward big business are represented in two ways: first, in the degree of confidence in scientists who work for industry (C-24c), and second, in the degree of confidence in large corporations (C-24f). Neither is significantly related to choosing the accelerated recovery program.

Prior knowledge does appear to be related to respondents' choices. *Distance to the site* as measured here by SCOAST, a dummy variable for respondents whose residences fall within the PSU's in the South Coast area (*i.e.*, Los Angeles and Orange counties), was also found to be associated with choices. There was a difference in the opposite direction for FARNORTH, PSU's north of the San Francisco Bay Area, the area farthest away from the South Coast.

The other two types of information are respondent's *understanding of the task* and his/her *belief in the scenario*. Interviewers' evaluations of respondents' performance (used as an indirect measure for respondents' *understanding of the task)* were not a factor in distinguishing the pattern of choices. However, as we will see below, a broader definition of possible interviewer-identified problems is associated with a smaller estimate of the Turnbull lower-bound mean. As we would expect, all of the measures of *belief in the scenario*, measured by both respondents' perceptions of the natural recovery process and the effectiveness of the accelerated

recovery program, distinguish the pattern of choices. The acceptance of the one year limit to the special tax is also a distinguishing feature. The interviewers' evaluations of respondents' impatience to complete the interview offer an indirect gauge of their willingness to perform the task. In this case, the cross-tabulation suggests a significant association with the impatient respondents tending to vote *not for* the program.

It is possible to use the variables identified by the NOAA Panel as a basis for dividing the base sample into sub-samples. Separate Turnbull estimates can be computed for each sub-sample's WTP distribution, and the lower-bound means compared. As a rule, repeating this process for the categorical variables defined by the survey and discussed earlier (in terms of cross-tabulations) indicates significant differences in the estimated lower-bound means across these categories.[242] For example, splitting the sample according to whether respondents were interviewed in the South Coast area yields, as we would expect, a significantly greater estimate of the **W1CH** lower-bound mean for SCOAST households in comparison with FARNORTH households (*i.e.*, \$71.65 versus \$43.26; $t=3.25$, $p < 0.001$). Households with bird watchers have a lower-bound estimate for mean WTP of \$76.12 versus \$53.97 for those who do not ($t=4.34$; $p < 0.001$).[243]

When comparable sample splits were considered for other elements in Table 9.6, the relationships between the lower-bound means estimated from each distribution were consistent with our prior expectations. For example, among those respondents who expressed a belief that

[242] In several instances, the interesting way to split the data into two sub-samples (*e.g.*, the 19 respondents who interviewers identified as having understood the injury and program material only slightly or not at all versus the rest of the respondents) results in at least one very small sub-sample and hence fairly unreliable estimates. As a consequence, the computations presented should be taken as illustrative of the implications of the differences tested with the cross tabulations.

[243] Extreme splits such as comparing those on question A-2e who think spending on endangered wildlife programs should be increased a great deal to those who think spending should be reduced a great deal produce quite large differences (\$111.42 versus \$18.20; $t=7.19$; $p < 0.001$).

natural recovery would take more time, we would expect that the estimated mean derived from a WTP distribution based on their choices would be significantly larger than that estimated from those who indicated otherwise; this is indeed the case ($99.69 versus $60.88; t=3.73; $p < 0.001$). These relationships reinforce the test results derived from comparing the cross-tabulations recommended by the NOAA Panel.

It is also possible to look at splitting the sample into those respondents with possible interviewer-identified problems according to the PINTPROB measure defined in section 8.5, and those not identified as having problems. We find that respondents with possible interviewer-identified problems have a lower-bound estimate of the mean which is approximately one half the size of the corresponding estimate for respondents identified as not having problems ($32.88 versus $64.48; t=-3.08; p=0.002).

§ 9.6 Construct Validity Using a Multivariate Approach

The estimation of a multivariate choice function is a statistical method used to relate respondents' choices to their evaluations of the accelerated recovery program as well as to their demographic characteristics and attitudes. These functions are often used to demonstrate *construct validity*, one of the standard validity concepts widely accepted for use in evaluating models. Construct validity refers to the degree to which a measure relates to other measures predicted by theory.[244] In examining construct validity, we look at whether variation in the **W1CH** choice measure is systematically related to factors suggested by economic theory such as preferences for the object of choice, the cost of program, and the ability to pay for it. Other

[244] Mitchell and Carson (1989) discuss two forms of construct validity: convergent validity and theoretical validity. The former refers to whether the measure of interest is correlated with other measures of the same theoretical construct and is not directly applicable here.

factors relevant for this application include measures of respondents' evaluations of the injuries and the characteristics of the accelerated recovery program. For example, we should expect those respondents who thought natural recovery would take less time than was described to them in the questionnaire to be less likely to vote *for* the program.

When we move from this general description of an evaluation of construct validity, it is important to acknowledge that most predictions are general and simply indicate whether the direction of the association between a variable and a respondent's choices should be positive or negative. Equally important, they rely on observing a large enough number of individuals with the characteristics or attitudes hypothesized to be related to a choice to be able to estimate the parameter of interest with reasonable precision.[245]

§ 9.6.1 Definition of Covariates in Choice Function

Table 9.7 presents a multivariate choice function estimated using a probit model with **W1CH** as the dependent indicator variable.[246] We used a probit model because of its simplicity in estimation and presentation, and because it is one of the models most frequently

[245] Because respondents' attitudes and demographic characteristics are measured in several different ways, and their evaluations of the injuries and the program are also evaluated from different perspectives, it is reasonable to expect correlation among these sets of variables. This multicollinearity can reduce the ability of the model to distinguish individual effects precisely when there are multiple measures reflecting closely-related influences on respondents' choices.

[246] Missing values for income have been replaced with an estimate based on the median income in the 1990 Census block, housing type, education, gender, race, age, and qualitative variables for the number of employed adults in the household. Appendix F reports the model for estimating income (Tables F.1 and F.2), more detailed definitions of the variables included in the choice function (Table F.3), as well as the model presented in Table 9.7 but excluding the households who do not report income from the sample (Table F.4). Doing this does not change the sign or significance of the income measures or the role of any other variables. It does reduce the sample from 1857 to 1692 so the p-values for some of the tests for relationships between these variables and respondents' choices necessarily decrease. The most notable examples arise with the location variables.

used to relate a binary, discrete-choice variable to a set of possible predictor variables.[247]

Table 9.7 Multivariate Analysis of Construct Validity: Probit Estimates for W1CH Choice Valuation Function

Variable	Coding	Parameter Estimate	Z-Statistic	p-value (two-sided)	Variable Mean
CONSTANT	Equals 1 of all respondents	-1.1592	-1.86	0.063	—
LW1AMT	Log of W1AMT	-0.4025	-12.77	0.000	4.0616
LINC1	Log of income if < median California household income ($35,173); 0 otherwise	0.1745	2.86	0.004	5.0777
LINC2	Log of income if ≥ to $35,173 and < $150,000; 0 otherwise	0.1491	2.70	0.007	4.85489
LINC3	Log of income if ≥ $150,000; 0 otherwise	0.1142	2.17	0.030	0.4493
EDUC	College Associates degree or higher=1; 0 otherwise	-0.1770	-2.26	0.024	0.3802
NOTAX	Did not pay California taxes=1; 0 otherwise	0.4854	3.43	0.000	0.1077
COASTIP	A-1c protect coastal area extremely important=1; 0 otherwise	0.1486	2.00	0.046	0.3667
COASTNIP	A-1e protect coastal area not important=1; 0 otherwise	-0.7135	-1.38	0.169	0.0135
WILDSP	A-2e increase endangered wildlife spending=1; 0 otherwise	0.4180	5.30	0.000	0.4847

[247] Generalizing the Turnbull estimate with covariates requires adding parametric structure either in the form of the distribution assumed to give rise to a probability distribution for the choice measure or the index function used to describe how the covariates influence choices, or both. Because the multivariate analysis was intended to test construct validity, we used a simple format for these tests and evaluated the sensitivity of the results to adjustments for outlying observations and flexibility on the parametric restrictions imposed on W1AMT and income, the two variables that were not qualitative (*i.e.*, categorical) variables. We considered a version of the probit estimator due to Pregibon (1982) to adjust for outlying observations. The resulting model is similar to that reported in Table 9.7. We also considered the generalized additive form of the probit model due to Hastie and Tibshirani (1990). This version uses a smoothing spline technique for the two continuous variables, W1AMT (which allows more flexibility in the error term) and income. The generalized additive form did not significantly improve the fit over that of the probit reported in Table 9.7. Neither approach altered our conclusion on construct validity.

Variable	Coding	Parameter Estimate	Z-Statistic	p-value (two-sided)	Variable Mean
WILDNSP	A-2e decrease endangered wildlife spending = 1; 0 otherwise	-0.2676	-2.15	0.032	0.1486
NONSENV	B-17 not at least a somewhat strong environmentalist = 1; 0 otherwise	-0.2404	-3.09	0.002	0.3861
MORETIME	B-3 natural recovery a lot more time = 1; 0 otherwise	0.5250	3.63	0.000	0.0630
LESSTIME	B-3 natural recovery a lot less time = 1; 0 otherwise	-0.2915	-2.69	0.007	0.1497
PWORKS	B-4 and B-5 expect program to be completely or mostly effective = 1; 0 otherwise	0.5998	7.46	0.000	0.6317
PNOTWORK	B-5 expect program to be not too effective or not at all effective = 1; 0 otherwise	-1.2578	-4.77	0.000	0.0872
QUESPROG	At A-13 or A-15 asked question about how program worked or its cost explanation = 1; 0 otherwise	-0.2961	-3.58	0.000	0.2439
PAYMORE	B-6 does not think will only have to pay special tax for one year = 1; 0 otherwise	-0.2817	-3.67	0.000	0.3667
PAYVEH	C-26 prefer tax vehicle over higher prices = 1; 0 otherwise	0.3908	5.44	0.000	0.3533
CONFCGV	C-24e great deal of confidence in California State Government = 1; 0 otherwise	0.3119	1.72	0.085	0.0393
NCONFCGV	C-24e no confidence in California government = 1; 0 otherwise	-0.2065	-2.13	0.033	0.1745
LOWSPEND	Wants increased spending only on one or no programs (A-2a, A-2b, A-2c, A-2d and A-2f) = 1; 0 otherwise	-0.3230	-3.72	0.000	0.2606

Variable	Coding	Parameter Estimate	Z-Statistic	p-value (two-sided)	Variable Mean
SWATREC	B-10, B-12, B-15 participate in saltwater boating or fishing or often go to beach = 1; 0 otherwise	0.2160	2.91	0.004	0.5859
BIRDWATC	B-13 birdwatcher = 1; 0 otherwise	0.1790	2.41	0.016	0.4136
TVBIRDS	B-14 often watch tv programs about animals and birds = 1; 0 otherwise	0.1861	2.52	0.012	0.4416
EATFISH	B-16 household often eats fish = 1; 0 otherwise	0.1759	2.45	0.014	0.4146
SCOAST	Los Angeles or Orange Counties = 1; 0 otherwise	0.1668	2.17	0.030	0.3253
FARNORTH	North of San Francisco Bay Area = 1; 0 otherwise	-0.2468	-2.10	0.036	0.1147
N = 1857 Log (L) = -879.78 Pseudo R^2 = 0.279					

In considering the model presented in Table 9.7, first note that the randomly assigned treatment variable, W1AMT, entered as a natural log, is a negative determinant of respondents' decisions about the accelerated recovery program and is a highly significant determinant of respondents' choices in the model. The other variables selected for inclusion in the choice model can be grouped into five broad categories following the general format of the NOAA Panel's recommendations for cross tabulations: variables measuring either directly or indirectly respondent economic characteristics; respondent preferences and demographic characteristics; respondent evaluations of the injuries and accelerated recovery program; respondent interpretations of the choice mechanism and circumstances of the choice; and respondent interest in, use of, and proximity to the affected natural resources. We now turn to a specific discussion

of the other variables in the construct validity equation.

The first group of variables, which measure economic characteristics, include income, EDUC, and NOTAX. As noted in the table, three income classes are identified, those below the median, annual California household income of $35,173 (INC1), between $35,173 and less than $150,000 (INC2), and those of $150,000 and above (INC3). The next variable, EDUC, is a qualitative variable indicating that the respondent has at least an Associates degree from an academic college program. NOTAX is an indicator that the household did not pay any California income taxes last year.

A series of five environment variables follow. The first four are defined from the initial questions asking respondents about preventing oil spills in coastal areas (A-1e) and protecting endangered wildlife species (A-2e). The former variables (COASTIP and COASTNIP) are entered as qualitative variables identifying those respondents who at A-1e rated the issue as "extremely important" as well as those indicating it was "not important at all." Each category is measured relative to the middle group. In the case of endangered wildlife (A-2e), the two variables are defined in terms of the size of spending changes, with those desiring spending increases (WILDSP) and spending decreases (WILDNSP) identifying the separate qualitative variables. The fifth environmental variable, NONSENV, identifies individuals who would *not* consider themselves to be at least a somewhat strong environmentalist.

The next set of factors are related to the program. The first two variables, MORETIME and LESSTIME, relate to respondents' evaluations of the length of natural recovery. The next two variables, PWORKS and PNOTWORK, relate to respondents' evaluations of whether the program would be effective. QUESPROG is an indicator of whether the respondent asked a question(s) about how much the program would cost or how it would work in A-13 or A-15.

The last variable, PAYMORE, relates to whether the respondent thought the tax payment might not be limited to one year.

The next group of variables relates more generally to respondents' views about government programs. The first, PAYVEH, is defined from respondents' evaluations of whether taxes were the appropriate way to pay for new programs to protect the environment. The next two, CONFCGV and NCONFCGV, reflect levels of trust in the California state government. Here the coding of C-24e into two categorical (0,1) indicator variables, distinguishing respondents who express a great deal of confidence in California state government and those with no confidence from the rest of the respondents. The last variable in this group, LOWSPEND, is an indicator variable for respondents who express willingness to increase spending on none or, at most, one of the programs asked about in question A-2 (*i.e.*, new state prisons, public transportation in Los Angeles, raises for state college and university faculty, shelters for the homeless, and more lifeguards at state beaches).

The last category of variables identifies the use activities that may be "related" to the injured natural resources, including: saltwater recreation (SWATREC, *e.g.*, saltwater fishing, boating, or beach use), often eating fish (EATFISH), bird watching (BIRDWATC), and watching television programs about birds and animals in the wild (TVBIRDS). Finally, we have also included in this group two qualitative variables identifying the respondent's location in relationship to the area closest to the natural resource injuries. Here FARNORTH and SCOAST are distinguished from the rest of the State.

§ 9.6.2 Interpretation of Covariates in Choice Function

In each case, the variables hypothesized to influence choices do so in the ways anticipated

and the estimated coefficients are generally significant at p-values less than conventional standards.[248] Distinguishing the extreme attitudes is helpful in highlighting these differences. The pattern of positive and negative signs on the coefficients suggests that those with attitudes supporting the environment, expressed as either a concern or a willingness to increase spending to protect endangered wildlife, are *more* likely to vote for the program. Those respondents who do not consider themselves strong environmentalists, who prefer not to increase spending on public programs, and who do not trust California government are *less* likely to support the program. EDUC has a negative effect on a respondent's willingness to support the program and is consistent with some skepticism toward the program expressed by educated respondents in focus groups.

As noted above, there are five program-related variables. We would expect those respondents who thought that natural recovery would take a lot longer than fifty years (MORETIME) to be more likely to vote *for* the program while those who thought that natural recovery would take a lot less than 50 years (LESSTIME) to be more likely to be *not for* the program. The coefficients in Table 9.7 confirm this; both effects are statistically significant. It is interesting to note that the two effects are almost exactly offsetting.[249]

We would also expect that those who thought the program would work (PWORKS) would be more likely to vote *for* while those who thought the program would not work (PNOTWORK) would be less likely to vote *for* the program. Again this is the case and the effects are highly significant. Since ideally all respondents would be in the PWORK=1 category, the overall

[248] Note that Table 9.7 reports p-values for two-sided hypothesis tests. In most instances, the hypothesis about the coefficient on a particular test is of the one-sided form (*e.g.*, a null hypothesis that respondents who do not think the program works are as likely to vote *for* the program as other respondents versus the alternative that they are less likely). For one-sided hypothesis tests, the reported (two-sided) p-values should be divided by 2.

[249] The absolute value of the coefficient on MORETIME is almost twice that of LESSTIME. However, the percent of respondents giving a LESSTIME answer is more than double that of those giving a MORETIME answer.

effect here is to lower the percentage of *for* votes. The coefficient on QUESPROG, a related variable, is negative and significant. To the extent that the questions asked reflect skepticism about the program, rather than cost sensitivity, the effect is undesirable. We would also expect those who did not think they would have to pay the amount asked about for only one year (PAYMORE) to be less likely to vote *for* the program. This is the case, and the effect is to significantly reduce the likelihood of a *for* vote. Taken as a whole, deviations from believing that there would be a 50 year natural recovery, that the accelerated recovery program would work, and that the special tax would only have to be paid for one year results in a significantly lower probability ($p < 0.001$) of voting *for* the program.

The next group of variables, PAYVEH, CONFCGV, NCONFCGV, and LOWSPEND, all have the expected signs and are significant. Those favoring the use of government taxes to effect environmental improvements are *more* likely to vote for the program as are those indicating more trust in the government. Those with no confidence in the government and those not favoring increased government spending in general are *less* likely to vote for the program.

The next group of variables, SWATREC, BIRDWATC, and EATFISH, are related to the natural resource. They are all positive and significant. That is, individuals whose activities and interests are related to saltwater recreation (SWATREC) and wildlife (BIRDWATC and TVBIRDS) are *more* likely to vote for the program. The same is true for households who often eat fish. Respondents living in the FARNORTH PSU's are *less* willing to vote for the program and those in the SCOAST PSU's *more* willing to vote for the program than those in the rest of the state.

All of these factors are quite robust determinants of **W1CH**. We considered several different codings of these responses, such as including only one side of on attitude scale in

comparison to all others (instead of using the two extreme evaluations relative to the intermediate ones). In most cases, the resolution for these variables was improved by accounting for the extremes in attitudes relative to intermediate opinions. However, the basic conclusions remain the same under reasonable alternative coding schemes. Moreover, they are not sensitive to the estimator used to describe the determinants of these initial responses. A Weibull choice model using **W1CH** rather than the log-normal probit model in Table 9.7 or their double-bounded counterparts assuming Weibull or log-normal distributions (see Table F.8 in Appendix F) also yield the same basic conclusions.

Household income was the variable most sensitive to its specification in the model. The model reported here allows income to have a different coefficient depending upon the level of household income. The coefficients for all three income terms are positive and statistically significant with p-values less than 0.05 and the p-values are less than 0.01 for LINC1 and LINC2. Likelihood ratio tests of the hypothesis that all income coefficients are jointly zero reject at $p=0.010$, using the sample with the imputed income for missing income values, and at $p=0.016$ in the model dropping these observations.

If we do not allow the income coefficient to vary with level of income, then the effect of the log of income on the likelihood of favoring the program is positive but no longer statistically significant. This conclusion holds regardless of the treatment of missing values for income.[250] Nonetheless, this specification would be rejected in favor of the one reported in Table 9.7 at $p=0.005$ ($p=0.007$ without the imputed income cases) using likelihood ratio tests. That specification is able to isolate a significant, positive effect of income because it includes

[250] Using income rather than log (income) yields a negative and insignificant coefficient. This specification, however, can also be rejected in favor of a specification with three income terms using likelihood ratio tests ($p=0.020$ using imputed income for missing income values and $p=0.054$ dropping these observations).

variables that capture the negative evaluations of government spending programs, environmental projects, and the accelerated recovery program on the part of a disproportionate share of the sample's highest income households. Thus, in the absence of a measure capturing these attitudes, it is possible to misinterpret the effect of income on respondents' choices. Equally important, by allowing for different income coefficients for these responses with the level of income, the model further distinguishes this group of high income households from others in the sample.

The last variable to be noted in the model is NOTAX, the indicator for households who do not pay California state income taxes. The coefficient on this variable is positive and highly significant ($p < 0.001$), indicating that this group is more likely to favor the program. Because it is possible that their choices reflect a recognition that they would not have to pay the stated tax amount, there is reason to question whether they have accepted financial responsibility for their choices. The next section discusses an adjustment in the choice measure used for developing the final estimate of prospective ILUV that treats the potential incentives to households not paying California taxes in a conservative fashion.

The survey questionnaire collected additional information on demographics, knowledge, and attitude/behavioral information. Our evaluation of the construct validity model reported in Table 9.7 also considered these variables. In discussing the results from the analyses of these other variables, it is important to acknowledge that the objective of our multivariate analysis is to evaluate whether measures of the primary economic, attitude, program-related, resource-related and demographic factors influenced respondent choices. In addressing this question of what should be included in the model, the sensitivity of our findings to alternative definitions for the included variables, as well as to variables that might have been included, was a key

consideration for the analysis. The summary to this point has considered the implications of the format used to represent the included variables. We now turn to the variables in the survey that were not reported as arguments in the Table 9.7 model.

The respondent's evaluation of the "seriousness of the injury" (B-8) is not included in the final model. When it was included in the specification, our conclusions about the effects of the tax amount, income, program-related variables, and several important demographic variables were not affected but some of the environmental variables were no longer significant.[251] Because this evaluation was requested after a respondent's choice, it is reasonable to assume that it conveys some of the same information as the choice itself (*i.e.*, respondents rating the injuries as "very" or "extremely" serious are more likely to vote *for* the program.) This measure is used in Chapter 10 to evaluate whether independent samples perceived a difference between the base and scope versions of the injury descriptions.

A number of demographic variables (age, gender, race/ethnicity, citizenship, the number of children under 18 in the household, and having grandchildren), were not significant determinants of choices when income, attitude, and program evaluation variables were included in the model. Some of these, such as age (negative relationship) and children (positive), were statistically significant in bivariate relationships with **W1CH**. Other variables which were significant in bivariate relationships with **W1CH**, but not significant in the model in Table 9.7, include C-1 (positive), the number of years lived in California, and, as noted earlier in Table 9.5, A-11 (positive), having heard about the DDT/PCB deposit.[252] A variable measuring

[251] Adding two indicator variables for B-8 equal 1 ("not serious at all") or 2 ("not too serious") and B-8 equal 4 ("very serious") or 5 ("extremely serious") in the model in Table 9.7 substantially increases the model's predictive power. Both of these variables are highly significant ($t = -6.00$ and $t = 7.68$ respectively). The inclusion of these two variables makes the income variables more significant and the environmental variables less significant.

[252] A-9, having heard about DDT, and A-10, having heard about PCB's, were not significant in either bivariate relationships with **W1CH** or in the multivariate model in Table 9.6.

respondents' desire to move from Los Angeles/Orange County (C-5) was a positive and significant determinant of choices when included in the model in Table 9.7. This question, however, was only asked of SCOAST area respondents and the collinearity between the two variables substantially increases the estimated standard error for the SCOAST variable. As a consequence, we retained only SCOAST which is the relevant variable for the full sample.

Overall, the construct validity model includes a large number of the factors describing respondents, their economic characteristics, attitudes, and evaluation of the injuries and accelerated recovery program. Moreover, our overall conclusion on construct validity withstood variations in the format of the included variables measuring the factors hypothesized to influence choices as well as to the inclusion of other potential determinants of these decisions.

§ 9.7 Correction for Non-Taxpayers

As noted in section 5.4, the payment vehicle used in this study is a one-time increase in California income taxes. Some respondents not currently paying state income taxes may not take a tax payment obligation as seriously as those who do pay taxes. While there are other differences in respondents' interpretations of the elements of the choices—as the multivariate choice model indicates—there is an important difference between these effects and the one associated with not paying California income taxes. By retaining the varied interpretations of the accelerated recovery program, we are understating the propensity of respondents to be willing to vote for the program (at all tax amounts). Thus, the absence of an adjustment is consistent with a conservative estimate of ILUV.

In contrast, respondents who do not pay California taxes appear more willing to vote *for* the program (at all tax amounts). The most conservative adjustment for this tendency is

accomplished by re-coding the 80 respondents who did not pay California income taxes in 1993 and who voted *for* the program given the **W1CH** choice measure to *not for* votes. This effectively sets the lower-bound mean estimate for this group of respondents to zero. We refer to this choice measure as **W1CHNT**.

There is further support for the use of this modified choice measure, **W1CHNT,** in interviewer ratings of the respondent's attention to the choice questions. Respondents who did not pay California income taxes were more likely ($p < 0.001$) on the PINTROB measure introduced in Chapter 8 to be rated as lower quality interviews, to be considered impatient (D-4 and D-4a), or to be only "slightly serious" or "not at all serious" (D-5) in responding to the choice questions. While the number of respondents in each of these undesirable categories is fairly small, these evaluations arise disproportionately from this grouping of respondents who do not pay California income taxes. Thus, this pattern is consistent with the hypothesis underlying our adjustment to the choice measure; that is, these respondents may not interpret the choice question in the same way as those who do pay California income taxes.

Table 9.8 reports the distribution of **W1CHNT** by W1AMT, while Table 9.9 reports the Turnbull lower-bound estimate for this choice measure. As is the case for the **W1** and **W1CH** choice measures, a $\chi^2_{(4)}$ test (111.02) for the **W1CHNT** measure also rejects the hypothesis ($p < 0.001$) that responses are not sensitive to W1AMT. As shown in Table 9.9, the estimated lower-bound mean for the **W1CHNT** choice measure is $55.58 with a standard error of $2.43.[253] This estimate, smaller than that from the **W1CH** choice measure ($63.24, with a standard error of $2.54), represents yet another conservative adjustment to the lower-bound

[253] The z-statistics for the five change in density parameters estimated by the model are 19.24, 2.86, 2.80, 1.93, and 1.70, respectively. The corresponding double-bounded estimate for **WDBCHNT** (Appendix F, Table F.10) is $59.53 (s.e. $2.78).

estimate of mean WTP.

Table 9.8 W1CHNT Choice Measure by W1AMT

W1AMT	For	Not For
$10	50.3%	49.7%
$25	39.8%	60.2%
$80	29.9%	70.1%
$140	23.6%	76.4%
$215	18.6%	81.4%
$\chi^2_{(4)} = 111.02$; $p < 0.001$		

Table 9.9 Turnbull Estimate of WTP Distribution and Lower-Bound Mean: W1CHNT Choice Measure [N=1857]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Change in Density
$0	$10	0.503	0.497
$10	$25	0.398	0.105
$25	$80	0.299	0.099
$80	$140	0.237	0.062
$140	$215	0.187	0.050
$215	∞	0.000	0.187
Log-Likelihood			-1112.10
Estimate of lower-bound mean			$55.58
Standard error of the estimate			$2.43

§ 9.8 Summary

Chapter 3 described the relationship between an individual's choice and the trade-off used to construct a monetary measure of the economic value implied by that choice. We argued that, with minimal assumptions, these choices could be used to isolate a lower-bound measure of each

individual's willingness to pay for an object of choice. Our CV survey was designed to present a choice consistent with measuring prospective ILUV for the injuries described in Chapter 2. This was accomplished using an accelerated recovery program as the object of choice.

The statistical method used, the non-parametric maximum likelihood Turnbull estimator, allows the estimation of a lower-bound mean which is equal to, or lower than, the sample mean. The assumptions this estimator uses are simply those which underlie the choice model developed in Chapter 3. That is, the Turnbull estimator does not require either distributional or preference-related assumptions, aside from the fundamental premise that respondents' choices are based on what is their most preferred alternative of the options presented to them.

To help gauge the reliability of respondents' choices in the base sample, two types of evaluations were presented. The first considered bivariate relationships, principally in the form of cross-tabulations between the information variables recommended by the NOAA Panel and the **W1** and **W1CH** choice measures. Overall, the bivariate analysis provided support for the presence of relationships that are hypothesized to be associated with choices for the accelerated recovery program.

The second evaluation considered the same issues but in a more structured format using a conventional, multivariate choice model. A probit model was estimated and used to help identify the determinants of the **W1CH** choices. These determinants include respondent economic characteristics, environmental variables, variables specifically related to the respondent's perception of the accelerated recovery program, general attitudes toward government programs, and variables which help identify the respondent's relationship to the injured natural resource. In each instance, factors hypothesized to be associated with the choices were found to be consistent with prior expectations and the relationships were statistically

significant determinants of **W1CH**. Moreover, these are robust effects that do not seem to change much with the specific coding of the variables involved.

Only in the case of household income were the results found to be fairly sensitive to the assumed parametric specification. A specification that allows the probability of voting *for* the program to vary with three different income groups isolates a positive and significant effect between income and **W1CH**. Several simpler specifications which resulted in insignificant income coefficients were rejected using likelihood ratio tests.

The lower-bound mean for respondents' willingness to pay for the accelerated recovery program was estimated to be $63.24. When the choice measure was adjusted to treat all households not paying California income taxes as having *not for* votes for the program, the lower-bound mean was $55.58. In both cases, the maximum likelihood estimates of the standard error for these lower-bound means were small (2.54 and 2.43, respectively) suggesting a reasonably high level of precision in these estimates.

§ 10 Responsiveness to Scope of the Injury

§ 10.1 Introduction

This chapter presents the empirical results of the comparison between responses to the base and scope survey instruments described in Chapter 6 and contained in Appendices A.1 and A.2.[254] As noted in Chapters 5 and 7, these survey instruments were developed and administered to permit complete comparability between the results from the two independent samples.

Scope refers to how the willingness to pay constructed from respondents' choices responds to changes in the object of choice. The NOAA Panel suggested that economic measures of value should display differences for objects of choice that are recognized by respondents to be different. This view implies that respondents' WTP for different objects of choice should be different and it indicates a direction for this difference. That is, an object of choice understood by respondents to be larger should have an estimated WTP which is greater than the WTP for a desirable object of choice recognized to be smaller. A test of whether respondents are willing to pay more for a larger set of injuries than a smaller set is one of the principal tests of reliability recommended by the NOAA Panel.

While the NOAA Panel report does not provide a detailed description on how to evaluate this property, two general aspects of their recommended evaluation are important to the design of our scope test. First, the scope test should be administered to independent samples. This requirement follows from the Panel's discussion of issues associated with *embedding*.[255] The

[254] The base version of the survey involves 2 species of fish and 2 species of birds with a 50 year natural recovery period. The scope version involves 2 species of fish with a 15 year natural recovery period. See Chapter 6 for a detailed description of the base and scope survey instruments.

[255] As noted in Chapter 3, embedding has been used to refer to a number of different phenomena; the context here is that where one object of choice nests or encompasses another object of choice.

Panel rejects the possibility of asking each respondent about several different objects of choice noting that:

> We must reject one possible approach [for dealing with embedding], that of asking each respondent to express willingness to pay to avert incidents of varying sizes; the danger is that embedding will be forcibly avoided, still without realism. [Arrow *et al.*, 1993; p. 4608; bracketed phrase added]

Second, in describing the scope property, the NOAA Panel notes that respondents must be able to *recognize* the differences in the objects of choice presented:

> Rationality in its weakest form requires certain kinds of consistency among choices made by individuals. ... Common notions of rationality impose other requirements which are relevant in different contexts. Usually, though not always, it is reasonable to suppose that more of something regarded as good is better so long as an individual is not satiated. This is in general translated into a willingness to pay somewhat more for more of a good, as judged by the individual. [Arrow, p. 4604]

Because these different objects of choice are presented to independent samples, a judgment about respondents' understanding of differences in the objects must be based on a qualitative analysis undertaken as part of the development of the survey instrument. Chapter 5 summarizes this development process. This chapter describes the results of our scope test which confirm that respondents perceived differences in the objects of choice described and were, overall, willing to pay more for the program offered in the base version.

Before presenting these test results in detail, section 10.2 briefly reviews the sampling design underlying our scope test. Then, section 10.3 explores whether key predictor variables—constructed from questions administered prior to the description of the injuries—and demographic variables have similar response distributions across the base and scope samples. This section also addresses whether respondents from the independent samples were sensitive to the differences in the base and scope injuries by examining whether variables (other than WTP) which should be sensitive to scope are indeed sensitive.

There are several different choice measures which could be used in a test of sensitivity to scope.[256] The single-bounded choice measures described in Chapter 9 were:

(a) **W1**, the respondent's original response to the W-1 question coded as *for* or *not for*,
(b) **W1CH**, the respondent's final choice after opportunities for reconsideration, and
(c) **W1CHNT**, **W1CH** adjusted by setting the responses of households not paying California taxes to *not for*.

This section reports scope tests using **W1**, **W1CH**, and **W1CHNT**. Our principal focus is on the **W1CH** case, as this case represents the respondent's final choice (whereas the **W1CHNT** choice measure represents an artificial adjustment made to the data to reduce any chance of over-estimating WTP). Scope tests based on the double-bounded choice measures, **WDB**, **WDBCH**, and **WDBCHNT**, are reported in Appendix F.

Next, section 10.4 describes in detail the base and scope respondents' choices for the accelerated recovery program. Simple contingency tables are presented which test whether the percent that voted *for* using the **W1CH** choice measure differs across the base and scope samples as a whole and at each tax amount (W1AMT asked in W-1). Statistical tests comparing estimates of the two WTP distributions derived using the Turnbull lower-bound estimator (introduced in the previous chapter) are also presented. Section 10.4 then presents some comparisons of the two WTP distributions using parametric survival models. Finally, section 10.5 offers a summary of our findings.

§ 10.2 Design of Scope Test and Summary of Overall Findings

We are interested in testing whether WTP for the base set of injuries (WTP_B) is greater than WTP for the scope set (WTP_S). Formally, this translates into a null hypothesis,

[256] As in Chapter 9, choice measures are denoted by bold capital letters.

$$H_0: \ WTP_B = WTP_S \ ,$$

versus an alternative hypothesis,

$$H_1: \ WTP_B > WTP_S \ .$$

To implement this test, the selected dwelling units (DU's) were randomly assigned within segments in a 2 to 1 ratio to either the base[257] or scope survey instrument and then to one of the five tax amount versions described in Chapter 6.[258] This second step in the random assignment allows an evaluation of the base and scope sample responses at these different tax amounts. Further, using the same tax amounts in both the base and scope instruments facilitates comparisons using both simple contingency tables and the lower-bound estimate of the mean from the Turnbull estimator (Turnbull, 1976).[259] The scope survey instrument was administered to a fairly large sample (final N=953) to ensure that statistical tests would have reasonable power to test the two samples' distributions of choices across tax amounts.

The most general test of sensitivity to scope is a test for differences in the distribution of the **W1CH** choices overall. We can also conduct a similar test at each of the W-1 tax amounts. Both sets of tests imply that the distributions of responses to the base and scope versions are significantly different. This is also true if we use the **W1** or **W1CHNT** choice measures.

A second type of test imposes some structure on the responses by first estimating separate Turnbull lower-bound means for the WTP constructed from the two sample's choices (*base-*

[257] Twice as many base instruments were randomly assigned to selected DU's as the principal purpose of this study is to use that instrument in deriving the estimate of prospective ILUV presented in Chapter 11.

[258] Random assignment of the cases (*i.e.*, respondents) to the two treatments (*i.e.*, base or scope) allows relatively simple and easy-to-interpret statistical techniques to be used to assess any differences in the responses to the two treatments.

[259] See Appendix E for a detailed discussion of the Turnbull estimator.

W1CH and *scope*-**W1CH**). Because the samples are independent, the estimated lower bounds can be compared using a straight-forward *z-test*. This procedure tests the responsiveness to scope by testing the equality in these lower-bound means for the base and scope injuries. A third approach adds more structure by using measures of central tendency for the selected parameter from survival models to test the same hypothesis.

For all of the above tests, the conclusion remains the same — there is a clear and robust difference between the distribution of respondents' choices for the objects of choice corresponding to the base and the scope injuries. This difference leads to a significant difference in both non-parametric and parametric measures of central tendency for the distribution of WTP (across respondents). These tests are discussed in section 10.4.

§ 10.3 Examination of Other Questions in Base and Scope Samples

Given random assignment of respondents between treatments, we would not expect to see any difference in responses to three different sets of questions in the base and scope instruments:

- questions asked before the injuries were introduced (*e.g.*, A-1 and A-2 series),
- recreational activity and environmental questions in section B, and
- demographic questions in section C.

This expectation can be tested in a contingency table framework for each variable. The p-values for 66 variables, shown in Table F.11 of Appendix F, indicate few significant differences between the base and scope versions of the survey and indeed fewer significant differences than would be expected simply by chance at the 0.05 confidence level (given the number of comparisons, 3.3 significant differences expected versus 1 observed) or at the 0.10 confidence level (6.6 expected versus 5 observed).[260] The two questions with the smallest p-values (A-2d,

[260] The expected number of significant differences is found by multiplying the confidence level by the number of variables compared to get the expected number of comparisons which are significantly different (*e.g.*, 0.10 x 66 = 6.6).

homeless, and B-15, beach use) are not expected to be important to a scope test. We conclude from this exercise that the observed differences in the two samples are quite small and none seem likely to substantially influence any comparison of the WTP responses to the base and scope surveys.

Several questions can be used to evaluate whether there is indirect evidence that respondents understood the differences in the set of injuries described in the base and the scope surveys. Question B-8, which asked about the seriousness of the reproduction problems described, is perhaps the most likely to be influenced by whether or not the respondent was administered the base or scope instrument.[261] The most straightforward way to detect any differences in responses to B-8 is to construct the two-by-five contingency table shown in Table 10.1. The rows depict the treatment (base or scope) and the columns represent the responses to the B-8 question after dropping the "not sure" responses. A simple $\chi^2_{(4)}$ test has a value of 148.90 and rejects the hypothesis ($p < 0.001$) of no difference in the B-8 responses with the version of the survey administered.[262] That is, respondents who were administered the base version were significantly more likely to consider the described set of injuries as more serious compared to those who were administered the scope version.

[261] The base version of question B-8 was: "All things considered, would you say the *fish and bird* reproduction problems I told you about in the South Coast are not serious at all, not too serious, somewhat serious, very serious, or extremely serious?" Question B-8 in the scope version was: "All things considered, would you say the *fish* reproduction problems I told you about in the South Coast are not serious at all, not too serious, somewhat serious, very serious, or extremely serious?"

[262] As noted in Chapter 6, the scope version of the questionnaire contained an additional question at the end of the survey which asks respondents if they thought that the reproduction problems described would be more serious if they impacted Bald Eagles and Peregrine Falcons. Seventy-four percent responded *yes*. This internal test provides additional support for the notion that respondents perceived a difference between the two injury scenarios.

Table 10.1 Version by Perceived Seriousness of Injury

Version	Not serious	Not too serious	Somewhat Serious	Very Serious	Extremely Serious
Base (row percent)	97 (5.3%)	355 (19.3%)	713 (38.7%)	475 (25.8%)	201 (10.9%)
Scope (row percent)	138 (14.6%)	287 (30.4%)	315 (33.4%)	140 (14.9%)	63 (6.7%)
$\chi^2_{(4)} = 148.90$; $p < 0.001$					

A second place we might look for indications of a difference between the response to the two versions of the survey is with respect to the length of natural recovery (questions B-2 and B-3). Due to the shorter natural recovery time in the scope version (15 years) and the longer natural recovery time in the base version (50 years), we might expect a higher fraction of the scope respondents to indicate that they thought a longer natural recovery time was likely and a higher fraction of respondents in the base version to indicate that a shorter natural recovery time was likely. These results are shown in Tables 10.2 and Table 10.3. In both instances the hypothesis of no difference is rejected ($p < 0.001$) in favor of the expected direction of the observed difference.[263] There is also a significant difference ($p=0.002$) on B-7a for the small percent (2.0) of respondents who thought they were pushed to vote against the program — a higher fraction of those receiving the scope version felt pushed to vote against.[264]

[263] There is also a significant difference ($p < 0.001$) on the initial B-2 question with 6% more of those receiving the base instrument perceiving a different natural recovery period than stated in the survey than those receiving the scope.

[264] Dropping the small number of respondents who felt pushed to vote *against* in both the base and scope samples does not alter the conclusion of any of the tests of sensitivity to scope presented in this chapter and in Appendix F.

Table 10.2 Version by Expected *Longer* Natural Recovery Time

Version	Not Longer	Longer
Base (row percent)	1740 (93.7%)	109 (6.3%)
Scope (row percent)	860 (90.2%)	93 (9.8%)
$\chi^2_{(1)} = 10.89$; $p = 0.001$ Fisher's Exact Test: $p = 7.36E\text{-}04$		

Table 10.3 Version by Expected *Shorter* Natural Recovery Time

Version	Not Shorter	Shorter
Base (row percent)	1579 (85.0%)	278 (15.0%)
Scope (row percent)	893 (93.7%)	60 (6.3%)
$\chi^2_{(1)} = 44.79$; $p < 0.001$ Fisher's Exact Test: $p = 1.88E\text{-}12$		

There are additional questions in section B eliciting respondents' evaluations of the injuries and accelerated recovery program that are less suitable for use in discriminating respondents' perceptions of the base and scope injuries. For example, question B-1 asked: "First, did it seem to you DDT and PCB could cause the reproduction problems I told you about?" Both the base and scope surveys described reproduction problems for specific species. The key distinction between the descriptions is the number of species affected and the timing of natural recovery. There seems no clear reason to expect these distinctions to change the way people would answer this question; our findings suggest they do not (p=0.308). Turning now to B-4, there is also no significant difference (p=0.263) on this question which asked, "When you decided how to vote, did it seem to you that the speed-up program would be completely

effective in solving the reproduction problems within five years?"[265] There is no significant difference (p=0.721) on B-6, which asked respondents: "When you decided how to vote, did you think your household would have to pay the special tax for the program for one year or for more than one year?"

The opportunities offered respondents to change their vote from a vote *for* to a vote *against* the program (see questions W-7 and C-17 to C-21 in Appendices A.1 and A.2) also afford a chance to review this issue. Here we might expect a larger fraction of respondents changing their vote in the scope version if some respondents initially perceived the scope injuries to be larger than described. Table 10.4 displays the two-by-two contingency table for those who initially voted *for* (either in W-1 or W-3) by whether they later changed their vote (in either W-7 or C-17 to C-21). These results indicate that a higher fraction of scope respondents changed their vote and that this difference is significant at any conventional confidence level.

Table 10.4 Version by Whether Respondent Changed Vote Upon Reconsideration

Version	Not Change	Change
Base (row percent)	804 (88.5%)	104 (11.5%)
Scope (row percent)	245 (81.7%)	55 (18.3%)
$\chi^2_{(1)} = 9.34$; $p = 0.002$ Fisher Exact Test: $p = 0.003$		

§ 10.4 Tests of the Scope Hypothesis

There are a number of different statistical tests that can be conducted to evaluate the null hypothesis, H_0: $WTP_B = WTP_S$, versus the alternative, H_1: $WTP_B > WTP_S$. The most direct

[265] In the contingency table for B-5, the follow-up question to B-4, there is a significant difference but the response pattern suggests only a weak directional effect of version.

test considers a two-by-two contingency table of the version of the survey by **W1CH**.[266] As shown in the contingency table (see Table 10.5), overall 36.6% of those who were administered the base instrument voted *for* the accelerated recovery program, while 21.0% of those administered the scope version voted *for* the program. The $\chi^2_{(1)}$ test statistic, 71.10, rejects the null hypothesis ($p < 0.001$) that $WTP_B = WTP_S$.

The uniformly most powerful test of the hypothesis in a two-by-two contingency table is the Fisher's exact test. This test takes account of the direction of the inequality in the alternative hypothesis (that $WTP_B > WTP_S$) and has a p-value of less than 0.001.[267] Thus, both the χ^2 and Fisher's exact tests indicate that respondents who were administered the base instrument were significantly more likely to vote *for* the program at the W-1 tax amount compared with those who were administered the scope instrument.

Table 10.5 Version by W1CH Aggregating Over Tax Amount Versions

Version	Not For	For
Base (row percent)	1178 (63.4%)	679 (36.6%)
Scope (row percent)	753 (79.0%)	200 (21.0%)
$\chi^2_{(1)} = 71.10$; $p < 0.001$ Fisher's Exact Test: $p = 5.81E\text{-}18$		

In Table 10.5, the **W1CH** responses are aggregated over the five tax amount versions.

[266] The χ^2 test for a two-by-two contingency table looks at the expected frequency in each of the four cells under the null hypothesis of no association relative to the observed frequency. This test gives the probability that the observed frequency differs from that expected under the null hypothesis. The χ^2 test in this case is a test of the null hypothesis that $WTP_B = WTP_S$ versus the alternative hypothesis that $WTP_B \neq WTP_S$ and is valid in reasonably large samples. See Lehmann (1986) for further discussion of the properties of this test.

[267] The one-sided Fisher's exact test is more powerful because it takes into account the direction of the alternative hypothesis and it is valid for both small and large samples. See Lehmann (1986) for further discussion of the properties of this test.

To more closely examine how the distribution of implied WTP estimates is likely to differ between the base and scope samples, each of the tax amount versions can be examined separately using the same two-by-two contingency table. This approach has the advantage of eliminating minor deviations due to sampling variation in the percent of respondents who were administered the base and scope versions at each tax amount. It is also a much more demanding set of tests than the one presented in Table 10.5 as it requires that the percent who voted *for* at each of the five tax amounts (W1AMT) to be larger in the base sample and, equally important, performs the test of sensitivity to scope with smaller sample sizes.

These results are displayed for each tax amount version in Tables 10.6a to 10.6e. For all five tax amounts, both the $\chi^2_{(1)}$ tests and the one-sided Fisher's exact tests clearly reject the null hypothesis at very small confidence levels. These conclusions are unchanged using either the original W-1 response (**W1**) or by a conservative treatment of respondents who do not pay California income taxes (**W1CHNT**).

Table 10.6a Version by Choice Measure (W1CH) for W1AMT=$10

Version	Not For	For
Base (row percent)	165 (44.1%)	209 (55.9%)
Scope (row percent)	130 (64.4%)	72 (35.6%)
$\chi^2_{(1)} = 21.50$; $p < 0.001$ Fisher's Exact Test: $p = 2.41E\text{-}06$		

Table 10.6b Version by Choice Measure (W1CH) for W1AMT=$25

Version	Not For	For
Base (row percent)	189 (53.7%)	163 (46.3%)
Scope (row percent)	137 (75.3%)	45 (24.7%)
$\chi^2_{(1)} = 23.50$; $p < 0.001$ Fisher's Exact Test: $p = 6.71E-07$		

Table 10.6c Version by Choice Measure (W1CH) for W1AMT=$80

Version	Not For	For
Base (row percent)	245 (67.1%)	120 (32.9%)
Scope (row percent)	161 (82.1%)	35 (17.9%)
$\chi^2_{(1)} = 14.39$; $p < 0.001$ Fisher's Exact Test: $p = 8.07E-05$		

Table 10.6d Version by Choice Measure (W1CH) for W1AMT=$140

Version	Not For	For
Base (row percent)	283 (73.5%)	102 (26.18%)
Scope (row percent)	166 (85.1%)	29 (14.9%)
$\chi^2_{(1)} = 10.00$; $p < 0.002$ Fisher's Exact Test: $p = 8.84E-04$		

Table 10.6e Version by Choice Measure (W1CH) for W1AMT=$215

Version	Not For	For
Base (row percent)	296 (77.7%)	85 (22.3%)
Scope (row percent)	159 (89.3%)	19 (10.7%)
$\chi^2_{(1)} = 10.85$; $p < 0.001$ Fisher's Exact Test: $p = 5.04E-04$		

Using the data from Tables 10.6a-10.6e, one can also compare the ratio of the percent who voted *for* at each W1AMT in the base sample to the percent who voted *for* in the scope sample. For the $10 tax amount, that ratio is 1.58 and generally increases over the tax amounts. The ratio is 2.08 at the highest tax amount, $215, which indicates that respondents who were administered this base version were over two times more likely to vote *for* the program relative to those who were administered the scope version.

The second class of tests that can be used to evaluate the differences in respondents' choices in the base and scope samples is one which uses these choices to estimate the Turnbull lower-bound mean for each sample and tests for differences in these estimates. This analysis is based on the first choice question and treats those changing their vote (either at W-7 or C-17 to C-21) as voting *against* the program.

The Turnbull estimator for the base-**W1CH** responses are presented in Table 10.7a and the estimator for the scope-**W1CH** responses in Table 10.7b. After computing the lower-bound estimate of the mean from each table—$63.24 for base and $34.02 for scope—we can then use the estimated standard errors for each (also displayed in Tables 10.7a and 10.7b) to construct an ordinary one-sided z-statistic. The resulting z-statistic of 7.17 rejects the null hypothesis ($p < 0.001$) in favor of the alternative that $WTP_B > WTP_S$. The likelihood ratio test

($\chi^2_{(5)}=83.46$), based on combining the base and scope samples, also rejects the null hypothesis ($p < 0.001$) of equivalent distributions.

Changing the responses of those who do not pay California taxes to votes *against* does not alter this conclusion. The lower-bound estimates of the means are $55.58 and $29.52 for the base and scope samples, respectively. The resulting z-statistic of 6.70 rejects the null hypothesis ($p < 0.001$) as does the likelihood ratio test. Using the double-bounded choice measures, we would again draw this same conclusion (see Tables F.12—F.14 in Appendix F).

Both the contingency table tests and the test based on the Turnbull estimator are tests based upon non-parametric estimates of the WTP distributions. It is also possible to fit parametric survival distributions to the WTP responses and test whether there is a difference between responses to the base and scope instruments. Estimates of parametric survival models with the Weibull and log-normal distributions using the single-bounded choice measures, **W1**, **W1CH**, or **W1CHNT** (see Table F.15 in Appendix F), or the double-bounded choice measures, **WDB**, **WDBCH**, or **WDBCHNT** (see Table F.16 in Appendix F), with the base and scope samples confirm the basic conclusions found with the Turnbull estimates.

Table 10.7a Turnbull Estimation Results for W1CH-*Base* Sample [N=1857]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Change in Density
$0	$10	0.559	0.441
$10	$25	0.463	0.096
$25	$80	0.329	0.134
$80	$140	0.265	0.064
$140	$215	0.223	0.042
$215	∞	0.000	0.223

Log-Likelihood . . . . . -1155.65
Lower bound of estimate of mean $63.24
Standard error of estimate 2.54

Table 10.7b Turnbull Estimation Results for W1CH-*Scope* Sample [N=953]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Change in Density
$0	$10	0.356	0.644
$10	$25	0.247	0.109
$25	$80	0.178	0.069
$80	$140	0.148	0.030
$140	$215	0.106	0.042
$215	∞	0.000	0.106

Log-Likelihood . . . . . -467.78
Lower bound of estimate of mean $34.02
Standard error of estimate 2.82

§ 10.5 Summary

The selected dwelling units for the main study were randomly assigned to one of two survey instruments—base or scope—which differed only in the descriptions of the extent of the injuries. Our analysis of the base and scope responses first considered whether questions reflecting information that should not have been influenced by the difference in the set of injuries appear to have been influenced. These findings clearly indicate they were not. Next, considering whether independent respondents recognized differences in the injuries, question B-8, asking about the seriousness of the injury, indicated that independent respondents did interpret the two injuries as reflecting different levels of seriousness.

Using a simple contingency table framework, direct tests of whether there were different responses to the choice questions in the base and scope samples leads to rejections of the null hypothesis of no difference ($WTP_B = WTP_S$) in favor of the alternative hypothesis ($WTP_B > WTP_S$). This is true for the **W1**, **W1CH**, and **W1CHNT** choice measures, aggregated across the five tax amounts and for each tax amount. That is, a higher percent of those who were administered the base instrument were willing to pay the tax amount described than those who were administered the scope instrument. This hypothesis was also tested for the three choice measures (and their double-bounded analogues) using the Turnbull lower-bound estimate for mean WTP. All of these tests reject the hypothesis of insensitivity to scope at any standard confidence level. Parametric estimates based on all three choice measures (and their double-bounded analogues) also reject the null hypothesis of scope insensitivity at any standard confidence level.

§ 11 Aggregate Estimate of Prospective Interim Lost Use Value

§ 11.1 Introduction

In this final chapter, the aggregate estimate of prospective interim lost use value (ILUV) is presented. Section 11.2 summarizes the economic and practical issues associated with defining the population to which we extrapolate our lower-bound estimate of mean willingness to pay (WTP) reported in Chapter 9. The *population* having "rights" to the injured resources in the Southern California Bight is defined using the negotiation framework introduced in Chapter 3. This theoretical definition of the population is evaluated in light of practical considerations. In Section 11.3, the weighted Turnbull estimate of the lower-bound mean is presented. Finally, Section 11.4 presents our aggregate estimate of prospective ILUV.

§ 11.2 Delineation of the *Population* for Aggregation

Chapter 3 described the theoretical definition of an individual's economic value for any object of choice. These measures of value were described as being derived from individuals' choices. It was further noted that the appropriate choice for the estimation of ILUV is one that permits the construction of *total* economic value, and an *ideal* choice would be one in which each member of the public (acting through agencies that serve as trustees) would agree to "permit" a pattern of injuries and natural recovery with restoration to a specified set of natural resources. An ideal choice defines the trade-off desired by isolating what must be given to each person (monetary compensation) for him or her to freely forego the object of choice (in this case, the resources in their baseline states).

This definition of the ideal choice for the estimation of ILUV is analogous to what would be sought if the trustees for the natural resources and those responsible for the injuries could

negotiate a payment in advance to assure that people's losses would be compensated. In undertaking a negotiation for these losses, the trustees for the resources would require estimates of total values for all individuals assumed to comprise the *public* or *relevant population* considered to have "rights" to the injured resources. Because the legal framework for recovery of ILUV does not specifically identify the relevant population, our definition is based on economic criteria as well as on the practical issues associated with the design of appropriate choices from which values can be constructed.

A definition of the relevant population specifies the set of individuals with "rights" to the injured resources and therefore could, in principle, correspond to all individuals experiencing losses due to the natural resource injuries. The compensation criteria underlying the ideal construction of ILUV would require that these individuals be in a position to have the opportunity to accept the losses (due to the injuries) in exchange for compensation specified by the trustee's negotiation. As noted in Chapters 3 and 4, this process leads to a WTA measure of economic value; however, the choice elements corresponding to a description of the object and circumstances of choice necessary for framing a WTA choice were not considered feasible. As a result, a WTP perspective on the rights to the natural resources and, consequently, a program for accelerated recovery of the injured natural resources was adopted.[268]

These two survey design decisions have implications for the definition of the *relevant population* assumed to be represented in the negotiation framework by the trustees. A WTP choice requires that the individuals in the population accept financial responsibility for their choices (*i.e.*, in this case, a one-time increase in California income taxes). This requirement implies that the population must be confined to adult decision-makers, *i.e.*, individuals with the

[268] The decision to adopt a WTP assignment of rights is conservative due to the wealth limitations discussed in Chapter 3.

ability to make such financial commitments. In principle, anyone who would experience losses under the circumstances of choice envisioned by the negotiation framework could be included in this population.

Furthermore, given the above qualification, any household in the United States could conceivably experience losses and accept financial responsibility for the program. Nonetheless, given the geographic distribution of injuries and the availability of substitutes elsewhere in the country for some of the affected resources, an individual living a substantial distance from the location of the injuries (*e.g.*, those living a substantial distance outside of California) might be expected to be willing to pay less for the program.[269] However, on the basis of distance alone, one can not define a point of geography beyond which households would not be willing to pay *anything* for the accelerated recovery program. To identify those who would and would not be willing to pay for the program is an empirical issue.

The estimation of ILUV requires that respondents be offered a credible choice. Following the NOAA Panel recommendations and our own past experience, the choice presented in our study was framed in a discrete take-it-or-leave-it referendum with the tax amount described as a one-time, state tax payment. The relevant population was confined to California households. As noted above, it is reasonable to assume that households outside of California could have a positive willingness to pay for the accelerated recovery program offered in this study. However, expanding our population definition to areas outside of California, for example Arizona, Oregon, and Washington, would require a very different characterization of the choice. For example, while it is credible to respondents residing in California to tax themselves to mitigate injuries to what they may perceive as state resources, it is unclear whether residents of

[269] Nothing in economic theory *requires* this presumption to be true.

Washington would find it credible to be taxed to "fix" what might be perceived by some as California problems.

While it is possible to design a choice that would be credible to residents outside of California, such design work would take a great deal of time and effort. The time constraints imposed by the damage assessment suggested that the prudent strategy would be to limit the relevant population to California households. To the extent people elsewhere in the U.S. experience losses and would be willing to pay for the program, this decision understates the aggregate estimate for prospective ILUV.

Within the population of California households it was necessary to further limit the population to which the survey was design to be extrapolated. First, as described in Chapter 5, similar time constraints led us to conduct interviews only in English, thereby excluding an estimated 697 thousand non-English speaking households from the inference population. Additionally, as described in Chapter 7, given the close proximity of 35 selected dwelling units to a neighborhood where the excavation of DDT was causing intense concern about human health, we excluded the 63 thousand households in the surrounding Torrance area (defined by five zipcodes). Thus, our results may be extrapolated to the population of English-speaking households in California outside of this Torrance area. To the degree that non-English speaking households in California or those in the Torrance area would be willing to pay for the program, we will underestimate prospective ILUV.

Finally, it should be noted that we make a very conservative adjustment with respect to California households that do not pay state income taxes. The use of a one-time increase in California income taxes as one of the choice elements implies that individuals who are not eligible to pay California income taxes may respond differently to the choice question than those

who do pay taxes. This was borne out by the multivariate analysis reported in Table 9.7 which showed that households not paying California income taxes last year were more likely to support the program, holding all other aspects of their characteristics and the tax amount (W1AMT) constant. Given the likelihood that some of these respondents assumed that they would not have to accept financial responsibility for their choices, these respondents' *for* votes have been treated as *not for* votes for the purposes of developing the lower-bound estimate of aggregate WTP. This effectively treats this group of respondents as having a lower-bound mean willingness-to-pay of zero. It is likely that this group of respondents has a positive, not a zero, aggregate (for this group) prospective ILUV for the program. The decisions involving these groups were intended to avoid any possible upward bias in the lower-bound estimate of mean WTP as a summary statistic for the population to which we extrapolate.

§ 11.3 Population Estimate of the Turnbull Lower-Bound Mean WTP

As described in Section 7.10, samples will vary somewhat from the populations from which they are drawn. As a result, it is standard survey practice to apply sample weights in order to estimate *population* values. In this section, we present the population estimate of the lower-bound mean using the weights developed by Westat (see Appendix C.5.5 for details of how the weights were constructed).

Table 11.11 provides the weighted estimate of the Turnbull likelihood function[270] for **W1CHNT**. The population lower-bound mean estimate of $55.61 is only $0.03 higher than that

[270] See Appendix E.

displayed for the **W1CHNT** sample estimate in Table 9.9.[271] The standard error of $2.66 in Table 11.1 was computed taking into account the particular sample design used in our study.[272]

Table 11.1 Weighted Turnbull Estimate of WTP Distribution and Lower-Bound Mean: Using W1CHNT Choice Measure [N=1857]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Change in Density
$0	$10	0.489	0.511
$10	$25	0.399	0.090
$25	$80	0.289	0.110
$80	$140	0.237	0.052
$140	$215	0.194	0.043
$215	∞	0.000	0.194

Log-Likelihood . . . . . -1113.39
Estimate of lower-bound mean $55.61
Jackknifed Standard error of the estimate $2.66

The fact that the weights produce little difference is likely due to several considerations: (1) the divergence between the sample and the population on the demographic and locational characteristics on which the weights were based was generally small, (2) placing all of the density in the Turnbull estimator at the lower bound of each interval makes the lower-bound

[271] Tables F.17, F.18, and F.19 contain the population lower-bound mean estimates respectively for the **W1CH**, **WDBCH**, and **WDBCHNT** choice measures. These estimates are also quite close to their counterparts reported earlier in Chapter 9 and Appendix F.

[272] As noted in Chapter 7, our sample design involved both clustering (at the final stage of selection) and the construction of sample weights. Relative to a simple random sample, both clustering and weighting decrease efficiency in the sense of needing more observations for the same level of precision. In order to estimate the standard error of the lower-bound mean estimate in Table 11.1, we used a resampling technique known as the jackknife, which takes account of these complexities in the sampling design (Wolter, 1985). Effectively this approach simulates what would happen if one drew repeated samples from the population using the same complex sampling design. The creation of these jackknife replicate weights is described in Appendix C.5.5. The jackknifed standard error is 9.7% larger than the standard error derived under the assumption of simple random sampling.

estimate of the mean fairly robust to the small changes the weights represent to the composition of the sample, and (3) setting all non-taxpayers to *not for* votes further decreases the sensitivity of the estimate to weighting the Turnbull likelihood function.

§ 11.4 Aggregate Estimate of Prospective ILUV

The aggregate estimate of prospective ILUV is obtained in a straightforward manner by multiplying the W1CHNT, lower-bound Turnbull estimate of the mean for the population, $55.61, by the estimate of the number of households in the population (10,347,108) to which the survey was designed to extrapolate. This extrapolation yields a point estimate of $575,402,676 with a standard error of $27,523,307.

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PROSPECTIVE INTERIM LOST USE VALUE DUE TO DDT AND PCB CONTAMINATION IN THE SOUTHERN CALIFORNIA BIGHT

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(Appendices)

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PROSPECTIVE INTERIM LOST USE VALUE DUE TO DDT AND PCB CONTAMINATION IN THE SOUTHERN CALIFORNIA BIGHT

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Appendix A
Main Study Survey Instruments

A.1 Base Survey Instrument, Map and Card Set
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A.3 "Q & A's Not In Questionnaire" Cards for Base and Scope

Appendix A.1
Base Survey Instrument, Map and Card Set

Questionnaire Versions

There are five versions of both the base and scope questionnaires which differ only in the tax amounts used for the choice questions [W-1, W-2, and W-3]. The tax amounts used in each version are listed in the table below. These tax amounts were also used in W-7 and Section C of the survey. Questions W-7, C-17, C-18, and C-20 are asked of those respondents who voted *for* the program at either W-1 or W-3; the highest tax amount to which the respondent voted *for* was used in these questions. Version 3 of the base and scope questionnaires appears in the following two appendices, A.1 and A.2, respectively.

TAX AMOUNTS BY VERSION AND CHOICE QUESTION

Version	W-1	W-2	W-3
1	$10	$25	$5
2	$25	$45	$10
3	$80	$140	$45
4	$140	$215	$80
5	$215	$360	$140

CALIFORNIA ISSUES STUDY

MAIN INTERVIEW

INTERVIEWER: Do not enter any identifying information about respondent (e.g., respondent's name, address) in this questionnaire.

START INTERVIEW TIME: ☐☐:☐☐ A.M. P.M.

SECTION A

A-1. Let's start by talking for a moment about some issues in California. Some may not be important to you, others may be. First, (READ X'd ITEM) . . ., is this issue

SHOW CARD A

not important at all to you personally, not too important, somewhat important, very important, or extremely important? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; RE-READ STEM AS NECESSARY.)

	NOT IMPORTANT AT ALL	NOT TOO IMPORTANT	SOMEWHAT IMPORTANT	VERY IMPORTANT	EXTREMELY IMPORTANT	NOT SURE
( ) a. Improving education in elementary and secondary schools	1	2	3	4	5	8
( ) b. Reducing air pollution in the cities	1	2	3	4	5	8
( ) c. Maintaining local library services	1	2	3	4	5	8
( ) d. Reducing crime	1	2	3	4	5	8
( ) e. Protecting coastal areas from oil spills	1	2	3	4	5	8
( ) f. Finding ways to reduce state taxes	1	2	3	4	5	8

A-2. The State of California spends money on many programs for many different purposes. I'm going to read a list of some of these programs. For each one, I'd like you to tell me whether you think the money the State is spending on these programs should be

SHOW CARD B

reduced a great deal, reduced somewhat, stay the same, increased somewhat or increased a great deal. First, (ITEM)? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; REPEAT ANSWER CATEGORIES, AS NECESSARY.)

		REDUCED GREAT DEAL	REDUCED SOMEWHAT	STAY THE SAME	INCREASED SOMEWHAT	INCREASED GREAT DEAL	NOT SURE
( )	a. Building new state prisons	1	2	3	4	5	8
( )	b. Providing public transportation for Los Angeles	1	2	3	4	5	8
( )	c. Providing pay raises for professors at state colleges and universities	1	2	3	4	5	8
( )	d. Providing shelter for the homeless in big cities	1	2	3	4	5	8
( )	e. Protecting endangered wildlife species	1	2	3	4	5	8
( )	f. Providing lifeguards at state beaches	1	2	3	4	5	8

These are just a few of the things the State of California spends tax money on.

Proposals are sometimes made to the State for new programs. The State does not want to undertake new programs unless taxpayers are willing to pay for them. One way for the State to find out about this is to give people like you information about a program so that you can make up your own mind about it.

In interviews of this kind, some people think the program they are asked about is not needed; STOP others think it is. We want to get the opinions of both kinds of people.

A-3. Have you ever been interviewed like this before to get your opinion about whether the State should or should not spend tax money for a particular purpose?

YES 1
NO 2
NOT SURE 8

In the past, people have been asked about various types of programs. In this interview, the particular program I am going to ask you about involves two types of ocean fish and two types of birds.

These fish and birds are producing fewer young than normal in one particular area. First, I will tell you about what is happening to them. Then, I will tell you about the cause. Then, I'll ask you whether or not you think anything should be done about this. I will also ask you to tell me why you feel the way you do.

SHOW MAP 1

Here is a map of California.

The situation I am going to tell you about is located along this one part of the California coast, the South Coast ▲.

This area includes the ocean here ▲, the shore here (▲ TRACE SHORELINE) and also these islands ▲, the Channel Islands.

STOP UNTIL R IS FINISHED LOOKING AT MAP 1

SHOW MAP 2

This map shows the South Coast in more detail.

BOX 1

IF INTERVIEWING IN LOS ANGELES OR ORANGE COUNTY,

CHECK HERE ☐ AND SKIP TO A-5.

IF NOT INTERVIEWING IN LOS ANGELES OR ORANGE COUNTY,

CHECK HERE ☐ AND CONTINUE.

A-4. Have you ever lived in Los Angeles County or Orange County?

YES 1
NO 2
} **(SKIP TO A-6)**

A-5. How many years have you lived in this county?

☐☐ YEARS

A-6. Many species of fish and birds live off the South Coast. Four of these species are having problems producing young.

I'll describe these reproduction problems beginning with the fish.

Two species of fish are having problems producing young in one place off the South Coast. These are White Croaker and Kelp Bass.

This card shows what these fish look like.

SHOW CARD C STOP UNTIL R IS FINISHED LOOKING AT CARD

The Kelp Bass is sometimes called Calico Bass.

Unlike some species of fish, these two do not travel up and down the coast but generally stay in one place where they live and breed.

SHOW MAP 2 AGAIN

Please look at the place marked in red on the map.

It is near Los Angeles harbor between Santa Monica Bay and San Pedro Bay.

This is the place where scientists have found that the White Croaker and Kelp Bass produce fewer young than elsewhere. However, as millions of these two fish live in other places along the California coast, neither species is in any danger of becoming extinct.

Two of the many species of birds living along the South Coast also have reproduction problems.

SHOW CARD D

They are Bald Eagles and Peregrine Falcons.

These eagles and falcons along the South Coast tend to stay there all year long.

Back in the 1940s, about 24 pairs of Bald Eagles and 20 pairs of Peregrine Falcons were successfully hatching their eggs in the South Coast. STOP

By the 1950s, the eagles and falcons in this area were having trouble producing young, mostly because their egg shells were too thin and the chicks did not hatch.

> As a result, the local populations of Bald Eagles and Peregrine Falcons disappeared from the South Coast.

BOX 2

IF R ASKS "**WHY HAS THIS HAPPENED?**" OR "**IS SOME SPECIFIC CAUSE RESPONSIBLE?**", CHECK HERE ☐ AND SAY:

I will come to that shortly.

About ten years ago, scientists began bringing adult falcons and eagles from outside the South Coast and releasing them on some of the Channel Islands.

> The scientists hoped these birds would be able to reproduce naturally and re-establish themselves in the area. Thus far, however, these birds have usually not been able to hatch any of their eggs. STOP

SHOW MAP 2 AGAIN

Unlike the White Croaker and the Kelp Bass, which only have problems in this place (TO PLACE MARKED IN RED ON MAP 2), these birds are having reproduction problems everywhere they live along the South Coast (TRACE SHORELINE), including the Channel Islands . STOP

A-7. Is there anything I have told you about these four fish and bird species that you would like me to repeat?

YES 1

NO . . . . . 2 **(SKIP TO A-8)**

A-7A. What is that?

_____

_____

_____

A-8. SHOW CARD E STOP

As you can see on this card, the two species of fish are not in danger of becoming extinct and are therefore not listed as endangered.

However, the eagles and falcons I told you about are listed as endangered by the State of California. At present, these birds are also listed as endangered in most of the other states where they live.

SHOW CARD F

This card compares how these birds are doing in the rest of California and the rest of the United States

with how they are doing along the South Coast .

STOP UNTIL R IS FINISHED LOOKING AT CARD F.

As you can see, in the rest of California and in the rest of the United States, these birds are increasing in number.

For example, at present, most of the 100 or so pairs of Bald Eagles that live in other parts of California are successfully hatching young.

Because the eagles and falcons are increasing in these areas , consideration is being given to reclassifying them from endangered to threatened in some parts of the country, including California.

Along the South Coast, however, the eagles and falcons are not increasing . This is because no eagles have hatched young on their own and only rarely have some Peregrine Falcons been able to do so. STOP

Many scientists have studied why these four species of fish and birds are having reproduction problems along the South Coast but not elsewhere along the California coast. STOP

Some of these scientists work for the Federal Government, others work for the State, and others are independent researchers at California universities.

They agree that these reproduction problems are caused by a deposit of two chemicals that are trapped in the sediment on the bottom of the ocean. STOP

These chemicals are DDT and PCBs.

A-9. Before today, had you heard anything at all about DDT?

YES 1
NO 2
NOT SURE 8

A-10. How about PCBs? Had you heard anything about them before today?

YES 1
NO 2
NOT SURE 8

(As you may know,) DDT is a pesticide that was developed during World War II. It was found to be a cheap and effective way to kill insects like mosquitos.

PCBs are chemicals that were developed around the same time and were used in electrical transformers and for other industrial purposes.

SHOW MAP 3

This big circle (TO BIG CIRCLE) is a blow-up of this small circle (TO SMALL CIRCLE.) The place marked in grey (TO GREY AREA IN BIG CIRCLE) shows the location of the deposit of DDT and PCBs on the ocean floor that causes the problems I have described. This deposit (TO GREY AREA) is about five miles long and two miles wide. STOP

The biggest source of these chemicals was a factory, located here , which was at one time the world's largest producer of DDT.

Over a period of thirty years, beginning in the late 1940s, this factory sent tons of waste DDT into the Los Angeles County sewer system where it went to this sewage treatment plant

> and was released with other treated wastes into the ocean through these underwater sewer pipes.

A smaller amount of waste PCBs from other sources also went out the sewer pipes in the same way. STOP

Back in the 1940s, 50s, and into the 1960s, there was little recognition that DDT and PCBs could affect fish and wildlife.

When this became clear in the 1970s, sending these two chemicals into the ocean through the sewers was stopped. The federal government also severely restricted the use of both DDT and PCBs. As a result, the DDT factory in Los Angeles went bankrupt STOP and was torn down. STOP

SHOW MAP 3 AGAIN

Even though no new DDT or PCBs have been put into the sewers for about 15 years, the old DDT and PCBs located in the grey area (⬆ TO GREY AREA) have continued to affect the four species of fish and birds.

Here's how this happens. Because these two chemicals do not dissolve in water, they gradually fell to the ocean bottom. Once they reached the bottom, they remained there trapped as part of the sediment.

BOX 3

IF R ASKS "**WHERE DOES THE SEDIMENT COME FROM?**", CHECK HERE ☐ AND SAY:

It comes from soil that is washed or blown off the land.

This sediment — made up of things like sand and dirt — is very stable. It lies more than a mile offshore under water more than 100 feet deep where there are no strong ocean currents. Therefore, the contaminated sediment has remained in this location ⬆, for over 15 years, where it is slowly being covered by new, uncontaminated sediment.

A-11. Before today, had you heard anything about the DDT and PCBs that are located in this particular place? (⬆ TO GREY AREA)

YES 1

NO . . . . . 2 } **(SKIP TO A-12)**
NOT SURE 8

A-11A. What have you heard?

_____

_____

_____

A-12. The federal, state, and university scientists I mentioned earlier have conducted studies of the effect of this deposit . They know that DDT and PCBs can build up in the bodies of some fish and birds when the food they eat has these chemicals in it.

According to the scientists, the only animals that are affected by this deposit are the four species I told you about. This is because they all feed in this particular place.

SHOW CARD G

This drawing shows how this happens.

STOP UNTIL R HAS HAD A CHANCE TO LOOK AT CARD G

These are small animals that live in the sediment on the ocean bottom. When they get food from contaminated sediment, they absorb DDT and PCBs into their bodies.

When they are eaten by other larger animals, like this fish which is feeding on the bottom ,

the DDT and PCBs can be absorbed into the body fat of the larger animals.

(As you know,) This also happens when larger fish eat the smaller fish ,

when birds like this eat contaminated fish,

or when birds like this eat other birds that have eaten contaminated fish.

REMOVE CARD G

Although the amount of DDT and PCBs in the bodies of the four species is high enough to affect their ability to reproduce, the amount is not enough to affect the adult fish or birds in any other way.

Some people are concerned that eating White Croaker or Kelp Bass contaminated by these chemicals might harm humans. This is an important question, so the scientists have studied it carefully.

SHOW MAP 3 AGAIN

They have found that the amount of DDT and PCBs in these two types of fish is so small that people would have to eat fish from this one area (TO AREA MARKED IN RED) on a regular basis to be harmed.

Fortunately, commercial fishing companies do not catch Kelp Bass, and the State has banned all commercial fishing for White Croaker in that area. Thus, the affected fish are not sold in markets or restaurants.

The State has also issued notices to local fishermen warning them about eating White Croaker and Kelp Bass caught there, and this warning is posted on signs. Therefore, it is extremely unlikely that these fish could cause any harm to humans. STOP

Fifteen years ago, the deposit of DDT and PCBs was also causing reproduction problems in several other species that sometimes feed in the area. However, these other species gradually recovered and now reproduce normally.

Their recovery over the past 15 years was the result of a natural process. This process gradually covers the contaminated sediment on the ocean bottom with new sediment that is uncontaminated by DDT and PCBs. The deeper the contaminated sediment is buried, the more these chemicals are removed from the food these species eat.

SHOW MAP 4

This drawing shows how this natural process works. These little dots ⬆ are things like sand and dirt that fall through the water and settle on the bottom. The orange layer is the sediment contaminated with the DDT and PCBs ⬆.

STOP UNTIL R IS FINISHED LOOKING AT MAP 4

Once the flow of DDT and PCBs into the sewers was stopped in the 1970s ⬆, a layer of new, uncontaminated sediment began to cover the contaminated layer. By 1994 ⬆, it had buried the contaminated layer about one foot deep ⬆. This is deep enough so that there are no DDT and PCBs left in the water.

Although these chemicals now no longer affect other species, they continue to affect the four species I told you about. These species are more exposed to these chemicals than the other wildlife because of their feeding habits. Once the chemicals are buried deeper under clean sediment, these four species will also recover.

Until recently, there was no way to speed up this natural process. However, a procedure has now been developed to cover chemical deposits like this.

A proposal has been made to use this procedure here, to speed up the recovery of the four fish and bird species I told you about. The State wants to find out how people feel about this. STOP

SHOW MAP 5

This picture shows how a speed-up program would work.

This is the existing layer of sediment that covers the contaminated layer one foot deep. A boat like this would drop three more feet of new, clean sediment down to the ocean floor without disturbing the sediment already there. This would cover the contaminated sediment under a total of four feet of clean sediment.

Once they are covered by four feet of clean sediment, the DDT and PCBs would be removed from the food these species eat. This is because none of the animals they eat live this far beneath the ocean floor.

The State would pay the cost to drop the three feet of clean sediment on the contaminated location. This program would be carried out by the Army Corps of Engineers which has successfully done this elsewhere. It would take one year to complete. Once this is done, it will take four more years for the animals I told you about to reproduce normally. So, within five years, these fish and birds would be reproducing normally.

BOX 4A

IF R MENTIONS REMOVING THE SEDIMENT FROM THE OCEAN FLOOR AS A BETTER (OR POSSIBLY BETTER) PROCEDURE, CHECK HERE ☐ AND SAY:

> Removing the sediment from the ocean floor has been considered, but rejected, because it would stir up the contaminated sediment and spread some of it back into the environment.

IF R ASKS WHERE THE SEDIMENT WOULD COME FROM, CHECK HERE ☐ AND SAY:

> It will come from places such as the State's reservoirs which are filling up with clean sediment.

A-13. Do you have any questions about how this would work?

YES 1

NO . . . . . 2 **(SKIP TO A-14)**

A-13A. What are they?

_____

_____

_____

BOX 4B

IF R MENTIONS REMOVING THE SEDIMENT FROM THE OCEAN FLOOR AS A BETTER (OR POSSIBLY BETTER) PROCEDURE, CHECK HERE ☐ AND SAY:

> Removing the sediment from the ocean floor was considered, but rejected, because it would stir up the contaminated sediment and spread some of it back into the environment.

IF R ASKS WHERE THE SEDIMENT WOULD COME FROM, CHECK HERE ☐ AND SAY:

> It will come from places such as the State's reservoirs which are filling up with clean sediment.

A-14. If the State does not implement this program, nature will do the same thing, but it will take longer, 50 years instead of 5.

This drawing shows how this will happen.

SHOW MAP 6

This is 1994 ⬆. Over the coming years, as the new, uncontaminated sediment continues to fall, the contaminated layer will get buried deeper and deeper. ⬆

Fifty years from now, around the year 2044, the contaminated sediment will be buried under four feet of clean sediment ⬆.

As I mentioned, this far under the ocean floor, the DDT and PCBs would be removed from the food the four fish and bird species eat.

The two fish and two bird species I told you about will then have fully recovered from their reproduction problems.

Thus, instead of the 5 years it would take for these species to recover if the State implements the speed-up program, with natural processes it would take 50 years ⬆. That is, an additional 45 years.

A-15. Is there anything else you would like to know about either the speed-up program or the natural recovery process?

YES 1

NO . . . . . 2 **(SKIP TO A-16)**

A-15A. What else would you like to know?

_____

_____

_____

A-16. I mentioned earlier that the State has asked people about various types of new programs. We are now interviewing people to find out how they would vote if this program to speed up recovery were on the ballot in a California election.

Here's how it would be paid for. California taxpayers would pay a one time additional amount on their next year's state income tax to cover the cost. This is the only payment that would be required. It would go into a special fund that could only be used for the program to cover the contaminated sediment.

The program would only be carried out if people are willing to pay this one time additional tax. STOP

There are reasons why you might vote for the speed-up program and reasons why you might vote against.

The speed-up program would make it possible for each of the four species to reproduce normally in the South Coast 45 years earlier than if natural processes take their course.

On the other hand,

SHOW CARD H

this deposit does not harm humans and the four species will recover anyway in 50 years. STOP

Your household might prefer to spend the money to solve other social or environmental problems instead. STOP

Or, the program costs more money than your household wants to spend for this. STOP

REMOVE CARD H

At present, the program to speed up the covering of the contaminated sediment is estimated to cost your household a total of $80. Your household would pay this as a special one time tax added to next year's California income tax.

UNFOLD SKIP RECORD

W-1. If an election were being held today and the total cost to your household would be a one time additional tax of $80, would you vote for the program to speed up recovery or would you vote against it?

FOR . . . . . 1 **(CODE SKIP RECORD AND GO TO W-2)**

AGAINST 2
NOT SURE 8
(CODE SKIP RECORD AND SKIP TO W-3)

W-2. It is possible that the final engineering cost estimates for the program would be higher than this. If this turns out to be the case and your household would have to pay a one time additional tax of $140 instead of $80, would you vote for or against the program?

FOR	1
AGAINST	2
NOT SURE	8

CODE SKIP RECORD AND SKIP TO W-6

W-3. It is possible that the final engineering cost estimates for the program would be lower than this. If this turns out to be the case and your household would have to pay a one time additional tax of $45 instead of $80, would you vote for or against the program?

FOR . . . . . 1 **(CODE SKIP RECORD AND SKIP TO W-6)**

AGAINST . . . . . 2 **(CODE SKIP RECORD AND GO TO W-4)**

NOT SURE . . . . . 8 **(CODE SKIP RECORD AND SKIP TO W-5)**

W-4. Did you vote against the program because it isn't worth that much money to you, or because it would be somewhat difficult for your household to pay that much, or because of some other reason?

ISN'T WORTH THAT MUCH MONEY 1

SOMEWHAT DIFFICULT TO PAY 2

OTHER (**SPECIFY**) 3

_____

_____

_____

SKIP TO SECTION B
PAGE 25

W-5. Could you tell me why you aren't sure? (**BE SURE TO PROBE**)

_____

_____

_____

_____

_____

SKIP TO SECTION B
PAGE 25

W-6. People have different reasons for voting for the program. Can you tell me what covering the contaminated sediments would do that made you willing to pay for it? **(PROBE: "Can you be more specific about what you have in mind?" / "Anything else?" / "What would (covering the contamination/fixing the problem) do that made you willing to pay for the program?")**

_____

_____

_____

_____

_____

BOX 5

IF R ONLY MENTIONS **"IT WOULD COVER UP THE CONTAMINATION"** OR **"IT WOULD FIX THE PROBLEM,"** CHECK HERE ☐ AND SAY:

What would (covering up the contamination/fixing the problem) do that made you willing to pay for the program?

_____

_____

_____

BOX 6

REVIEW SKIP RECORD: Record in W-7 LARGEST amount R voted "FOR" and continue.

W-7. It is not unusual for some people to vote for the program because they are concerned that these DDT and PCBs may harm human health. Suppose human health is definitely not affected in this situation and the program would only speed up the recovery of these four species of fish and birds. Would you vote for or against the program if it cost your household $_____?

VOTE "FOR" 1

VOTE "AGAINST" 2

NOT SURE 8

CODE W-7 ON SKIP RECORD

SECTION B

I gave you a lot of information before you voted. Please think back to a few moments ago when you decided how to vote. We are interested in what you were thinking then.

B-1. First, did it seem to you that DDT and PCBs could cause the reproduction problems I told you about?

YES 1
NO 2
NOT SURE 8

B-2. When you decided how to vote, did it seem to you that natural processes would take about fifty years to return things to normal?

YES, ABOUT 50 YEARS . . . . . 1 **(SKIP TO B-4)**

NO 2
NOT SURE 8

B-3. Did it seem to you that it would take a lot more than 50 years or a lot less than 50?

A LOT MORE 1
A LOT LESS 2
OTHER (SPECIFY) 3

_____

_____

_____

_____

_____

NOT SURE 8

B-4. When you decided how to vote, did it seem to you that the speed-up program would be completely effective in solving the reproduction problems within five years?

YES . . . . . 1 **(SKIP TO B-6)**

NO 2
NOT SURE 8

SHOW CARD I

B-5. Did it seem that the program would be . . .

Mostly effective 1
Somewhat effective 2
Not too effective, or 3
Not effective at all? 4
NOT SURE 8

B-6. When you decided how to vote, did you think your household would have to pay the special tax for the program for one year or for more than one year?

ONE YEAR 1
MORE THAN ONE YEAR 2
NOT SURE 8

B-7. Thinking about everything I have told you during this interview, overall did it try to push you to vote one way or another, or did it let you make up your own mind about which way to vote?

PUSHED ONE WAY OR ANOTHER . . 1

LET ME MAKE UP OWN MIND . . . . 2 } **(SKIP TO B-8)**
NOT SURE 8

B-7A. Which way did you think it pushed you?

VOTE FOR THE PROGRAM 1
VOTE AGAINST THE PROGRAM 2
OTHER **(SPECIFY)** 3

_____

_____

_____

_____

NOT SURE 8

B-7B. What was it that made you think that? **(PROBE: "Can you be more specific about what you have in mind?" "Anything else?")**

_____

_____

_____

_____

SHOW CARD J

B-8. All things considered, would you say the fish and bird reproduction problems I told you about in the South Coast are . . .

Not serious at all	1
Not too serious	2
Somewhat serious	3
Very serious, or	4
Extremely serious?	5
NOT SURE	8

Now I would like to ask you a few questions about your household's recreational activities.

B-9. In the past five years has anyone in your household gone fishing?

YES 1

NO . . . . . 2 } (SKIP TO B-11)
NOT SURE 8

B-10. Is that saltwater fishing, freshwater fishing, or both?

SALTWATER 1
FRESHWATER 2
BOTH 3
NOT SURE 8

B-11. In the past five years has anyone in your household gone boating?

YES 1

NO . . . . . 2 } (SKIP TO B-13)
NOT SURE 8

B-12. Is that saltwater boating, freshwater boating, or both?

SALTWATER 1
FRESHWATER 2
BOTH 3
NOT SURE 8

B-13. Does anyone in your household like to identify different species of birds?

YES 1
NO 2
NOT SURE 8

SHOW CARD K

B-14. How often do you personally watch television programs about animals and birds in the wild . . .

Very often 1
Often 2
Sometimes 3
Rarely, or 4
Never? 5
NOT SURE 8

SHOW CARD K AGAIN

B-15. How often do people in your household go to the beach at the ocean . . .

Very often 1
Often 2
Sometimes 3
Rarely, or 4
Never? 5
NOT SURE 8

SHOW CARD K AGAIN

B-16. How often do people in your household eat fish . . .

Very often 1
Often 2
Sometimes 3
Rarely, or 4
Never? 5
NOT SURE 8

SHOW CARD L

B-17. On another subject, would you say you think of yourself as an . . .

Environmental activist, a 1
Strong environmentalist, a 2
Somewhat strong environmentalist, a 3
Not particularly strong environmentalist, or . . . 4
Not an environmentalist at all? 5
NOT SURE 8

SECTION C

Now, I have just a few questions about your background.

C-1. First, in total, how many years have you lived in California?

☐☐ YEARS

C-2. Have you ever been to Catalina or any of the other Channel Islands?

YES 1

NO . . . . . 2 } (SKIP TO C-4)
NOT SURE 8

C-3. Was your most recent visit within the past five years?

YES, PAST FIVE YEARS 1
NO, LONGER AGO 2
NOT SURE 8

C-4. Do you intend to move <u>outside</u> California in the next few years?

YES . . . . . 1 **(SKIP TO C-6)**

NO 2
NOT SURE 8

BOX 7

IF INTERVIEWING IN LOS ANGELES OR ORANGE COUNTIES,
CHECK HERE ☐ AND GO TO C-5.

IF NOT INTERVIEWING IN LOS ANGELES OR ORANGE COUNTIES,
CHECK HERE ☐ AND SKIP TO C-6.

C-5. Do you intend to move outside (L.A./Orange) County in the next few years?

YES 1
NO 2
NOT SURE 8

C-6. In what month and year were you born? ☐☐/☐☐
MONTH YEAR

C-7. What is the highest year of school you completed or the highest degree you received?

THROUGH 8th GRADE 01
9th, 10th, 11th, 12th GRADE (NO DIPLOMA) 02
HIGH SCHOOL EQUIVALENT (for example, GED) 03
HIGH SCHOOL GRADUATE (DIPLOMA) 04
SOME COLLEGE BUT NO DEGREE 05
ASSOCIATES DEGREE IN OCCUPATIONAL
OR VOCATIONAL PROGRAM 06
ASSOCIATES DEGREE IN ACADEMIC
PROGRAM 07
BACHELOR'S DEGREE (for example, BA, AB, BS) 08
MASTER'S DEGREE (for example, MA, MS, MEng,
MEd, MSW, MBA) 09
PROFESSIONAL SCHOOL DEGREE (for example, MD,
DDS, DVM, LLB, JD) 10
DOCTORATE DEGREE (for example, PhD, EdD) 11

REFUSED 97
NOT SURE 98

C-8. During 1993, how many adults in your household, including yourself, worked for pay?

0 1 2 3 4 5 6 (OR MORE)

NUMBER WHO WORKED FOR PAY LAST YEAR

C-9. How many people live in this household who are younger than 18?

0 1 2 3 4 5 6 (OR MORE)

NUMBER UNDER 18

C-10. Do you have children of any age who live outside this household?

YES 1

NO . . . . . 2 **(SKIP TO C-12)**

C-11. Do you have any grandchildren?

YES 1
NO 2

C-12. Did anyone in your household have any income from social security or pensions in 1993?

YES 1
NO 2
NOT SURE 8

C-13. I'd like you to think about the income received last year by everyone in your household.

SHOW CARD M

Adding together all income for everyone in your household, which letter on this card best describes your household's total income for last year — 1993 — before taxes? Please include wages or salaries, social security or other retirement income, child support, public assistance, business income, and all other income.

LETTER A 01
LETTER B 02

LETTER C 03
LETTER D 04
LETTER E 05
LETTER F 06
LETTER G 07
LETTER H 08
LETTER I 09
LETTER J 10
LETTER K 11

NOT SURE 98
REFUSED 97

(SKIP TO C-15)

C-14. Did anyone in your household pay any California income taxes for last year, 1993, either by having taxes withheld from wages, retirement income, or other money received, or by sending money to the State with a tax form?

YES 1
NO 2
NOT SURE 8

C-15. If things go as you expect, do you think your household's total income for this year will be about the same as last year, higher than last year, or lower than last year?

SAME 1
HIGHER 2
LOWER 3
NOT SURE 8

BOX 8		
REVIEW SKIP RECORD: HOW DID R VOTE AT W-7?		
FOR	1	Transfer LARGEST amount coded FOR from skip record into C-16, C-17, C-18, and C-20 and continue.
AGAINST/NOT SURE OR W-7 NOT ASKED	2	Skip to C-24, Page 39

C-16. Now that we're close to the end of the interview and you have been able to think a bit more about the situation, I'd like to give you a chance to review your answers to the voting questions.

You said you would vote for the program to speed up the recovery of the four fish and bird species if it cost your household a one time additional tax payment of $_____.

C-17. How difficult would it be for your household to actually pay $_____ next year if the program passed? Would it be . . .

Very difficult 1
Somewhat difficult 2

Not too difficult, or 3
Not difficult at all? 4
} **(SKIP TO C-19)**

NOT SURE 8

C-18. Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $_____?

VOTE "FOR"	1	**(SKIP TO C-21)**
VOTE "AGAINST"	2	**(SKIP TO C-24)**
NOT SURE	8	**(SKIP TO C-21)**

C-19. How <u>strongly</u> do you favor the program if it cost your household this much money? Would you say . . .

Very strongly	1	**(SKIP TO C-24)**
Strongly	2	
Not too strongly, or	3	
Not at all strongly?	4	
DOESN'T FAVOR PLAN	5	**(SKIP TO C-22)**
NOT SURE	8	

C-20. Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $_____?

VOTE "FOR"	1	**(SKIP TO C-24)**
VOTE "AGAINST"	2	**(SKIP TO C-22)**
NOT SURE	8	

C-21. How strongly do you favor the program if it cost your household this much money? Would you say . . .

Very strongly	1	(SKIP TO C-24)
Strongly	2	
Not too strongly, or	3	
Not at all strongly?	4	
DOESN'T FAVOR PLAN	5	
NOT SURE	8	(SKIP TO C-24)

C-22. Why is that?

_____

_____

_____

_____

THERE IS NO QUESTION C-23 IN THIS VERSION

C-24. I'd like to know how much confidence you have in some of the institutions and groups in this country.

SHOW CARD N

First, (READ X'd ITEM) . . ., generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . .? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; RE-READ STEM AS NECESSARY.)

		GREAT DEAL	SOME	HARDLY ANY	NONE	NOT SURE
( )	a. University scientists	1	2	3	4	8
( )	b. U.S. Congress	1	2	3	4	8
( )	c. Scientists who work for industry	1	2	3	4	8
( )	d. Newspapers	1	2	3	4	8
( )	e. California state government	1	2	3	4	8
( )	f. Large corporations	1	2	3	4	8

SHOW CARD O

C-25. How much of the time do you think we can trust the California state government to do what is right? Would you say . . .

Always 1
Almost always 2
Most of the time 3
Some of the time 4
Almost never, or 5
Never? 6
NOT SURE 8

C-26. There are different ways for people to pay for new programs to protect the environment. (STOP) One way is for the government to pay the cost. This will raise everyone's taxes. (STOP) The other way is for businesses to pay the cost. This will make prices go up for everyone.

If you had to choose, would you prefer to pay for new environmental programs . .

Through higher taxes, or 1
Through higher prices? 2
EITHER ONE/DON'T CARE WHICH 3
NEITHER 4
NOT SURE 8

C-29. What is your full name and phone number, in case my supervisor wants to check my work? (RECORD FULL NAME AND PHONE NUMBER ON RECORD OF ACTIONS. **DO NOT RECORD IT HERE**.)

RECORDED ON RECORD OF ACTION 1
NO PHONE 2
REFUSED 7

INTERVIEWER, PLEASE NOTE THE FOLLOWING ABOUT THE RESPONDENT BY CIRCLING THE NUMBER OF THE CORRECT RESPONSE:

C-30. SEX

MALE 1
FEMALE 2

C-31. RACE

WHITE, NOT HISPANIC 1
WHITE, HISPANIC 2
BLACK, NOT HISPANIC 3
BLACK, HISPANIC 4
ASIAN 5
OTHER (SPECIFY) 6

_____

C-32. ENTER R'S ZIP CODE: ☐☐☐☐☐

C-33. ENTER R'S PSU #: ☐☐

END INTERVIEW TIME: ☐☐:☐☐ A.M. P.M.

SECTION D
INTERVIEW EVALUATION QUESTIONS

D-1. What was the reaction of the respondent as you read through the material **beginning with A-3 through A-16**? (This is the descriptive material including the maps and charts.)

		EXTREMELY	VERY	SOMEWHAT	SLIGHTLY	NOT AT ALL	NOT SURE
a.	How distracted was the respondent?	1	2	3	4	5	8
b.	How attentive was the respondent?	1	2	3	4	5	8
c.	How well did the respondent understand this material?	1	2	3	4	5	8

D-2. Did the respondent say anything suggesting that he or she had any difficulty understanding either the natural recovery process or the speed-up program?

YES 1

NO . . . . . 2 **(SKIP TO D-3)**

D-2A. Describe the difficulties.

_____

_____

_____

D-3. Did the respondent have any difficulty understanding the vote questions (W-1 through W-3)?

YES 1

NO . . . . . 2 **(SKIP TO D-4)**

D-3A. Describe the difficulties.

_____

_____

_____

D-4. When you asked the voting questions did you feel the respondent was impatient to finish the interview?

YES 1

NO . . . . . 2 } **(SKIP TO D-5)**
NOT SURE 8

D-4A. How impatient was the respondent?

VERY IMPATIENT 1
SOMEWHAT IMPATIENT 2
A LITTLE IMPATIENT 3
NOT VERY IMPATIENT 4
NOT SURE 8

D-5. How serious was the consideration the respondent gave to the decision about how to vote?

EXTREMELY SERIOUS 1
VERY SERIOUS 2
SOMEWHAT SERIOUS 3
SLIGHTLY SERIOUS 4
NOT AT ALL SERIOUS 5
NOT SURE 8

D-6. Not counting you and the respondent, was anyone age 13 or older present when the respondent voted?

YES 1

NO . . . . . 2 **(SKIP TO D-7)**

OTHERS CAME IN AND OUT 3

D-6A. Do you think the other person(s) affected how the respondent voted or don't you know?

YES 1
NO 2
DON'T KNOW 8

D-7. Do you have any other comments about this interview?

_____

_____

_____

_____

_____

_____

_____

A-3 SKIP RECORD
W-1: 80
FOR 1
AGAINST/ NOT SURE 2
W-2: 140
FOR 1
AGAINST/ NOT SURE 2
W-3: 45
FOR 1
AGAINST/ NOT SURE 2
W-7
FOR 1
AGAINST/ NOT SURE 2

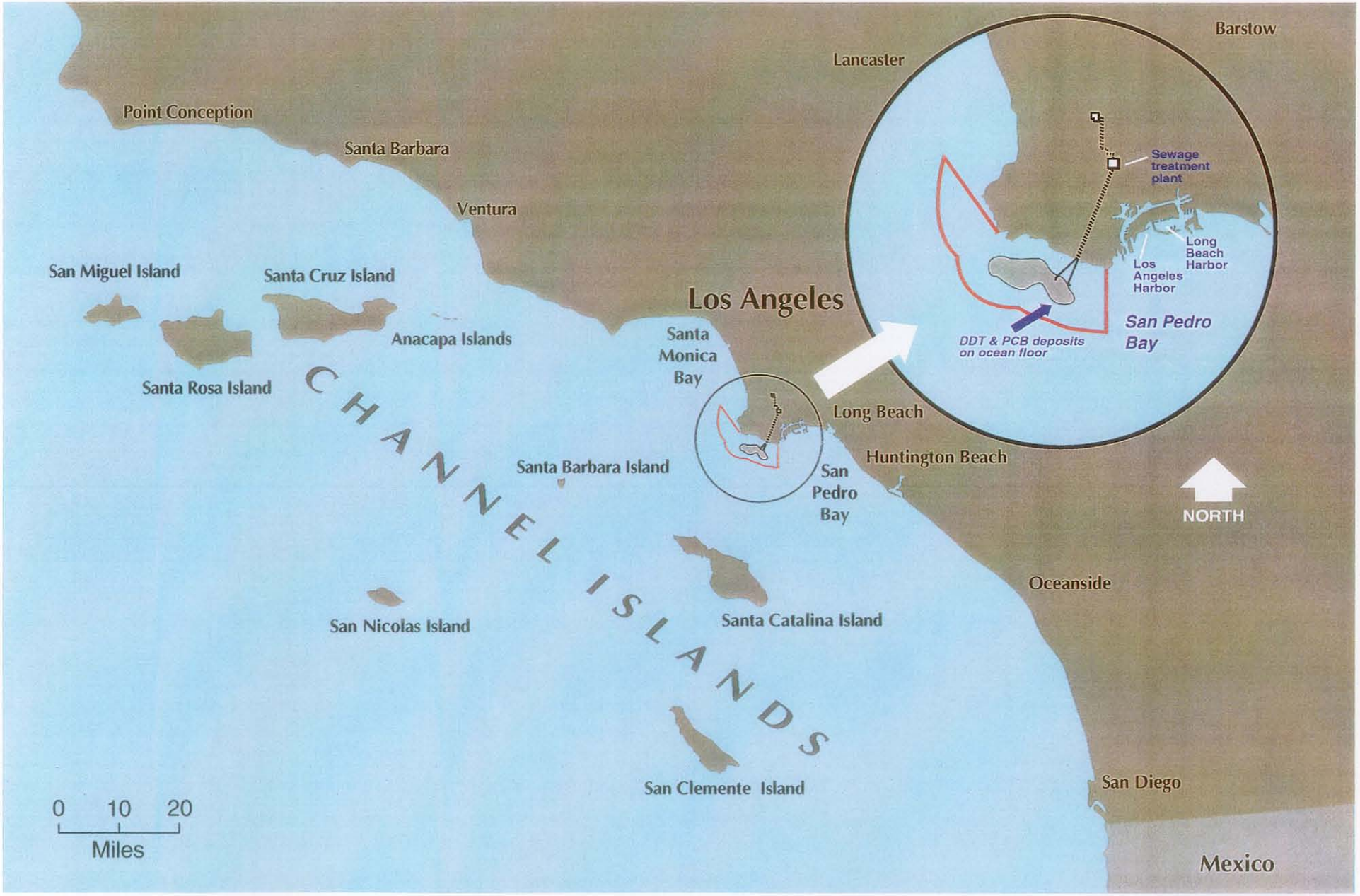
THE FIELD VERSION OF THE MAP BOOKLET WAS 11½" X 14" AND CONTAINED SIX COLOR MAPS, LABELED 1 THROUGH 6. IT WAS SPIRAL BOUND WITH A HEAVY FRONT AND BACK COVER.

California Coastal Areas

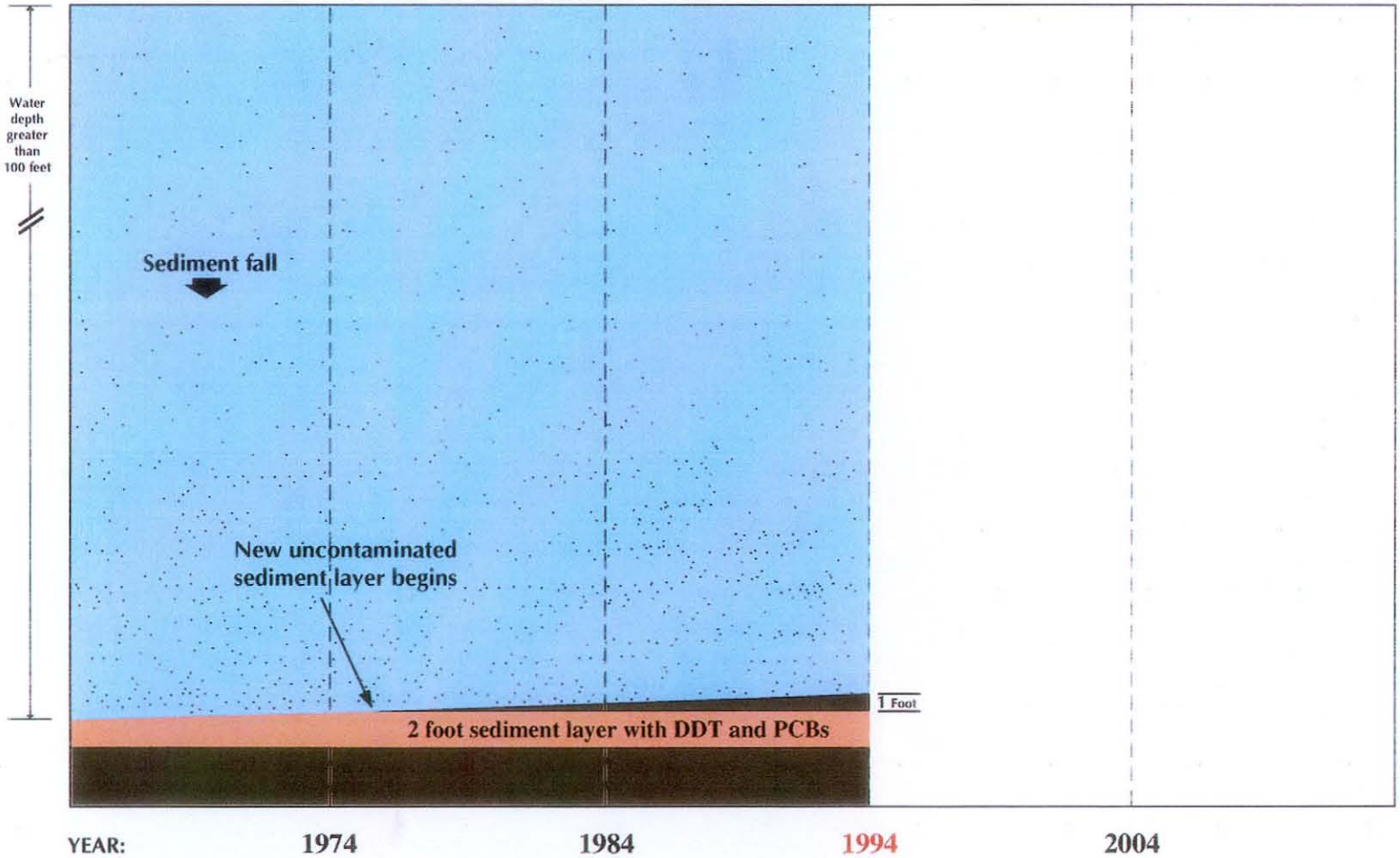
South Coast

Map 2

South Coast

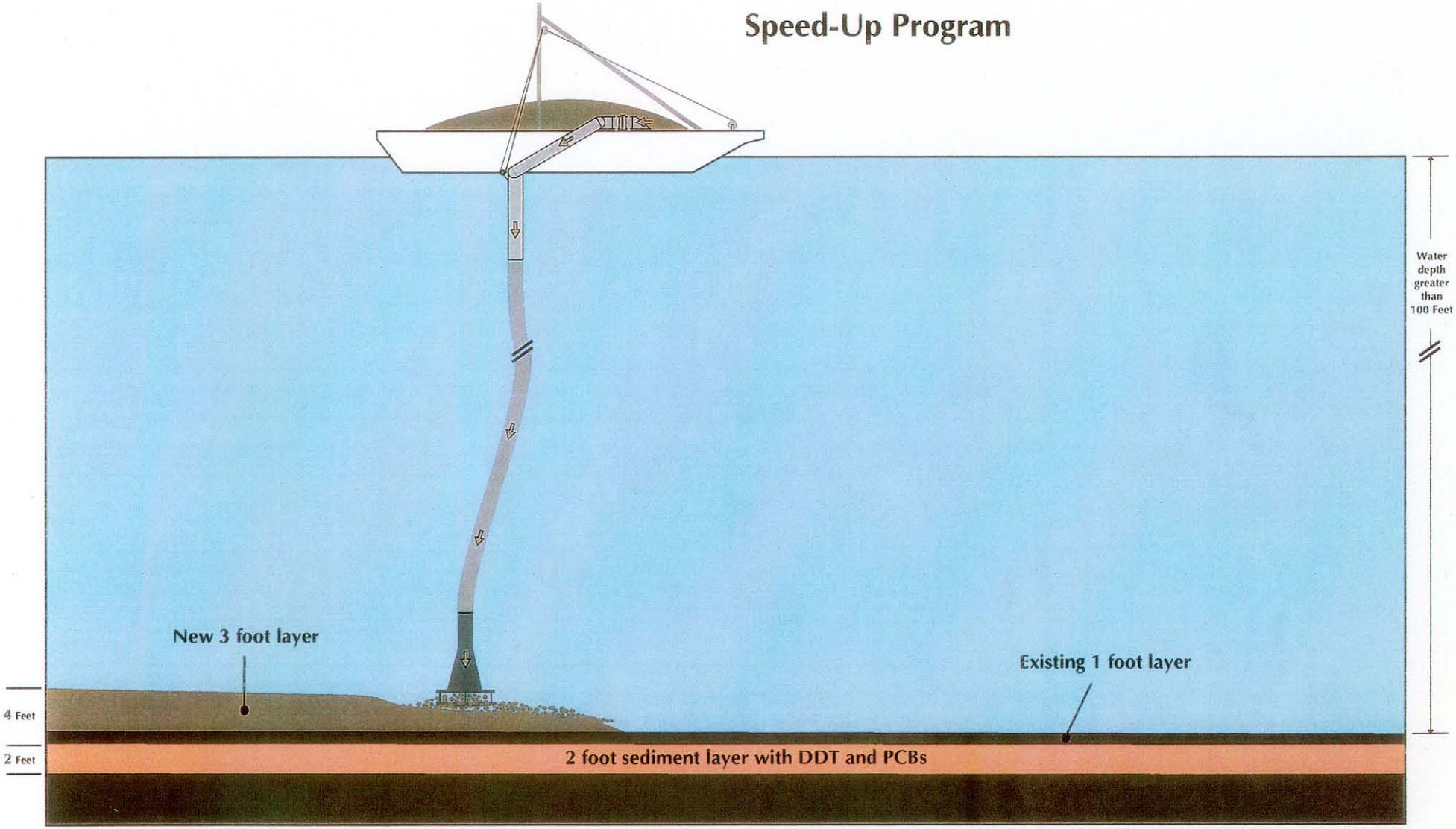


Map 3


Water depth greater than 100 feet
Sediment fall
New uncontaminated sediment layer begins
1 Foot
2 foot sediment layer with DDT and PCBs
YEAR:
1974
1984
1994
2004

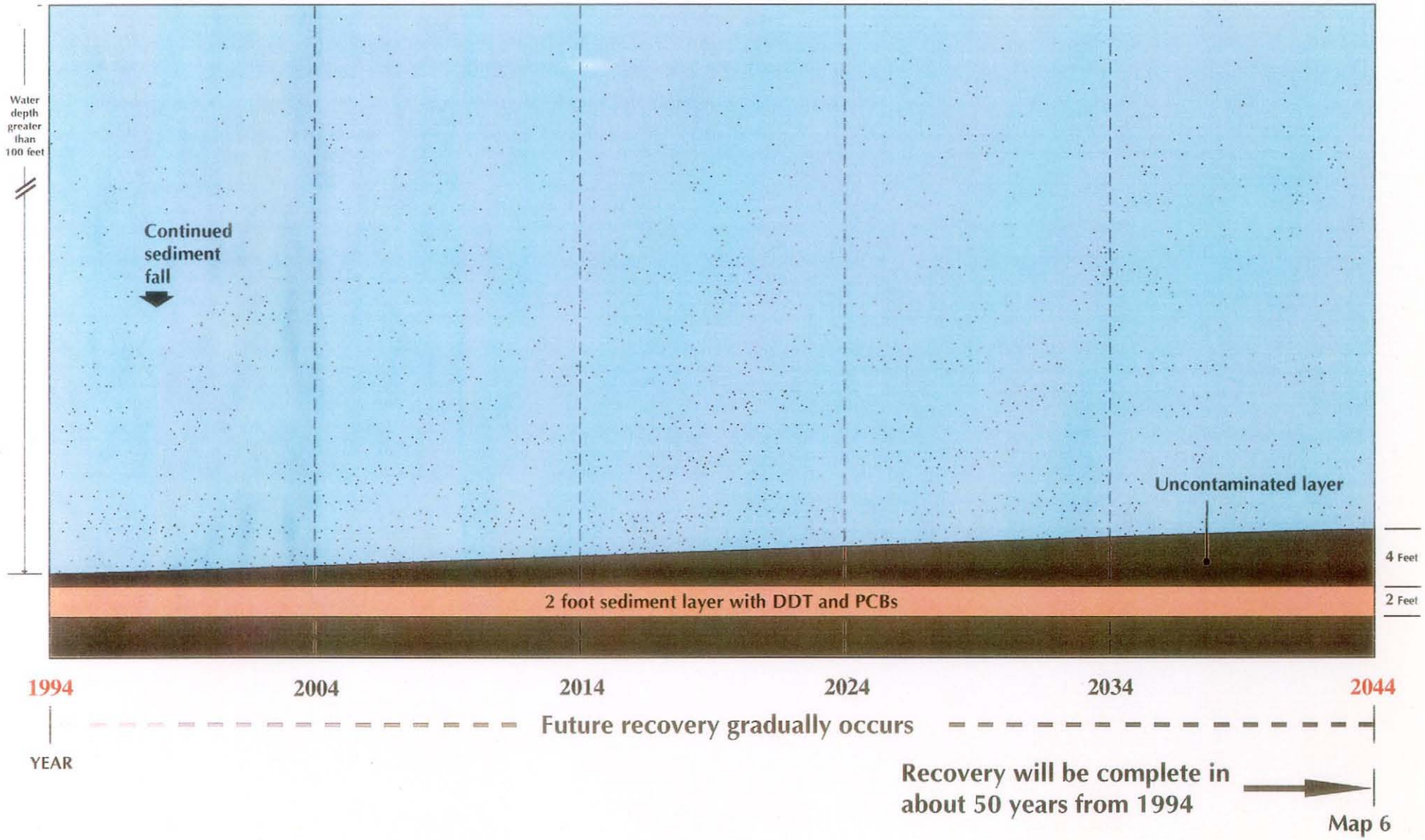
Map 4

Speed-Up Program



Map 5

Natural Recovery Process



Map 6

1. Not Important At All

2. Not Too Important

3. Somewhat Important

4. Very Important

5. Extremely Important

1. Reduced a Great Deal

2. Reduced Somewhat

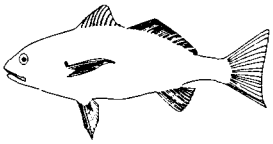
3. Stay the Same

4. Increased Somewhat

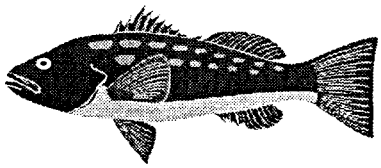
5. Increased a Great Deal

SOUTH COAST FISH AFFECTED

WHITE CROAKER

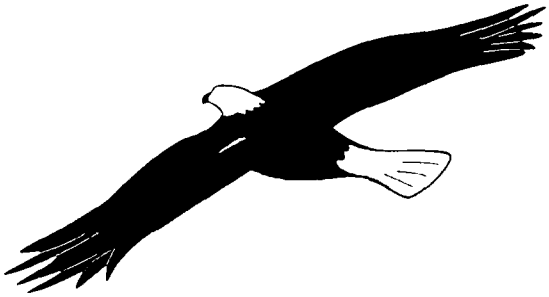


KELP BASS
(Calico Bass)



SOUTH COAST BIRDS AFFECTED

BALD EAGLE



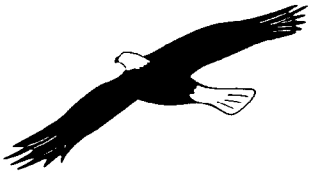
PEREGRINE FALCON

Is species currently listed as endangered in California?

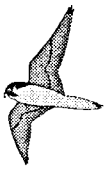
White Croaker

Kelp Bass

No



Bald Eagle



Peregrine Falcon

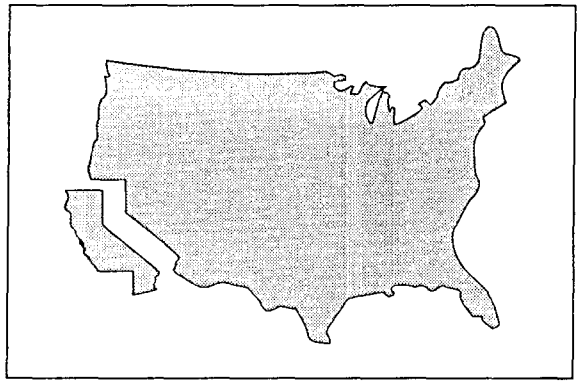
Yes

Population of

BALD EAGLE

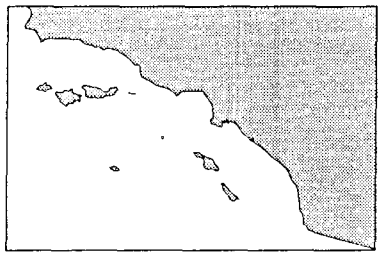
PEREGRINE FALCON

Rest of California
and
Rest of United States



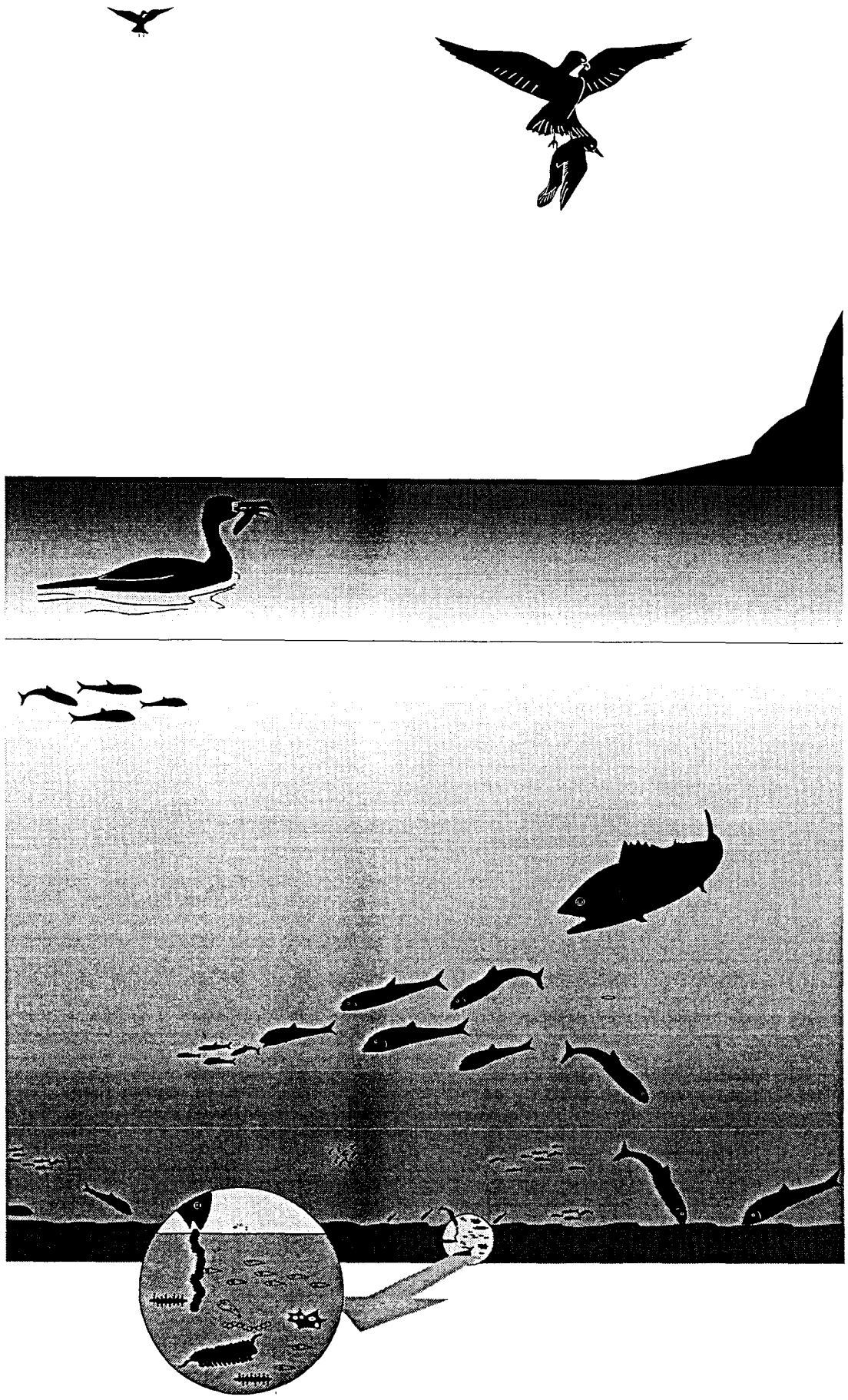
Increasing

Along the South Coast



Not Increasing

CARD F



This deposit does not harm humans and the four species will recover anyway in 50 years.

Your household might prefer to spend the money to solve other social or environmental problems instead.

The program costs more money than your household wants to spend for this.

1. Mostly effective

2. Somewhat effective

3. Not too effective

4. Not effective at all

1. Not Serious At All

2. Not Too Serious

3. Somewhat Serious

4. Very Serious

5. Extremely Serious

1. Very Often

2. Often

3. Sometimes

4. Rarely

5. Never

1. Environmental Activist

2. Strong Environmentalist

3. Somewhat Strong Environmentalist

4. Not Particularly Strong Environmentalist

5. Not An Environmentalist At All

Total Before-Tax Income in 1993 for Everyone in Your Household*

A. Under $10,000

B. $10,000 to $19,999

C. $20,000 to $29,999

D. $30,000 to $39,999

E. $40,000 to $49,999

F. $50,000 to $59,999

G. $60,000 to $69,999

H. $70,000 to $79,999

I. $80,000 to $99,999

J. $100,000 to $149,999

K. $150,000 or more

*Please include all income sources, including social security or other retirement, etc., for everyone in your household.

1. Great Deal of Confidence

2. Some Confidence

3. Hardly Any Confidence

4. No Confidence At All

1. Always

2. Almost Always

3. Most of the Time

4. Some of the Time

5. Almost Never

6. Never

Appendix A.2
Scope Survey Instrument, Map and Card Set

CALIFORNIA ISSUES STUDY

MAIN INTERVIEW

INTERVIEWER: Do not enter any identifying information about respondent (e.g., respondent's name, address) in this questionnaire.

START INTERVIEW TIME: ☐☐:☐☐ A.M. P.M.

SECTION A

A-1. Let's start by talking for a moment about some issues in California. Some may not be important to you, others may be. First, (READ X'd ITEM) . . ., is this issue

SHOW CARD A

not important at all to you personally, not too important, somewhat important, very important, or extremely important? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; RE-READ STEM AS NECESSARY.)

	NOT IMPORTANT AT ALL	NOT TOO IMPORTANT	SOMEWHAT IMPORTANT	VERY IMPORTANT	EXTREMELY IMPORTANT	NOT SURE
( ) a. Improving education in elementary and secondary schools	1	2	3	4	5	8
( ) b. Reducing air pollution in the cities	1	2	3	4	5	8
( ) c. Maintaining local library services	1	2	3	4	5	8
( ) d. Reducing crime	1	2	3	4	5	8
( ) e. Protecting coastal areas from oil spills	1	2	3	4	5	8
( ) f. Finding ways to reduce state taxes	1	2	3	4	5	8

A-2. The State of California spends money on many programs for many different purposes. I'm going to read a list of some of these programs. For each one, I'd like you to tell me whether you think the money the State is spending on these programs should be

SHOW CARD B

reduced a great deal, reduced somewhat, stay the same, increased somewhat or increased a great deal. First, (ITEM)? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; REPEAT ANSWER CATEGORIES, AS NECESSARY.)

		REDUCED GREAT DEAL	REDUCED SOMEWHAT	STAY THE SAME	INCREASED SOMEWHAT	INCREASED GREAT DEAL	NOT SURE
( )	a. Building new state prisons	1	2	3	4	5	8
( )	b. Providing public transportation for Los Angeles	1	2	3	4	5	8
( )	c. Providing pay raises for professors at state colleges and universities	1	2	3	4	5	8
( )	d. Providing shelter for the homeless in big cities	1	2	3	4	5	8
( )	e. Protecting endangered wildlife species	1	2	3	4	5	8
( )	f. Providing lifeguards at state beaches	1	2	3	4	5	8

These are just a few of the things the State of California spends tax money on.

Proposals are sometimes made to the State for new programs. The State does not want to undertake new programs unless taxpayers are willing to pay for them. One way for the State to find out about this is to give people like you information about a program so that you can make up your own mind about it.

In interviews of this kind, some people think the program they are asked about is not needed; STOP others think it is. We want to get the opinions of both kinds of people.

A-3. Have you ever been interviewed like this before to get your opinion about whether the State should or should not spend tax money for a particular purpose?

YES 1
NO 2
NOT SURE 8

In the past, people have been asked about various types of programs. In this interview, the particular program I am going to ask you about involves two types of ocean fish.

These fish are producing fewer young than normal in one particular area. First, I will tell you about what is happening to them. Then, I will tell you about the cause. Then, I'll ask you whether or not you think anything should be done about this. I will also ask you to tell me why you feel the way you do.

SHOW MAP 1

Here is a map of California.

The situation I am going to tell you about is located along this one part of the California coast, the South Coast.

STOP UNTIL R IS FINISHED LOOKING AT MAP 1

SHOW MAP 2

This map shows the South Coast in more detail.

BOX 1

IF INTERVIEWING IN LOS ANGELES OR ORANGE COUNTY,

CHECK HERE ☐ AND SKIP TO A-5.

IF NOT INTERVIEWING IN LOS ANGELES OR ORANGE COUNTY,

CHECK HERE ☐ AND CONTINUE.

A-4. Have you ever lived in Los Angeles County or Orange County?

YES 1
NO 2
} (SKIP TO A-6)

A-5. How many years have you lived in this county?

☐☐ YEARS

A-6. Many species of fish live off the South Coast. Two of these species are having problems producing young in one place off the South Coast. These are White Croaker and Kelp Bass.

This card shows what these fish look like.

SHOW CARD C

STOP UNTIL R IS FINISHED LOOKING AT CARD

Kelp Bass is sometimes called Calico Bass.

Unlike some species of fish, these two do not travel up and down the coast but generally stay in one place where they live and breed.

SHOW MAP 2 AGAIN

Please look at the place marked in red on the map.

It is near Los Angeles harbor between Santa Monica Bay and San Pedro Bay.

This is the place where scientists have found that the White Croaker and Kelp Bass produce fewer young than elsewhere. However, as millions of these two fish live in other places along the California coast, neither species is in any danger of becoming extinct.

BOX 2

IF R ASKS "**WHY HAS THIS HAPPENED?**" OR "**IS SOME SPECIFIC CAUSE RESPONSIBLE?**", CHECK HERE ☐ AND SAY:

I will come to that shortly.

A-7. Is there anything I have told you about these two fish species that you would like me to repeat?

YES 1

NO . . . . . 2 **(SKIP TO A-8)**

A-7A. What is that?

_____

_____

_____

A-8. Many scientists have studied <u>why</u> these two fish species are having reproduction problems in this particular place but <u>not</u> elsewhere along the California coast. STOP

Some of these scientists work for the Federal Government, others work for the State, and others are independent researchers at California universities.

They agree that these reproduction problems are caused by a deposit of <u>two</u> chemicals that are trapped in the sediment on the bottom of the ocean. STOP

These chemicals are <u>DDT</u> and <u>PCBs</u>.

A-9. Before today, had you heard anything at all about DDT?

YES 1
NO 2
NOT SURE 8

A-10. How about PCBs? Had you heard anything about them before today?

YES 1
NO 2
NOT SURE 8

(As you may know,) DDT is a pesticide that was developed during World War II. It was found to be a cheap and effective way to kill insects like mosquitos.

PCBs are chemicals that were developed around the same time and were used in electrical transformers and for other industrial purposes.

SHOW MAP 3

This big circle (TO BIG CIRCLE) is a blow-up of this small circle (TO SMALL CIRCLE). The place marked in grey (TO GREY AREA IN BIG CIRCLE) shows the location of the deposit of DDT and PCBs on the ocean floor that causes the problems I have described. This deposit (TO GREY AREA) is about five miles long and two miles wide. STOP

The biggest source of these chemicals was a factory, located here , which was at one time the world's largest producer of DDT.

Over a period of thirty years, beginning in the late 1940s, this factory sent tons of waste DDT into the Los Angeles County sewer system where it went to this sewage treatment plant

> and was released with other treated wastes into the ocean through these underwater sewer pipes.

A smaller amount of waste PCBs from other sources also went out the sewer pipes in the same way. STOP

Back in the 1940s, 50s, and into the 1960s, there was little recognition that DDT and PCBs could affect fish.

When this became clear in the 1970s, sending these two chemicals into the ocean through the sewers was stopped. The federal government also severely restricted the use of both DDT and PCBs. As a result, the DDT factory in Los Angeles went bankrupt STOP and was torn down. STOP

SHOW MAP 3 AGAIN

Even though no new DDT or PCBs have been put into the sewers for about 15 years, the old DDT and PCBs located in the grey area (⬆ TO GREY AREA) have continued to affect the two fish species in the one place I told you about.

Here's how this happens. Because these two chemicals do not dissolve in water, they gradually fell to the ocean bottom. Once they reached the bottom, they remained there trapped as part of the sediment.

BOX 3

IF R ASKS "**WHERE DOES THE SEDIMENT COME FROM?**", CHECK HERE ☐ AND SAY:

It comes from soil that is washed or blown off the land.

This sediment — made up of things like sand and dirt — is very stable. It lies more than a mile offshore under water more than 100 feet deep where there are no strong ocean currents. Therefore, the contaminated sediment has remained in this location ⬆, for over 15 years, where it is slowly being covered by new, uncontaminated sediment.

A-11. Before today, had you heard anything about the DDT and PCBs that are located in this particular place? (⬆ TO GREY AREA)

YES 1

NO 2
NOT SURE 8
} **(SKIP TO A-12)**

A-11A. What have you heard?

_____

_____

_____

A-12. The federal, state, and university scientists I mentioned earlier have conducted studies of the effect of this deposit . They know that DDT and PCBs can build up in the bodies of some fish when the food they eat has these chemicals in it.

According to the scientists, the only fish that are affected by this deposit are the two species I told you about. This is because they live and feed in this particular place.

SHOW CARD D

This drawing shows how this happens.

STOP UNTIL R HAS HAD A CHANCE TO LOOK AT CARD D

These are small animals that live in the sediment on the ocean bottom. When they get food from contaminated sediment, they absorb DDT and PCBs into their bodies.

When they are eaten by the White Croaker and Kelp Bass, the DDT and PCBs are absorbed into their body fat. When the fish have a high enough level of DDT and PCBs in their bodies, their ability to reproduce is affected.

REMOVE CARD D

Although the amount of DDT and PCBs in the bodies of the two fish is high enough to affect their ability to reproduce, the amount is not enough to affect the adult fish in any other way.

As I mentioned earlier, these fish are not in danger of becoming extinct because of the millions of White Croaker and Kelp Bass along the California Coast that are not having reproduction problems.

Some people are concerned that eating White Croaker or Kelp Bass contaminated by these chemicals might harm humans. This is an important question, so the scientists have studied it carefully.

SHOW MAP 3 AGAIN

They have found that the amount of DDT and PCBs in these two types of fish is so small that people would have to eat fish from this one area (TO AREA MARKED IN RED) on a regular basis to be harmed.

Fortunately, commercial fishing companies do not catch Kelp Bass, and the State has banned all commercial fishing for White Croaker in that area. Thus, the affected fish are not sold in markets or restaurants.

The State has also issued notices to local fishermen warning them about eating White Croaker and Kelp Bass caught there, and this warning is posted on signs. Therefore, it is extremely unlikely that these fish could cause any harm to humans. STOP

Fifteen years ago, the deposit of DDT and PCBs was also causing reproduction problems in several other species that sometimes feed in the area. However, these other species gradually recovered and now reproduce normally.

Their recovery over the past 15 years was the result of a natural process. This process gradually covers the contaminated sediment on the ocean bottom with new sediment that is uncontaminated by DDT and PCBs. The deeper the contaminated sediment is buried, the more these chemicals are removed from the food these species eat.

SHOW MAP 4

This drawing shows how this natural process works. These little dots ⬆ are things like sand and dirt that fall through the water and settle on the bottom. The orange layer is the sediment contaminated with the DDT and PCBs ⬆.

STOP UNTIL R IS FINISHED LOOKING AT MAP 4

Once the flow of DDT and PCBs into the sewers was stopped in the 1970s ⬆, a layer of new, uncontaminated sediment began to cover the contaminated layer. By 1994 ⬆, it had buried the contaminated layer about two feet deep ⬆. This is deep enough so that there are no DDT and PCBs left in the water.

Although these chemicals now no longer affect other species, they continue to affect the two fish species I told you about. This is because, unlike the other species, everything they eat comes from the ocean bottom in this one place where they live year round. Once the chemicals are buried deeper under clean sediment, these two fish species will also recover.

Until recently, there was no way to speed up this natural process. However, a procedure has now been developed to cover chemical deposits like this.

A proposal has been made to use this procedure here, to speed up the recovery of the two fish species I told you about. The State wants to find out how people feel about this. STOP

SHOW MAP 5

This picture shows how a speed-up program would work.

This is the existing layer of sediment that covers the contaminated layer two feet deep. A boat like this would drop two more feet of new, clean sediment down to the ocean floor without disturbing the sediment already there. This would cover the contaminated sediment under a total of four feet of clean sediment.

Once they are covered by four feet of clean sediment, the DDT and PCBs would be removed from the food the White Croaker and Kelp Bass eat. This is because none of the animals they eat live this far beneath the ocean floor.

The State would pay the cost to drop the two feet of clean sediment on the contaminated location. This program would be carried out by the Army Corps of Engineers which has successfully done this elsewhere. It would take one year to complete. Once this is done, it will take four more years for the fish I told you about to reproduce normally. So, within five years, these fish would be reproducing normally.

BOX 4A

IF R MENTIONS REMOVING THE SEDIMENT FROM THE OCEAN FLOOR AS A BETTER (OR POSSIBLY BETTER) PROCEDURE, CHECK HERE ☐ AND SAY:

> Removing the sediment from the ocean floor has been considered, but rejected, because it would stir up the contaminated sediment and spread some of it back into the environment.

IF R ASKS WHERE THE SEDIMENT WOULD COME FROM, CHECK HERE ☐ AND SAY:

> It will come from places such as the State's reservoirs which are filling up with clean sediment.

A-13. Do you have any questions about how this would work?

YES 1

NO . . . . . 2 **(SKIP TO A-14)**

A-13A. What are they?

_____

_____

_____

BOX 4B

IF R MENTIONS REMOVING THE SEDIMENT FROM THE OCEAN FLOOR AS A BETTER (OR POSSIBLY BETTER) PROCEDURE, CHECK HERE ☐ AND SAY:

> Removing the sediment from the ocean floor has been considered, but rejected, because it would stir up the contaminated sediment and spread some of it back into the environment.

IF R ASKS WHERE THE SEDIMENT WOULD COME FROM, CHECK HERE ☐ AND SAY:

> It will come from places such as the State's reservoirs which are filling up with clean sediment.

A-14. If the State does not implement this program, nature will do the same thing, but it will take longer, 15 years instead of 5.

This drawing shows how this will happen.

SHOW MAP 6

This is 1994 ⬆. Over the coming years, as the new, uncontaminated sediment continues to fall, the contaminated layer will get buried deeper and deeper. ⬆

Fifteen years from now, around the year 2009, the contaminated sediment will be buried under four feet of clean sediment ⬆.

As I mentioned, this far under the ocean floor, the DDT and PCBs would be removed from the food the two fish species eat.

The two fish species I told you about will then have fully recovered from their reproduction problems.

Thus, instead of the 5 years it would take for these species to recover if the State implements the speed-up program, with natural processes it would take 15 years ⬆. That is, an additional 10 years.

A-15. Is there anything else you would like to know about either the speed-up program or the natural recovery process?

YES 1

NO . . . . . 2 **(SKIP TO A-16)**

A-15A. What else would you like to know?

_____

_____

_____

A-16. I mentioned earlier that the State has asked people about various types of new programs. We are now interviewing people to find out how they would vote if this program to speed up recovery were on the ballot in a California election.

Here's how it would be paid for. California taxpayers would pay a one time additional amount on their next year's state income tax to cover the cost. This is the only payment that would be required. It would go into a special fund that could only be used for the program to cover the contaminated sediment.

The program would only be carried out if people are willing to pay this one time additional tax. STOP

There are reasons why you might vote for the speed-up program and reasons why you might vote against.

The speed-up program would make it possible for the two fish species to reproduce normally in the place near Los Angeles 10 years earlier than if natural processes take their course.

On the other hand,

SHOW CARD E

this deposit does not harm humans and the two fish species will recover anyway in 15 years. STOP

Your household might prefer to spend the money to solve other social or environmental problems instead. STOP

Or, the program costs more money than your household wants to spend for this. STOP

REMOVE CARD E

At present, the program to speed up the covering of the contaminated sediment is estimated to cost your household a total of $80. Your household would pay this as a special one time tax added to next year's California income tax.

UNFOLD SKIP RECORD

W-1. If an election were being held today and the total cost to your household would be a one time additional tax of $80, would you vote for the program to speed up recovery or would you vote against it?

FOR . . . . . 1 **(CODE SKIP RECORD AND GO TO W-2)**

AGAINST 2
NOT SURE 8
(CODE SKIP RECORD AND SKIP TO W-3)

W-2. It is possible that the final engineering cost estimates for the program would be higher than this. If this turns out to be the case and your household would have to pay a one time additional tax of $140 instead of $80, would you vote for or against the program?

FOR	1
AGAINST	2
NOT SURE	8

CODE SKIP RECORD AND SKIP TO W-6

W-3. It is possible that the final engineering cost estimates for the program would be lower than this. If this turns out to be the case and your household would have to pay a one time additional tax of $45 instead of $80, would you vote for or against the program?

FOR . . . . . 1 **(CODE SKIP RECORD AND SKIP TO W-6)**

AGAINST . . . . . 2 **(CODE SKIP RECORD AND GO TO W-4)**

NOT SURE . . . . . 8 **(CODE SKIP RECORD AND SKIP TO W-5)**

W-4. Did you vote against the program because it isn't worth that much money to you, or because it would be somewhat difficult for your household to pay that much, or because of some other reason?

ISN'T WORTH THAT MUCH MONEY 1

SOMEWHAT DIFFICULT TO PAY 2

OTHER (**SPECIFY**) 3

_____

_____

_____

SKIP TO SECTION B
PAGE 22

W-5. Could you tell me why you aren't sure? **(BE SURE TO PROBE)**

_____

_____

_____

_____

_____

SKIP TO SECTION B
PAGE 22

W-6. People have different reasons for voting for the program. Can you tell me what covering the contaminated sediments would do that made you willing to pay for it? **(PROBE: "Can you be more specific about what you have in mind?" / "Anything else?" / "What would (covering the contamination/fixing the problem) do that made you willing to pay for the program?")**

_____

_____

_____

_____

_____

BOX 5

IF R ONLY MENTIONS **"IT WOULD COVER UP THE CONTAMINATION"** OR **"IT WOULD FIX THE PROBLEM,"** CHECK HERE ☐ AND SAY:

What would (covering up the contamination/fixing the problem) do that made you willing to pay for the program?

_____

_____

_____

BOX 6	
REVIEW SKIP RECORD:	Record in W-7 LARGEST amount R voted "FOR" and continue.

W-7. It is not unusual for some people to vote for the program because they are concerned that these DDT and PCBs may harm human health. Suppose human health is definitely not affected in this situation and the program would only speed up the recovery of these two species of fish. Would you vote for or against the program if it cost your household $_____?

VOTE "FOR" 1

VOTE "AGAINST" 2

NOT SURE 8

CODE W-7 ON SKIP RECORD

SECTION B

I gave you a lot of information before you voted. Please think back to a few moments ago when you decided how to vote. We are interested in what you were thinking then.

B-1. First, did it seem to you that DDT and PCBs could cause the reproduction problems I told you about?

YES 1
NO 2
NOT SURE 8

B-2. When you decided how to vote, did it seem to you that natural processes would take about 15 years to return things to normal?

YES, ABOUT 15 YEARS . . . . . 1 **(SKIP TO B-4)**

NO 2
NOT SURE 8

B-3. Did it seem to you that it would take a lot more than 15 years or a lot less than 15 years?

A LOT MORE 1
A LOT LESS 2
OTHER (SPECIFY) 3

_____

_____

_____

_____

_____

NOT SURE 8

B-4. When you decided how to vote, did it seem to you that the speed-up program would be completely effective in solving the reproduction problems within five years?

YES . . . . . 1 **(SKIP TO B-6)**

NO 2
NOT SURE 8

SHOW CARD F

B-5. Did it seem that the program would be . . .

Mostly effective 1
Somewhat effective 2
Not too effective, or 3
Not effective at all? 4
NOT SURE 8

B-6. When you decided how to vote, did you think your household would have to pay the special tax for the program for one year or for more than one year?

ONE YEAR 1
MORE THAN ONE YEAR 2
NOT SURE 8

B-7. Thinking about everything I have told you during this interview, overall did it try to push you to vote one way or another, or did it let you make up your own mind about which way to vote?

PUSHED ONE WAY OR ANOTHER . . 1

LET ME MAKE UP OWN MIND 2
NOT SURE 8
} **(SKIP TO B-8)**

B-7A. Which way did you think it pushed you?

VOTE FOR THE PROGRAM 1
VOTE AGAINST THE PROGRAM 2
OTHER **(SPECIFY)** 3

_____

_____

_____

_____

NOT SURE 8

B-7B. What was it that made you think that? **(PROBE: "Can you be more specific about what you have in mind?" "Anything else?")**

_____

_____

_____

_____

SHOW CARD G

B-8. All things considered, would you say the fish reproduction problems I told you about in the South Coast are . . .

Not serious at all	1
Not too serious	2
Somewhat serious	3
Very serious, or	4
Extremely serious?	5
NOT SURE	8

Now I would like to ask you a few questions about your household's recreational activities.

B-9. In the past five years has anyone in your household gone fishing?

YES 1

NO . . . . . 2 } (SKIP TO B-11)
NOT SURE 8

B-10. Is that saltwater fishing, freshwater fishing, or both?

SALTWATER 1
FRESHWATER 2
BOTH 3
NOT SURE 8

B-11. In the past five years has anyone in your household gone boating?

YES 1

NO . . . . . 2 } (SKIP TO B-13)
NOT SURE 8

B-12. Is that saltwater boating, freshwater boating, or both?

SALTWATER 1
FRESHWATER 2
BOTH 3
NOT SURE 8

B-13. Does anyone in your household like to identify different species of birds?

YES 1
NO 2
NOT SURE 8

SHOW CARD H

B-14. How often do you personally watch television programs about animals and birds in the wild . . .

Very often 1
Often 2
Sometimes 3
Rarely, or 4
Never? 5
NOT SURE 8

SHOW CARD H AGAIN

B-15. How often do people in your household go to the beach at the ocean . . .

Very often 1
Often 2
Sometimes 3
Rarely, or 4
Never? 5
NOT SURE 8

SHOW CARD H AGAIN

B-16. How often do people in your household eat fish . . .

Very often 1
Often 2
Sometimes 3
Rarely, or 4
Never? 5
NOT SURE 8

SHOW CARD I

B-17. On another subject, would you say you think of yourself as an . . .

Environmental activist, a 1
Strong environmentalist, a 2
Somewhat strong environmentalist, a 3
Not particularly strong environmentalist, or . . . 4
Not an environmentalist at all? 5
NOT SURE 8

SECTION C

Now, I have just a few questions about your background.

C-1. First, in total, how many years have you lived in California?

☐☐ YEARS

C-2. Have you ever been to Catalina or any of the other Channel Islands?

YES 1

NO . . . . . 2 } (SKIP TO C-4)
NOT SURE 8

C-3. Was your most recent visit within the past five years?

YES, PAST FIVE YEARS 1
NO, LONGER AGO 2
NOT SURE 8

C-4. Do you intend to move <u>outside</u> California in the next few years?

YES . . . . . 1 **(SKIP TO C-6)**

NO 2
NOT SURE 8

BOX 7

IF INTERVIEWING IN LOS ANGELES OR ORANGE COUNTIES,
CHECK HERE ☐ AND GO TO C-5.

IF NOT INTERVIEWING IN LOS ANGELES OR ORANGE COUNTIES,
CHECK HERE ☐ AND SKIP TO C-6.

C-5. Do you intend to move outside (L.A./Orange) County in the next few years?

YES 1
NO 2
NOT SURE 8

C-6. In what month and year were you born? ☐☐/☐☐
MONTH YEAR

C-7. What is the highest year of school you completed or the highest degree you received?

THROUGH 8th GRADE 01
9th, 10th, 11th, 12th GRADE (NO DIPLOMA) 02
HIGH SCHOOL EQUIVALENT (for example, GED) 03
HIGH SCHOOL GRADUATE (DIPLOMA) 04
SOME COLLEGE BUT NO DEGREE 05
ASSOCIATES DEGREE IN OCCUPATIONAL
OR VOCATIONAL PROGRAM 06
ASSOCIATES DEGREE IN ACADEMIC
PROGRAM 07
BACHELOR'S DEGREE (for example, BA, AB, BS) 08
MASTER'S DEGREE (for example, MA, MS, MEng,
MEd, MSW, MBA) 09
PROFESSIONAL SCHOOL DEGREE (for example, MD,
DDS, DVM, LLB, JD) 10
DOCTORATE DEGREE (for example, PhD, EdD) 11

REFUSED 97
NOT SURE 98

C-8. During 1993, how many adults in your household, <u>including yourself</u>, worked for pay?

0 1 2 3 4 5 6 (OR MORE)

_____

NUMBER WHO WORKED FOR PAY LAST YEAR

C-9. How many people live in this household who are younger than 18?

0 1 2 3 4 5 6 (OR MORE)

_____

NUMBER UNDER 18

C-10. Do you have children of any age who live <u>outside</u> this household?

YES 1

NO . . . . . 2 **(SKIP TO C-12)**

C-11. Do you have any grandchildren?

YES 1
NO 2

C-12. Did anyone in your household have any income from social security or pensions in 1993?

YES 1
NO 2
NOT SURE 8

C-13. I'd like you to think about the income received last year by everyone in your household.

SHOW CARD J

Adding together all income for everyone in your household, which letter on this card best describes your household's total income for last year — 1993 — before taxes? Please include wages or salaries, social security or other retirement income, child support, public assistance, business income, and all other income.

LETTER A 01
LETTER B 02

LETTER C 03
LETTER D 04
LETTER E 05
LETTER F 06
LETTER G 07
LETTER H 08
LETTER I 09
LETTER J 10
LETTER K 11

NOT SURE 98
REFUSED 97

(SKIP TO C-15)

C-14. Did anyone in your household pay any California income taxes for last year, 1993, either by having taxes withheld from wages, retirement income, or other money received, or by sending money to the State with a tax form?

YES 1
NO 2
NOT SURE 8

C-15. If things go as you expect, do you think your household's total income for this year will be about the same as last year, higher than last year, or lower than last year?

SAME 1
HIGHER 2
LOWER 3
NOT SURE 8

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BOX 8		
REVIEW SKIP RECORD: HOW DID R VOTE AT W-7?		
FOR	1	Transfer LARGEST amount coded FOR from skip record into C-16, C-17, C-18, and C-20 and continue.
AGAINST/NOT SURE OR W-7 NOT ASKED	2	Skip to C-23, Page 37

C-16. Now that we're close to the end of the interview and you have been able to think a bit more about the situation, I'd like to give you a chance to review your answers to the voting questions.

You said you would vote for the program to speed up the recovery of the two fish species if it cost your household a one time additional tax payment of $_____.

C-17. How difficult would it be for your household to actually pay $_____ next year if the program passed? Would it be . . .

Very difficult 1
Somewhat difficult 2

Not too difficult, or 3
Not difficult at all? 4
} **(SKIP TO C-19)**

NOT SURE 8

C-18. Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $_____?

VOTE "FOR"	1	(SKIP TO C-21)
VOTE "AGAINST"	2	(SKIP TO C-23)
NOT SURE	8	(SKIP TO C-21)

C-19. How strongly do you favor the program if it cost your household this much money? Would you say . . .

Very strongly	1	(SKIP TO C-23)
Strongly	2	
Not too strongly, or	3	
Not at all strongly?	4	
DOESN'T FAVOR PLAN	5	(SKIP TO C-22)
NOT SURE	8	

C-20. Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $_____?

VOTE "FOR"	1	(SKIP TO C-23)
VOTE "AGAINST"	2	(SKIP TO C-22)
NOT SURE	8	

C-21. How strongly do you favor the program if it cost your household this much money? Would you say . . .

Very strongly	1	(SKIP TO C-23)
Strongly	2	
Not too strongly, or	3	
Not at all strongly?	4	
DOESN'T FAVOR PLAN	5	
NOT SURE	8	(SKIP TO C-23)

C-22. Why is that?

_____

_____

_____

_____

C-23. In this interview I described the effects of DDT and PCBs on the White Croaker and Kelp Bass that live off the Los Angeles coast. Some scientists think DDT and PCBs may still be causing reproduction problems in two other species in the South Coast. These are the Bald Eagle and the Peregrine Falcon. If this turned out to be the case, would you consider the problem caused by these chemicals to be more serious?

YES 1
NO 2
NOT SURE 8

BOX 9

RECORD ANY COMMENTS MADE BY RESPONDENT AT C-23:

_____

_____

_____

_____

_____

_____

_____

C-24. I'd like to know how much confidence you have in some of the institutions and groups in this country.

SHOW CARD K

First, (READ X'd ITEM) . . ., generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . .? (READ EACH ITEM, BEGINNING WITH X'd ITEM; CIRCLE ONE CODE FOR EACH; RE-READ STEM AS NECESSARY.)

		GREAT DEAL	SOME	HARDLY ANY	NONE	NOT SURE
( )	a. University scientists	1	2	3	4	8
( )	b. U.S. Congress	1	2	3	4	8
( )	c. Scientists who work for industry	1	2	3	4	8
( )	d. Newspapers	1	2	3	4	8
( )	e. California state government	1	2	3	4	8
( )	f. Large corporations	1	2	3	4	8

SHOW CARD L

C-25. How much of the time do you think we can trust the California state government to do what is right? Would you say . . .

Always 1
Almost always 2
Most of the time 3
Some of the time 4
Almost never, or 5
Never? 6
NOT SURE 8

C-26. There are different ways for people to pay for new programs to protect the environment. (STOP) One way is for the government to pay the cost. This will raise everyone's taxes. (STOP) The other way is for businesses to pay the cost. This will make prices go up for everyone.

If you had to choose, would you prefer to pay for new environmental programs . .

Through higher taxes, or 1
Through higher prices? 2
EITHER ONE/DON'T CARE WHICH 3
NEITHER 4
NOT SURE 8

C-27. Do you usually speak English at home?

YES . . . . . 1 **(SKIP TO C-28)**

NO 2

OTHER **(SPECIFY)** . . . . . 3 **(SKIP TO C-28)**

_____

_____

_____

C-27A. What language do you usually speak at home?

SPANISH 1
OTHER LANGUAGE **(SPECIFY)** 2

_____

_____

_____

C-28. Are you a citizen of the United States?

YES 1
NO 2

C-29. What is your full name and phone number, in case my supervisor wants to check my work? (RECORD FULL NAME AND PHONE NUMBER ON RECORD OF ACTIONS. **DO NOT RECORD IT HERE**.)

RECORDED ON RECORD OF ACTION 1
NO PHONE 2
REFUSED 7

INTERVIEWER, PLEASE NOTE THE FOLLOWING ABOUT THE RESPONDENT BY CIRCLING THE NUMBER OF THE CORRECT RESPONSE:

C-30. SEX

MALE 1
FEMALE 2

C-31. RACE

WHITE, NOT HISPANIC 1
WHITE, HISPANIC 2
BLACK, NOT HISPANIC 3
BLACK, HISPANIC 4
ASIAN 5
OTHER (SPECIFY) 6

_____

C-32. ENTER R'S ZIP CODE: ☐☐☐☐☐

C-33. ENTER R'S PSU #: ☐☐☐

END INTERVIEW TIME: ☐☐:☐☐ A.M. P.M.

SECTION D
INTERVIEW EVALUATION QUESTIONS

D-1. What was the reaction of the respondent as you read through the material **beginning with A-3 through A-16**? (This is the descriptive material including the maps and charts.)

		EXTREMELY	VERY	SOMEWHAT	SLIGHTLY	NOT AT ALL	NOT SURE
a.	How distracted was the respondent?	1	2	3	4	5	8
b.	How attentive was the respondent?	1	2	3	4	5	8
c.	How well did the respondent understand this material?	1	2	3	4	5	8

D-2. Did the respondent say anything suggesting that he or she had any difficulty understanding either the natural recovery process or the speed-up program?

YES 1

NO . . . . . 2 **(SKIP TO D-3)**

D-2A. Describe the difficulties.

_____

_____

_____

D-3. Did the respondent have any difficulty understanding the vote questions (W-1 through W-3)?

YES 1

NO . . . . . 2 **(SKIP TO D-4)**

D-3A. Describe the difficulties.

_____

_____

_____

D-4. When you asked the voting questions did you feel the respondent was impatient to finish the interview?

YES 1

NO . . . . . 2 } **(SKIP TO D-5)**
NOT SURE 8

D-4A. How impatient was the respondent?

VERY IMPATIENT 1
SOMEWHAT IMPATIENT 2
A LITTLE IMPATIENT 3
NOT VERY IMPATIENT 4
NOT SURE 8

D-5. How serious was the consideration the respondent gave to the decision about how to vote?

EXTREMELY SERIOUS 1
VERY SERIOUS 2
SOMEWHAT SERIOUS 3
SLIGHTLY SERIOUS 4
NOT AT ALL SERIOUS 5
NOT SURE 8

D-6. Not counting you and the respondent, was anyone age 13 or older present when the respondent voted?

YES 1

NO . . . . . 2 **(SKIP TO D-7)**

OTHERS CAME IN AND OUT 3

D-6A. Do you think the other person(s) affected how the respondent voted or don't you know?

YES 1
NO 2
DON'T KNOW 8

D-7. Do you have any other comments about this interview?

_____

_____

_____

_____

_____

_____

_____

B-3 SKIP RECORD
W-1: 80
FOR . . . . .
AGAINST/ NOT SURE . . . .
W-2: 140
FOR . . . . .
AGAINST/ NOT SURE . . . .
W-3: 45
FOR . . . . .
AGAINST/ NOT SURE . . . .
W-7
FOR . . . . .
AGAINST/ NOT SURE . . . .

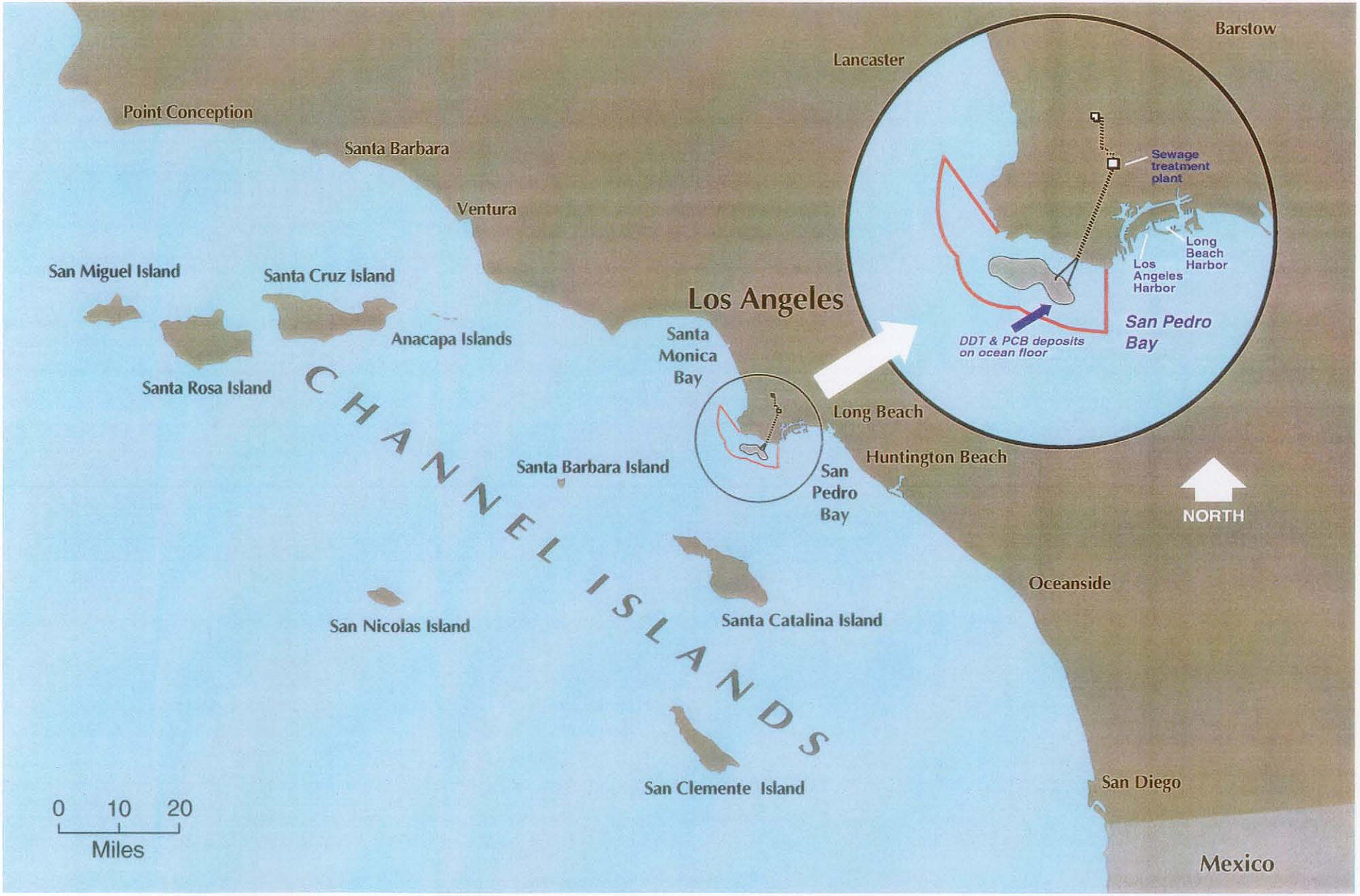
THE FIELD VERSION OF THE MAP BOOKLET WAS 11½" X 14" AND CONTAINED SIX COLOR MAPS, LABELED 1 THROUGH 6. IT WAS SPIRAL BOUND WITH A HEAVY FRONT AND BACK COVER.

California Coastal Areas

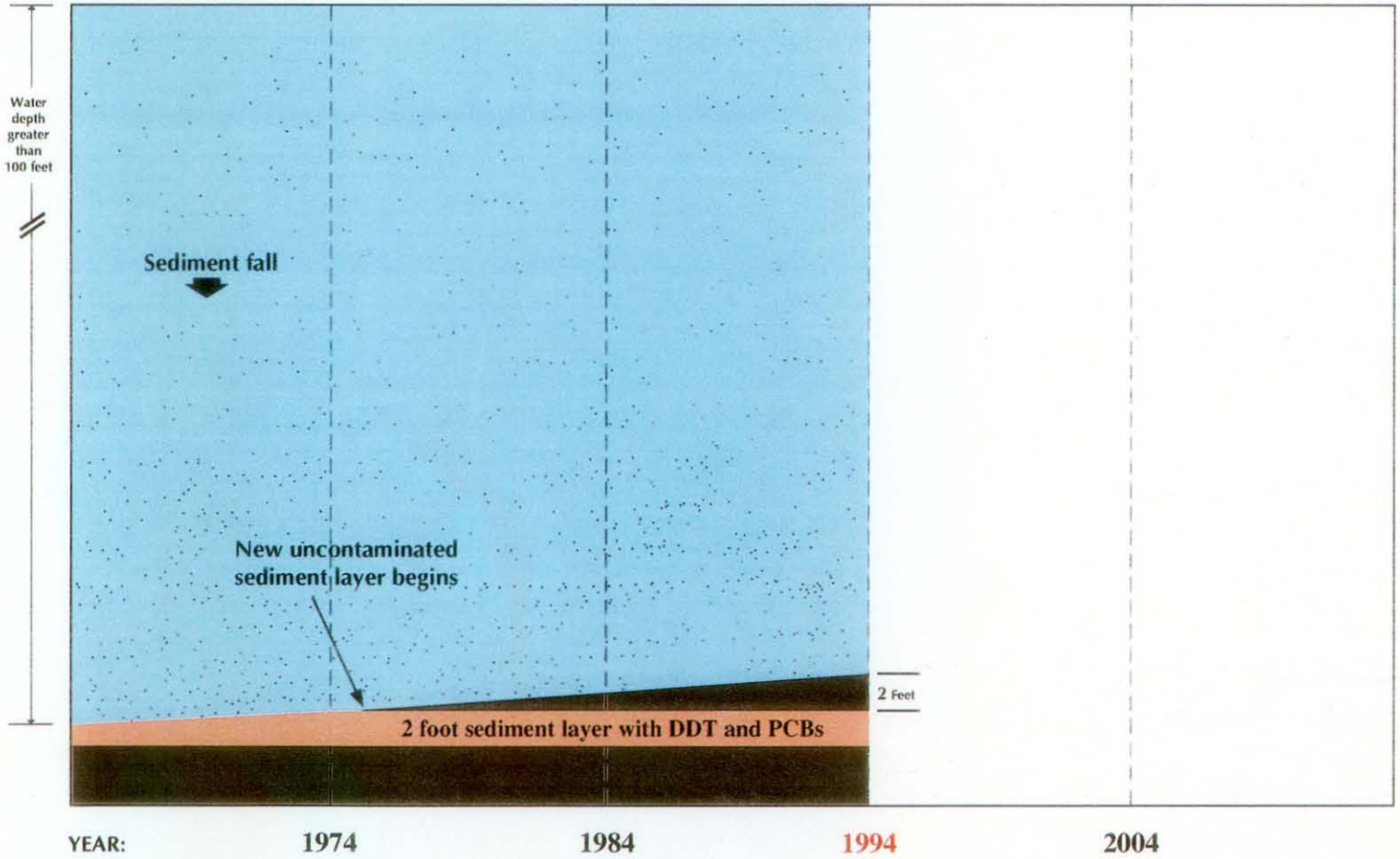
South Coast

Map 2

South Coast

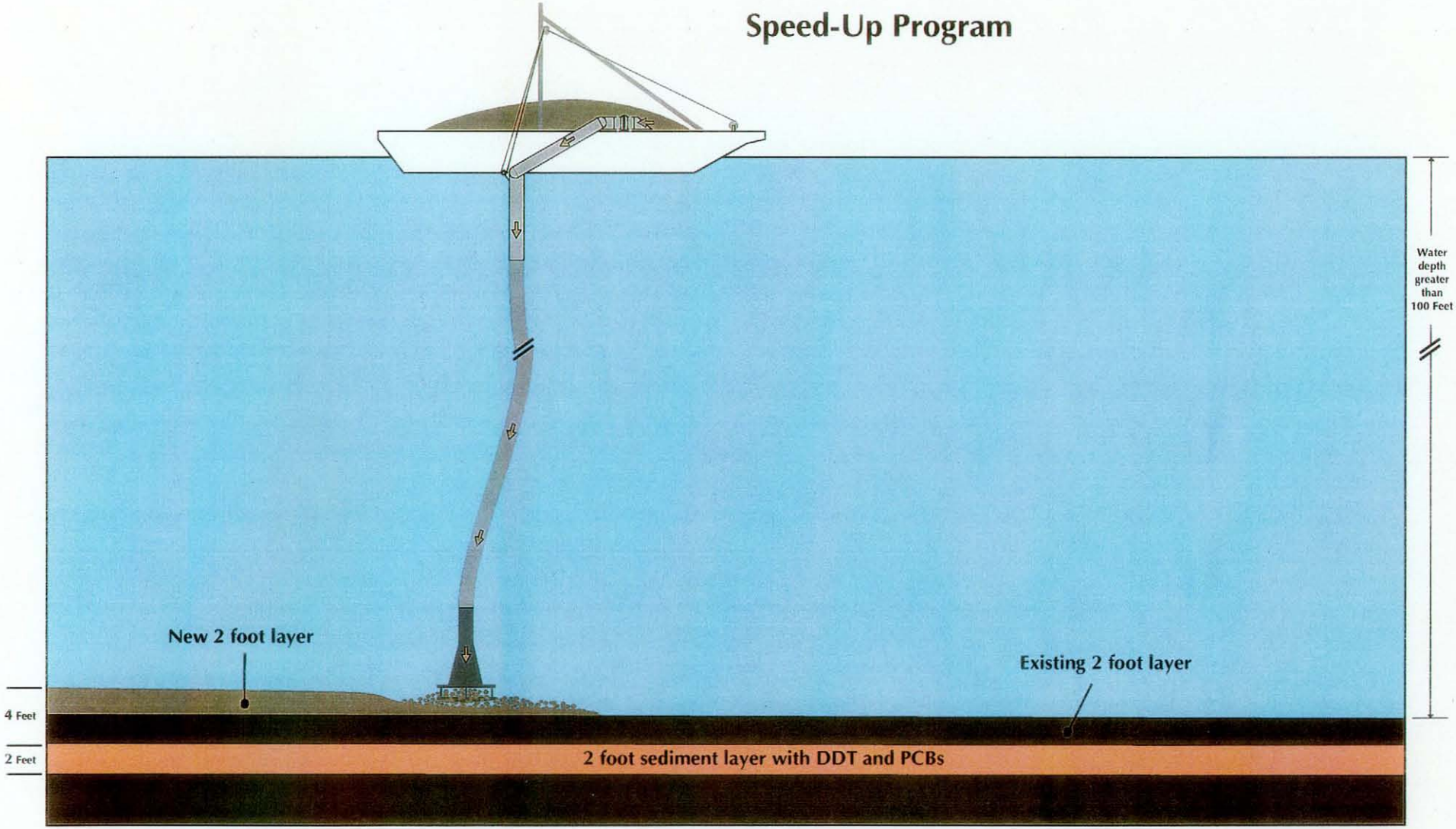


Map 3


Water depth greater than 100 feet
Sediment fall
New uncontaminated sediment layer begins
2 Feet
2 foot sediment layer with DDT and PCBs
YEAR:
1974
1984
1994
2004

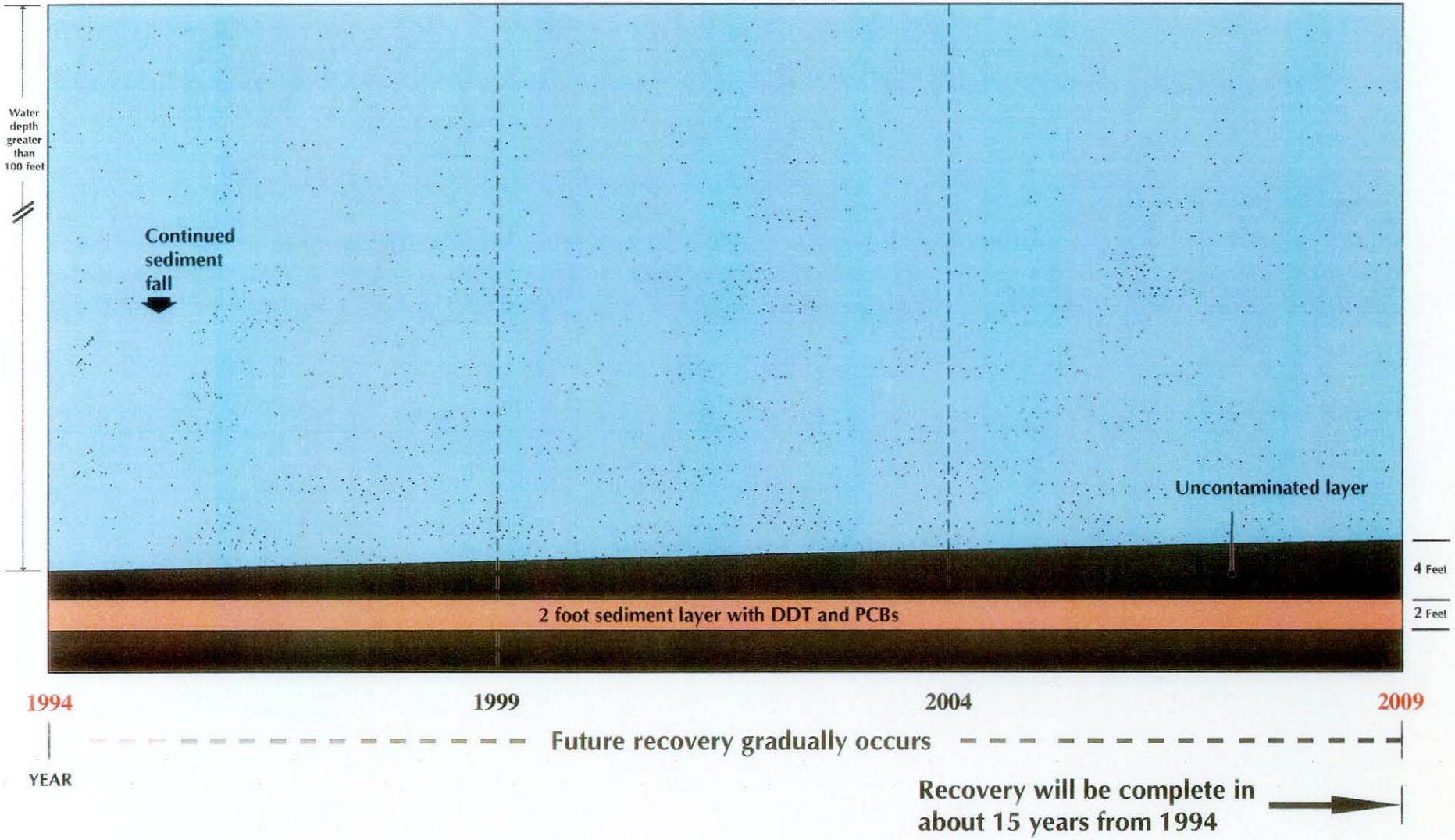
Map 4

Speed-Up Program



Map 5

Natural Recovery Process



Map 6

CARD A

1. Not Important At All

2. Not Too Important

3. Somewhat Important

4. Very Important

5. Extremely Important

1. Reduced a Great Deal

2. Reduced Somewhat

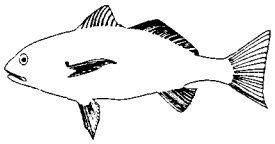
3. Stay the Same

4. Increased Somewhat

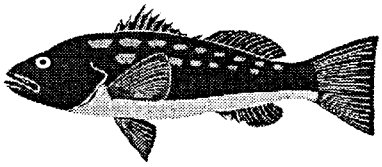
5. Increased a Great Deal

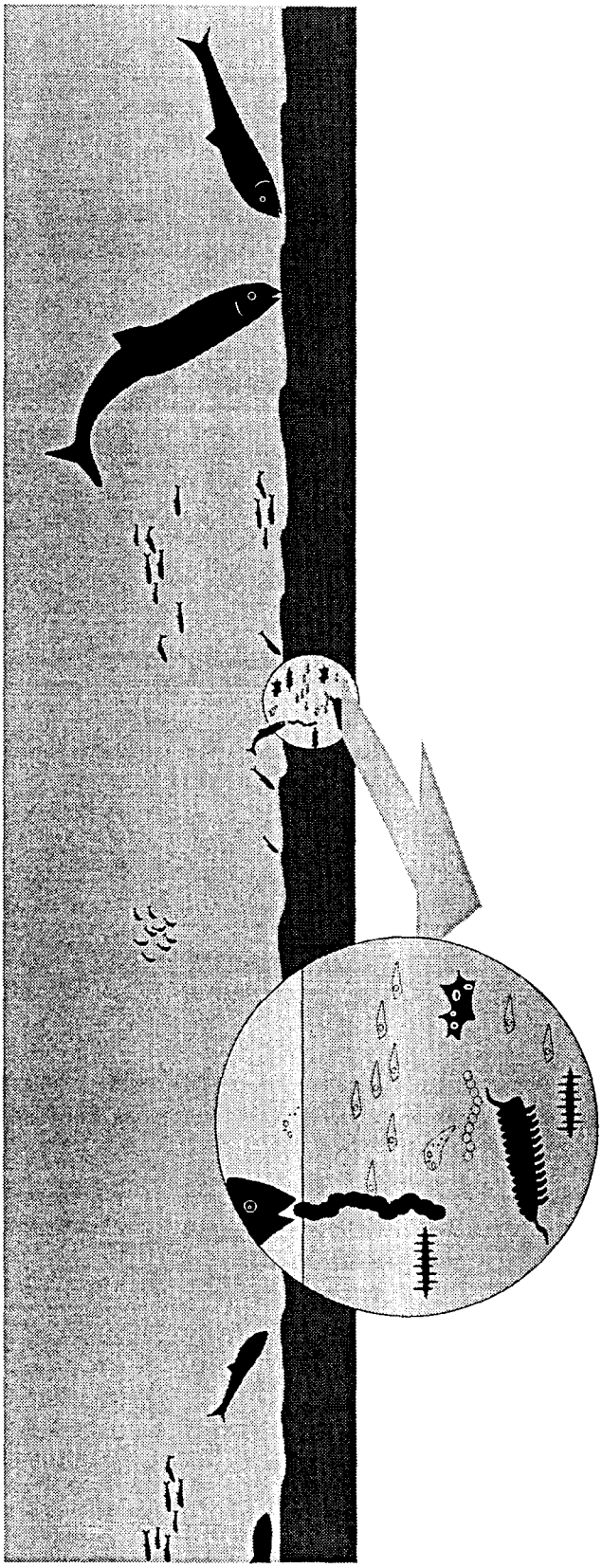
SOUTH COAST FISH AFFECTED

WHITE CROAKER



KELP BASS
(Calico Bass)





This deposit does not harm humans and the two fish species will recover anyway in 15 years.

Your household might prefer to spend the money to solve other social or environmental problems instead.

The program costs more money than your household wants to spend for this.

1. Mostly effective

2. Somewhat effective

3. Not too effective

4. Not effective at all

1. Not Serious At All

2. Not Too Serious

3. Somewhat Serious

4. Very Serious

5. Extremely Serious

1. Very Often

2. Often

3. Sometimes

4. Rarely

5. Never

1. Environmental Activist

2. Strong Environmentalist

3. Somewhat Strong Environmentalist

4. Not Particularly Strong Environmentalist

5. Not An Environmentalist At All

Total Before-Tax Income in 1993 for
Everyone in Your Household*

A. Under $10,000

B. $10,000 to $19,999

C. $20,000 to $29,999

D. $30,000 to $39,999

E. $40,000 to $49,999

F. $50,000 to $59,999

G. $60,000 to $69,999

H. $70,000 to $79,999

I. $80,000 to $99,999

J. $100,000 to $149,999

K. $150,000 or more

*Please include all income sources, including social security or other retirement, etc., for everyone in your household.

1. Great Deal of Confidence

2. Some Confidence

3. Hardly Any Confidence

4. No Confidence At All

1. Always

2. Almost Always

3. Most of the Time

4. Some of the Time

5. Almost Never

6. Never

Appendix A.3
"Q & A's Not In Questionnaire" Cards for Base and Scope

CALIFORNIA ISSUES STUDY
VERSION A
Q AND A's NOT IN QUESTIONNAIRE

Initial Contact

Why are you doing this survey? **The study will provide information so State policy makers can understand how people like yourself feel about these issues.** (If needed) **We are not selling anything.**

What is this survey about? We are faced with many problems in California today. This study is about some of these problems and issues. Some may be of concern to you, others may not. The study attempts to find out how Californians feel about some of the problems facing the state today.

Who is doing this survey? **The survey is being conducted by Westat, Inc., a survey research firm in Rockville, Maryland.** (If needed) **Westat has conducted nationwide surveys for many government agencies such as the U.S. Department of Health and Human Services, the Department of Education, and the Department of Energy.**

Which State agency is the study for? **We are conducting this study for a group of state agencies that are concerned with these issues.**

How did you select me? **This community was selected randomly from a list of all communities in California. Then your address was selected randomly from a listing we prepared of <u>all</u> the addresses in this community. We selected addresses, <u>not</u> people.**

(continue over)

Page 5 Elsewhere	If R asks for an answer to a question he/she has asked, answer: **"I don't know the answer to that question, but I will write it (have written it) down because the researchers want to know what questions people have about this."**
Card C & Page 5	If R asks about the size of these fish, answer: **"The adult kelp bass ranges in size from about 10 to 16 inches and the croaker from about 5 to 13 inches."**
Page 8	If R asks about the difference between endangered and threatened, answer: **"Endangered species means a species that is in danger of extinction throughout all or a significant part of its range. Threatened species means any species that is likely to become an endangered species within the foreseeable future."**
Page 18	If R has had taxes withheld from a paycheck and asks whether this additional tax would be withheld from the paycheck, answer: **"Yes"**
W-1	If R is confused about the idea of a household amount, say: **"Think of this amount as a total amount for your household."** If R expresses uncertainty about voting by saying "I can't vote," answer: **"If you could vote, would you vote for the program or against it."** If R expresses uncertainty or wants to know what you think, answer: **"We want to know what you think. Take as much time as you want to answer this question. (PAUSE) We find that some people say they would vote for, some against; which way would you vote if the plan cost your household $_____?"**
W-5	If the R's answer is vague such as "I don't know" or "I'm just not sure," answer: **"Can you tell me what it is about the program that made you unsure?"**
B-1 to B-6	If R is impatient or puzzled by these questions, say: **"We find that some people have different ideas about this. It is important for us to know what you had in mind."**
B-13 to B-17	If R says, "What do you mean by _____?" answer: **"Whatever it means to you."**
C-24	If R asks for clarification, answer: **"(Name of item) in general."**

NEW Q AND A's FOR INTERVIEWERS

Why do you say the eagles are endangered? I recently read in the paper that Bald Eagles are no longer endangered.

On June 30, the federal government announced that it will change its classification of the Bald Eagle from an "endangered species" to a "threatened species." This change applies to most of the country.

When the questionnaire was prepared some months ago, the recent change in classification of the Bald Eagle by the federal government had not been announced. That is why we said a change like this was under "consideration."

Are the eagles still endangered in California?

Although the State of California still lists the Bald Eagle as endangered, in our state it can be considered to be "threatened" but not "endangered" every where but in the South Coast. In the South Coast it should be thought of as endangered for the reasons I have described to you.

What does "threatened" mean?

This status means that although the species is not in immediate danger of extinction, there is still concern that the number of live individuals of that species is small. Species classified as "threatened" are protected by law.

CALIFORNIA ISSUES STUDY
VERSION B
Q AND A's NOT IN QUESTIONNAIRE

Initial Contact

Why are you doing this survey? The study will provide information so State policy makers can understand how people like yourself feel about these issues. (If needed) We are not selling anything.

What is this survey about? We are faced with many problems in California today. This study is about some of these problems and issues. Some may be of concern to you, others may not. The study attempts to find out how Californians feel about some of the problems facing the state today.

Who is doing this survey? The survey is being conducted by Westat, Inc., a survey research firm in Rockville, Maryland. (If needed) Westat has conducted nationwide surveys for many government agencies such as the U.S. Department of Health and Human Services, the Department of Education, and the Department of Energy.

Which State agency is the study for? We are conducting this study for a group of state agencies that are concerned with these issues.

How did you select me? This community was selected randomly from a list of all communities in California. Then your address was selected randomly from a listing we prepared of all the addresses in this community. We selected addresses, not people.

(continued over)

Page 5 & Elsewhere	If R asks for an answer to a question he/she has asked, answer: "I don't know the answer to that question, but I will write it (have written it) down because the researchers want to know what questions people have about this."
Card C & Page 5	If R asks about the size of these fish, answer: "The adult kelp bass ranges in size from about 10 to 16 inches and the croaker from about 5 to 13 inches."
Page 15	If R has had taxes withheld from a paycheck and asks whether this additional tax would be withheld from the paycheck, answer: "Yes"
W-1	If R is confused about the idea of a household amount, say: "Think of this amount as a total amount for your household."
	If R expresses uncertainty about voting by saying "I can't vote," answer: "If you could vote, would you vote for the program or against it."
	If R expresses uncertainty or wants to know what you think, answer: "We want to know what you think. Take as much time as you want to answer this question. (PAUSE) We find that some people say they would vote for, some against; which way would you vote if the plan cost your household $_____?"
W-5	If the R's answer is vague such as "I don't know" or "I'm just not sure," answer: "Can you tell me what it is about the program that made you unsure?"
B-1 to B-6	If R is impatient or puzzled by these questions, say: "We find that some people have different ideas about this. It is important for us to know what you had in mind."
B-13 to B-17	If R says, "What do you mean by _____?" answer: "Whatever it means to you."
C-24	If R asks for clarification, answer: "(Name of item) in general."

Appendix B
Main Study Survey Design

B.1 Effects of Offering a No-Vote Option
B.2 Response Order Effects for Dichotomous Choice Questions

Appendix B.1
Effects of Offering a No-Vote Option

§ 1 Introduction

The NOAA Panel on Contingent Valuation suggested that a no-answer option should be offered explicitly in referendum questions used to measure willingness to pay (WTP) (Arrow *et al*, 1993, p. 4609). This recommendation was presumably based upon a concern that some respondents might have no opinion regarding a referendum but might feel pressure to vote in order to appear cooperative. Converse (1964) suggested some years ago that respondents in this position might answer questions of opinion arbitrarily or even purely randomly. If this type of respondent behavior were to occur in a CV survey, some people would be providing answers that are not reflective of their preferences. If these individuals were instead encouraged not to vote, the mis-estimation of WTP could conceivably be prevented.

The NOAA Panel also recommended that researchers explore the possibility of using a secret voting mechanism to mirror the use of secret ballots in elections. Their notion was that the presence of an interviewer might lead some respondents to feel pressure to vote in favor of the referendum on the presumption that such a vote might appear to be socially desirable in this context. Approaches which allow survey respondents to report socially undesirable behavior (such as illegal drug use) without directly telling an interviewer have sometimes increased the reporting of such behavior. If some answers to CV surveys are the result of interpersonal pressure on respondents to appear socially desirable, then measuring WTP via secret ballot might reduce votes in favor.

The Panel's concerns may not be as applicable to well-designed CV surveys as to more conventional surveys. In conventional polls, attitudes are typically measured using relatively short questions about minimally-specified issues (*e.g.*, "Do you think U.S. defense spending should be increased, decreased, or kept about the same?"). Thus, many people may not have

an adequate understanding of the object in question and/or may not have pre-existing opinions about it. Legitimizing a no-opinion response might therefore be quite desirable, so that these individuals could feel comfortable acknowledging that preference. In contrast, CV surveys provide respondents with the information they need to formulate judgments about the object. Furthermore, well-designed CV surveys go to great lengths to minimize social desirability pressures and to maximize the objectivity of the interview process, thus minimizing interviewer effects.

More importantly, it is possible that the procedures recommended by the Panel might have additional consequences beyond those that they addressed directly. In fact, a model of survey responding proposed recently by Krosnick (1991) anticipates just such consequences. This model suggests that both the use of a not-vote option and the use of a secret ballot might actually work against the goal of collecting high-quality data from respondents. The model draws on the distinction between optimizing and satisficing. Optimizing occurs when a person exerts the mental effort necessary to evaluate a question carefully and to report a judgment that clearly represents his or her opinion on the issue in question. Satisficing occurs when a person instead chooses to spend as little effort as possible in order to provide an answer that simply appears to be reasonable. Krosnick proposed that this is most likely to occur (1) when a cue in a question points to an easy answer that respondents can give while expending little effort to select or justify the choice, and (2) when a respondent's ability and motivation to optimize are low.

According to this perspective, offering respondents the opportunity to say they have no opinion on an issue provides an easy way for those who wish to satisfice to do so. If this option were not presented, however, these respondents would find it harder to satisfice and would be

more likely to expend the mental effort necessary to optimize. That is, offering a no-opinion response option might forego collecting valid data from these individuals. In CV surveys, then, offering an explicit option not to vote might lead some people who are otherwise disposed to satisfice, to select this response and thereby bypass expending the effort necessary to assess their preferences precisely and report them accurately.

Krosnick's perspective suggests a similar drawback to employing a secret voting approach. One source of respondent motivation to optimize in surveys is accountability, the belief that one might be asked to justify the answers he or she gives to survey questions. When accountability is high, the risk of satisficing is decreased, because the interpersonal costs of being unable to justify an answer may be significant. In contrast, if people vote on CV referenda via secret ballot to which interviewers have no access, respondents can be confident that they will not be asked to justify their answers. Thus, under secret voting conditions, attraction to the not-vote option may be particularly pronounced, and the loss of useful data quite significant. We designed a test of these ideas in the context of a CV survey.[1]

§ 2 Not-Vote Option Test

Our test was done with a questionnaire that assessed lost passive use values for the natural resources in Prince William Sound, Alaska, that were injured by the 1989 Exxon Valdez oil spill. Respondents were asked how they would vote on a proposal to prevent future spills of this sort at a specified cost. Varying the form of the referendum question allowed us to assess the impact of providing people with an option not to vote.

[1] The results reported here draw upon and extend work reported on in NRDA (1994). That study looks at four different treatments combining oral voting and secret (ballot box) voting with a not vote option. The principal result of that study was that the four different treatments resulted in willingness-to-pay estimates which were not statistically different from each other.

§ 2.1 Data collection. The National Opinion Research Center interviewed 1,182 Americans face-to-face in their homes during May, June, and July, 1993 (response rate = 73%). The survey used a probability sample of adults chosen from 34 counties throughout the United States. The questionnaire presented a lengthy scenario describing the condition of Prince William Sound before the Exxon Valdez spill, as well as the damage done by the spill. Respondents were then told that a plan had been proposed to prevent a future oil spill of this sort in that location. The plan involved setting up a fleet of escort ships to guide oil tankers into and out of the Sound and to contain oil if some were spilled. Respondents were told that implementing the plan would cost their households a specified dollar amount, to be paid as a one-time federal income tax (either $10, $30, $60, or $120, determined randomly for each respondent). Respondents were then asked whether, they would vote for or against the proposal in a referendum.

§ 2.2 Voting Treatments. Four different versions of the referendum voting measure were implemented in this study. Three hundred respondents received what we call the standard version, which asked them to answer the referendum question aloud without being given the explicit option not to vote. When respondents receiving this version said they would not vote, however, interviewers accepted those answers. Another 322 people received the explicit not-vote version, which asked them to answer the referendum aloud but offered them the explicit option to say that they would not vote.

A third group of 271 people were not given the explicit not-vote option, and they were asked to vote secretly. Interviewers handed them a paper ballot, an envelope in which to place

the ballot, and a wooden box with a small opening on the top, and gave them the following directions:

> Because elections in the United States use secret ballots, I will ask you to record your vote on a secret ballot. Please don't tell me how you vote. This is the ballot that you will use. Once you have voted, please seal the ballot in the envelope and drop it in this ballot box. Your ballot will be sent, unopened, to the National Opinion Research Center.

We refer to this treatment as the ballot box version.

A final group of 289 people also voted secretly, but they were told explicitly that they could choose not to vote at all if they wished. This is called the ballot box/not-vote version.

Table 1 displays the attributes of these four groups' measurement conditions.

Table 1. Study Design

Condition Method	Number of Respondents	Not-Vote Option	Voting
Standard	300	No	Oral
Not-Vote	322	Yes	Oral
Ballot Box	271	No	Secret
Ballot Box/Not-Vote	289	Yes	Secret

§ 3 Results

The not-vote option increased abstentions. As expected, offering the not-vote option increased the proportion of respondents who abstained from the voting decision. This proportion was 4.7% among individuals who were not offered the not-vote option, and it increased to 17.2% among people who were offered this option ($p < 0.01$, see first panel in Table 2).

The increase in abstentions was most common under conditions thought to foster satisficing. Krosnick (1991) proposed that if attraction to the not-vote option is a result of

Table 2. Proportions of Respondents Abstaining From the Referendum Vote

"I Would Not Vote"			
	Option Not Offered	Option Offered	Difference
All Respondents	4.7% (571)[1]	17.2% (611)	12.5%*
Respondents With Less Than High School Education	8.7% (103)	28.7% (87)	20.0%*
High School Graduates	4.6% (196)	21.9% (215)	17.3%
Respondents With Some College Education	2.5% (120)	13.4% (157)	10.9%*
College Graduates	4.2% (142)	8.6% (140)	4.4%
Oral Voting	6.7% (300)	17.7% (322)	11.0%***
Secret Voting	2.6% (271)	16.6% (289)	14.0%***
Oral Voting: Less Than High School	8.2% (49)	22.0% (41)	13.8%+
Secret Voting: Less Than High School	9.3% (54)	34.8% (46)	25.5%**

[1]Numbers in parentheses are numbers of cases.
+$p < 0.10$
*$p < 0.05$
**$p < 0.01$
***$p < 0.001$

satisficing, it should be most common under the circumstances that promote satisficing. Consistent with this reasoning, attraction to the not-vote option was greatest among people for whom optimizing should be most difficult, those with relatively low cognitive skills. As the second panel of Table 2 shows, an explicit not-vote option led 20% more of the least educated respondents to say not vote, whereas the comparable figure among the most edcated respondents

was only 4.4%. The negative relation of education to the impact of offering the not-vote option was statistically significant ($p < .01$).

If using the ballot box reduces accountability and encourages satisficing, then attraction to the not-vote option should be greater with the ballot box than without it. And, as the third panel of Table 2 shows, this is indeed the case. Eleven percent of respondents are attracted to the not-vote option under oral voting conditions, and this figure increases to 14.0% when the ballot box is used, a marginally significant difference ($p < 0.10$). As anticipated, this difference is even more pronounced among respondents lowest in cognitive skills: attraction to the not-vote option was nearly twice as frequent (25.5%) under secret voting conditions than under oral voting conditions (13.8%, see the bottom panel of Table 2).

The not-vote option did not alter the proportion of people voting in favor of the program. The proportion of respondents voting in favor of the escort ship program was not altered by the not-vote option manipulation. When the not-vote option was omitted, 51.5% of respondents voted in favor of the program, and when the not-vote option was offered, 48.9% voted in favor. This difference is not statistically significant. Thus, it appears that almost all of the respondents who selected the not-vote option when it was offered would have voted against the program if that option had been omitted.

The not-vote option did not improve data quality. We assessed the "quality" of the votes in favor and opposed to the program in two ways. First, we gauged how much they responded to changes in the amount that respondents were told they would have to pay if the plan were implemented. When people optimize, fewer individuals should be willing to pay for the plan as the price increase. And, if offering the not-vote option prevents some people from making haphazard votes, then responsiveness to price should increase under those circumstances.

However, responsiveness to price was the same when the not-vote option was offered as when it was omitted ($\chi^2_{(2)}$= 3.21, p = 0.201). The same result was obtained when we examined only those individuals who voted orally ($\chi^2_{(2)}$= 3.62, p = 0.164) and only those who voted secretly ($\chi^2_{(2)}$= 1.07, p = 0.586).

We also examined the degree to which people's votes reflected a range of attitudinal and demographic predictors, including beliefs about how well they thought the escort ship program would work, how much damage they felt it could prevent, their likelihood of visiting Alaska, and their general support for environmental protection. Parameter estimates from probit equations for the four questionnaire forms are shown in Table 3 below. Here again, the linkage between people's votes and these predictors was no stronger when the not-vote option was offered than when it was omitted ($\chi^2_{(8)}$= 2.57, p = 0.958). Furthermore, this was unchanged when looking only at respondents who voted orally ($\chi^2_{(8)}$= 6.76, p = 0.563) and when looking only at those who voted secretly ($\chi^2_{(8)}$= 3.92, p = 0.864). Thus, data quality was unaltered by the manipulations.

§ 4 Conclusion

We tested the NOAA Panel's suggestion regarding the addition of an explicit no-answer option in CV surveys using a referendum. The evidence from our tests indicate that offering a not-vote option does not alter substantive findings of a survey, either by altering willingness to pay or by avoiding haphazard responses. The addition of a secret ballot does not change this result. We therefore see no reason that respondents should be offered an explicit no-answer option.

Table 3: Probit Equations Predicting Votes For and Against the Escort Ship Program

	Oral Voting			Secret Voting		
	Not-Vote Option			Not-Vote Option		
Predictor	Not Offered	Offered	Difference	Not Offered	Offered	Difference
Tax amount	-.4101**	-.4941**	.0840	-.1597+	-.1747+	.0150
Likely damage without the plan	.4372**	.6549**	-.2177	.4191**	.3110**	.1081
Effectiveness of the plan	-.3917**	-.5779**	.1862	-.3356**	-.2836**	-.0520
Support for protecting wildlife areas	.4235*	.2777	.1458	.2098	.3075+	-.0977
Likelihood of visiting Alaska	.4274*	.4764*	-.0490	.2390	.3628*	-.1238
Race (white versus others)	.4275+	.1370	.2905	.1661	.3367	-.1706
Belief that oil companies should pay	-.5265*	-.7087**	.1822	-.9272*	-.3407	-.5865
Constant	-.4265	.9210		-.2139	-.1583	
N	280	265		264	241	

Note: None of the differences in the third and sixth columns of this table are statistically significant or marginally significant.

+p<0.10
*p<0.05
**p<0.01

Appendix B.2
Response Order Effects for Dichotomous Choice Questions

§ 1 Introduction

During the past sixty years, numerous studies have documented the occurrence of response-order effects, *i.e.*, that people's answers to survey questions are determined partly by the order in which answer choices are presented (*e.g.*, Krosnick and Alwin, 1987). Although response-order effects have been shown using many different sorts of questions, including questions with long and linguistically complex dichotomous-response choices, such effects had not been investigated in questions that present simple, dichotomous choices. Questions with choice-pairs such as favor/oppose, for/against, agree/disagree, and like/dislike are some of the most common types of survey items, *e.g.*, the omnipresent item asking people whether they approve or disapprove of the president's job performance. Questions involving such choices seem most naturally presented with the positive or affirmative alternative first and the negative one second, and this is generally how they are asked.

To assess the impact of response order in questions using a referendum format, we conducted a set of four split-sample tests. Three of the four tests show no effect from varying response order. In the fourth test, the question with *vote-for* in the first position obtained fewer votes for the program.

§ 2 Method

For an omnibus survey, the Roper Organization interviewed a national sample of 1,982 Americans face-to-face in their homes during August of 1993. Forty-seven percent of the sample respondents were male, and 53% were female. Eighty-two percent were white; 13% were black; 3% were Asian; and 2% were other races. Twenty percent of the sample had less than a high school education; 37% were high school graduates; and 43% had at least

attended some college. Fifty-six percent of respondents were married, and 48% were between ages 18 and 39.

Among the approximately 150 questions asked in this omnibus survey, our four were designed to test for response order effects:

> [Import Tax.] On another subject. The Federal Government is considering raising the import tax on steel that comes into the United States from other countries. Raising the steel tax would protect the steel industry from foreign competition and create more jobs for American steel workers. However, it would also increase the prices Americans pay for products made from steel.
>
> If you could vote on this, would you vote for raising the import tax on steel or would you vote against it?
>
> * * *
>
> [Spotted Owl.] As you may know, the Spotted Owl is an endangered species that lives in some old forests in the Pacific Northwest. The only way to protect the Spotted Owl is for the Forest Service to issue a new rule that limits the number of trees that companies are allowed to cut in these forests. If fewer trees are cut, the price of lumber for new houses would increase somewhat and several thousand loggers would be put out of work.
>
> If you could vote on this, would you vote for the new rule that limits logging in these forests or would you vote against it?
>
> * * *
>
> [Drug Development.] Moving on to other topics. The U.S. Food and Drug Administration is considering a special program to approve new drugs for life-threatening diseases like cancer before they are fully tested. If the program is approved, the drugs would be available faster, but the risk of harm from unexpected side effects would be greater.
>
> If you could vote on this, would you vote for the special program to speed drug approval or would you vote against it?
>
> * * *
>
> [Mandatory Insurance.] At present about one out of every four automobile drivers in the United States does not have accident insurance. The federal government is considering a national program, that would be strictly enforced, to require every driver in the U.S. to carry this insurance. This program would protect all drivers from worrying about being hit by an uninsured driver. However, it would increase the cost of auto insurance for everybody by about 10 percent to cover the enforcement cost. It would also force some low income people who cannot afford auto insurance to stop driving.

> If you could vote on this, would you vote for a national program to require accident insurance or would you vote against it?

If respondents said they would not vote at all or that they didn't know how they would vote, interviewers were instructed to accept those answers rather than encouraging respondents to make choices.

Roper was instructed to scatter the four questions throughout the interview, with the constraint that they should not immediately follow questions on similar topics. The import tax item was the 28th question in the interview; the spotted owl item was the 35th question; the drug development item was the 97th question; and the mandatory insurance item was the 111th question.

Respondents were assigned to receive either the X or Y form of the questionnaire. On the X form, the spotted owl and mandatory insurance items were presented with the *for* option first, and the import tax and drug development items offered the *against* option first. On the Y form, the import tax and drug development items presented the *for* option first, and the spotted owl and mandatory insurance items presented the *against* option first. Each interviewer alternated administering the X and Y forms across his or her sequence of respondents.

§ 3 Results

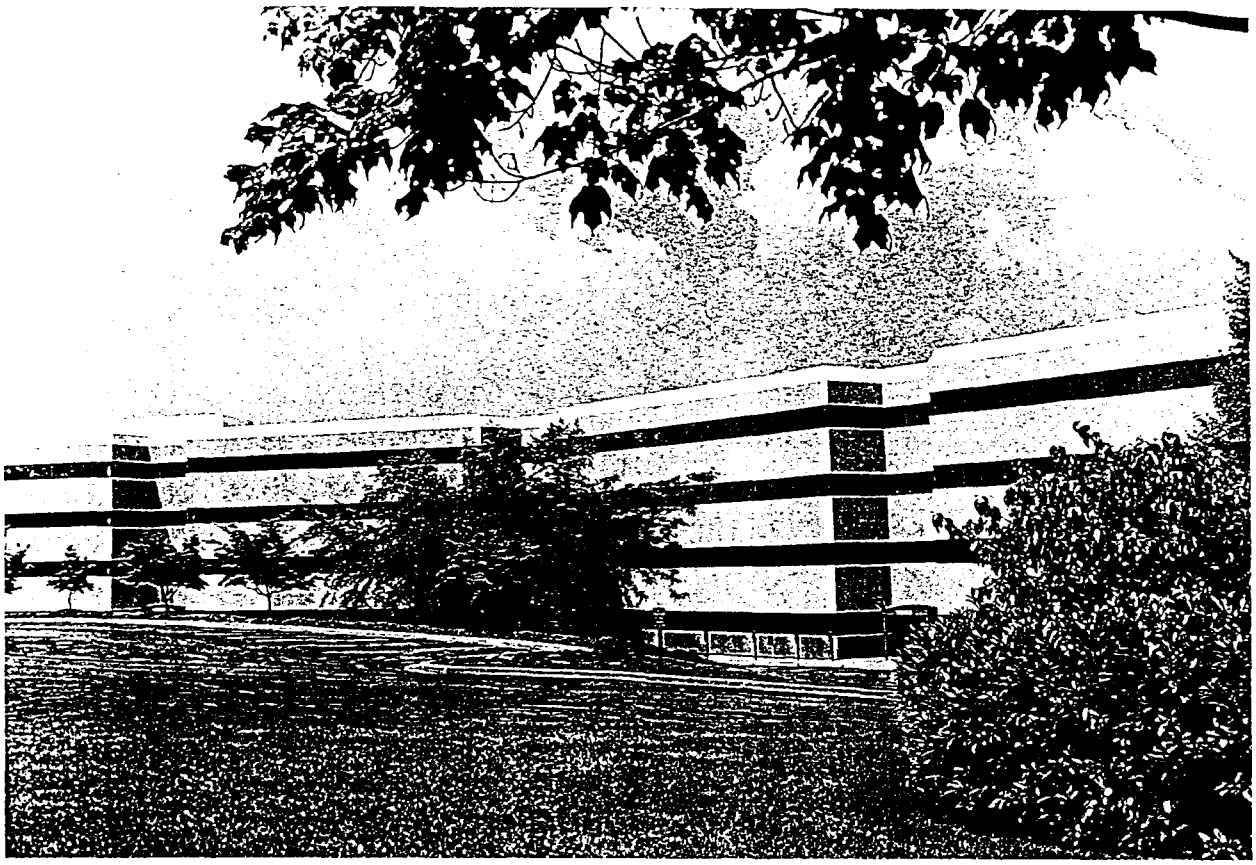
As Table 1 shows, treatment differences for the Spotted Owl, Drug Development, and Mandatory Insurance items were small, and none approached significance. A marginally significant response-order effect did appear for the Import Tax item, for which approximately four percent more respondents said they would vote in favor when the *vote-for* option was presented last than said they would vote in favor when the *vote-for* option was presented first. Thus, this set of split-sample tests suggests that simple dichotomous-choice questions

are usually not subject to response order effects; but if they are, then using the for/against response order reduces the proportion of votes *for*. On the basis of this evidence, the for/against response is a conservative choice in a contingent valuation study since, if response order makes a difference, this choice will understate the number of votes *for*.

Table 1. Proportion of *Vote-For* Responses by Question Form and Education Level

Item	Question Form	Full Sample
Import Tax	*For* First	60.6 %
	Against First	65.0%
	$\chi^2_{(1)}$	3.29
	p	.07
	N	1,542
Spotted Owl	*For* First	59.5%
	Against First	57.6%
	$\chi^2_{(1)}$	.58
	p	.45
	N	1,632
Drug Development	*For* First	67.0%
	Against First	64.3%
	$\chi^2_{(1)}$	1.39
	p	.24
	N	1,692
Mandatory Insurance	*For* First	59.9%
	Against First	61.2%
	$\chi^2_{(1)}$	.31
	p	.58
	N	1,626

Appendix C.1
Westat Brochure



Westat is an employee-owned corporation headquartered in the greater Washington, DC, metropolitan area. We provide research, survey, and consulting services to the agencies of the U.S. Government and to a broad range of institutional and business clients. With a strong technical and managerial staff and a long record of high-quality research efforts, we have become one of the leading survey research and evaluation organizations in the United States. Our capabilities include state-of-the-art telephone, in-person, and mail survey techniques and facilities.

Our professional staff of more than 600 has designed and conducted large-scale research efforts and provided the personal client services necessary on customized studies of all sizes. This staff includes statisticians, psychologists, medical researchers, sociologists, economists, market research and behavioral analysts, computer systems analysts, and programmers. Their capabilities cover a wide range of methodological skills and subject areas. Their activities are supported by a strong staff of survey designers and managers, field supervisors, survey assistants, and interviewers. The entire staff works in a professional climate that encourages high-quality project performance.

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RESEARCH STUDY DESIGN AND ANALYSIS

SURVEY AND QUESTIONNAIRE DESIGN. Westat combines subject and program area expertise with a thorough knowledge of survey methods and extensive experience in developing and using a broad range of survey designs and data collection instruments. This experience encompasses case-control studies, retrospective cohort studies, and longitudinal followup studies. In program evaluation studies, we have developed impact measures and comparison groups, examined program processes in relation to program outcomes, and developed models to isolate program effects from exogenous factors. Westat data collection instruments have dealt with employment and earnings histories, health conditions, medical treatments, and program participation, as well as respondent knowledge, attitudes, and behaviors.

SURVEY RESEARCH METHODS. Westat has been a leader in the development and evaluation of survey methodologies across a wide range of substantive areas. This research has included detailed case studies, focus groups, and large-scale field experiments. Westat has also been in the forefront in applying the methods of cognitive psychology to survey research. These methods have been used to develop all phases of the survey process, including the survey instruments, interviewing techniques, and data collection modalities (comparison of telephone and in-person collection).

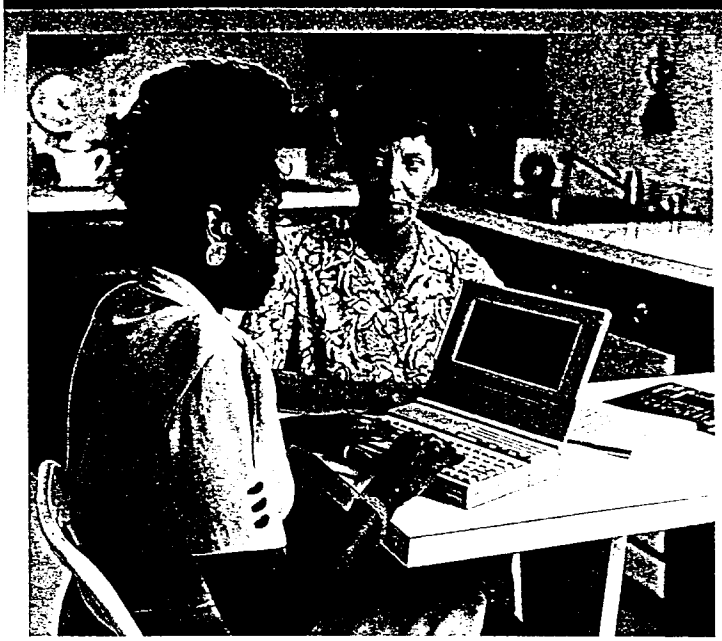
SAMPLE DESIGN. Our statistical capabilities are an important foundation of most of our survey research projects. Our most senior survey statisticians are international authorities in survey methodology and sample design. They have made important technical contributions to the use of effective statistical methods: **area probability sampling, random digit dialing** for telephone surveys, **automated variance estimation,** and **data imputation.** They guide our statistical staff in applying customized, optimally efficient sampling and estimation procedures to our broad range of survey research projects. Our senior statistical staff work closely with project teams throughout the design, implementation, and analysis phases of our major projects.

Under statistical support contracts, Westat statisticians have provided important design support in connection with the revision of the Consumer Price Index and the National Health Interview Survey, and they have frequently been engaged as expert statistical witnesses in administrative hearings and court actions.

PROGRAM EVALUATION. Westat evaluators bring together their expertise in agency-specific programmatic areas with their understanding of data collection and analytic methodologies to design, implement, and report on process evaluation and program impacts.

DATA ANALYSIS. Westat analysts are thoroughly experienced in the broad range of analysis and presentation methods required to meet client needs. In many areas, Westat personnel have made nationally and internationally recognized contributions in statistical analysis. Data analysis often begins with the need to thoroughly summarize study results. Using descriptive techniques, Westat researchers regularly prepare tabular study findings and frequently combine them with graphic summaries that present results in an easily understood format.

Westat analysts are also thoroughly versed in the analysis of data from program evaluations, quasi-experiments, interrupted time series, and survey designs. **Multivariate inferential analyses** utilize various techniques such as regression, factor, multidimensional scaling, and cluster analyses. Several perceptual or attitudinal measures are often summarized in convenient, easily understood ways using these techniques. For the analysis of complex (i.e., non-simple random sample) surveys, Westat has developed computer software for the descriptive and multivariate analysis of study results. Modeling is used to predict the answers to "what if" questions. Westat has developed several mathematical models, using econometric methods to simulate or forecast changes in program outcomes.



For computer assisted personal interviewing, a Westat field interviewer uses one of Westat's notebook-sized (8-1/2" x 11") personal computers. These laptop computers have 20 megabyte hard disks, internal modems, and battery packs, yet weigh only 7 pounds.

FOCUS GROUP AND COGNITIVE LABORATORY EXPERIENCE. Focus groups are semi-structured interviews with 8 to 10 participants, led by trained moderators. Participants are often selected for the topics under investigation and have included Government officials, community leaders, representatives of various occupations, and members of the general population.

Westat uses focus groups in several ways. Sometimes they are used to develop or refine survey questionnaires, to refine the design and analysis of traditional probability sample surveys, or as stand-alone data collection mechanisms in substantive studies and program evaluations. In other cases, they are the primary data collection tool for qualitative evaluations. Westat staff prepare reports that summarize the main themes and issues elicited by the focus groups.

Westat's in-house focus group facility includes built-in microphones, a monitoring room with a one-way mirror, and the audiovisual equipment to monitor and record sessions. Our experienced moderators are skilled at eliciting key information about the program or issue in question.

Cognitive research methods provide important new tools for conducting in-depth examinations of the processes respondents use to answer survey questions. Concurrent and retrospective protocols, behavioral coding of respondent-interviewer interactions, and respondent debriefings are among the methods that are used to evaluate survey instruments and the procedures used to administer them. For example, Westat has completed several projects, under task order contracts with the Bureau of Labor Statistics and the U.S. Bureau of the Census, to identify sources of error in large national surveys such as the Current Population Survey, the Consumer Expenditure Survey, and the Survey of Income and Program Participation. This research includes studies to clarify key concepts for survey respondents, to improve the usability of self-administered forms, and to develop methods for improving coverage of minority populations.

SURVEY DATA COLLECTION

IN-PERSON INTERVIEWING. Westat has substantial supervisory and interviewing resources for nationwide in-person interviewing projects. They have been used to perform household-based studies ranging from 1,500 to more than 30,000 households, as well as for surveys of business and industrial establishments. Westat has **three overlapping national master samples,** encompassing 60, 80, and 100 primary sampling units (PSUs). In addition, we use the Census databases and our statistical skills to quickly select the sample that is most efficient for a particular project.

Our survey operations staff is expert in tailoring interviewer training and survey management methods to the needs of each study. Regional field supervisors direct the work of interviewers, most of whom have worked for us on a wide range of studies. These interviewers are located in the PSUs of our national master samples and in many locations outside of our PSUs. In total, our computerized field file includes information on **5,000 interviewers** located throughout the U.S. who have worked for us in the last 3 years. Complete records on each interviewer's availability, experience, and previous performance are accessible by computer inquiry and enable us to staff new projects quickly and efficiently.

All data collection activities take advantage of computerized survey management and control systems. These systems yield timely information to manage the assignment of cases, to monitor individual interviewer performance, and to direct the overall survey effort.

Westat uses **computer assisted personal interviewing (CAPI)** on selected studies. Interviewers use laptop personal computers that are easily portable in the field. Applications are set up using our Cheshire software that is fully integrated with the software systems we use for computer assisted telephone interviewing and data entry. Among Westat's CAPI projects is a large-scale survey of Medicare beneficiaries, for the Health Care Financing Administration, to collect data three times a year about health care use and expenditures.

TELEPHONE SURVEYS. Telephone surveys play an important role in Westat's research and in the followup of mail and in-person surveys. Westat has actively supported research and experimentation to develop efficient random digit dialing sampling procedures (the Waksberg method) and new training techniques for improving interviewer performance.

Westat's **Telephone Research Center** operates in three locations: one facility is near our headquarters in Rockville, Maryland; the second is about 30 minutes away in Frederick, Maryland; and the third is in Oceanside, California. All three facilities have complete **computer assisted telephone interviewing (CATI)** capability based on our customized CATI software systems. Each facility is managed by an experienced survey manager and an experienced staff of supervisors who train interviewers and ensure the quality of survey work. The combined facilities have approximately 200 interviewing stations connected to dedicated VAX computers and to the complete facilities of our computer center and PC network via dedicated high-speed digital telecommunications circuits. With this linkage, CATI studies can use a single database to control and monitor the interviewers working on the same project in all three centers.

Each center is equipped with state-of-the-art automatic dialing, least-cost route selection to minimize telephone line charges, silent monitoring equipment, monitoring rooms, conference rooms, and training facilities. A computerized survey control system makes interviewer assignments, records the disposition of sample cases, and helps survey managers monitor survey performance.

One of the largest CATI surveys ever conducted was carried out by Westat for the U.S. Department of Education. This study involved random digit dialing screening of 60,000 households and the administration of questionnaires to more than 26,000 persons.

MAIL SURVEYS. Self-administered mail surveys are a cost-effective way to collect data from individuals and establishments. Westat staff design questionnaires that elicit high-quality information in a format that minimizes respondent burden and maximizes response rates. Mail surveys also require careful attention to the specification and development of sample lists, experience with a wide range of tracing sources and procedures, as well as protocols, clearances, and followup to obtain high rates of cooperation.

We have the experience and the full range of facilities to perform these survey tasks efficiently — including computerized mailout and receipt control systems, advanced reflective-read optical scanning equipment for efficient data capture, and dedicated key-entry stations for processing written information. We have conducted mail surveys of up to 90,000 respondents (e.g., private and public sector employees, nurses, teachers, military personnel), as well as smaller, complex surveys of businesses (e.g., manufacturers and utilities in connection with environmental protection and energy studies).

DATA PREPARATION AND PROCESSING

Westat's capabilities in the handling and processing of data contribute significantly to the quality, timeliness, and responsiveness of our work. These capabilities begin with a large staff of data handling professionals who are experienced in all aspects of managing and delivering high-quality survey data. This staff includes data system designers, data preparation supervisors, data coders and editors, data entry personnel, and more than 100 systems analysts and programmers with a broad range of skills and experience. Their expertise covers a number of general programming languages, such as PL/1, C, Focus, and FORTRAN; statistical analysis software packages such as SAS and SPSS-X; and database management packages such as Oracle, Paradox, and dBase.

The Westat Telephone Research Center (TRC) in Gaithersburg, Maryland, provides 76 computer assisted telephone interviewing (CATI) stations. This center is one of three Westat TRCs that have, combined, approximately 200 CATI stations.

Westat has developed and maintains a proprietary software system called **Cheshire** to administer the long and complex questionnaires required for Government surveys and to manage these administrations to thousands of survey respondents. **Cheshire** is a database management and collection system that can be used in an effective, integrated manner for computer assisted telephone interviewing (CATI), computer assisted personal interviewing (CAPI), and computer assisted data entry (CADE).

Westat's central computer facility includes DEC VAX computers, running under VMS, with large-scale memory and disk storage, several triple-density nine-track tape drives, and a variety of high- and low-speed printers, including a production laser printer. The equipment is located in our main office in Rockville and in satellite computer facilities that serve our telephone centers. It is connected through local area networks for sharing peak loads, efficient storage access, and for backup purposes. All of our computer facilities are temperature and humidity controlled, are served by an uninterruptible power system, and contain security protocols to protect the confidentiality of data.

Personal computers (PCs) are of increasing importance to all aspects of our survey research and administrative operations. More than 1,000 IBM-compatible PCs are used in survey control, project management, data cleaning, data analysis, graphical presentation of survey results, and word processing. Apple computers are used extensively in our graphics unit. Westat's PCs are connected, via a high-speed ETHERNET network, to our in-house computer facilities, several Government dial-up computer centers, and a remote timeshare facility.

Westat's data preparation capabilities also include a **key-to-tape data entry facility** that is dedicated to the special needs of direct data entry from completed survey forms. **Optical scanning equipment** for data conversion is also available in house when this method is more cost effective. Computer graphics capabilities assist our staff in data analysis and in the preparation of project reports.

HEALTH

For more than 25 years, Westat has conducted or supported health research for numerous Federal agencies and the private sector. This work includes epidemiologic research, health services research, health and physical examination surveys, clinical trials, and health education and intervention research.

EPIDEMIOLOGIC RESEARCH

- Research services for a broad range of **epidemiologic studies** to investigate environmental exposures and other risk factors for disease. Clients include several of the National Institutes of Health and the Centers for Disease Control. Services include survey design, case-control selection, subject tracing, interviewing, medical record abstracting, and extensive data processing and analytical support. Westat has also conducted numerous **morbidity and mortality studies.**
- **Coordinating center contracts** for several major collaborative studies. Westat provides expertise in protocol and instrument design, data collection, quality control monitoring, data processing, and statistical analysis.
- Collaborative studies with medical schools and state departments of health, where Westat serves as the **statistical coordinating center.** Studies have dealt with such subjects as the role of saccharin in bladder cancer and the role of steroid hormones in cervical cancer.
- Studies of the **safety of the nation's donor blood supply.** As medical coordinating center, Westat works with five blood centers serving large population centers throughout the U.S. Studies examine the incidence and prevalence of retrovirus infection and infectious disease markers among donors, the transmission of viruses to blood recipients, and the development of disease in a large cohort of HTLV-seropositive donors and matched controls.
- Collection of **environmental exposure data** in homes, schools, and workplaces to study causes of disease. Westat has applied its national field data collection resources to studies of electromagnetic fields; radon exposure; air quality; lead in paint, dust, and soil; asbestos; and pesticide exposure. Westat staff use environmental monitoring equipment for some studies, and environmental samples are analyzed at specialized scientific laboratories, following Westat's quality assurance specifications.

HEALTH SERVICES RESEARCH

- The **National Medical Expenditure Survey** was a major longitudinal survey to provide estimates of the use of health care services, their costs, and the amounts paid by various forms of health insurance. Data were collected through multiple rounds of in-person and computer assisted telephone (CATI) interviews. Information on the noninstitutionalized population came from a national probability sample of about 14,000 households and a separate sample of about 2,000 American Indian and Alaska Native households; data on the institutionalized population came from a survey of about 11,000 persons in nursing homes and institutions for the mentally retarded. Black, Hispanic, and several other population subgroups of special interest were oversampled. Information from surveys of medical care providers, employers, and insurers supplemented the household survey data.
- The **Medicare Current Beneficiary Survey,** conducted for the Health Care Financing Administration (HCFA), is a 5-year, in-person study to provide comprehensive and timely data on Medicare costs and use, beneficiary characteristics, and the effects of current laws and proposed changes in program features, such as long-term care coverage for the aged and disabled. The study sample of 12,000 Medicare beneficiaries (including 1,000 in nursing homes) in 100 PSUs is drawn from the Medicare enrollment file and refreshed periodically to compensate for attrition and death of respondents. Survey files are matched to HCFA claims payment and other administrative records.
- The **AIDS Cost and Services Utilization Survey,** for the Agency for Health Care Policy and Research, is a nationwide, longitudinal survey to measure the use and costs of medical care and support services for persons with human immunodeficiency virus (HIV)-related illnesses.

A phlebotomist for the Chinese Academy of Medical Sciences draws blood from one of 33,000 participants in the Linxian Nutrition Intervention Trial, sponsored by the National Cancer Institute with training, data handling and preparation support, and other technical assistance provided by Westat.

HEALTH AND PHYSICAL EXAMINATION SURVEYS

- The **National Health and Nutrition Examination Surveys (NHANES)** have been performed for the National Center for Health Statistics. **NHANES III** involves in-person interviews and medical and dental examinations of about 30,000 persons nationwide. Mobile examination centers and traveling teams of physicians, dentists, technicians, nutritionists, and interviewers perform data collection. The first **NHANES I Epidemiologic Followup Survey** involved tracing, followup interviewing, in-home blood pressure measurement, and collection of hospital and vital records data for about 14,000 persons from the 1971-75 NHANES I survey. Additional surveys of these persons have been performed using CATI interviews. The **Hispanic HANES** survey, a smaller version of the NHANES interviewing and examination survey, was conducted among the Hispanic population in 1982-84.
- **National Surveys of Oral Health** have been conducted for the National Institute of Dental Research to assess the dental needs of children and adults, to measure changes in oral health over time, and to provide information to help in preventing dental disease. Dental examination surveys have been conducted by traveling teams of dentists, dental assistants, and survey coordinators. Each survey obtained data on oral health measures, such as presence of coronal caries, treatment needs, loss of attachment, dental fluorosis, and documentation of soft tissue lesions.

CLINICAL TRIALS

As the administrative operations and statistical coordinator for phase I-III clinical trials, Westat develops study protocols, monitors clinical site operations, assures compliance with regulatory requirements, processes data, and coordinates data analysis. We assist in preparing Investigational New Drug applications, register sites for participation, develop and conduct training programs for clinical site staff, distribute study drugs, and monitor adverse events.

- For the National Institute of Allergy and Infectious Diseases, we develop, coordinate, and analyze data from clinical trials of **HIV therapies** conducted by approximately 50 clinical centers.
- For the National Institute of Child Health and Human Development (NICHD), we coordinate a network of 30 clinical centers performing clinical trials of **therapies to treat pediatric HIV infection** and to interrupt maternal-fetal HIV transmission.

OCCUPATIONAL HEALTH STUDIES

- Estimates of workplace exposure to toxic chemicals, using information collected from plant inspections, chemical inventories, and other sources.
- For the **National Occupational Exposure Survey,** statistical design, sampling, and plant hazard inspections.
- Retrospective cohort morbidity and mortality studies of persons employed in selected occupations and industries.

HEALTH EDUCATION AND INTERVENTION

Westat has designed and conducted longitudinal surveys to evaluate intervention programs for promoting healthy lifestyles and reducing behaviors associated with adverse health outcomes. Westat has also supported the development and implementation of intervention programs through training assistance, educational materials development, and program planning and coordination. Projects have been performed for various Federal health agencies and private philanthropic organizations.

- For the National Cancer Institute (NCI), we serve as data and nutrition coordinating center for a multiclinic study of **dietary intervention and recurrence of polyps** among persons undergoing polypectomy.
- For the U.S. Surgeon General, Westat performed a **national survey of smoking behavior, attitudes, and knowledge.**
- For NCI, we have performed 6 years of point-prevalence and longitudinal surveys to assess the effectiveness of the Institute's 22 community **smoking cessation intervention (COMMIT) trials.**
- For NICHD, we designed and pilot tested **smoking cessation intervention materials,** including audiovisual materials, targeted at pregnant women.
- For NCI, Westat is the coordinating and data management center for a 16-year randomized trial of **screening programs for prostate, lung, colorectal, and ovarian cancers,** which will enroll approximately 150,000 older men and women at 10 clinical sites.

HOUSING

Westat has designed and implemented evaluation studies of many of the U.S. Department of Housing and Urban Development's (HUD's) large and innovative programs. These programs serve persons who are homeless, mentally and physically disabled, elderly, or unemployed. These projects have included the following:

- A national evaluation of the **Community Development Block Grant Program,** HUD's largest community development program;
- Studies of **services to homeless persons,** including shelters and the Supportive Housing Demonstration Program;
- An evaluation of **housing and supportive service projects to serve the frail elderly;** and
- A national survey of the **prevalence of lead-based paint** in American homes.

SOCIAL SERVICES AND COMMUNITY DEVELOPMENT

The needs of children, families, the elderly, persons with disabilities, and the homeless are major concerns of Federal and state social service policymakers. Westat has quantified the extent of these needs and has examined the operations, effectiveness, and impact of several major social service programs. Projects have included the following:

- National studies of the incidence and severity of **child abuse;**
- A national study of the incidence of **missing children;**
- A national study examining the extent to which adoption agencies are facilitating the **adoption of special needs children;**
- Surveys of participants in the School Lunch Program and the Special Supplemental Food Program for Women, Infants, and Children (WIC) of the Food and Nutrition Service;
- An evaluation of local planning, program development, and delivery of services for the aging;
- An evaluation of the impact of **child care services in public housing** on workforce participation and welfare dependence;
- A study, for the National Institute of Mental Health, of facilities and programs for **mentally disordered criminal offenders;** and
- A national study of the effectiveness of **independent living programs** for children leaving foster care.

EMPLOYMENT AND TRAINING

For more than 20 years, Westat has worked closely with the U.S. Department of Labor to evaluate major employment and training programs, such as the Job Training Partnership Act (JTPA) and several youth programs. Westat professionals also have conducted studies of employment service programs, including unemployment insurance and various forms of worker assistance.

- The **JTPA Rapid Response Mechanism** provides timely reports on JTPA program operations of current interest to policymakers. Studies have focused on programmatic, management, and organizational issues, such as performance-based contracts, JTPA service to welfare recipients, training of child care workers, and assistance to dislocated workers.
- The **Process Evaluation of the Implementation of JTPA** was a 2-year study to evaluate the organizational, administrative, and operational processes related to Titles I, IIA, and III of JTPA. The evaluation was conducted in a randomly selected sample of 20 states and 40 service delivery areas within those states.
- Westat conducted a baseline survey and a 3-year followup survey of 6,000 **immigrants newly legalized** under the Immigration Reform and Control Act. The surveys focused on labor force experience and use of social services.

ENVIRONMENTAL PROTECTION

Westat has designed and conducted national surveys, focus groups, statistical consulting, information systems, and data processing support for Environmental Protection Agency studies, program evaluations, planning, and regulatory assessment. Westat's studies have covered a wide range of environmental areas, including toxic substances (PCBs, asbestos, lead, cadmium, etc.), hazardous waste, air pollution, water contamination, effluent guidelines, cleanup criteria, pesticides, drinking water, budget and human resources, environmental sampling, and merging survey and laboratory data. The following is a sample of Westat's environmental studies:

- A national survey of **hazardous waste generation, treatment, storage, and disposal facilities** that included landfills, surface impoundments, waste piles, land treatment, injection wells, incinerators, and tanks;
- Studies of **asbestos in schools and commercial and residential buildings** that involved building inspections, laboratory analyses of bulk samples, exposure hazard assessments, and policy recommendations;
- Indoor air and work area environment surveys of workers in large office buildings;
- National surveys of **pesticide, machinery, and pharmaceutical manufacturers** to determine the need for new effluent limitations guidelines and standards;
- Development of statistical tests for the evaluation of **soil and groundwater cleanup** at Superfund sites and for improved regulations on groundwater contamination;
- A national telephone survey to determine **household use of products containing toxic substances;** and
- National surveys and production of statistical guidance documents on **lead contamination of paint, dust, water, soil, and household products.**

SCIENCE AND TECHNOLOGY

Westat has assessed scientific research and teaching capabilities and monitored the impact of technology transfer and innovation. Studies in this area include the following:

- Several time-series studies for the National Science Foundation (NSF), to monitor changes in the condition and adequacy of **academic research facilities and equipment;** and
- An assessment of NSF's **College Science Instrumentation Program,** which is intended to improve the quality of undergraduate science teaching.

EDUCATION

Westat has the subject matter and statistical/analytical expertise to conduct surveys of schools, teachers, students, and parents and to present meaningful, program-oriented findings. The following are some examples of Westat's education studies:

- The **National Household Education Survey,** a random digit dialing telephone survey using computer assisted telephone interviewing technology to address educational issues, including early childhood educational experiences, parent involvement in education, school readiness, adult education, and citizenship education;
- Statistical design, school recruitment, and in-school testing for the **National Assessment of Educational Progress,** a biennial survey of the educational achievement of elementary and secondary school students in a variety of academic subjects;
- Studies and technical assistance for the **National Assessment of Vocational Education** and for the **Office of Special Education;**
- **Quick turnaround surveys** to collect policy-relevant data for the National Center for Education Statistics and the National Science Foundation;
- A study of the Chapter 1 **Migrant Education Program,** describing student characteristics, staffing, and state and local government program administration and expenditures;
- Technical support for issues analysis in elementary and secondary education and in postsecondary education;
- Technical assistance to state and local education agencies in connection with survey-based evaluations of **HIV education programs;**
- Studies of student financial assistance programs, including the major **National Postsecondary Student Aid Study** and studies of the Pell Grant and Title IV programs; and
- The U.S. part of an international study of **children's reading literacy.**

ENERGY

Westat's capabilities in survey design, nationwide field data collection, and statistical analysis have played a vital part in major studies for the Energy Information Administration (EIA) and other organizations involved in energy programs:

- National surveys of **energy consumption in commercial buildings** and followup surveys to assess changes in energy consumption and the implementation of conservation measures;
- Regional and state surveys of **residential and nonresidential energy consumption;**
- Statistical and survey systems support for ongoing EIA surveys of **domestic oil and gas reserves;**
- Evaluations of **energy conservation programs** sponsored by the U.S. Department of Energy and private utilities; and
- A national industrial energy consumption survey measuring the amount and type of energy use by functional end use.

TRANSPORTATION

Westat combines strong statistical skills and national survey data collection capabilities with the experience of several nationally recognized researchers in transportation and highway safety. Our experience has included the following projects:

- An evaluation of the U.S. Department of Transportation's **automobile bumper standards,** based on a national survey of more than 10,500 drivers, to assess the incidence and costs of low-speed accidents;
- Statistical support for surveys of **seat-belt use** conducted by individual states; and
- The sample design for the **National Accident Sampling System,** a major data file of 18,000 accident reports annually.

Two of Westat's Statistical Process Control (SPC) consultants (right) tour the rod mill at BHP Steel, Ltd., in Newcastle, New South Wales, Australia. Westat has conducted more than 30 SPC classes at this and other BHP Steel sites throughout Australia.

MILITARY HUMAN RESOURCES

Westat has extensive experience in studies that support the military's human resource needs, particularly in the areas of the recruitment and retention of military personnel, the improvement of training and leadership, and the design and implementation of Army family programs.

- The **Communications and Enlistment Decision Studies/Youth Attitude Tracking Study III** involves gathering data from military-age youth on their attitudes, interests, values, and media habits; their perceptions of the military; and their awareness of military enlistment incentives and advertising. Westat conducts computer assisted telephone (CATI) interviews with 10,000 16- to 24-year-olds each fall. Each administration includes some previously interviewed youth to provide longitudinal data.
- The **Army Communications Objectives Measurement Surveys,** a 2-year quarterly assessment of the Army's advertising programs, was conducted for the Army Research Institute. CATI interviews of youth and parents tracked changes in attitudes toward Army advertising and the effects of these attitudes on the youths' enlistment intentions and actions.
- The **Annual U.S. Army Reserve Troop Program Unit Soldier Survey** collected data from 40,000 reservists each year to examine organizational issues such as personnel retention, promotion policy, the quality of unit leaders, training and equipment, readiness for mobilization and deployment, and recruitment to provide a basis for policy and program change.
- For the U.S. Department of Defense, Westat is developing the database and analyzing survey data from the **1992 Survey of Officers and Enlisted Personnel and Their Spouses,** which collected information about the characteristics, attitudes, and concerns of approximately 60,000 active duty personnel and 25,000 military spouses.

ORGANIZATIONAL AND PERSONNEL STUDIES

Increasingly, the identification of organizational and personnel problems and the development of solutions to them require sophisticated qualitative and quantitative investigation. Drawing from our core competencies in applied social science research, Westat has established an interdisciplinary team of organizational and personnel researchers to conduct studies and to consult with Federal agencies, state and local governments, major corporations, utility companies, and labor unions. Work has focused on organizational assessment and effectiveness, change management, job analysis, test development and validation, performance appraisal, training, and systems evaluation. Westat's projects include the following:

- **Workforce surveys** for several large, multinational companies (120,000 employees), including detailed statistical summaries of the results for more than 800 work units;
- **Surveys of Federal employees** to evaluate changes in personnel compensation and management systems;
- **Surveys of police forces** to study workplace stresses and their interaction with family conditions;
- **Large-scale job analyses** for the U.S. Army Personnel Command and the U.S. Navy Medical Research Development Command; and
- The development of a **performance appraisal system** for a major gas utility company.

MARKETING RESEARCH STUDIES

Westat is a leader in custom marketing research, with a reputation for thoughtful and innovative design, quality, and expert statistical and interpretive analysis. Our primary commercial marketing research unit, **Crossley Surveys,** has worked for major corporations and advertising agencies for more than 60 years. We service a diverse mix of clients, including Fortune 500 companies, utilities, trade and professional associations, and Government agencies. The markets we have researched include packaged goods and food products sectors, telecommunications, office equipment, data processing, publishing, the media, energy, health services, and financial services. Key methodological and substantive areas include the following:

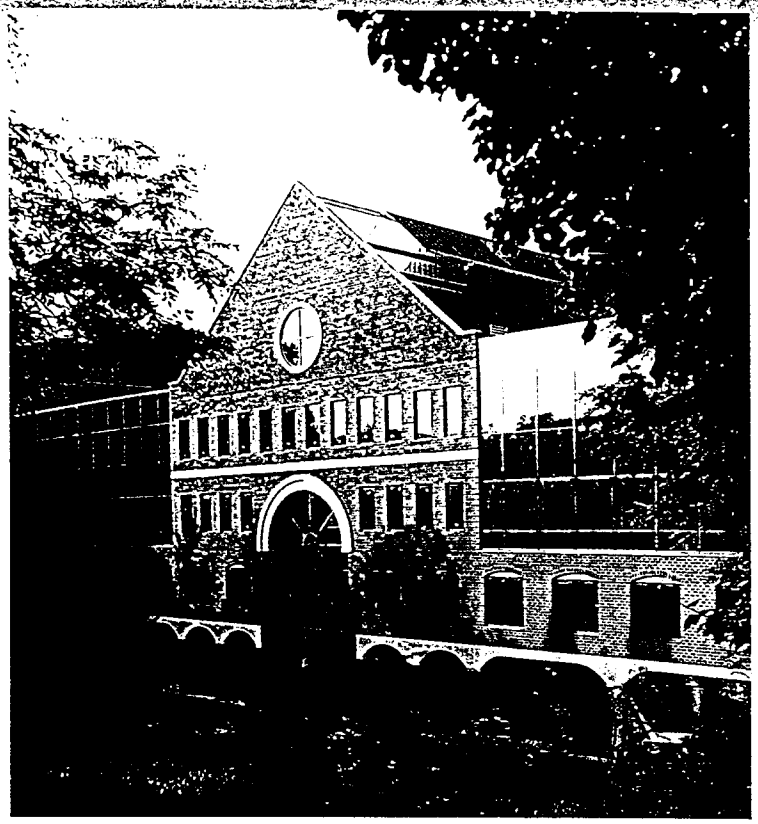
- Random digit dialing telephone surveys of consumers;
- Scientific sampling of business establishments;
- Interviewing of business executives by telephone and in person;
- Strategic marketing surveys;
- Product development studies and concept testing;
- Advertising evaluation research;
- Qualitative research, including focus group interviewing;
- Pricing evaluation studies; and
- Market modeling using multivariate statistical techniques.

CONSULTING SERVICES

Westat staff specialists offer a wide and expanding variety of consulting services to businesses, as well as Federal, state, and local governments:

- Training and consultation on **Statistical Process Control (SPC)** and **Total Quality Management (TQM)** have aided many domestic and international industrial clients in their quality improvement programs. Training ranges from programs for senior executives, which focus on specific quality management issues, to programs of several weeks' duration for operating managers and line supervisors, which focus on building problem-solving skills using statistical methods. Westat staff also work with clients to improve productivity and quality using SPC and TQM management concepts and practices.
- **Computer software systems** have been developed and implemented for a variety of applications. A major telecommunications firm has installed Westat-developed operating systems software. A Westat computer model analyzes data and simulates outcomes for a major financial institution. A versatile software package, developed by Westat, assists state social service agencies in their planning functions.
- Westat staff have conducted **studies of health effects and risks from occupational and environmental exposure** for major industrial clients. Services include analysis and reporting of findings from existing databases and collection of clinical and interview data on employees.
- To conduct **clinical trials** for over-the-counter medications, sample persons are recruited, screened, randomized for treatment, and followed. Study results are analyzed and reported in line with Food and Drug Administration requirements.
- Westat staff have developed fair and equitable **selection, assignment, and promotion practices** and assisted Government agencies and private sector clients in implementing these procedures. They have also recommended changes in **human resource management policies and practices** to help clients meet the challenges of a changing U.S. labor market, including managing an increasingly culturally diverse workforce.

EMPLOYEE OWNERSHIP AT WESTAT



Ownership of Westat by its employees contributes in important ways to the quality of the services we provide and the capabilities that we offer to our clients:

- Sharing our success with employees provides an important incentive for maintaining the quality of our services;
- Retaining our assets within Westat provides the resources to build our capabilities as a research organization;
- Ownership by employees provides a stable organizational framework for long-term growth and development; and
- All employees can earn a share of ownership through the Westat Employee Stock Ownership Plan. Since the introduction of the plan in 1977, the value of employee holdings has grown with our success as a research organization and with the growth of our staff. Stock earned through the Employee Stock Ownership Plan supplements other fringe benefits that include a 401(k) plan, health and life insurance, and vacation, holiday, and sick time. Advanced degrees and professional development activities are supported by reimbursement for approved college courses and for attendance at professional meetings.

For further information about Westat, contact:

Dee Schofield, *Marketing*
Patricia Smith, *Personnel*
Westat, Inc.
1650 Research Boulevard
Rockville, Maryland 20850
(301) 251-1500

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Chairman of the Board and Senior Statistician

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Chairman Emeritus and Senior Statistical Consultant

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Vice President and Senior Statistician

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Vice President and Associate Director, Computer Systems Staff

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Senior Vice President, Crossley Surveys Division

**Board of Directors*

CORPORATE AND PRINCIPAL RESEARCH STAFF OFFICES

(301) 251-1500

Main location:

1650 Research Boulevard
Rockville, MD 20850

Contiguous locations:

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Appendix C.2
Westat Field Materials

C.2.1 Missed DU Procedure, Household Screener & Screener Handcards
C.2.2 Westat Advance Letter
C.2.3 Refusal Conversion Letters
C.2.4 Not at Home/Unable to Contact Letter
C.2.5 Community Leader Letter
C.2.6 "Sorry I Missed You" Card
C.2.7 "No Habla Español" Card

Appendix C.2.1
Missed DU Procedure, Household Screener and Screener Handcards

CALIFORNIA ISSUES STUDY

MAIN STUDY QUESTIONNAIRE

ID No.: _____

Address: _____

_____

Line Number: _____

QUESTIONNAIRE VERSION: _____

Missed DU Procedure? YES NO

Missed Structure Procedure? YES NO

If Missed DU, Record Parent ID: |__|__|__|-|__|__|__|-|__|__|__|__|

ADDRESS VERIFICATION: Hello, I'm (YOUR NAME) with Westat, Inc., a research organization. Is this (ADDRESS FROM ASSIGNMENT LABEL)? (MAKE CORRECTIONS TO ASSIGNMENT LABEL IF NECESSARY. IF AT CORRECT ADDRESS, CONTINUE WITH INTRODUCTION. IF NOT, THANK RESPONDENT AND LEAVE.)

INTRODUCTION: We are helping the State of California conduct the California Issues Study. Recently we sent you a letter explaining the study and the importance of your participation. (IF RESPONDENT DOES NOT REMEMBER RECEIVING LETTER, HAND NEW ADVANCE LETTER) (As you may recall from the letter) this study asks for your opinion on issues that may concern you such as education, the environment, and crime. First I need to determine who in your household will be selected to participate. To do this, I'd like to ask you a few questions about the persons who live here.

MISSED DU PROCEDURE INSTRUCTIONS

A MISSED DU IS A UNIT WITHIN OR ATTACHED TO THE STRUCTURE IN WHICH THE SAMPLED DU IS LOCATED, SUCH AS A BASEMENT OR ATTIC APARTMENT OR AN APARTMENT OVER AN ATTACHED GARAGE. IT MAY ALSO BE AN APARTMENT WITHIN A MULTI UNIT STRUCTURE.

> IF TWO OR MORE UNITS AT THIS ADDRESS (FOR EXAMPLE, AN APARTMENT BUILDING), SKIP TO STEP 2; OTHERWISE, BEGIN WITH STEP 1.

STEP

1. AFTER COMPLETING SCREENER, SAY: We want to be sure that every household in this area has been given a chance to participate in this important survey. Are there any other living quarters at this address such as basement or attic apartments that we may have missed?

2. CHECK IN THE LOBBY AND AROUND THE OUTSIDE OF THIS (HOUSE/BUILDING) FOR ADDITIONAL UNITS OR ENTRANCES TO THIS ADDRESS.

3. RECORD DISCOVERED DUs ON FORM BELOW. NUMBER DISCOVERED DUs SEQUENTIALLY WITHIN SEGMENTS BEGINNING WITH DU NUMBER 501. EACH NUMBER MUST BE ASSIGNED ONLY ONCE WITHIN A SEGMENT. IF NO ADDITIONAL DUs, CHECK THE CIRCLE IN THE UPPER LEFT-HAND CORNER OF THE FORM BELOW.

4. IF 1 TO 4 MISSED DUs ARE DISCOVERED, FILL OUT AN ASSIGNMENT BOX ON A BLANK QUESTIONNAIRE FOR EACH (INSTRUCTIONS FOR HOW TO DO THIS ARE IN THE INTERVIEWER MANUAL) AND CONDUCT AN INTERVIEW. ADD THE DISCOVERED DUs TO THE LISTING SHEET AND TO ALL COPIES OF THE INTERVIEWER REPORTS.

5. IF 5 OR MORE DUs ARE DISCOVERED, CALL SUPERVISOR FOR INSTRUCTIONS BEFORE YOU DO ANY ADDITIONAL INTERVIEWS. ADD ALL OF THE DISCOVERED DUs TO THE LISTING SHEET AND THE SELECTED SAMPLE DUs TO ALL COPIES OF THE INTERVIEWER REPORTS. THEN FILL OUT AN ASSIGNMENT BOX ON A BLANK QUESTIONNAIRE FOR EACH SELECTED SAMPLE DU AND CONDUCT AN INTERVIEW.

MISSED DU FORM

CHECK (√) IF NO MISSED DU AT SAMPLED STRUCTURE: ○

PSU # _____ SEG # _____

DU # ASSIGNED	ADDRESS OF DISCOVERED DU

[ ] TOTAL ADDITIONAL DUs

CALIFORNIA ISSUES STUDY

MAIN STUDY

HOUSEHOLD SCREENER

Conducted by: Westat, Inc.
1650 Research Blvd.
Rockville, MD 20850

HOME OFFICE USE ONLY

|__|__|__|__|__|
SEQUENCE #

|__|__|
INTERVIEWER

|__|__|
CONTACTS

|__|__| |__|__|
SCR MI
FS FS

S-1. Including yourself, how many people, age 18 or older, live in this household?

_____
NUMBER

S-2. What is the first name of the person or one of the persons who owns or rents this home? (ENTER NAME ON LINE 01 BELOW.)

BOX 1. IF ONLY ONE PERSON LIVES IN HOUSEHOLD, GO TO S-5. OTHERWISE, CONTINUE.

S-3. And the other members of this household who are age 18 or older – what are their first names? Let's begin with everyone related to (PERSON 01)? (ENTER FIRST NAMES IN TABLE BELOW.)

S-4. Are there any other people age 18 or older living here who are not related to (PERSON 01)?

YES ..... 1 (ENTER NAME(S) IN TABLE; THEN S-5)
NO 2 (S-5)

S-5. [I have listed (READ NAMES IN ORDER.)] Have I missed other household members age 18 or older now away from home who usually live here, for example, someone away on vacation or business, or in a hospital?

YES ..... 1 (ENTER NAME(S) IN TABLE; THEN ENUMERATE)
NO ..... 2 (ENUMERATION TABLE)

ENUMERATION TABLE

AFTER LISTING HOUSEHOLD, ASK S-6 THROUGH S-11 FOR EACH PERSON PERSON # FIRST NAME	S-6. What is (PERSON)'s relationship to (PERSON 01)?	S-7. Is (PERSON) one of the persons who owns or rents or pays toward the rent or mortgage of this home?		S-8. CODE SEX (ASK IF NOT OBVIOUS FROM S-6) Is (PERSON) male or female?		S-9. How old was (PERSON) on (his/her) last birthday?	S-10. HAND CARD A. Which of these groups represent (PERSON'S) national origin or ancestry? (ENTER LETTER)	S-11. HAND CARD B. Which of the groups on this card best describes (PERSON'S) racial background? (ENTER LETTER)
		YES	NO	M	F			
01		1	2	1	2		_____ LETTER	_____ LETTER
02		1	2	1	2		_____ LETTER	_____ LETTER
03		1	2	1	2		_____ LETTER	_____ LETTER
04		1	2	1	2		_____ LETTER	_____ LETTER
05		1	2	1	2		_____ LETTER	_____ LETTER

S-12. Is there anyone I have listed who does not speak English well?

YES ..... 1 (PROBE FOR NAME(S) AND DRAW A LINE THROUGH NAME(S) IN TABLE ABOVE)
NO ..... 2 (BOX 2)

BOX 2. IF NO ELIGIBLE PERSON IS LISTED IN ENUMERATION TABLE, GO TO S13. OTHERWISE, CONTINUE WITH BOX 3.

BOX 3

STEP 1. HOW MANY ELIGIBLE PERSONS ARE IN THIS HOUSEHOLD? ["ELIGIBLE" IS A PERSON WHO CONTRIBUTES TO THE OWNERSHIP OR RENTAL OF THE HOME (S-7 IS CODED "YES") AND SPEAKS ENGLISH WELL.]

ONE..... 1 (BOX 4)
MORE THAN ONE _____ ..... 2 (STEP 2)
NUMBER

STEP 2. ENTER NAMES OF ELIGIBLE PERSONS BELOW IN AGE ORDER, BEGINNING WITH THE OLDEST ON LINE A.

LINE	FIRST NAME	AGE
A.		
B.		
C.		
D.		
E.		

STEP 3. USE SAMPLING TABLE BELOW TO SELECT ONE PERSON FOR THE MAIN INTERVIEW. IN BOX 4 ENTER FIRST NAME AND PERSON # FROM ENUMERATION TABLE.

46

Number of Eligible Persons in Household	Choose Person
1	A
2	A
3	A
4	C
5	A

If more than 5 eligible persons in household then contact supervisor for instructions.

BOX 4. MAIN INTERVIEW RESPONDENT IS:

_____ PERSON # FROM ENUM. TABLE, PG 2

_____ FIRST NAME

S-13. May I have your home telephone number (in case my office wants to check my work)? (RECORD ON RECORD OF ACTIONS)

RECORDED ON RECORD OF ACTIONS 1
NO PHONE 2
REFUSED 3

INTERVIEWER:

S-14. WITH WHOM DID YOU CONDUCT THE SCREENER?

PERSON # FROM PAGE 2 _____|_____

S-15. CODE TYPE OF STRUCTURE:

SINGLE-FAMILY DETACHED HOME 1
TOWNHOUSE, ROW HOUSE 2
ATTACHED APARTMENT OR CONDOMINIUM 3
MOBILE HOME 4
DUPLEX 5
OTHER (SPECIFY) _____ 6

19. DOES THE ASSIGNMENT LABEL REQUIRE THE MISSED DU PROCEDURE?

☐ YES

- COMPLETE MISSED DU PROCEDURE AND FORM ON INSIDE COVER OF QUESTIONNAIRE NOW. THEN:
- IF SELECTED R AVAILABLE, CONTINUE WITH MAIN INTERVIEW.
- IF SELECTED R NOT AVAILABLE, MAKE AN APPOINTMENT TO RETURN.

☐ NO

- IF SELECTED R AVAILABLE, CONTINUE WITH MAIN INTERVIEW.
- IF SELECTED R NOT AVAILABLE, MAKE APPOINTMENT TO RETURN.

NON-INTERVIEW REPORT FORM

N-1. TYPE OF NIR:

VACANT OR NOT A DWELLING UNIT 1 (N-2)
SCREENER NIR 2 (N-4)
MAIN INTERVIEW NIR 4 (N-14)

N-2. CODE WHY THE SAMPLED ADDRESS DOES NOT QUALIFY AS A DWELLING UNIT.

VACANT 01
CONDEMNED/DEMOLISHED 02
PLACE OF BUSINESS (NONRESIDENTIAL) 03
GROUP QUARTERS 04
NO SUCH ADDRESS 05
VACATION CABIN 06
NOT USABLE AS PERMANENT RESIDENCE 07
TRANSIENT USE (LESS THAN 1 MONTH) 08
STILL UNDER CONSTRUCTION 09
OUTSIDE OF SEGMENT BOUNDARIES 10
NOT A DU FOR OTHER REASON 11
(SPECIFY)_____

_____

N-3. RECORD ANY ADDITIONAL INFORMATION ABOUT THIS UNIT BELOW.

_____

_____

_____

GO TO N-17

COMPLETE ITEMS N-4 AND N-5 ABOUT THE SAMPLED DU BASED ON NEIGHBOR INFORMATION OR YOUR OBSERVATION. COMPLETE N-6 BASED ON YOUR JUDGEMENT.

N-4. RECORD THE NUMBER OF HH MEMBERS IN EACH AGE CATEGORY.

	AGE		
	18-44	45-64	65 +
# OF HH MEMBERS			

N-5. RACE/ETHNICITY OF HH:

WHITE 1
BLACK 2
HISPANIC 3
ASIAN 4
MIXED 5
OTHER (SPECIFY) _____ 6
CANNOT DETERMINE 9

N-6. HH INCOME:

UPPER INCOME 1
MIDDLE INCOME 2
LOW INCOME 3

N-7. WITH WHOM DID YOU SPEAK DURING YOUR CONTACT ATTEMPT(S)? (CODE ALL THAT APPLY.)

NO ONE 1
ADULT FROM SAMPLED HH 2
RELATIVE/FRIEND OF HH 3
HH MEMBER UNDER 18 4
NEIGHBOR 5
OTHER (SPECIFY) _____ 6
_____

N-8. WHY WERE YOU UNABLE TO COMPLETE THE SCREENER? (CODE ONE)

MAXIMUM ATTEMPTS 1 (N-11)
UNABLE TO ENTER STRUCTURE 2 (N-11)
REFUSAL/BREAK-OFF 3 (N-9)
UNAVAILABLE FOR FIELD PERIOD 4 (N-11)
ILLNESS OR DISABILITY 5 (N-11)
NON-ENGLISH SPEAKING HH 6 (N-11)
(SPECIFY LANGUAGE)_____
OTHER NON-RESPONSE 7 (N-11)
(SPECIFY) _____

N-9. EXPLAIN THE REFUSAL OR BREAK-OFF USING THE WORDS OF THE PERSON WHO REFUSED, WHENEVER POSSIBLE.
THEN CIRCLE THE CODE(S) WHICH BEST SUMMARIZE THE REASON FOR THE REFUSAL/BREAK-OFF.

_____
_____
_____
_____
_____
_____

DID NOT BELIEVE IN SURVEYS 1
DID NOT HAVE TIME, DIDN'T WANT TO BE BOTHERED ... 2
AFRAID TO LET INTERVIEWER IN, AFRAID TO ANSWER .. 3
WASTE OF (GOVERNMENT) MONEY 4
CLAIMED THIS SURVEY DID NOT APPLY TO HH 5
OTHER (SPECIFY)_____ 6
_____

N-10. FROM YOUR OBSERVATION, RECORD SEX, APPROXIMATE AGE, AND RACE OF PERSON WHO REFUSED.

SEX

MALE..... 1
FEMALE..... 2

APPROXIMATE AGE

18-25 1
26-39 2
40-55 3
56-70 4
OVER 70 5
DON'T KNOW..... 8

RACE/ETHNICITY

WHITE..... 1
BLACK..... 2
HISPANIC 3
ASIAN..... 4
OTHER (SPECIFY) _____ 5
CANNOT DETERMINE..... 9

N-11. RECORD ANY INFORMATION THAT MIGHT HELP ANOTHER INTERVIEWER MAKE CONTACT WITH THE HH AND COMPLETE THE SCREENER.

_____
_____
_____

N-12. IF AVAILABLE, RECORD THE CONTACT'S NAME AND PHONE NUMBER ON RECORD OF ACTIONS.

N-13. CODE THE TYPE OF STRUCTURE:

SINGLE-FAMILY DETACHED HOME 1
TOWNHOUSE, ROW HOUSE 2
ATTACHED APARTMENT OR CONDOMINIUM 3
MOBILE HOME 4
DUPLEX 5
OTHER (SPECIFY)_____6
_____

} (N-17)

N-14. WHY WERE YOU UNABLE TO COMPLETE THE MAIN INTERVIEW?

ILLNESS OR DISABILITY 1 (N-16)
SELECTED R REFUSED 2 (N-15)
SOMEONE REFUSED FOR SELECTED R 3 (N-15)
SPANISH SPEAKING RESPONDENT 4 (N-16)
UNAVAILABLE DURING FIELD PERIOD 5 (N-16)
MAXIMUM ATTEMPTS 6 (N-16)
OTHER NON-RESPONSE (SPECIFY)_____ 7 (N-16)
_____

N-15. EXPLAIN THE REFUSAL OR BREAK-OFF USING THE WORDS OF THE PERSON WHO REFUSED, WHENEVER POSSIBLE.
THEN CIRCLE THE CODE(S) WHICH BEST SUMMARIZE THE REASON FOR THE REFUSAL/BREAK-OFF.

_____
_____
_____
_____
_____
_____
_____
_____

DID NOT BELIEVE IN SURVEYS 1
DID NOT HAVE TIME, DIDN'T WANT TO BE BOTHERED ... 2
AFRAID TO LET INTERVIEWER IN, AFRAID TO ANSWER .. 3
WASTE OF (GOVERNMENT) MONEY 4
CLAIMED THIS SURVEY DID NOT APPLY TO HH 5
OTHER (SPECIFY)_____ 6
_____

N-16. RECORD ANY INFORMATION THAT MIGHT HELP ANOTHER INTERVIEWER MAKE CONTACT WITH THE RESPONDENT AND COMPLETE THE MAIN INTERVIEW

_____
_____
_____

N-17. DATE OF NIR:

_____/ _____/ _____
MONTH DAY YEAR

CIS

SCREENER HANDCARD A

A - MEXICANO, MEXICAN, MEXICAN AMERICAN, CHICANO

B - PUERTO RICAN

C - CUBAN

D - CENTRAL/SOUTH AMERICAN

E - OTHER SPANISH/HISPANIC

F - NONE OF THE ABOVE

CIS

SCREENER HANDCARD B

A - WHITE

B - BLACK (AFRICAN AMERICAN)

C - ASIAN/PACIFIC ISLANDER

D - AMERICAN INDIAN/ALASKAN NATIVE

E - OTHER

Appendix C.2.2
Westat Advance Letter

WESTAT
An Employee-Owned Research Corporation
1650 Research Blvd. • Rockville, MD 20850-3129 • 301 251-1500 • FAX 301 294-2040

March 1994

Dear California Resident:

Westat, Inc., a survey research firm, is helping the State of California conduct a study about the opinions of Californians on issues facing the state today such as education, the environment, and crime. Your household has been selected to participate. This study will collect valuable information about how you feel about some of the matters facing the state today.

The person who will contact you is a trained interviewer representing Westat. When the interviewer makes contact at your household, he or she will have a picture ID card identifying him or her as an employee of Westat.

Your participation in this study will be greatly appreciated. Should you have any questions, please call Shirley Finnegan, the California Field Manager, between 9:00 a.m. and 5:00 p.m. toll free at 1-800-621-3976.

Thank you in advance for your cooperation.

Sincerely,

Susan Rieger

Susan Rieger
Project Director

THE CALIFORNIA ISSUES STUDY

WHAT IS THIS SURVEY ABOUT?

We are faced with many problems in California today. This study is about some of these problems and issues. Some may be of concern to you, others may not. The study attempts to find out how Californians feel about some of the problems facing the state today.

WHO IS WESTAT?

Westat is a survey research organization in Rockville, Maryland. Westat has conducted nationwide surveys for many government agencies such as the U.S. Department of Health and Human Services, the Department of Education, and the Department of Energy.

HOW DID YOU SELECT ME?

This community was selected randomly from a list of all communities in California. Then your address was selected randomly from a listing we prepared of <u>all</u> the addresses in this community. We selected addresses, <u>not</u> people.

Appendix C.2.3
Refusal Conversion Letters

WESTAT
An Employee-Owned Research Corporation
1650 Research Blvd. • Rockville, MD 20850-3129 • 301 251-1500 • FAX 301 294-2040

April 1994

Dear California Resident:

Issues facing the state today, such as education, the environment, and crime, affect all California residents. Your household was selected to participate in the "California Issues Study," a study that will help the State of California learn how you feel about some of these problems.

Your cooperation is needed to help state officials understand the opinions of the people they serve. Your household was selected through a statistically valid sampling procedure to represent thousands of other households in California. Because of the careful, scientific design of the research, no other household can replace yours in this study.

When a member of our staff recently contacted your household on behalf of this study, your household declined to participate. Because your household's representation is important to getting a true picture of what Californians think, we hope you will reconsider your decision. With that prospect in mind, we have asked our field representative to call upon your household again.

The study is being conducted by Westat, Inc., a leading social research firm in the Washington, D.C. area. Information about the type of research Westat conducts is listed on the back of this letter.

If you have any questions about this study or wish to make an appointment, please call the California Field Manager, Shirley Finnegan, toll free at 1-800-621-3976.

Thank you for your time.

Sincerely,

Rita A. Stone

Rita Stone
Field Director

RS/lta

WHAT IS THIS SURVEY ABOUT?

We are faced with many problems in California today. This study is about some of these problems and issues. Some may be of concern to you, others may not. The study attempts to find out how Californians feel about some of the problems facing the state today.

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WESTAT
An Employee-Owned Research Corporation
1650 Research Blvd. • Rockville, MD 20850-3129 • 301 251-1500 • FAX 301 294-2040

April 1994

Dear California Resident:

Issues facing the state today, such as education, the environment, and crime, affect all California residents. Your household was selected to participate in the "California Issues Study," a study that will help the State of California learn how you feel about some of these problems.

Your cooperation is needed to help state officials understand the opinions of the people they serve. Your household was selected through a statistically valid sampling procedure to represent thousands of other households in California. Because of the careful, scientific design of the research, no other household can replace yours in this study.

When a member of our staff recently contacted your household on behalf of this study, your household declined to participate. I understand that you are very busy and I would not consider imposing on you if this study were not so important. We need only a half hour of your time and our field staff will do everything possible to interview you at your convenience. We hope you will reconsider your decision. With that prospect in mind, we have asked our field representative to call upon your household again.

The study is being conducted by Westat, Inc., a leading social research firm in the Washington, D.C. area. Information about the type of research Westat conducts is listed on the back of this letter.

If you have any questions about this study or wish to make an appointment, please call the California Field Manager, Shirley Finnegan, toll free at 1-800-621-3976.

Thank you for your time.

Sincerely,

Rita A Stone

Rita Stone
Field Director

rs/ltb

WHAT IS THIS SURVEY ABOUT?

We are faced with many problems in California today. This study is about some of these problems and issues. Some may be of concern to you, others may not. The study attempts to find out how Californians feel about some of the problems facing the state today.

WHO IS WESTAT?

Westat is a survey research organization in Rockville, Maryland. Westat has conducted nationwide surveys for many government agencies such as the U.S. Department of Health and Human Services, the Department of Education, and the Department of Energy.

HOW DID YOU SELECT ME?

This community was selected randomly from a list of all communities in California. Then your address was selected randomly from a listing we prepared of <u>all</u> the addresses in this community. We selected addresses, <u>not</u> people.

WESTAT
An Employee-Owned Research Corporation
1650 Research Blvd. • Rockville, MD 20850-3129 • 301 251-1500 • FAX 301 294-2040

April 1994

Dear California Resident:

Issues facing the state today, such as education, the environment, and crime, affect all California residents. Your household was selected to participate in the "California Issues Study," a study that will help the State of California learn how you feel about some of these problems.

Your cooperation is needed to help state officials understand the opinions of the people they serve. Your household was selected through a statistically valid sampling procedure to represent thousands of other households in California. Because of the careful, scientific design of the research, no other household can replace yours in this study.

When a member of our staff recently contacted your household on behalf of this study, your household declined to participate. By participating in the study, you are allowing your opinion to be heard because you represent the thousands of other Californians who were not selected for this study. Please make your opinion count. We hope you will reconsider your decision. With that prospect in mind, we have asked our field representative to call upon your household again.

The study is being conducted by Westat, Inc., a leading social research firm in the Washington, D.C. area. Information about the type of research Westat conducts is listed on the back of this letter.

If you have any questions about this study or wish to make an appointment, please call the California Field Manager, Shirley Finnegan, toll free at 1-800-621-3976.

Thank you for your time.

Sincerely,

Rita A. Stone

Rita Stone
Field Director

RS/ltc

WHAT IS THIS SURVEY ABOUT?

We are faced with many problems in California today. This study is about some of these problems and issues. Some may be of concern to you, others may not. The study attempts to find out how Californians feel about some of the problems facing the state today.

WHO IS WESTAT?

Westat is a survey research organization in Rockville, Maryland. Westat has conducted nationwide surveys for many government agencies such as the U.S. Department of Health and Human Services, the Department of Education, and the Department of Energy.

HOW DID YOU SELECT ME?

This community was selected randomly from a list of all communities in California. Then your address was selected randomly from a listing we prepared of all the addresses in this community. We selected addresses, not people.

Appendix C.2.4
Not at Home/Unable to Contact Letter

WESTAT
An Employee-Owned Research Corporation
1650 Research Blvd. • Rockville, MD 20850-3129 • 301 251-1500 • FAX 301 294-2040

Dear California Resident:

Issues facing the state today, such as education, the environment, and crime, affect all California residents. Your household was selected to participate in the "California Issues Study," a study that will help the State of California learn how you feel about some of these problems.

Your cooperation is needed to help State officials understand the opinions of the people they serve. Your household was selected through a statistically valid sampling procedure to represent hundreds of other families in California. Because of the careful, scientific design of the research, no other household can replace yours in this study.

A member of our staff has tried several times to contact your household on behalf of this study. We would like to schedule an appointment for the interview at your convenience. Because we have been unsuccessful in reaching you, we hope you will call our California Field Manager, Shirley Finnegan, toll free at 1-800-621-3976 to arrange for an appointment or to obtain further information abut this study.

The study is being conducted by Westat, Inc., a leading social research firm in the Washington, D.C. area. Information about the type of research Westat conducts is listed on the back of this letter.

Thank you in advance for your cooperation.

Sincerely,

Rita A. Stone

Rita Stone
Field Director

RS:nh

WESTAT, INC.

Westat, Inc., one of the leading survey research organizations in the United States, has been conducting statistical surveys for over 25 years for both government agencies and commercial clients. Headquartered in the Washington, DC metropolitan area, its staff includes internationally known statisticians, social scientists, and computer specialists.

Some of the important topics that Westat has studied over the years include:

- Educational progress of students in the United Sates in reading, writing, mathematics, science, and other subjects
- Cost of health care in the United States
- Health and nutritional status of Americans
- Effects of stress at work or home
- Patterns of energy consumption in nonresidential buildings
- Hazards in the workplace, schools, and home
- Evaluation of nutritional programs for women and children and the elderly
- Students' use of aids in the schools, including television and computers

Appendix C.2.5
Community Leader Letter

WESTAT
An Employee-Owned Research Corporation
1650 Research Blvd. • Rockville, MD 20850-3129 • 301 251-1500 • FAX 301 294-2040

April 1994

Dear Community Leader:

Westat, Inc., a leading social science research firm in Rockville, Maryland, is conducting a survey in your area for the State of California. For over 25 years, Westat has conducted household studies for national, state and local government agencies. Information about the types of research Westat conducts is listed on the back of this letter.

In order to conduct a statistically valid household study, Westat first identifies a sample of households to represent the study population. Then, households are randomly selected from the sample and asked to participate in the study.

This study is about issues that face all Californians such as crime, education, and the environment. Letters have been mailed, when possible, to selected households informing them of the study and alerting them to the fact that a field interviewer will be calling on their household.

Each Westat field interviewer carries a picture identification badge. Although no soliciting is ever done, citizens in your area may make inquiries about our interviewer's presence. We would appreciate your help in reassuring them that we are conducting valid research.

If you have any questions or need further information, please feel free to contact me at the above telephone number or call our California Field Manager, Shirley Finnegan, toll free at 1-800-621-3976.

Thank you for your cooperation.

Sincerely,

Rita A. Stone

Rita Stone
Field Director

WESTAT, INC.

Westat, Inc., one of the leading survey research organizations in the United States, has been conducting statistical surveys for government agencies for over 25 years. Headquartered in the Washington, DC metropolitan area, its staff includes internationally known statisticians, social scientists, and computer specialists.

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- Cost of health care in the United States
- Health and nutritional status of Americans
- Effects of stress at work or home
- Patterns of energy consumption in nonresidential buildings
- Hazards in the workplace, schools, and home
- Evaluation of nutritional programs for women and children and the elderly
- Students' use of aids in the schools, including television and computers

Appendix C.2.6
"Sorry I Missed You" Card

Sorry I missed you

WESTAT
An Employee-Owned Research Corporation
1650 Research Blvd. • Rockville, MD 20850 • 301 251-1500

Date:_____

Dear Resident:

Today, I visited your home on behalf of the *California Issues Study* to ask for your opinions on some important issues facing our state such as education, the environment, and crime.

I'm sorry I did not find you here, however, I will return in the next few days and will try to reach you at that time. If you would like to make an appointment or get more information about the study before I return, please call Westat's California Field Manager, Shirley Finnegan toll free at 1-800-621-3976. Thank you in advance for your cooperation.

Sincerely,

_____

Appendix C.2.7
"No Habla Español" Card

"NO HABLO ESPAÑOL" CARD

(I am sorry.) I do not speak Spanish.

(Lo siento.) No hablo Espanñol.

(Please) May I speak with someone who speaks English?

Por favor, ¿ puedo hablar con alguien que hable inglés?

(IF "NO")

Thank you for your attention. I only speak English; perhaps someone who speaks Spanish may contact you.

Muchas gracias por su atención. Yo sólo hablo inglés, quizás alguien que hable español se ponga en contacto con usted.

Appendix C.3
Westat Edit Form

Case ID: _____ Date: _____

Int ID: (Last contact) _____ Reviewer: _____

Call Record Checklist:			
1. Complete Home Office Use Only Box -- Interviewer ID, Contacts, SCR FS and MI FS	☐		
2. Check Record of Actions for completeness.	☐		
3. If final code is 14/24, were adequate number of "well-timed" visits made?	Y	N*	NA
4. If final code is 12/22, are name and telephone number of respondent recorded?	Y	N	NA
5. If final code is not 22, is NIR completed?	Y	N	NA

COMPLETE REMAINDER OF FORM ONLY IF FINAL STATUS IS 22.

Screener Edit Specifications		
1. Was Respondent selection done correctly?	Y	N*
2. Are any questions unanswered or answered incorrectly?	Y*	N

Main Interview Edit Specifications		
1. Are Start and Ending Times entered and reasonable?	Y	N
2. Is skip record completed properly?	Y	N*

Other Problems:

Question/Page	Omitted In Error	Answered In Error	Skip Error	Comments

Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

*Explain comments section

SUMMARY

1. Please rate how well the interviewer performed each of the following:

		Poorly				Very well
a.	Verbatims Complete	1	2	3	4	5
b.	Followed Skip Patterns	1	2	3	4	5
c.	Wrote legibly	1	2	3	4	5
d.	Edited own work	1	2	3	4	5
e.	Used probe marks appropriately/adequately	1	2	3	4	5
	Overall	1	2	3	4	5

2. Based on the review of this questionnaire, in what areas, if any, does the interviewer need to improve?

_____

_____

3. Did you provide feedback to the interviewer? Y N

IF YES, when was feedback given? _____/_____/_____
MO DA YR

4. Interviewer's Response: _____

_____

5. Other Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix C.4
Westat Validation Form

CALIFORNIA ISSUES STUDY - MAIN SURVEY
VALIDATION FORM

Type of Validation:	
Preselected	1
Substitution	2
Additional	3

Mode of Validation:	
By Telephone	1
Field	2
Mail	3

CONTACT RECORD:

Contact	Validator Initials	Date	Time	Outcome
1				
2				
3				
4				
5				

Case ID#:_____

Interviewer ID#:_____

Name of Sample Person:_____

Address:_____

_____

_____

Telephone: ( )_____

Date of Interview:_____

VALIDATION OUTCOME:	
Acceptable	1
Potential Problem	2
Unacceptable	3
Refusal/Breakoff	4
Unable to Contact	5
No Attempt Made	6
Other	7
Partially Valid	8

COMPLETE SECTION A, PAGE 2 ONLY IF VALIDATION IS FOR COMPLETED CASE (CODE 22). OTHERWISE GO TO SECTION B, PAGE 4.

SECTION A:

Hello. May I please speak to (MAIN INTERVIEW RESPONDENT).

IF MAIN INTERVIEW RESPONDENT IS NOT AVAILABLE: I'm calling with regard to a survey (RESPONDENT) took part in recently. When would be a good time to call back? (RECORD BEST TIME ON CONTACT RECORD.)

A1. WHEN RESPONDENT AVAILABLE: My name is (NAME) with Westat. One of our interviewers visited you recently for the California Issues Study. Do you recall being interviewed?

YES 1 (A3)
NO 2 (A2)

A2. The interviewer described the effects of chemicals on fish off the coast of Southern California and showed maps and charts. According to our records, the interviewer talked with you on (DATE OF INTERVIEW). Now do you remember the interview?

YES 1
NO 2

A3. On (DATE OF INTERVIEW), was your address (READ ADDRESS FROM CONTACT RECORD)?

YES 1 (A5)
NO 2 (A4)

A4. What was your address then?

_____

_____

IF ADDRESS IS NOT IN SAMPLE, END VALIDATION; OTHERWISE CONTINUE.

A5. (IF RESPONDENT REMEMBERS INTERVIEW: Thank you again for participating in the study. In this kind of research, we always get in touch with some of the people who were interviewed to make sure our interviewers are following proper procedures. IF RESPONDENT DOES NOT REMEMBER INTERVIEW: I'd like to verify a few pieces of information to see if I can understand how this mistake was made.)

A6. What is the highest year of school you completed or the highest degree you received? (C-7)

THROUGH 8TH GRADE 1
9-12 (NO DIPLOMA) 2
HIGH SCHOOL EQUIVALENT (e.g., GED) 3
HIGH SCHOOL GRADUATE (DIPLOMA) 4
SOME COLLEGE BUT NO DEGREE 5
ASSOCIATES DEGREE IN ACADEMIC OR VOCATIONAL PROGRAM 6
ASSOCIATES DEGREE IN ACADEMIC PROGRAM 7
BACHELOR'S DEGREE (e.g., BA, AB, BS) 8
MASTER'S DEGREE (e.g., MA, MS, M.ENG, M. ED, MSW, MBA) 9
PROFESSIONAL SCHOOL DEGREE (e.g., MD, DDS, DVM, LLB, JD) 10
DOCTORATE DEGREE (e.g., PhD, EDD) 11
REFUSED 97
NOT SURE 98

A7. In what month and year were you born? (C-6)

_____/_____
MO YR

A8. On (DATE OF INTERVIEW), how many people lived in your household who were younger than 18? (C9)

_____
NUMBER

IF R STILL DOES NOT REMEMBER THE INTERVIEW, TERMINATE VALIDATION. OTHERWISE, CONTINUE.

A9. About how long did the interview last?

|__|__|

Minutes 1
Hours 2

IF MORE THAN 20 MINUTES, GO TO A11; OTHERWISE, ASK A10.

A10. Just so I can be sure the interviewer covered all the topics, did (she/he)...

	YES	NO	NOT SURE
a. Describe the problems happening on the South Coast area of California due to DDTs and PCBs on the ocean floor?	1	2	8
b. Describe a program to speed up the recovery program of the contaminated South Coast area?	1	2	8
c. Ask you how you would vote on a recovery program?	1	2	8

A11. And, now just a few questions about the interviewer.

	YES	NO	NOT SURE
a. Was (the interviewer) polite and courteous?	1	2	8
b. Did (he/she) wear (his/her) ID badge [or identify (his/herself) appropriately]?	1	2	8

A12. Finally, I want to again thank you for your time. Is there anything (else) you would like to say about the survey or the interviewer?

_____

_____

_____

END OF VALIDATION FOR COMPLETED CASE.

SECTION B: NONRESPONSE VALIDATION

B1. Case Result Code:

(13/23)	Refusal/Breakoff	1
(14/24)	Not Home/Max Calls	2
(15/25)	Other	3
(16/26)	Illness/Disabled	4
(17/27)	Language Barrier	5
(18)	Vacant/NDU	6

B2. Were you able to verify result code?

Yes - No Problem	1	(B4)
Yes - Discrepancy	2	(B3)
No	3	(B4)

B3. Explain the discrepancy:

_____

_____

_____

B4. Other comments:

_____

_____

_____

Appendix C.5
Westat Reports

C.5.1 Field Staff Training
C.5.2 CIS Data Flow
C.5.3 Interviewer Incentive Plans
C.5.4 Validation
C.5.5 Weighting CIS Survey Results
C.5.6 Replicate Weighting and Estimation of Variance

Appendix C.5.1
Field Staff Training

FIELD STAFF TRAINING

General Approach

The general approach used by Westat for training field staff has the following characteristics:

- Home office staff who are highly experienced with the project and interviewer training develop all training materials.
- Staff responsible for the development of materials train other trainers in their use.
- All aspects for the training are documented in written materials.
- Training sessions are conducted principally by home office staff highly experienced with training. Field supervisors typically participate in all aspects of training the interviewers they will be supervising.
- Training techniques call for the active participation of the trainees.

Training Materials

Training materials may include:

- Interviewer's Manual;
- Home Study Exercise;
- Audio-Visual Presentations;
- Lecture Scripts;
- Role Plays;
- Demonstration scripts; and
- Exercises.

The training materials are very carefully prepared to cover every concept that the field staff needs to know. The elaborate preparation of all training materials accomplishes two purposes. First, it achieves standardization, which is particularly important when a large staff of interviewers is being

trained. Second, it allows all trainers to rehearse their roles and be completely prepared before training. Our materials eliminate the necessity for the trainer to improvise or ad lib. This allows a training session to move smoothly and on schedule, which gives the interviewers confidence that they are being trained by people who are knowledgeable.

Training Techniques

Westat's approach to interviewer training is to draw upon a variety of training techniques that we have found to be effective over the years, selecting the techniques best suited for the material to be presented. The development of the training program is intended to produce an integrated set of training materials that provide a comprehensive presentation of the concepts field staff will need to know.

The training approach stresses techniques that require the active participation of all trainees and that place the trainees in situations where they must use the procedures and questionnaires as they will in the field. Our training is presented through scripted lecture protocols. Using these protocols, the trainer acts the role of the respondent while the trainee takes the role of interviewer. Each script includes the mock respondent's answers to questions as well as specific instructions to the trainer to reinforce certain interviewing techniques, note the need to probe responses, refer to their manual, etc.

Another important aspect of Westat's approach to interviewer training is the use of small learning communities for much of the training session. Each community is made up of 8 to 12 trainees and a community leader who is responsible for directing and reinforcing the learning of the trainees in the community. Small learning communities enable each trainee to participate more fully in the training experience and provide an environment which encourages all trainees to ask questions and clarify problems. In addition, the small size of the group enables the community leader to monitor each trainee's progress more effectively.

There are seven basic training techniques that Westat draws on in designing a training session: home study, audio-visual presentations, interactive lectures to a large group, mock interviews in the small community, dyad role playing, exercises, and demonstrations.

A. **Home Study.** Westat's home study materials are designed in the form of programmed learning texts with learning exercises interspersed throughout an instruction manual. In

using a home study package, a trainee will read a section of the manual and then complete a set of exercises that relate to the materials first read. Answers to these exercises are reprinted on the reverse side of the exercise pages so that trainees can check their answers and correct any errors immediately. Typically, a final exercise without answers is included for review. Trainees are asked to turn in the home study exercise the first day of training. The exercises are reviewed by the trainers and feedback is provided during the session. Westat typically uses home study packages covering general interviewing techniques and listing procedures.

B. **Audio-Visual Presentations.** Westat has two audio-visual presentations for use in training interviewers. The first is a 40-minute review of general interviewing instructions which serves to reinforce the materials learned in the home study. The second is an introduction to listing procedures which is presented to listers and also to interviewers to help them use materials prepared by the listers when they set out to locate households assigned for interviewing. Additionally, project specific videos are sometimes developed to supplement written materials.

C. **Interactive Lecture to a Large Group.** The technique of interactive lecture to a large group is used for the initial presentation of the basic concepts of each section of a questionnaire. These lectures are presented from carefully developed and fully documented scripts. After an opening explanation of the concepts to be covered in the lecture, the lecturer leads the group through the questionnaire, calling on individual trainees to act the role of interviewer while the lecturer plays respondent. Each trainee records the responses in a blank copy of the questionnaire while a member of the training staff records responses on a transparency projected on a screen at the front of the training room. Trainees then check their recording against that on the screen. These lectures are presented by home office staff, freeing the supervisors to circulate among the trainees in their communities to check recording and generally get a feel for how trainees are progressing.

For lectures to a large group, a very simple scenario is used for the first presentation of the questionnaire. That is, the script is designed to follow the simpler skip patterns of the questions and to present no unusual or complex problems. The use of the interviewer's manual is kept to a minimum at this stage to provide for a relatively uninterrupted flow

through the questionnaire. Subsequent presentations build on this basic introduction, and incorporate more complex scenarios with more extensive use of the interviewer manual.

D. **Mock Interviews in a Small Community.** After being introduced to materials in the interactive lecture, trainees break up into small communities for more intensive study. At this stage, the scripts used by the community leaders become more complex and present increasingly difficult situations for the trainees to deal with. In the communities, trainees are encouraged to bring up all questions and areas of confusion. The scripts used by community leaders include frequent references to the interviewer's manual or other training materials. When these references are made, trainees are asked to read portions of the manual aloud. This technique is used to reinforce the trainees' use of the materials by showing them the extent to which the materials contain the answers to questions and problems they will encounter in the field.

E. **Dyad Role Playing.** After the trainees have been through the questionnaire with the community leaders, they break up into pairs, or dyads. Within each dyad, one trainee takes the role of interviewer while the other plays respondent, using a prepared script. Then they reverse roles, using a second prepared script. Trainers move about during the role-playing to answer questions and check progress. Trainees playing the respondent role are cautioned not to coach the one playing interviewer but, as much as possible, to create a true interviewing situation. The scripts are written to present a variety of different respondent types.

F. **Demonstration Interview.** Sometimes the best way to introduce a particularly complex task or section of a questionnaire is through a demonstration, that is, by having members of the training staff simply perform the task or administer the questions while the group observes. This technique provides the trainees with a general sense of the flow of a series of questions or an entire interview.

Appendix C.5.2
CIS Data Flow

CIS DATA FLOW

Statisticians selected a sample of addresses to be included in the study from segment listings of residential addresses prepared by trained field interviewers. Each sampled dwelling unit (DU) address was keyed into a survey control file and assigned a field identification number. The field identification number was used to track the DU throughout the data collection period.

For each sampled DU, a computer generated label was produced from the survey control file that contained the field identification number and other information needed by the interviewer to locate the address and conduct an interview (including the designation of one of the ten questionnaire versions that was to be administered at that particular address.) The label was attached to the front of the survey questionnaire and all of the survey questionnaires for DUs in a segment were assembled with the appropriate segment folder containing listing sheets and maps. The average segment size was 7 DUs; the average interviewer assignment was 11 segments.

The survey questionnaire consisted of two sections: (1) a short screener section which collected the household composition data required to select an eligible respondent for the main interview; and (2) the main interview section which contained the survey narrative and questions administered to the eligible respondent.

Field supervisors, under the direction of a Field Manager, made all interviewer assignment decisions and relayed these decisions to the home office where segment assignments were assembled and mailed to the interviewers. Field supervisors were provided with a laptop computer with an automated field management system which they used to keep track of the assignment of a case to an interviewer and the subsequent status of the case.

On a weekly basis, interviewers telephoned their supervisors to report detailed field production status and cost data. Supervisors entered the field reports into the field management system and electronically transmitted the information regularly to the home office computer. Weekly reports displaying production and cost data, as well as response rates, were generated and distributed to survey staff for review.

Twice a week, interviewers mailed their completed cases to their field supervisor, after performing an edit on each case. Supervisors had responsibility for reviewing the completed cases for

accuracy and checking case dispositions in the automated field management system. Field supervisors corrected any disposition discrepancies and then shipped the cases to the Westat home office.

Cases received at the home office were reviewed and case dispositions were logged into an automated receipt system. Additionally, a processing identification number was assigned to the case before being sent to the data processing staff for key entry. The data processing number was used to track documents through the processing steps.

Data processing staff entered all discrete data directly from the questionnaires into the survey database. Keyentry III, a data entry package, was customized for use in data entry of the discrete data items. All discrete data were 100% key verified. After discrete data were entered, a data entry clerk entered verbatim and open ended responses in the main interview questionnaire into a word processing file.

Documentation of the codes and coding specifications for the screener and main interview data, as well as machine data editing specifications for screener data, were developed in COED (Cobol Editor.) COED, a proprietary software package developed by Westat, is an integrated system of programs that allows for customized development of codebooks and software needed for machine editing of data.

Once all discrete and open ended data items were key entered, a machine edit program was run against the screener data items to check for accuracy and consistency. Clean data were appended to a cumulative data file and stored in the home office survey database.

Discrete and open ended data processed each week were transmitted electronically to NRDA. The screener section of the questionnaire was separated from the main interview section and the main interview questionnaires processed each week were shipped to NRDA. Westat maintains the hard copy screener data in a secure location.

Appendix C.5.3
Interviewer Incentive Plans

INTERVIEWER INCENTIVE PLANS

Interviewer incentive plans are used frequently on Westat field studies and involve paying interviewers an additional bonus above their hourly pay rate for the completion of an interview. Since interviewers typically work only part-time, the purpose of an incentive plan is to motivate the interviewers to produce more completed interviews per week, to work on the more difficult cases, and to help avoid interviewer attrition.

Westat does not have one standard interviewer incentive plan, but rather allows a project to decide if an incentive plan would be beneficial, when to initiate it, and how exactly to implement it. Examples of incentive plans used on Westat field studies are described below.

California Issues Study

The CIS interviewer incentive plan was introduced about halfway through the study. The incentive plan had a two-tiered approach. Tier one provided a monetary incentive on a sliding scale based on the total number of cases completed throughout the entire field period. An incentive of $1.00 per case was paid if the interviewer completed 45-54 cases. The incentive increased incrementally by $.50 per case for each additional 10 cases completed up to $4.00 per case for 114 completes. The incentive increased to $5.00 per case for each additional complete over 114. No bonus was paid if the interviewer completed fewer than 45 cases.

Tier two of the plan provided a monetary incentive also on a sliding scale based on the number of cases completed on a weekly basis beginning in June. Interviewers were paid $3.00 per completed interview for each week in which they completed 4 or 5 interviews. The incentive increased incrementally by $1.00 for each additional 2 cases completed. No incentive was paid for completing fewer than 4 cases in a week. The bonus was issued only after the cases were validated and received in the home office.

National Medical Expenditures Survey

On this study, an incentive plan was used in the second round of interviewing. The interviewing during this round extended over a four-month period and the incentive plan was implemented in two phases. During the first half of the field period, interviewers were paid

$5.00 per completed interview after they had completed 35 interviews. During the second half of the field period, interviewers were paid $5.00 per completed interview for each work week they completed more than 3 interviews.

National Health and Nutrition Examination Survey

Over a 6-year data collection period, interviewers were paid an incentive from the outset of the study. Participation in this study required the respondent to provide household screening information, complete a household interview, and then visit a mobile examination center for a 4-hour physical examination. The interviewer incentive plan paid the interviewer $5.00 per screener once a certain number of screeners had been completed and another $5.00 if the respondent completed the examination. An additional $5.00 payment was made if the interviewer was able to convince the respondent to complete the examination after initially refusing to participate.

National Survey of Family Growth, Cycle IV

The incentive plan on this study was initiated at the outset of the field period and paid the interviewer $10.00 per completed interview.

Appendix C.5.4
Validation

VALIDATION

General Procedures

Validation is an important quality control procedure conducted on all Westat field studies and involves recontacting a percentage of each interviewer's cases. Typically, 10 percent of each interviewer's work is validated by telephone by his or her supervisor if a telephone number is available, or in-person by another interviewer if there is no telephone.

Cases are randomly selected for validation at the outset of the study, and therefore, include validating all cases regardless of their disposition, e.g., completed interviews, vacant dwelling units, and nonresponse and ineligible cases. Interviewers are told that their work will be validated but they do not know the number of cases or which cases are selected.

The validation interview verifies that the interviewer went to the selected address, confirms the status of the case, and in the event of a completed interview, that the interview was conducted with the correct respondent following the prescribed procedures for the study. If any problem is detected during the validation interview, 100 percent of the interviewer's cases are then validated. The interviewer is dismissed if a problem is confirmed.

Validation Procedures on the California Issues Study

The general procedures described above were followed on the California Issues Study with some adaptation. A 10 percent sample of each interviewer's cases were validated up until an interviewer incentive plan was introduced about half way through a five month field period. After the incentive plan was implemented, 100 percent of the each interviewer's cases were validated. This procedure led to 26 percent of all sampled cases being validated and 34 percent of the completed interviews being validated.

The validation efforts revealed that two interviewers of the 59 interviewers who worked on the project had validation problems. These interviewers were dismissed as soon as the validation problem was confirmed. Tables 1 and 2 show the overall results of validation for these two interviewers. Of the 247 cases assigned to these two interviewers, all but 14 were validated. After extensive effort, we were unable to recontact those 14 households and they were counted as nonresponse to the survey. Of the 233 cases that were validated, 200 were found to have no validation problems and 33 were found to

have some type of problem, e.g., the wrong respondent was interviewed at the sampled dwelling unit or the interviewer went to a nonsampled dwelling unit. Of these 33 problems, 30 cases were originally reported as completed interviews.*

Validation on Other Westat Studies

Unfortunately, validation problems are not uncommon on surveys which is why validation interviews are an important quality control procedure. Over the past twenty years, Westat has kept computerized records on all interviewers who have worked on field studies, and therefore, is able to provide statistics on our interviewing workforce including how many projects have discovered validation problems with one or more of its interviewers. In the past twenty years, Westat has conducted 71 field studies requiring a field staff of 50 or more interviewers. These studies include some of the largest and most well-recognized surveys conducted for the federal government, including the National Medical Expenditure Survey, the National Survey of Family Growth, the National Adult Literacy Survey, the National Health and Nutrition Examination Survey, the Medicare Current Beneficiary Survey, and others. Of these 71 field studies, 43 have reported validation problems with at least one interviewer. Table 3 summarizes the information for these 71 studies by indicating the total number of interviewers who have worked on these studies and the number of interviewers found to have some type of validation problem. The number of interviewers who have validation problems is a very small percentage of the total number of interviewers who work on a study but problems can occur on any study which is why rigorous validation procedures are used to detect and correct any irregularities.

---

*In 28 of the 30 cases, the case was counted as nonresponse because it was determined that conducting a main interview after a validation interview had been completed might bias the responses of the respondent or because it was not possible to get respondent cooperation to conduct the interview. In two of the 30 cases, a main interview was conducted after the validation interview and the case was counted as a complete.

TABLE 1: VALIDATION STATUS OF CLOSED OUT CASES OF TWO PROBLEM INTERVIEWERS

ALL CASES (INTERVIEWS AND NON-INTERVIEWS)

NAME	No of Cases	Acceptable	Unacceptable	Unable to Determine
Interviewer A	148	122	19	7
Interviewer B	99	78	14	7
TOTAL	247	200	33	14

COMPLETED MAIN INTERVIEWS

NAME	No of Completes	Acceptable	Unacceptable	Unable to Determine
Interviewer A	116	93	18	5
Interviewer B	57	42	12	3
TOTAL	173	135	30	8

TABLE 2: DISTRIBUTION OF UNACCEPTABLE OR UNABLE TO DETERMINE VALIDATION CASES BY SAMPLE TYPE (BASE OR SCOPE)

ALL CASES (INTERVIEWS AND NON-INTERVIEWS)

TYPE	Unacceptable	Unable to Determine	Total
Base	18	8	26
Scope	15	6	21
TOTAL	33	14	47

COMPLETED MAIN INTERVIEWS

TYPE	Unacceptable	Unable to Determine	Total
Base	16	4	20
Scope	14	4	18
TOTAL	30	8	38

TABLE 3: NUMBER OF WESTAT FIELD STUDIES WITH VALIDATION PROBLEMS

	Number of Projects with Validation Problems					
No. of Interviewers on Project	0 Interviewers w/problems	1-2 Interviewers w/problems	3-4 Interviewers w/problems	5-6 Interviewers w/problems	7+ Interviewers w/problems	Total
50-99	11	9	3	0		23
100-149	7	4	1	4	1	17
150-199	2	3	2	0		7
200-249	1	1	3	0	1	6
250+	7	4	1	1	5	18
Total Projects	28	21	10	5	7	71

Appendix C.5.5
Weighting CIS Survey Results

WEIGHTING CIS SURVEY RESULTS

Overview

The procedure we followed for weighting the survey results is described in the accompanying flow chart, Figure 1. We start with a brief overview of the process and then describe each step in greater detail. In many instances we reference internal memos, included as an appendix, that provide the exact specifications for each step in the flow chart. The boxes in the flow chart provide the number of the memo that describes that step.

The purpose of the weighting is to appropriately reflect the contribution of each respondent's response to estimates obtained from the survey results. Given the probability of selection, this contribution is essentially the number of housing units a sampled housing unit represents. For example, if the chance of selecting a housing unit is 1 in a thousand, that housing unit represents 1,000 housing units in the state. If all sampled households cooperated fully with the survey and if there was no possibility that some elements in the population of interest could have been left out (undercovered), the reciprocal of the probability of selection (1/(1/1,000) = 1,000 in our example) could suffice as a survey weight. However, because there is nonresponse to survey interviews and because some components of the target population may be undercovered, further steps are taken.

One such step is nonresponse adjustments. Nonresponse adjustments are made to the weights of survey respondents so that the respondent weights reflect sampled households who do not respond. The respondents are matched with the nonrespondents on several characteristics (e.g., race/ethnicity, age, type of household) thought to be correlated with responses to key questionnaire items. To the extent that respondents resemble nonrespondents in terms of their responses to such items, any potential bias due to survey nonresponse into the survey estimates is reduced.

Another such step is poststratification (which was accomplished by a process called raking for this survey). Poststratification is the procedure of forcing the sums of sample weights for demographic subgroups (i.e., the survey estimate for the number of households in each subgroup) to match those obtained from an independent and more stable set of figures (more stable because they reflect known population figures or are based on a survey that is broader in scope and size). We are using the March 1993 Current Population Survey (CPS) estimates for the State of California for this purpose. The CPS is a large household survey of the nation conducted by the

Census Bureau. Matching these independent figures can help reduce bias in survey estimates resulting from undercoverage of any component of the target population. It can also help reduce the variability of estimates resulting from the vagaries of sample selection. For example, by chance, the percentage of Hispanic householders in the sampled housing units may be somewhat larger than the corresponding percentage in the general population. Poststratification can help reduce sample variation resulting from such departures.

The universe of interest or target population for this survey is householders in the State of California who speak English and who do not live in the Torrance area.

The weighting process begins with a base weight, the reciprocal of the selection probability of each sampled housing unit. Using a raking procedure, we adjusted the base weights of responding households so that they sum to various known figures for California from the 1993 March CPS. We used the following four variables in the raking operation: household type, household location, and the screener respondent's age and race. Next, we eliminated households that were successfully screened but found to be in the Torrance area as defined by five ZIP codes. Finally, we formed nonresponse adjustment cells defined by characteristics known about households screened regardless of whether a final questionnaire was obtained from the household. We now examine each of these steps in greater detail.

1. Departures from Equal Probability

The sampling rates within segments were designed to yield a self-weighting sample. That is, the sampling rate within a segment is set so that the product of the probability of selection of the PSU, the probability of selection of the segment within the PSU, and the probability of selection of addresses within the segment is the same for all sampled addresses. If the number of addresses listed in a given segment matches the number of housing units indicated in the 1990 Census data for that segment, the sample yield of addresses will be the same in every segment, distributing the field workload in a predictable and uniform manner. However, current listings generally differ somewhat from the 1990 Census information for a segment, usually reflecting new construction or removal of some housing units. If a segment experiences growth the sample yield of addresses is proportionately increased in that segment compared to that which would have resulted using the 1990 housing counts. Similarly, if their are fewer listings than given in the 1990 Census data, the yield is reduced.

This is the standard approach for achieving an equal probability sample for a household survey, but adjustments are made in those rare occasions where there is unusually large growth in a segment. For example, in this survey, one segment had 20 housing units according to 1990 Census data, but because of new construction had close to 2,000 housing units in 1993 when the segment was listed. Using the self-weighting approach without adjustment would have resulted in this segment contributing a disproportionately large portion of households to the total sample (close to 15 percent). In order to minimize the mean square error of the sample estimates (the mean square error reflects both sample variance and bias), it is standard practice to limit the sample size selected from such segments and to trim the sample weights of DUs selected from these segments to limit their impact on the sample estimates. Westat generally limits the sample size to between 3 and 4 times the number that would have been selected had the number of addresses listed equaled the number of housing units in 1990. For this survey it was limited to 4 times the number of housing units in 1990. There were two segments in all where this occurred, and thus departures from the equal probability sampling occurred.

Other departures from equal probability selection arose due to a clerical error. The number of housing units within segment were appropriately applied for segment selection. However, in four segments the numbers were miscoded prior to establishing the sampling rates within segments, resulting in sampling rates that were not as planned. The appropriate probabilities of selections, reflecting the sampling rates actually employed, were computed, the inverse of which serve as the base sample weights. This departure from unequal weighting will increase sample variability slightly but is unbiased as it reflects the actual probabilities of selection.

2. Trimmed vs. Untrimmed Base Weights

Earlier we indicated that practically all households had the same selection probability. Due to extensive growth in a few segments, the measure of size, 1990 census counts, used to select some segments was vastly smaller than the number of housing units found at the time of listing. In such cases it is standard practice to subsample the area so as to select a manageable workload. This, however, results in changing the selection probabilities. When this situation occurs, it is common to trim the resulting weight to prevent the undue influence of one or a handful of respondents with large weights on survey estimates. We will produce final sample weights both trimming and not trimming the original base weights so that a comparison can be made to assess the effect of trimming. (See memo 2.2.)

3. Imputation of Missing Screener Data

The next step after computing base weights was to adjust the sums of weights for completed screeners to known population totals. Some of the screener data was missing, however, due to item nonresponse, including data required for nonresponse adjustment and raking. We therefore imputed missing values in critical fields using WESDECK, a Westat hotdeck imputation procedure, using PSU and segment as hard and soft boundaries, respectively. The variables imputed were: sex, age, race/ethnicity and household type. The rates of missing data were 0.1, 1.2, 1.2, and 5.5 percent, respectively. (See memos 3.2 and 4.2.)

4. Weighting the Screener Respondents

The weights of all households completing the screening process were adjusted so that they added to the total number of households in the state as indicated by the March 1993 Current Population Survey. This adjustment process accomplishes two things. First, it addresses the problem of nonresponding households. (The base weights of the households completing the screening interview will add to less than the total number of households in the state.) Second, it reduces the potential for bias from undercoverage.

The screener weight adjustment was accomplished with a three-way raking process. Raking is a multi-dimensional technique by which survey weights are iteratively modified so that they sum to specific totals. Our three sets of totals were the marginal distribution of: race by age, race by geographic area, and race by household type

Data from the March, 1993 CPS was used to obtain the three sets of control totals described above. Tables 1 through 3 in the appendix show the results. These totals were then adjusted for language barriers based on the U.S. Census Bureau's 1990 PUMS (Public Use Microdata Sample) database, which contains sample items from the 1990 census including self-reported ability to speak English. Table 4 shows the adjustment factors used while Table 5 shows the resulting adjusted CPS race by age totals. Table 6 shows the marginal adjustment factors for race and Tables 7 and 8 show the adjusted CPS race by household type and race by area totals using these factors. (See memo 5.1.)

The effect of the raking on the base weights can be seen in Tables 9-11. These tables describe the magnitude of the changes to the base weight in each subgroup category. If these factors were all one, it would indicate that survey estimates using the base weights exactly matched

our external control totals. Factors greater than one indicate a short fall in sampled respondents due either to undercoverage or nonresponse.

5. Weighting the Main Questionnaire

As mentioned above, the weights of responding screeners were raked so that they added up to the state-level figures for the target population. Since households in the Torrance area were ineligible for the main interview, those households screened in the Torrance area were removed from the remainder of the weighting process. The sum of the weights of all remaining screener respondents represents an estimate of the number of households in the target population.

Since not all eligible screened households completed the main interview, the last step of the weighting was to adjust the weights of the responding households to the weighted total for all eligible households. Nonresponse adjustment cells were created by crosstabulating the following three variables:

Household type (2 levels) by Race (initially 4 levels) by Age (initially 4 levels).

Examination of response rates by gender showed little difference; accordingly gender was not used for adjustment. An examination of a count of screened households falling in these 32 cells revealed that some of the cells had insufficient sample to create stable ratio factors for adjustment. Some of the cells were collapsed so that only 20 cells were used for the actual adjustment. Table 12 in the appendix shows the cells that were used for the nonresponse adjustment.

Within each of the 20 nonresponse adjustment cells, the ratio of the sum of the weights of eligible households screened to the sum of the weights of the households that responded to the interview was multiplied by each respondents weight. Thus, the respondents' weights reflected both the respondents and eligible nonrespondents in each cell. (See memo 6.1.)

6. Sample Distributions by Subclass

Tables 13...15 show the sample distributions for race by age, race by household type and race by area. An unweighted distribution is given along with weighted distributions using the base, raked and nonresponse adjusted weights. The breakdowns in the three tables correspond exactly with the breakdowns of the PUMS adjusted CPS raking totals. The weighted distribution using the raked weights is identical to the distribution of the adjusted CPS totals. Differences in the distributions are minor, indicating only minor variability in weights introduced by the raking and nonresponse adjustments.

Table 1. CPS race X age California totals

Race	Age ≤34	Age 35 - 44	Age 45 - 64	Age >65	Total
Hispanic	897,022.53	632,205.44	547,351.52	165,429.50	2,242,008.99
White	1,589,583.23	1,510,863.91	2,343,355.37	1,764,189.03	7,207,991.54
Black	207,724.07	173,251.57	226,707.03	102,469.77	710,152.44
Other	277,157.82	265,911.59	306,890.13	97,091.66	947,051.20
Total	2,971,487.65	2,582,232.51	3,424,304.05	2,129,179.96	11,107,204.17

Table 2. CPS race X HHtype California totals

Race	HHtype Family HH, MC	HHtype Other	Total
Hispanic	1,315,519.53	926,489.46	2,242,008.99
White	3,868,342.85	3,339,648.69	7,207,991.54
Black	267,482.26	442,670.18	710,152.44
Other	613,572.35	333,478.85	947,051.20
Total	6,064,916.99	5,042,287.18	11,107,204.17

Table 3. CPS race X area California totals

Race	Area Anaheim, Santa Anna	Area Los Angeles, LB	Area San Fran., Oak	Area All other	Total
Hispanic	174,485.47	958,288.23	170,086.24	939,149.05	2,242,008.99
White	642,558.43	1,546,511.73	1,019,690.49	3,999,230.89	7,207,991.54
Black	10,423.71	350,088.14	110,397.96	239,242.63	710,152.44
Other	68,115.03	339,362.86	232,845.99	306,727.32	947,051.20
Total	895,582.64	3,194,250.96	1,533,020.68	5,484,349.89	11,107,204.17

Table 4. PUMS race x age California adjustment factors

Race	Age ≤34	Age 35 - 44	Age 45 - 64	Age >65
Hispanic	0.781585669	0.778182503	0.776794589	0.763462403
White	0.995887173	0.995267127	0.993180479	0.989349658
Black	0.995248950	0.994597521	0.996656967	0.997197762
Other	0.910904882	0.868836300	0.805459926	0.702495794

Table 5. PUMS adjusted CPS race x age California totals

Race	Age ≤34	Age 35 - 44	Age 45 - 64	Age >65	Total
Hispanic	701,099.95	491,971.21	425,179.70	126,299.20	1,744,550.07
White	1,583,045.55	1,503,713.18	2,327,374.81	1,745,399.81	7,159,533.35
Black	206,737.16	172,315.58	225,949.14	102,182.63	707,184.51
Other	252,464.41	231,033.64	247,187.70	68,206.48	798,892.24
	2,743,347.08	2,399,033.62	3,225,691.35	2,042,088.12	10,410,160.17

Table 6. PUMS marginal race adjustment factors

Race	Adjustment factor
Hispanic	0.778119123
White	0.993277158
Black	0.995820715
Other	0.843557600

Table 7. Adjusted CPS race X HHtype California totals

Race	HHtype Family HH, MC	HHtype Other	Total
Hispanic	1,023,630.90	720,919.17	1,744,550.07
White	3,842,336.59	3,317,196.76	7,159,533.35
Black	266,364.38	440,820.14	707,184.51
Other	517,583.62	281,308.62	798,892.24
Total	5,649,915.49	4,760,244.68	10,410,160.17

Table 8. Adjusted CPS race X area California totals

Race	Area Anaheim, Santa Anna	Area Los Angeles, LB	Area San Fran., Oak	Area All other	Total
Hispanic	135,770.48	745,662.40	132,347.36	730,769.84	1,744,550.07
White	638,238.61	1,536,114.78	1,012,835.27	3,972,344.69	7,159,533.35
Black	10,380.15	348,625.02	109,936.58	238,242.77	707,184.51
Other	57,458.95	286,272.12	196,419.00	258,742.16	798,892.24
Total	841,848.19	2,916,674.32	1,451,538.21	5,200,099.46	10,410,160.17

Table 9: Race by age minimum, maximum and mean raking factors

Race/Ethnicity	Age	Raking factor		
		Minimum	Maximum	Mean
White	18-34	1.05908	1.38424	1.17290
	35-44	1.14303	1.49397	1.28778
	45-64	1.28560	1.68031	1.46006
	65 +	1.64862	2.15480	1.80484
Black	18-34	0.65999	1.25055	0.87169
	35-44	0.79669	1.50957	1.07225
	45 +	0.89009	1.68655	1.22300
Hispanic	18-34	1.31133	1.88543	1.57677
	35-44	1.57704	2.26747	1.90225
	45 +	1.05427	1.51582	1.26359
Other	18-34	0.89141	1.39435	1.08368
	35-44	1.04910	1.64100	1.34126
	45+	1.00290	1.56873	1.31753

Table 10: Race by household type minimum, maximum and mean raking factors

Race/Ethnicity	HH type	Raking factor		
		Minimum	Maximum	Mean
White	1 *	1.17884	2.15480	1.47772
	2 *	1.05908	1.93588	1.33688
Black	1	0.88775	1.68655	1.25762
	2	0.65999	1.25386	0.96496
Hispanic	1	1.05427	2.22154	1.50581
	2	1.07606	2.26747	1.57102
Other	1	0.98983	1.64100	1.34696
	2	0.89141	1.47784	1.08441

*1 = Family household, married couple
*2 = All others

Table 11: Race by area minimum, maximum and mean raking factors

Race/Ethnicity	Area	Raking Factor		
		Minimum	Maximum	Mean
White	Anaheim	1.24361	2.15480	1.55140
	Los Angeles, Long Beach	1.16898	2.02549	1.44634
	San Francisco, Oakland	1.23158	2.13395	1.53040
	Other	1.05908	1.83506	1.34785
All others	Anaheim, Los Angeles, Long Beach	0.92971	2.26747	1.57831
	San Francisco, Oakland	0.80376	1.96030	1.29088
	Other	0.65999	1.60965	1.11042

Table 12: Nonresponse adjustment cells and factors

Cell	Household type	Race/Ethnicity	Age	Frequency	Nonresponse adjustment factor
1	Family household, married couple	White	18-34	135	1.22100
2	" "		35-44	150	1.15502
3	" "		45-64	250	1.11697
4	" "		65+	91	1.24578
5	" "	Hispanic	18-34	67	1.09967
6	" "		35-44	37	1.25315
7	" "		45 +	63	1.16166
8	" "	Black/Other	18-34	44	1.14922
9	" "		35-44	48	1.04023
10			45 +	54	1.22104
11	Other " "	White	18-34	197	1.10399
12	" "		35-44	135	1.15592
13	" "		45-64	156	1.10245
14	" "		65 +	132	1.17885
15	" "	Hispanic	18-34	50	1.12303
16	" "		35-44	25	1.04553
17	" "		45 +	47	1.02607
18	" "	Black/Other	18-34	72	1.15651
19	" "		35-44	37	1.20959
20			45 +	67	1.14228

Table 13. Sample distributions for race by age.

Race/ethnicity	Age	Percent unweighted	Percent using trimmed base weights	Percent using raked weights	Percent using nonresponse adjusted weights
White	<=34	17.9	17.9	15.2	15.3
	35-44	15.3	15.5	14.4	14.5
	45-64	21.4	21.2	22.4	22.4
	65+	12.6	12.8	16.8	16.9
Black	<= 34	3.2	3.2	2.0	2.1
	35-44	2.2	2.1	1.7	1.7
	45+	3.5	3.6	3.2	3.1
Hispanic	<=34	6.1	5.9	6.7	6.8
	35-44	3.4	3.4	4.7	4.7
	45+	5.7	5.8	5.3	5.2
Other	<=34	3.1	3.1	2.4	2.3
	35-44	2.3	2.3	2.2	2.1
	45+	3.2	3.2	3.0	2.9
Total		99.9	100.0	100.0	100.0

Table 14. Sample distributions for race by household type

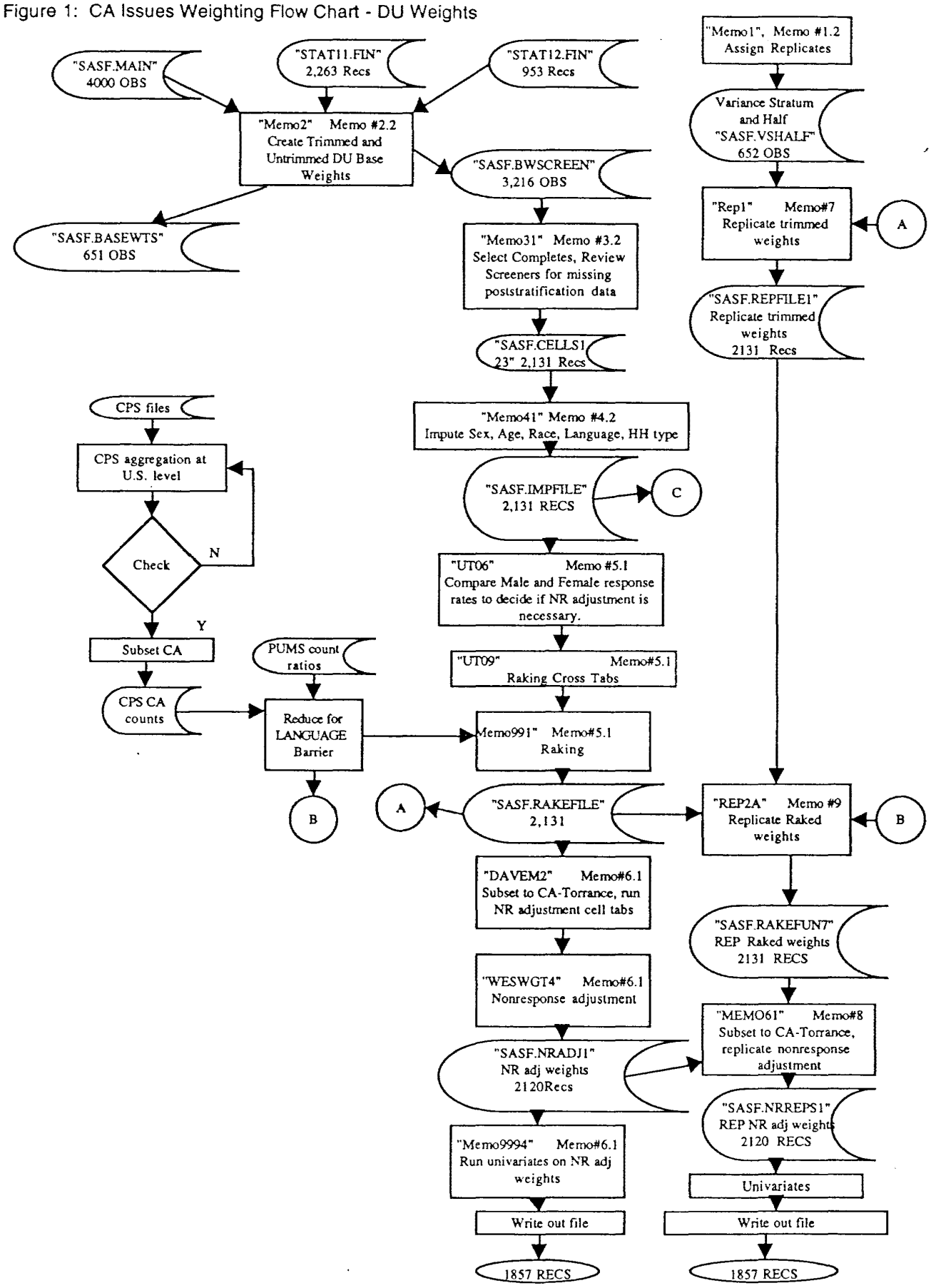
Race/ethnicity	Household type	Percent unweighted	Percent using trimmed base weights	Percent using raked weights	Percent using nonresponse adjusted weights
White	1*	34.4	34.5	36.9	37.0
	2**	32.8	32.9	31.9	32.1
Black	1	2.9	2.8	2.6	2.6
	2	6.1	6.1	4.2	4.3
Hispanic	1	9.1	9.0	9.8	9.8
	2	6.1	6.1	6.9	6.9
Other	1	5.2	5.1	5.0	4.7
	2	3.5	3.4	2.7	2.6
Total		100.1	99.9	100.0	100.0

*1 = Family household, married couple
**2 = All others

Table 15. Sample distributions for race by area.

Race	Area	Percent unweighted	Percent using trimmed base weights	Percent using raked weights	Percent using nonresponse adjusted weights
White	Anaheim, Santa Anna	5.4	5.5	6.1	6.0
	Los Angeles, Long Beach	14.5	14.0	14.8	14.9
	San Francisco, Oakland	8.7	8.8	9.7	9.9
	Other	38.7	39.2	38.2	38.2
Other	Los Angeles, Long Beach, Anaheim, Santa Anna	13.4	13.4	15.2	14.2
	San Francisco, Oakland	4.5	4.5	4.2	4.4
	Other	14.9	14.7	11.8	12.4
Total		100.1	100.1	100.0	100.0

Figure 1: CA Issues Weighting Flow Chart - DU Weights



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MEMORANDUM

TO: John Edmonds

DATE: 9/14/94
Memo No. 2.2

FROM: James L. Green

SUBJECT: CA Issues Study - Creating Trimmed and Untrimmed Full Sample DU Base Weights.

Key Words: FHBW, TFHBW.

Changes: This version describes, for the record, the processing that was done in this step. All previous versions of this memo should be discarded.

Introduction

We will create a base weights file of both trimmed (TFHBW) and untrimmed (FHBW) full sample DU base weights at the PSU | SEGMENT level. We will also create a screener data file at the DU level by concatenating the completed screener data file and the uncompleted screener data file. We will then merge the base weights file with the concatenated screener data file by PSU and SEGMENT, thereby assigning the trimmed and untrimmed full sample DU base weights to the screener records.

Inputs

Three files. The PSU | SEGMENT level file "[COS903001]CHKSAMP.DAT", the completed screener data file "[COS903001]STAT11.SASEB$DATA" and the uncompleted screener data file "[COS903001]STAT12.SASEB$DATA".

Process

Create the Untrimmed Full Sample DU Base Weights

Create an untrimmed full sample DU base weight (FHBW) for each PSU | SEGMENT as follows:

$$FHBW = \left(\frac{MOSDU}{MOSSEG}\right) * \left(\frac{11,447,548.47}{3,200}\right) * \left(\frac{ACTDUIJ}{4 * MOSDU}\right)$$

where MOSDU = XPECTDU

MOSSEG = 1,028 IF PSU = 104 AND SEGMENT = 221
1,485 IF PSU = 108 AND SEGMENT = 212
1,730 IF PSU = 109 AND SEGMENT = 232
1,261 IF PSU = 110 AND SEGMENT = 267
XPECTDU otherwise

ACTDUIJ = 4 * XPECTDU IF RIJ < 4
ACTUALDU / PCHUNK otherwise

(Note that the fields XPECTDU, ACTUALDU, PCHUNK and RIJ exist on the PSU | SEGMENT input file and that Rob Dymowski has already written a program "CHKSAMP" which did these calculations, but on a temporary basis.)

Run a PROC FREQ on the new field FHBW.

Create the Trimmed Full Sample DU Base Weights

Create a trimmed full sample DU base weight (TFHBW) as follows:

```
IF FHBW ≤ 2 * (MODAL (FHBW)) THEN
        TFHBW = FHBW
ELSE
        TFHBW = 2 * (MODAL (FHBW))
```

(Note that the modal value of FHBW should be 3577.3588969...; The purpose of requesting the modal value is to avoid any loss in precision that would result from a literal assignment.)

Run a PROC FREQ on the new field TFHBW.

Create the Base Weights File

Add the two fields FHBW and TFHBW to the PSU | SEGMENT level input file on a permanent basis. Run a PROC CONTENTS on the resulting file.

Concatenate the Screener Data Files

Concatenate the two input screener data files. Run a check for unique SQID1 within PSU and SEGMENT in the concatenated file. Dump all duplicate records, giving all fields. Stop the

processing at this point if any duplicate records are found. Run a PROC CONTENTS on the resulting file.

Merge the Base Weights and Screener Data Files

Merge the base weights file and the concatenated screener data file by PSU and SEGMENT. Check both files for non merging records. Dump all non merging records, giving all fields, separately for each file. Stop the processing at this point if any non merging records are found. Add the two fields FHBW and TFHBW to the concatenated screener data file. Run a PROC CONTENTS on the resulting file.

Outputs

Two files. The base weights file with FHBW and TFHBW added. The concatenated screener data file with FHBW and TFHBW added.

cc: Debby Vivari
David Morganstein
Ralph DiGaetano

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MEMORANDUM

TO: John Edmonds

DATE: 9/14/94
Memo No. 3.2

FROM: James L. Green

SUBJECT: CA Issues Study - Subset Records and Review for Missing Poststratification Data.

Key Words:

Changes: This version updates the cell frequencies reported in table 1. All previous versions of this memo should be discarded.

Introduction

We will subset the input screener data file to those records that are in scope and eligible for poststratification and non response adjustments. We will then review the amount of missing data in fields relevant to poststratification. A section on the crosswalk between poststratification cell definitions and screener data is also provided for future reference.

Inputs

One file. The Memo #2 screener data output file "SASF.BWSCREEN".

Process

Subset to Eligible Records

Table 1 shows a classification of records based on screener and interview dispositions. Cells 1, 2 and 3 represent the cases which will be poststratified up to the PUMS adjusted number of DUs in California. Cells 1 and 2 represent the cases which will be input to WESWGT Function 4 for nonresponse adjustment. Subset the records in the input file to those in cells 1, 2 and 3 based on the field HOMI as shown in table 1. Run a frequency on HOMI and HOSCR using the subset file.

Table 1. Classification of screener and interview dispositions

SCREENER RESPONSE		SCREENER NONRESPONSE/ INELIGIBLE
INTERVIEW RESPONSE	INTERVIEW NONRESPONSE/ INELIGIBLE	
RESPONSE (HOMI = 22) [1,857] Cell 1	NONRESPONSE (HOMI = 23, 24, 25, 26) [274] Cell 2	NONRESPONSE (HOSCR = 13, 14, 15, 16) [516] Cell 5
	OTHER INELIGIBLE (HOMI = 29) [0] Cell 3	OTHER INELIGIBLE (HOSCR = 19) [2] Cell 6
		VACANT - NOT A DU (HOSCR = 18) [333] Cell 7
	LANGUAGE PROBLEM (HOMI = 27) [132] Cell 4	LANGUAGE PROBLEM (HOSCR = 17) [102] Cell 8

[3,216 cases total]

Review Missing Data

Run frequencies on the following fields using the subset file:

SS8_1	{Sex}
SS9_1	{Age}
SS101	{Ethnicity}
SS111	{Race}
SS121	{Ability to Speak English}
SS6_2	{Relationship to person01}
SS6_3	
SS6_4	
SS6_5	
SS6_6	
SS6_7	
SS6_8	
SS6_9	
SS610	

Attached are copies of the relevant pages from the codebook. Note that SS6_2...SS610 have the same coding structure, so only the page for SS6_2 is shown.

Crosswalk Between Poststratification Cell Definitions and Screener Data

The poststratification totals we created are for the following domains:

Race / Ethnicity of Householder	X	Household Type
" "	X	Age of Householder
" "	X	Geographic Area

The relationship between these domains and the fields above are as follows:

Race / Ethnicity of Householder

White	(SS101 = 6) AND (SS111 = 1)
Black	(SS101 = 6) AND (SS111 = 2)
Hispanic	(SS101 = 1..5)
Other	(SS101 = 6) AND (SS111 = 3, 4, 5)

Household Type

Family Household, Married Couple	(SS6_2 OR SS6_3 OR ... OR SS610 = 02)
All Others	All Others

Age of Householder

00-34	$18 \leq SS9_1 \leq 34$
35-44	$35 \leq SS9_1 \leq 44$
45-64	$45 \leq SS9_1 \leq 64$
65+	$65 \leq SS9_1 \leq 96$

Geographic Area

Los Angeles, Long Beach	PSU = 109, 110
Anaheim, Santa Anna	PSU = 111
San Francisco, Oakland	PSU = 103
Other	

Outputs

One file. The subset screener data file. Run a PROC CONTENTS on the file.

cc: Debby Vivari
David Morganstein
Ralph DiGaetano

Question Name	Column Number(s)	
SS6_1	036-037	WHAT IS (PERSON)'S RELATIONSHIP TO (PERSON 01) ?
		++ = INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR)
		01 = REFERENCE PERSON
SS7_1	038	IS (PERSON) ONE OF THE PERSONS WHO OWNS OR RENTS OR PAYS TOWARD THE RENT OR MORTGAGE OF THIS HOME?
		+ = INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR)
		1 = YES
SS8_1	039	CODE SEX (ASK IF NOT OBVIOUS FROM SS6_1) IS (PERSON) MALE OR FEMALE?
		+ = INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR)
		1 = MALE
		2 = FEMALE
		7 = REFUSED
		8 = DON'T KNOW
		9 = NOT ASCERTAINED
SS9_1	040-041	HOW OLD WAS (PERSON) ON (HIS/HER) LAST BIRTHDAY?
		++ = INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR)
		18-95 = AGE OF PERSON 01
		96 = 96 YEARS OLD OR OLDER
		97 = REFUSED
		98 = DON'T KNOW
		99 = NOT ASCERTAINED

Question Name	Column Number(s)	
SS101	042	WHICH OF THESE GROUPS REPRESENT (PERSON'S) NATIONAL ORIGIN OR ANCESTRY?

+	= INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR)
1	= MEXICANO, MEXICAN, MEXICAN AMERICAN, CHICANO
2	= PUERTO RICAN
3	= CUBAN
4	= CENTRAL/SOUTH AMERICAN
5	= OTHER SPANISH/HISPANIC
6	= NONE OF THE ABOVE
7	= REFUSED
8	= DON'T KNOW
9	= NOT ASCERTAINED

SS111	043	WHICH OF THE GROUPS BEST DESCRIBES (PERSON'S) RACIAL BACKGROUND?

+	= INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR)
1	= WHITE
2	= BLACK (AFRICAN AMERICAN)
3	= ASIAN/PACIFIC ISLANDER
4	= AMERICAN INDIAN/ALASKAN NATIVE
5	= OTHER (NO SPECIFY)
7	= REFUSED
8	= DON'T KNOW
9	= NOT ASCERTAINED

SS121	044	DOES (PERSON 01) NOT SPEAK ENGLISH WELL?

+	= INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR)
1	= YES
2	= NO
7	= REFUSED
8	= DON'T KNOW
9	= NOT ASCERTAINED

Question Name	Column Number(s)	
SS3_2	045-046	WHAT IS THE FIRST NAME OF SECOND MEMBER OF THIS HOUSEHOLD WHO IS AGE 18 OR OLDER? (LINE 02)
		++ = INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR) OR ONLY ONE HOUSEHOLD MEMBER (CODED 01 IN SS1)
		02 = SECOND PERSON #
SS6_2	047-048	WHAT IS (PERSON 02)'S RELATIONSHIP TO (PERSON 01)?
		++ = INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR) OR ONLY ONE HOUSEHOLD MEMBER (CODED 01 IN SS1)
		02 = SPOUSE (LEGALLY MARRIED)
		03 = PARTNER (INFORMALLY MARRIED)
		04 = CHILD (RELATED BY BLOOD, MARRIAGE (STEP), OR ADOPTION)
		05 = SIBLING (SISTER, BROTHER, INCLUDING HALF, STEP AND THROUGH ADOPTION)
		06 = PARENT (RELATED BY BLOOD, MARRIAGE, OR ADOPTION)
		07 = OTHER RELATIVE (AUNT, UNCLE, COUSINS)
		08 = NOT RELATED (FRIEND, ROOMMATE, ETC.)
		97 = REFUSED
		98 = DON'T KNOW
		99 = NOT ASCERTAINED
SS7_2	049	IS (PERSON 02) ONE OF THE PERSONS WHO OWNS OR RENTS OR PAYS TOWARD THE RENT OR MORTGAGE OF THIS HOME?
		+ = INAPPLICABLE, SCREENER NOT COMPLETED (CODED 13 THROUGH 19 IN HOSCR) OR ONLY ONE HOUSEHOLD MEMBER (CODED 01 IN SS1)
		1 = YES
		2 = NO
		7 = REFUSED
		8 = DON'T KNOW
		9 = NOT ASCERTAINED

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MEMORANDUM

TO: John Edmonds

DATE: 9/14/94
Memo No. 4.2

FROM: James L. Green

SUBJECT: CA Issues Study - Imputation of Missing Data in Critical Fields.

Key Words: RSEX, RAGE, RRACETH, RLANG, RHHTYPE, ISEX, IAGE, IRACETH, ILANG, IHHTYPE

Changes: This version includes the full name of the input file and switches SEG to a soft boundary in the WESDECK form. All previous versions of this memo should be discarded.

Introduction

We will impute missing data in fields relevant to non response adjustment and poststratification using WESDECK. First we will create new fields at levels of detail sufficient for non response adjustment and poststratification. Then we will use WESDECK to fill in any missing values in the new fields.

Inputs

One file. The Memo #3 output file "SASF.CELLS123".

Process

Create New Fields

Create the following new fields:

RSEX	=	SS8_1		(1 = Male, 2 = Female)
RAGE	=	1	IF	$18 \le SS9_1 \le 34$
	=	2	IF	$35 \le SS9_1 \le 44$
	=	3	IF	$45 \le SS9_1 \le 64$
	=	4	IF	$65 \le SS9_1 \le 96$

= 7 otherwise

{Note: Prior to using WESDECK to fill in missing values in RAGE (=7), we would like to assign values based on a spouse's nonmissing SS9_2, SS9_3 ... SS910, wherever possible. This will consist of the following steps:

- Identify which of the fields SS6_2, SS6_3...SS610 = 02, if any.
- Record the index (X) of the field equal to 02. For instance, if SS6_4 = 02, then set X to 4.
- Assign RAGE based on the appropriate SS9_X. In our example, RAGE would be assigned based on the value of SS9_4 and the above logic for the 4 values of RAGE.
- Set the field I_AGE equal to 3. Note that you will have to use a temporary name for this field as WESDECK will otherwise abort since I've specified the same field name in the CATFLAG list.}

RRACETH	=	1	IF	(SS101 = 6)	AND	(SS111 = 1)	White
	=	2	IF	(SS101 = 6)	AND	(SS111 = 2)	Black
	=	3	IF	(SS101 = 1..5)			Hispanic
	=	4	IF	(SS101 = 6)	AND	(SS111 = 3, 4, 5)	Other
	=	7	otherwise				
RLANG	=	SS121		(1=Not well, 2 = well)			
RHHTYPE	=	1	IF	SS6_2 = 02 OR SS6_3 = 02 OR... SS610 = 02			
	=	2	IF	SS6_2 = (SAS missing, 3..8) AND SS6_3 = (SAS missing, 3..8) AND ...SS610 = (SAS missing, 3..8)			
	=	7	otherwise				

Run a frequency on these fields after they are created. These frequencies should be compared against the frequencies on the raw data fields from memo #3 to check the processing.

Run WESDECK

Run WESDECK to fill in any missing values in the fields RSEX, RAGE, RRACETH, RLANG and RHHTYPE. See the attached WESDECK specification form for details. Run a frequency on these fields after WESDECK is finished.

Outputs

One file. The input data file with the fields RSEX, RAGE, RRACETH, RLANG, RHHTYPE, ISEX, IAGE, IRACETH, ILANG and IHHTYPE attached . Run a PROC CONTENTS on the file.

cc: Debby Vivari
David Morganstein
Ralph DiGaetano

WESDECK Macro, Version 2.2
Parameter specification form

Date:
Study Name: Project Director:
Charge Number: Statistician:

Parameter		*	Entry	Default	Description
Input Controllers	INDSN =	R			input data set name
	IMPCAT =	E	RSEX RAGE RRACETH RLANG RHHTYPE		list of categorical impute variables
	IMPCON =	E			list of continuous impute variables
	RESPID =	R	PSU | SEG | SQIDI		unique ID for each observation
	PRESORT =	O	N	N	flag to indicate if data set is presorted
Algorithm Controllers	HARDBND =	R	PSU		list of hard boundary variables
	SOFTBND =	O	SEG		list of soft boundary variables
	SASMISS =	O	N	Y	flag indicating whether SAS missing values are to be imputed
	MISSVALC =	O	7, 8, 9		alternate values to be treated as missing in the categorical variables
	MISSVALN =	O			alternate values to be treated as missing in the continuous variables
	NODONC =	O			values which cannot be used as donors in the categorical variables
	NODONN =	O			values which cannot be used as donors in the continuous variables
	DONMAX =	O	3	3	donation maximum
	CONTINUE =	O	Y	N	flag to determine if variables with insufficient donors should be imputed
	RANDSEED =	O			random seed from previous run
Output Controllers	INTERIM =	O		_INTERIM	interim data set name
	OUTDSN =	R			output data set name
	CATFLAG =	X	ISEX, IAGE, IRACETH, ILANG, IHHTYPE		list of categorical impute flag variables
	CONFLAG =	X			list of continuous impute flag variables
	CATDON =	O	IDSEX, IDAGE, IDRACETH, IDLANG, IDHHTYPE		list of categorical donor ID variables
	CONDON =	O			list of continuous donor ID variables
	REPORTS =	O		Y	print cell and collapsing reports?

* R: Required O: Optional E: Either one or both may be present

X: Required if corresponding IMP* parameter present

Version 1, June 1994

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MEMORANDUM

TO: John Edmonds

DATE: 9/15/94
Memo No. 5.1

FROM: James L. Green

SUBJECT: CA Issues Study - Full Sample Raking.

Key Words: TFHRKW

Introduction

We will use WESWGT function 6 to rake the completed screeners to known household population counts for California. The proposed dimensions for the raking take into account all possible screener data except for sex, so we will first check for differential nonresponse by sex to assess the necessity of any explicit nonresponse adjustment by sex prior to the raking.

Inputs

Two files. The Memo #4 output file "SASF.IMPFILE" and the control totals data file resulting from the CPS and PUMS work.

Process

Check for Differential Nonresponse by Sex

Produce three crosstabs of sex (SS8_1) with response status (CELL) using all records in the file "SASF.IMPFILE", one unweighted, one using the untrimmed full sample base weight (FHBW) and one using the trimmed full sample base weight (TFHBW.) We will compare the response rates for differences by sex.

Note: The response rates for males and females are similar in all three crosstabs. The unweighted response rate for males was 86.43% while the unweighted response rate for females was 88.18%. The weighted rates using the untrimmed weights were 81.95% and 86.49%, respectively. The weighted rates using the trimmed weights were 86.27 % and 88.18%, respectively. A separate nonresponse adjustment by sex will not be made.

Produce Raking Cell Frequencies

Run a frequency on the following 3 cross classifications:

- race / ethnicity (RRACETH) X age (RAGE)
- race / ethnicity (RRACETH) X household type (RHHTYPE)
- race (RACE2) X area (HGMSAC).

If any of the cells contain a small number of records (e.g., under 30), we will redefine the cells using some collapsing.

Note: Some of the cells did have frequencies below 30. Therefore, the following collapsed raking cells were used:

- race / ethnicity (white, black, Hispanic, other) X age (18..34, 35..44, 45..64, 65+ if white; 18..34, 35..44, 45+ if black, Hispanic or other)
- race / ethnicity X household type
- race (white, all other) X area (Anaheim, Los Angeles - Long Beach, San Francisco - Oakland, Other if white; Anaheim - Los Angeles - Long Beach, San Francisco - Oakland, Other if all other.)

Run WESWGT

Run WESWGT function 6 using the above dimensions and the parameters specified in the enclosed WESWGT form.

Outputs

One file. The input file with the field TFHRKW attached . Run a PROC CONTENTS on the file.

cc: Debby Vivari
David Morganstein
Ralph DiGaetano

Weighting Macro V1.1
Module 6
Parameter specification form

F6: Raking

Study Name:

Date:

Requestor:

	Parameter	*	Entry	Default	Description
Input Controller	INDD=	O		WORK._LAST_	input sample file
	WGT0=	R	TFHBW		full-sample weight
	ITERVAR1	R	RRACETH	RAGE2	the first phase adjustment cell
	EXT1=	R			the 1st phase control file
	EXTVAR1=	R			the 1st phase control variable
	ITERVAR2	O	RRACETH	RHHTYPE	the 2nd phase adjustment cell
	EXT2=	O			the 2nd phase control file
	EXTVAR2=	O			the 2nd phase control variable
	ITERVAR3	O	RACE2	HGMSAC2	the 3rd phase adjustment cell
	EXT3=	O			the 3rd phase control file
	EXTVAR3=	O			the 3rd phase control variable
	ITERVAR4	O			the 4th phase adjustment cell
	EXT4=	O			the 4th phase control file
	EXTVAR4=	O			the 4th phase control variable
	ITERVAR5 =	O			the 5th phase adjustment cell
	EXT5=	O			the 5th phase control file
	EXTVAR5=	O			the 5th phase control variable
	ITERVAR6 =	O			the 6th phase adjustment cell
	EXT6=	O			the 6th phase control file
	EXTVAR6=	O			the 6th phase control variable
	ITERVAR7 =	O			the 7th phase adjustment cell
	EXT7=	O			the 7th phase control file
	EXTVAR7=	O			the 7th phase control variable
	ITERVAR8 =	O			the 8th phase adjustment cell
	EXT8=	O			the 8th phase control file
	EXTVAR8=	O			the 8th phase control variable
Algorithm	MINSZ=	O	an integer	30*DIM	suggested minimum cell size
	DIM=	R	3		number of dimension

Controller	NITER=	O	an integer	15	max number of iteration
	DELTA=	O	a real	1	max allowed absolute difference
Output	OUTDD=	O		WORK.__OUTF 6	output file
Controller	ALLFCTRS =	O	any char / blank	blank(nooutput)	file of the final fctrs at all cell levels
	INTERMED =	R			file of the intermediate wgtsums

* O : Optional R : Required

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MEMORANDUM

TO: John Edmonds

DATE: 9/15/94
Memo No. 6.1

FROM: James L. Green

SUBJECT: CA Issues Study - Full Sample Nonresponse Adjustment.

Key Words: NRB_WGT

Introduction

We will use WESWGT function 4 to nonresponse adjust the completed questionnaire cases to the sums of weights of responding screeners, excluding cases in Torrance. This will allow the estimation of totals for the target population of English speaking DUs in California, excluding Torrance.

Inputs

Three files. The Memo #5 output file "SASF.RAKEFILE" and the two raw data files that were used to create the files "STAT11.FIN" and "STAT12.FIN". We will get the Torrance flag from these two later files and thereby reduce the raked weights file (2,131 records) to a file excluding Torrance cases (should be 2,120 records.)

Process

Subset Files to California Excluding Torrance

Get the TORRANCE flag from the raw data files that were used to create the files "STAT11.FIN" and "STAT12.FIN". This field is in the 8th column and is a 0, 1 variable (0 = not in Torrance ZIP codes, 1 = in Torrance ZIP codes.) Merge TORRANCE onto the file "SASF.RAKEFILE" by PSU | SEG | SQID1. Subset "SASF.RAKEFILE" to records with TORRANCE = 0. This should result in a file of 2,120 records.

Produce Nonresponse Adjustment Cell Frequencies

Run a frequency on the following cross classification: household type (RHHTYPE) X race / ethnicity (RRACETH) X age (RAGE). This should result in a total of 32 cells. If any of the cells contain less than 20 completed questionnaires, we will redefine the cells using some collapsing.

Note: Some of the cells did have frequencies far below 20. Therefore, the following collapsed nonresponse adjustment cells were used: household type X race / ethnicity (white, Hispanic, other) X age (for white...18..34, 35..44, 45..64, 65+, for Hispanic and other...18..34, 35..44, 45+.) This resulted in a total of 20 cells.

Run WESWGT

Run WESWGT function 4 using the above cell definitions (NRCELL) and the parameters specified in the enclosed WESWGT form.

Produce Univariates on the Nonresponse Adjusted Weights

Run PROC UNIVARIATE on the nonresponse adjusted weight (NRB_WGT) both overall and by the dimensions used for the raking (race / ethnicity X age, race / ethnicity X household type, race / ethnicity X area.) Also produce weighted estimates of the three questionnaire items C8, C9 and C13.

Outputs

One file. The file "SASF.RAKEFILE" with the field NRB_WGT attached . Run a PROC CONTENTS on the file.

cc: Debby Vivari
David Morganstein
Ralph DiGaetano

Weighting Macro V1.1
Module 4
Parameter specification form

F4: Adjusting the full-sample weight

Study Name:
Date:
Requestor:

	Parameter	*	Entry	Default	Description
Input Controllers	INDD=	O		WORK._LAST_	input sample file
	BWGT0=	R	TFHRKW		full-sample base weight
	STATUS=	R	CELL		eligibility / response status
	EXT2=	O			control file for the 1st ps adj
	EXT3=	O			control file for the 2nd ps adj
Algorithm Controllers	CLASS1A=	O			1st nr adj cell definition
	CLASS1B=	O	NRCELL		2nd nr adj cell definition
	CLASS2=	O			1st ps adj cell definition
	CLASS3=	O			2nd ps adj cell definition
	VAR1=	O			size variable for nr adj
	VAR2=	O			size variable for 1st ps adj
	VAR3=	O			size variable for 2nd ps adj
	INCLUDE=	O	12	012345	status to be included in weighting
Output Controllers	LIST=	O		MAX(1,#OBS)	print interval
	CASEID=	O			case identification
	OUTDD=	O		WORK.__OUTF4	output file
	ORDER=	O		nosort	output file to be sorted by
	TABLE=	O	any char	blank(noprint)	tabulate the weights by cells
	TCELL=	O		all cells	cell def in TABLE=
	MAX5=	O	any char	blank(noprint)	descript statistics on the weights
	DEBUG=	O	blank	blank(noprint)	print intermediate weight sums

* O : Optional R : Required

Appendix C.5.6
Replicate Weighting and Estimation of Variance

Replicate Weighting and Estimation of Variance

Replicate weights were constructed to enable variance estimation via the jackknife method (e.g., see K.M. Wolter's Introduction to Variance Estimation.) A total of 70 variance estimation strata were created from 652 segments and resulted in 70 replicate weights (see Memo #1 for details.) Each replicate weight is calculated using a subset of the sample and repeating the steps of the full sample weighting (see Memo #s 7, 8 and 9 for details.) Each replicate weight is then used to obtain a replicated estimate of the statistic of interest. The sum of squared differences between the replicated estimates and the full sample estimate estimates the sampling variance of the statistic.

The statistic of interest can be written as a linear combination of independent random variables of the form

$$T = \sum_i W_i P_i$$

The variance of T can therefore be written as

$$VAR(T) = \sum_i W_i^2 VAR(P_i)$$

The Westat SAS macro WESVAR was used to get jackknife estimates of the variance for each P_i. These were substituted in the expression above to get an estimated VAR(T) = 7.073709815, which yields a standard error of 2.659644678.

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MEMORANDUM

TO: John Edmonds

DATE: 9/19/94
Memo No. 9.1

FROM: James L. Green

SUBJECT: CA Issues Study - Replication of Raked Weights.

Key Words: TRHRKW1..TRHRKW70

Introduction

We will replicate the raked household weights using WESWGT Function 7.

Inputs

Two files. The base weight replication output file "SASF.REPFILE1" and the raking control totals file.

Process

Run WESWGT

Run WESWGT function 7 using "SASF.REPFILE1" as the input file. See the enclosed WESWGT form for details. Run a PROC CONTENTS on the WESWGT output file.

Outputs

One file. The input file with the fields TRHRKW1..TRHRKW70 attached.

cc: Debby Vivari, David Morganstein, Ralph DiGaetano

Weighting Macro Module 7
Parameter specification form

V1.0

F7: Replicate Raking

Study Name:
Date:
Requestor:

Parameter		*	Entry	Default	Description
Input Controllers	INDD =	O	SASF.NPFILE1	WORK._LAST_	input sample file
	IPREF =	O	TRHBW	BWGT	input replicate weights prefix
	NREP =	R	70		number of replicates
	STATUS =	R	CELL		response status variable
	ITERVAR1	R	RACE X AGE		the first phase adjustment cell
	EXT1 =	R			the 1st phase control file
	EXTVAR1 =	R			the 1st phase contorl variable
	ITERVAR2	O	RACE X HHTYPE		the 2nd phase adjustment cell
	EXT2 =	O			the 2nd phase control file
	EXTVAR2 =	O			the 2nd phase contorl variable
	ITERVAR3	O	RACE X ANA		the 3rd phase adjustment cell
	EXT3 =	O			the 3rd phase control file
	EXTVAR3 =	O			the 3rd phase contorl variable
	ITERVAR4	O			the 4th phase adjustment cell
	EXT4 =	O			the 4th phase control file
	EXTVAR4 =	O			the 4th phase contorl variable
	ITERVAR5 =	O			the 5th phase adjustment cell
	EXT5 =	O			the 5th phase control file
	EXTVAR5 =	O			the 5th phase contorl variable
	ITERVAR6 =	O			the 6th phase adjustment cell
	EXT6 =	O			the 6th phase control file
	EXTVAR6 =	O			the 6th phase contorl variable
	ITERVAR7 =	O			the 7th phase adjustment cell
	EXT7 =	O			the 7th phase control file
	EXTVAR7 =	O			the 7th phase contorl variable
	ITERVAR8 =	O			the 8th phase adjustment cell
	EXT8 =	O			the 8th phase control file
	EXTVAR8 =	O			the 8th phase contorl variable
Algorithm Controllers	INCLUDE =	O	12	1	value(s) of STATUS var to include
	DIM =	R	3		number of dimensions
	NITER =	O	an integer 15	5	max number of iterations
	DELTA =	O	a real 1	250	max allowed absolute difference
Output Controllers	OUTDD =	O		WORK._OUTF7	output file
	OPREF =	O	TRHRKW	FWGT	output replicate weights prefix

* O : Optional R : Required

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MEMORANDUM

TO: John Edmonds

DATE: 9/26/94
Memo No. 8.2

FROM: James L. Green

SUBJECT: CA Issues Study - Replication of Nonresponse Adjusted Weights.

Key Words: TRHNRW1..TRHNRW70

Introduction

We will replicate the nonresponse adjusted household weights using WESWGT Function 5.

Inputs

Two files. The replicate raking output file "SASF.RAKEFUN7" (2,131 records) and the full sample nonresponse adjustment output file "SASF.NRADJ1" (2,120 records.)

Process

Merge the Input files

Merge the two input files via PSU | SEG | SQID1. Keep all fields in the replicate raking output file and add the two fields NRCELL and NRB_WGT from "SASF.NRADJ1". Keep a record only if it is in both files. This should result in 2,120 records total, thereby dropping the 11 records in Torrance.

Run WESWGT

Run WESWGT function 5 using the merged file as the input file. See the enclosed WESWGT form for details. Run a PROC CONTENTS on the WESWGT output file.

Run WESVAR

Run WESVAR on the three questionnaire items C8, C9 and C13 which we have been using, passing the new weights TRHNRW1..TRHNRW70 as the weights to use.

Run PROC UNIVARIATE

Run PROC UNIVARIATE on TRHNRW1..TRHNRW70.

Outputs

One file. The merged and reduced file with the fields TRHNRW1..TRHNRW70 attached.

cc: Debby Vivari
David Morganstein
Ralph DiGaetano

Weighting Macro Module 5
Parameter specification form

V1.2

F5: Adjusting the replicate weights

Study Name:
Date:
Requestor:

Parameter		*	Entry	Default	Description
Input Controllers	INDD=	O	MERGED + NONRESP FILE	WORK._LAST_	input sample file
	STATUS=	R	CELL		eligibility /response status
	NREP=	R	70		number of replicates
	EXT2=	O			control file for 1st ps adjustment
	EXT3=	O			control file for 2nd ps adjustment
	IPREF=	O	TRHRKW	BWGT	prefix of replicate base weights
Algorithm Controllers	CLASS1A=	O			1st nr adj cell definition
	CLASS1B=	O	NRCELL		2nd nr adj cell definition
	CLASS2=	O			1st ps adj cell definition
	CLASS3=	O			2nd ps adj cell definition
	VAR1=	O			size variable for nr adj
	VAR2=	O			size variable for 1st ps adj
	VAR3=	O			size variable for 2nd ps adj
	INCLUDE=	O	12	012345	status to be included in weighting
Output Controllers	OPREF=	O	TRHNRW	FWGT	prefix of final replicate weights
	CASEID=	O			case identification
	FWGT0=	R	~~TFHRKW~~	NRB_WGT	full-sample final weight
	BWGT0=	O	TFHRKW	(__FWGT0)	full-sample base weight
	OUTDD=	O		WORK.__OUTF5	output file
	ORDER=	O		nosort	output file to be sorted by
	LIST=	O		MAX(1,#OBS)	print interval
	TABLE=	O	any char / blank	blank(noprint)	tabulate the weights by cells
	TCELL=	O		all cells	cell def in TABLE=
	RSUM_F=	O	any char / blank	blank(noprint)	summary of weights at final stage
	RSUM_ST=	O	any char / blank	blank(noprint)	summary of weights at each stage
	DEBUG=	O	any char / blank	blank(noprint)	print intermidiate weight sums

* O : Optional R : Required

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MEMORANDUM

TO: John Edmonds

DATE: 9/19/94
Memo No. 7.1

FROM: James L. Green

SUBJECT: CA Issues Study - Replication of Trimmed Household Base Weights.

Key Words: TRHBW1..TRHBW70

Introduction

We will replicate the trimmed household base weights using WESWGT Function 3.

Inputs

Two files. The Memo #1 output file "SASF.VSHALF" and the full sample raking output file "SASF.RAKEFILE".

Process

Merge the Input Files

Merge the two input files by PSU and SEG. The resulting file should contain all fields in the file "SASF.RAKEFILE" plus the fields VSTRAT and HALF from the memo #1 output file. Run a PROC CONTENTS on the resulting file.

Run WESWGT

Run WESWGT function 3 using the merged file as the input file. See the enclosed WESWGT form for details. Run a PROC CONTENTS on the WESWGT output file.

Outputs

One file. The merged file with the fields input data file with the fields TRHBW1..TRHBW70 attached.

cc: Debby Vivari, David Morganstein, Ralph DiGaetano

Weighting Macro V1.2
Module 3
Parameter specification form

F3: Generating the replicate base weights

Study Name:
Date:
Requestor:

	Parameter	*	Entry	Default	Description
Input Controllers	INDD=	O		WORK._LAST_	input sample file
	ABSCERT=	O			certainty indicator
	BWGT0=	R	TFHBW		full-sample base weight
	VARSTRAT=	O	VSTRAT		variance stratum
	VARUNIT=	R	HALF		variance unit
	VARREP2=	O			2nd rep drop for JK2 with triplets
	AUX=	O		dummy "1"	auxiliary variates in replication
	NU=	O		2	number of units per stratum
	STRATUM=	O		VARSTRAT	original stratum
	STATUS=	O			eligibility/response status
Algorithm Controllers	METHOD=	R	JK2		replicate method
	COLLAPSE=	O		HHM	collapse method
	SEED=	O		0	random number seed
	FAY_K=	O		0	Fay's factor for BRR
	INCLUDE=	O		012345	status to be included in weighting
Output Controllers	LIST=	O	1	MAX(1,#OBS)	print interval
	CASEID=	O	PSU SEG SQID1		case identification
	PREF=	O	TRHBW	BWGT	prefix of the output weights
	OUTDD=	O		WORK.__OUTF3	output file
	ORDER=	O		nosort	output file to be sorted by
	TABLE=	O	any char	blank(noprint)	tabulate the weights by cells
	SIZE=	O		0	SORTSIZE for PC users

* O : Optional R : Required

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MEMORANDUM

TO: John Edmonds

DATE: 8/18/94
Memo No. 1.2

FROM: James L. Green

SUBJECT: CA Issues Study - Creation of Variance Stratum and Half.

Key Words: VSTRAT, HALF.

Changes: This version corrects the number of segments per PSU given on page 3 and adjusts the example of assigning VSTRAT and PSU accordingly. The previous version of this memo should be discarded.

Introduction

We will create a file of replicate variance stratum (VSTRAT), replicate half (HALF) and corresponding PSU and SEGMENT for all records in the CA Issues study. This file will be used later to assign variance stratum and half to individual records before replicating the trimmed base weights.

Inputs

The file "SASF.BGSEGS" containing all PSU and SEGMENT combinations selected for the CA Issues study.

Process

Assign VSTRAT and HALF

Assign VSTRAT and HALF to all SEGMENT within non certainty PSUs based on the following table:

PSU	VSTRAT	HALF
101	1	1
107	1	2
104	2	1
106	2	2

Assign VSTRAT and HALF to all SEGMENT within certainty (i.e., all remaining) PSUs as follows:

- Sort the records hierarchically by PSU and SEGMENT in ascending order.
- Assign the same value of VSTRAT (3..70) to each group of 8 successive values of SEGMENT within PSU; if the total number of segments within a given PSU is not evenly divisible by 8 then simply assign the remaining values of SEGMENT within that PSU to their own VSTRAT.
- Alternately assign values of HALF (1, 2) to each value of SEGMENT within VSTRAT. Select the initial value of HALF within a given VSTRAT at random.

An example of the assignment is as follows:

PSU	SEGMENT	VSTRAT	HALF
101	201	1	1
.	.	.	.
.	.	.	.
.	.	.	.
101	232	1	1
107	201	1	2
.	.	.	.
.	.	.	.
.	.	.	.
107	236	1	2
104	201	2	1
.	.	.	.
.	.	.	.
.	.	.	.
104	234	2	1
106	201	2	2
.	.	.	.
.	.	.	.
.	.	.	.
106	231	2	2
102	201	3	1
102	202	3	2
102	203	3	1
102	204	3	2
102	205	3	1
102	206	3	2
102	207	3	1
102	208	3	2
102	209	4	1
.	.	.	.
.	.	.	.
.	.	.	.
102	232	6	2

102	233	7	1
102	234	7	2
102	235	7	1
102	236	7	2
103	201	8	1
.	.	.	.
.	.	.	.
.	.	.	.
113	248	69	1
113	249	70	2
113	250	70	1
113	251	70	2
113	252	70	1
113	253	70	2
113	254	70	1
113	255	70	2

Produce a similar listing for checking purposes after making the assignments.

Statistician Notes

13 PSUs were selected for the study, 9 of which were selected with certainty. 652 segments were selected within the 13 PSUs, with 519 segments selected within the certainty PSUs and the remaining 133 segments selected within the non certainty PSUs. The table below provides the exact number of segments selected within each PSU.

Certainty PSU	PSU	Name	# Segments
N	101	Del Norte	32
N	107	Santa Barbara	36
N	104	San Joaquin	34
N	106	Fresno	31
Y	102	Sacramento	36
Y	103	Bay Area	88
Y	105	Santa Clara	31
Y	108	Ventura	13
Y	109	LA County	110
Y	110	LA City	75
Y	111	Orange	51
Y	112	Riverside - SB	60
Y	113	San Diego	55

Note that 261 JK2 replicate groups could be constructed for variance estimation given the above sample design. Something more on the order of 60 replicate groups would likely give adequate precision. The strategy proposed above will result in a total of 70 replicate groups.

It is possible, however, that even 70 replicate groups will prove a burden to the client given the fact that they will not be able to use existing software (e.g., WESVAR, WESREG or WESLOG) to replicate estimates of their model parameters (which are some kind of nonparametric survival model parameters.) In this case, the following combining scheme will result in 16 replicate groups:

PSU	"Active" VSTRAT
101	1
107	1
104	2
106	2
109	3..16
110	3..12
105	13..16
103	3..13
108	14..15
111	3..9
113	10..16
102	4..8
112	9..16

where the term "active" VSTRAT simply means those replicate groups in which the replicate weight is perturbed (i.e., not simply the full sample weight.) This structure assumes the same grouping of 8 segments and handling of remainders that is described above for the 70 replicate group design. This design attempts to reduce the number of replicate groups to something near 10 while maximizing the degrees of freedom associated with potential domains of analysis (i.e., areas.)

Outputs

One file. A file containing the fields PSU, SEGMENT, VSTRAT and HALF. Run a PROC CONTENTS on the file.

cc: Debby Vivari
David Morganstein
Ralph DiGaetano

Appendix C.6
Response Rates by Primary Sampling Unit

CALIFORNIA RESPONSE RATES BY PSU
ALL CASES FINAL SAMPLE

PSU	# OF DUS	# OF SCRN COMP	SCREENER FINAL DISPOSITIONS							# OF MAIN COMP	MAIN FINAL DISPOSITIONS						RESP RATE
			REF	NOT HOME	OTHER NRESP	ILL/ DISAB	LANG. BARR*	VACNT NDU*	OTHER INEL*		REF	NOT HOME	OTHER NRESP	ILL/ DISAB	LANG. BARR*	OTHER INEL*	
101	239	183	24	3	0	4	0	25	0	167	9	2	0	1	4	0	.798
102	261	196	23	3	1	2	5	31	0	167	19	2	1	2	5	0	.764
103	617	426	89	13	8	11	22	47	1	372	29	15	3	1	6	0	.698
104	271	190	42	2	2	0	7	28	0	156	15	3	3	4	9	0	.699
105	242	166	41	4	0	2	2	27	0	129	23	4	5	2	3	0	.618
106	218	189	9	1	1	0	1	17	0	155	14	3	1	3	13	0	.832
107	265	194	27	4	3	3	15	19	0	168	8	7	2	2	7	0	.763
108	137	101	20	2	5	2	4	3	0	90	7	3	1	0	0	0	.698
109	770	583	72	5	20	5	19	66	0	449	58	2	10	4	60	0	.734
110	564	335	43	7	35	2	54	87	1	268	19	2	8	1	37	0	.735
111	358	243	55	2	11	4	8	35	0	202	21	4	1	0	15	0	.688
112	460	300	49	3	2	4	7	95	0	237	33	6	0	3	21	0	.714
113	384	285	57	3	7	0	8	23	1	250	14	1	8	3	9	0	.738
TOT	4786	3391	551	52	95	39	152	503	3	2810	269	54	43	26	189	0	.727

* DENOTES COLUMNS SUBTRACTED FROM DENOMINATOR IN CALCULATING RESPONSE RATES

RESPONSE RATE EQUALS THE NUMBER OF COMPLETED MAIN INTERVIEWS DIVIDED BY THE FOLLOWING:
THE NUMBER OF DUS MINUS THE SUM OF SCREENER VACANTS, SCREENER AND MAIN LANGUAGE BARRIERS,
OTHER SCREENER INELIGIBLES, PLUS THE PRODUCT OF THE E RATIO AND THE NUMBER FOR WHICH ELIGIBILITY IS UNKNOWN.

CALIFORNIA RESPONSE RATES BY PSU
BASE CASES FINAL SAMPLE

PSU	# OF DUS	# OF SCRN COMP	SCREENER FINAL DISPOSITIONS							# OF MAIN COMP	MAIN FINAL DISPOSITIONS						RESP RATE
			REF	NOT HOME	OTHER NRESP	ILL/ DISAB	LANG. BARR*	VACNT NDU*	OTHER INEL*		REF	NOT HOME	OTHER NRESP	ILL/ DISAB	LANG. BARR*	OTHER INEL*	
101	160	119	17	3	0	3	0	18	0	106	8	2	0	1	2	0	.759
102	174	127	18	2	0	1	5	21	0	107	13	2	1	1	3	0	.744
103	412	282	61	8	6	5	14	35	1	251	20	7	1	1	2	0	.706
104	182	122	35	1	1	0	5	18	0	99	11	2	2	2	6	0	.661
105	160	115	23	4	0	1	1	16	0	91	12	4	4	1	3	0	.655
106	145	122	6	1	1	0	0	15	0	98	13	1	0	1	9	0	.814
107	177	133	20	0	2	2	11	9	0	116	3	7	1	2	4	0	.771
108	91	67	13	1	4	2	2	2	0	60	4	3	0	0	0	0	.694
109	515	386	56	5	9	5	12	42	0	288	44	2	6	2	44	0	.709
110	377	228	29	3	21	2	38	55	1	183	13	2	4	1	25	0	.747
111	239	165	40	0	6	3	4	21	0	133	16	4	0	0	12	0	.674
112	307	195	36	2	1	2	5	66	0	155	19	3	0	3	15	0	.715
113	255	191	39	1	5	0	5	14	0	170	7	0	5	2	7	0	.751
TOT	3194	2252	393	31	56	26	102	332	2	1857	183	39	24	17	132	0	.721

* DENOTES COLUMNS SUBTRACTED FROM DENOMINATOR IN CALCULATING RESPONSE RATES

RESPONSE RATE EQUALS THE NUMBER OF COMPLETED MAIN INTERVIEWS DIVIDED BY THE FOLLOWING:
THE NUMBER OF DUS MINUS THE SUM OF SCREENER VACANTS, SCREENER AND MAIN LANGUAGE BARRIERS,
OTHER SCREENER INELIGIBLES, PLUS THE PRODUCT OF THE E RATIO AND THE NUMBER FOR WHICH ELIGIBILITY IS UNKNOWN.

CALIFORNIA RESPONSE RATES BY PSU
SCOPE CASES FINAL SAMPLE

PSU	# OF DUS	# OF SCRN COMP	SCREENER FINAL DISPOSITIONS							# OF MAIN COMP	MAIN FINAL DISPOSITIONS						RESP RATE
			REF	NOT HOME	OTHER NRESP	ILL/ DISAB	LANG. BARR*	VACNT NDU*	OTHER INEL*		REF	NOT HOME	OTHER NRESP	ILL/ DISAB	LANG. BARR*	OTHER INEL*	
101	79	64	7	0	0	1	0	7	0	61	1	0	0	0	2	0	.875
102	87	69	5	1	1	1	0	10	0	60	6	0	0	1	2	0	.802
103	205	144	28	5	2	6	8	12	0	121	9	8	2	0	4	0	.681
104	89	68	7	1	1	0	2	10	0	57	4	1	1	2	3	0	.777
105	82	51	18	0	0	1	1	11	0	38	11	0	1	1	0	0	.546
106	73	67	3	0	0	0	1	2	0	57	1	2	1	2	4	0	.867
107	88	61	7	4	1	1	4	10	0	52	5	0	1	0	3	0	.747
108	46	34	7	1	1	0	2	1	0	30	3	0	1	0	0	0	.706
109	255	197	16	0	11	0	7	24	0	161	14	0	4	2	16	0	.786
110	187	107	14	4	14	0	16	32	0	85	6	0	4	0	12	0	.710
111	119	78	15	2	5	1	4	14	0	69	5	0	1	0	3	0	.718
112	153	105	13	1	1	2	2	29	0	82	14	3	0	0	6	0	.715
113	129	94	18	2	2	0	3	9	1	80	7	1	3	1	2	0	.710
TOT	1592	1139	158	21	39	13	50	171	1	953	86	15	19	9	57	0	.738

* DENOTES COLUMNS SUBTRACTED FROM DENOMINATOR IN CALCULATING RESPONSE RATES

RESPONSE RATE EQUALS THE NUMBER OF COMPLETED MAIN INTERVIEWS DIVIDED BY THE FOLLOWING:
THE NUMBER OF DUS MINUS THE SUM OF SCREENER VACANTS, SCREENER AND MAIN LANGUAGE BARRIERS,
OTHER SCREENER INELIGIBLES, PLUS THE PRODUCT OF THE E RATIO AND THE NUMBER FOR WHICH ELIGIBILITY IS UNKNOWN.

Appendix C.7
Data Cleaning and Recode Files

CLEAN.ADO

```
/*CLEANING OF RAW DATA SET*/
program define clean
set more 1
use rawdata
encode(qxvers), gen(version)
drop qxvers
/*STRTTIME CONTAINS REPLACE STATEMENTS FOR MISSING START TIME AND START
TIME AM/PM (VALUES PROVIDED BY WESTAT)*/
strttime
/*STOPTIME CONTAINS REPLACE STATEMENTS FOR MISSING STOP TIME AND STOP
TIME AM/PM (VALUES PROVIDED BY WESTAT)*/
stoptime
/*VTRECODE CONTAINS STATEMENTS CORRECTING FOR I CODING ERRORS AT W1,
W2, W3, W7, AND SECTION C RECONSIDERATION QUESTIONS C17-C21*/
vtrecode
/*FOR QUESTIONS ASKED WHEN SHOULD NOT HAVE BEEN, RESPONSE SET TO
MISSING BELOW*/
/*FOR QUESTIONS THAT SHOULD HAVE BEEN ASKED BUT WERE NOT, RESPONSE SET
TO 9 (OR 99, 999, or 9999) BELOW*/
log using clean, replace
replace strttime=9999 if strttime==.
replace strtampm=9 if strtampm==.
replace a1rotate=9 if a1rotate==.
replace a1a=9 if a1a==.
replace a1b=9 if a1b==.
replace a1c=9 if a1c==.
replace a1d=9 if a1d==.
replace a1e=9 if a1e==.
replace a1f=9 if a1f==.
replace a2rotate=9 if a2rotate==.
replace a2a=9 if a2a==.
replace a2b=9 if a2b==.
replace a2c=9 if a2c==.
replace a2d=9 if a2d==.
replace a2e=9 if a2e==.
replace a2f=9 if a2f==.
replace a3=9 if a3==.
/*box1 recoded if incorrectly checked by interviewer*/
replace box1=1 if (psu==109 | psu==110 | psu==111) & box1~=1
replace box1=2 if (psu~=109 & psu~=110 & psu~=111) & box1~=2
replace a4=. if box1==1 & a4~=.
replace a4=9 if box1==2 & a4==.
replace a5=999 if box1==1 & a5==.
replace a5=. if box1==2 & a5~=.
replace a7=9 if a7==.
replace a9=9 if a9==.
replace a10=9 if a10==.
replace a11=9 if a11==.
replace a13=9 if a13==.
replace a15=9 if a15==.
```

```
/*FOLLOWING STATEMENTS CODE FILTER A13/A15 AS '1' IF VERBATIM REPONSE AT
A13A/A15A*/
replace a13=1 if sqid2==10084 | sqid2==10087 | sqid2==10175 | sqid2==10399 |
sqid2==10401 | sqid2==10405 | sqid2==10712 | sqid2==11205 | sqid2==11364 |
sqid2==11368 | sqid2==11634 | sqid2==11641 | sqid2==11868 | sqid2==11999 |
sqid2==12260 | sqid2==12309 | sqid2==12432
replace a15=1 if sqid2==10172 | sqid2==10481 | sqid2==10922 | sqid2==10943 |
sqid2==11691 | sqid2==11943
replace w1=9 if w1==.
replace w2=9 if w1==1 & w2==.
replace w3=9 if (w1==2 | w1==8) & w3==.
replace w2=. if (w1==2 | w1==8) & w2~=.
replace w3=. if w1==1 & w3~=.
replace w4=9 if w3==2 & w4==.
replace w4=. if (w2~=. | w3==1 | w3==8) & w4~=.
replace w7=9 if (w2~=. | w3==1) & w7==.
replace w7=. if (w3==2 | w3==8) & w7~=.
replace b1=9 if b1==.
replace b2=9 if b2==.
replace b3=. if b2==1 & b3~=.
replace b3=9 if (b2==2 | b2==8) & b3==.
/*FOLLOWING TWO REPLACE STATEMENTS CODE B3 AS 1 0R 2 IF OTHER(SPECIFY)
VERBATIM RESPONSE CLEARLY INDICATES EITHER "A LOT MORE" OR "A LOT LESS"*/
replace b3=1 if sqid2==11211 | sqid2==10845 | sqid2==11125 | sqid2==11189 |
sqid2==12753 | sqid2==12959 | sqid2==13011 | sqid2==11178 | sqid2==11509 |
sqid2==21443
replace b3=2 if sqid2==10172 | sqid2==11221 | sqid2==10517 | sqid2==11762 |
sqid2==11825 | sqid2==11240 | sqid2==11508 | sqid2==11493 | sqid2==20047 |
sqid2==20538
replace b4=9 if b4==.
replace b5=. if b4==1 & b5~=.
replace b5=9 if (b4==2 | b4==8) & b5==.
replace b6=9 if b6==.
replace b7=9 if b7==.
replace b7a=. if (b7==2 | b7==8) & b7a~=.
replace b7a=9 if b7==1 & b7a==.
replace b8=9 if b8==.
replace b9=9 if b9==.
replace b10=9 if b9==1 & b10==.
replace b10=. if (b9==2 | b9==8) & b10~=.
replace b11=9 if b11==.
replace b12=9 if b11==1 & b12==.
replace b12=. if (b11==2 | b11==8) & b12~=.
replace b13=9 if b13==.
replace b14=9 if b14==.
replace b15=9 if b15==.
replace b16=9 if b16==.
replace b17=9 if b17==.
replace c1=999 if c1==.
replace c1=00 if c1<=.50
replace c2=9 if c2==.
replace c3=. if (c2==2 | c2==8) & c3~=.
```

```
replace c3=9 if c2==1 & c3==.
replace c4=9 if c4==.
/*box7 recoded if incorrectly checked by interviewer*/
replace box7=1 if (psu==109 | psu==110 | psu==111) & box7~=1
replace box7=2 if (psu~=109 & psu~=110 & psu~=111) & box7~=2
replace box7=. if c4==1 & box7~=.
replace c5=. if (psu~=109 & psu~=110 & psu~=111) | c4==1
replace c5=9 if box7==1 & c5==.
replace c6mm=99 if c6mm==.
/*according to screener record, interviewer recorded wrong year at c6yy for case 20862; recoded
below with correct screener value*/
replace c6yy=69 if sqid2==20862
replace c6yy=99 if c6yy==.
replace c7=99 if c7==.
replace c8=9 if c8==.
replace c9=9 if c9==.
replace c10=9 if c10==.
replace c11=9 if c10==1 & c11==.
replace c11=. if c10==2 & c11~=.
replace c12=9 if c12==.
replace c13=99 if c13==.
replace c14=9 if (c13==1 | c13==2) & c14==.
replace c14=. if (c13~=1 & c13~=2) & c14~=.
replace c15=9 if c15==.
replace box8=9 if box8==.
replace c17=9 if (box8==1 | w7==1) & c17==.
replace c17=. if (box8==2 | w7==2 | w7==8) & c17~=.
replace c18=9 if (c17==1 | c17==2 | c17==8) & c18==.
replace c18=. if (c17~=1 & c17~=2 & c17~=8) & c18~=.
replace c19=9 if (c17==3 | c17==4) & c19==.
replace c19=. if (c17~=3 & c17~=4) & c19~=.
replace c20=9 if (c19==3 | c19==4 | c19==8) & c20==.
replace c20=. if (c19~=3 & c19~=4 & c19~=8) & c20~=.
replace c21=9 if (c18==1 | c18==8) & c21==.
replace c21=. if (c18~=1 & c18~=8) & c21~=.
replace c23=. if (c23==. & version==2)
replace c24rotat=9 if c24rotat==.
replace c24a=9 if c24a==.
replace c24b=9 if c24b==.
replace c24c=9 if c24c==.
replace c24d=9 if c24d==.
replace c24e=9 if c24e==.
replace c24f=9 if c24f==.
replace c25=9 if c25==.
replace c26=9 if c26==.
replace c27=9 if c27==.
replace c27a=. if (c27==1 | c27==3) & c27a~=.
replace c27a=9 if c27==2 & c27a==.
replace c28=9 if c28==.
replace sex=9 if sex==.
replace race=9 if race==.
replace zipcode=9 if zipcode==.
```

```
replace d1a=9 if d1a==.
replace d1b=9 if d1b==.
replace d1c=9 if d1c==.
replace d2=9 if d2==.
replace d3=9 if d3==.
replace d4=9 if d4==.
replace d4a=. if (d4==2 | d4==8) & d4a~=.
replace d4a=9 if d4==1 & d4a==.
replace d5=9 if d5==.
replace d6=9 if d6==.
replace d6a=9 if (d6==1 | d6==3) & d6a==.
replace d6a=. if d6==2 & d6a~=.
sort sqid2
log close
compress
save clean, replace
end
```

STRTTIME.ADO

```
/*STATEMENTS FOR MISSING START TIME AND START TIME AM/PM (VALUES
PROVIDED BY WESTAT)*/
program define strttime
set more 1
log using strttime, replace
replace strtampm=2 if sqid2==20807
replace strtampm=2 if sqid2==20837
replace strtampm=2 if sqid2==20586
replace strtampm=2 if sqid2==20605
replace strtampm=2 if sqid2==20644
replace strtampm=1 if sqid2==20686
replace strtampm=1 if sqid2==20702
replace strtampm=1 if sqid2==20707
replace strtampm=2 if sqid2==20523
replace strtampm=1 if sqid2==11766
replace strtampm=2 if sqid2==11704
replace strtampm=1 if sqid2==20034
replace strtampm=2 if sqid2==20030
replace strtampm=2 if sqid2==20009
replace strtampm=2 if sqid2==10349
replace strtampm=2 if sqid2==10332
replace strtampm=2 if sqid2==10324
replace strtampm=1 if sqid2==10310
replace strtampm=1 if sqid2==10290
replace strtampm=2 if sqid2==10287
replace strtampm=2 if sqid2==10285
replace strtampm=2 if sqid2==10284
replace strtampm=2 if sqid2==10283
replace strtampm=2 if sqid2==10256
replace strtampm=1 if sqid2==10227
replace strtampm=2 if sqid2==10212
replace strtampm=2 if sqid2==10209
replace strtampm=2 if sqid2==10200
replace strtampm=2 if sqid2==10199
replace strtampm=2 if sqid2==10198
replace strtampm=2 if sqid2==10195
replace strtampm=2 if sqid2==10194
replace strtampm=2 if sqid2==10193
replace strtampm=2 if sqid2==10190
replace strtampm=2 if sqid2==10189
replace strtampm=2 if sqid2==10188
replace strtampm=2 if sqid2==10181
replace strtampm=1 if sqid2==10149
replace strtampm=2 if sqid2==10146
replace strtampm=2 if sqid2==10126
replace strtampm=2 if sqid2==10125
replace strtampm=2 if sqid2==10124
replace strtampm=2 if sqid2==10123
replace strtampm=1 if sqid2==10097
replace strtampm=2 if sqid2==10096
```

```
replace strtampm=1 if sqid2==10095
replace strtampm=1 if sqid2==10086
replace strtampm=1 if sqid2==10084
replace strtampm=2 if sqid2==10074
replace strtampm=2 if sqid2==10062
replace strtampm=2 if sqid2==10057
replace strtampm=2 if sqid2==10015
replace strtampm=1 if sqid2==10012
replace strtampm=2 if sqid2==10013
replace strtampm=2 if sqid2==10361
replace strtampm=2 if sqid2==10362
replace strtampm=2 if sqid2==10363
replace strtampm=2 if sqid2==10370
replace strtampm=2 if sqid2==10376
replace strtampm=2 if sqid2==10377
replace strtampm=2 if sqid2==10390
replace strtampm=2 if sqid2==10474
replace strtampm=2 if sqid2==10475
replace strtampm=2 if sqid2==10485
replace strtampm=2 if sqid2==10488
replace strtampm=2 if sqid2==10501
replace strtampm=2 if sqid2==10506
replace strtampm=2 if sqid2==10508
replace strtampm=2 if sqid2==10593
replace strtampm=1 if sqid2==10660
replace strtampm=2 if sqid2==10679
replace strtampm=1 if sqid2==10698
replace strtampm=2 if sqid2==10712
replace strtampm=2 if sqid2==10721
replace strtampm=2 if sqid2==10738
replace strtampm=1 if sqid2==10743
replace strtampm=1 if sqid2==10751
replace strtampm=1 if sqid2==10752
replace strtampm=1 if sqid2==10753
replace strtampm=2 if sqid2==10754
replace strtampm=2 if sqid2==10755
replace strtampm=2 if sqid2==10756
replace strtampm=1 if sqid2==10757
replace strtampm=2 if sqid2==10758
replace strtampm=2 if sqid2==10765
replace strtampm=2 if sqid2==10769
replace strtampm=2 if sqid2==10780
replace strtampm=2 if sqid2==10887
replace strtampm=2 if sqid2==10903
replace strtampm=2 if sqid2==10907
replace strtampm=2 if sqid2==10912
replace strtampm=2 if sqid2==10913
replace strtampm=2 if sqid2==10918
replace strtampm=2 if sqid2==10920
replace strtampm=2 if sqid2==10929
replace strtampm=2 if sqid2==10939
replace strtampm=2 if sqid2==10940
```

```
replace strtampm=2 if sqid2==10941
replace strtampm=2 if sqid2==10948
replace strtampm=2 if sqid2==10951
replace strtampm=2 if sqid2==10970
replace strtampm=2 if sqid2==10980
replace strtampm=2 if sqid2==11012
replace strtampm=2 if sqid2==11016
replace strtampm=2 if sqid2==11067
replace strtampm=2 if sqid2==11132
replace strtampm=2 if sqid2==11202
replace strtampm=2 if sqid2==11205
replace strtampm=2 if sqid2==11207
replace strtampm=2 if sqid2==11212
replace strtampm=2 if sqid2==11241
replace strtampm=2 if sqid2==11362
replace strtampm=2 if sqid2==11367
replace strtampm=1 if sqid2==11374
replace strtampm=1 if sqid2==11444
replace strtampm=2 if sqid2==11517
replace strtampm=2 if sqid2==11775
replace strtampm=2 if sqid2==11824
replace strtampm=2 if sqid2==11934
replace strtampm=2 if sqid2==11880
replace strtampm=2 if sqid2==12152
replace strtampm=1 if sqid2==12179
replace strtampm=2 if sqid2==12371
replace strtampm=2 if sqid2==12373
replace strtampm=2 if sqid2==12383
replace strtampm=2 if sqid2==12753
replace strtampm=2 if sqid2==12754
replace strtampm=1 if sqid2==12797
replace strtampm=1 if sqid2==12907
replace strtampm=2 if sqid2==13056
replace strtampm=2 if sqid2==20057
replace strtampm=1 if sqid2==20058
replace strtampm=2 if sqid2==20071
replace strtampm=2 if sqid2==20072
replace strtampm=2 if sqid2==20073
replace strtampm=2 if sqid2==20095
replace strtampm=2 if sqid2==20114
replace strtampm=2 if sqid2==20118
replace strtampm=2 if sqid2==20119
replace strtampm=2 if sqid2==20120
replace strtampm=1 if sqid2==20143
replace strtampm=2 if sqid2==20173
replace strtampm=2 if sqid2==20181
replace strtampm=2 if sqid2==20189
replace strtampm=2 if sqid2==20297
replace strtampm=1 if sqid2==20298
replace strtampm=2 if sqid2==20299
replace strtampm=2 if sqid2==20300
replace strtampm=2 if sqid2==20301
```

```
replace strtampm=1 if sqid2==20305
replace strtampm=2 if sqid2==20307
replace strtampm=2 if sqid2==20315
replace strtampm=1 if sqid2==20322
replace strtampm=2 if sqid2==20328
replace strtampm=2 if sqid2==20329
replace strtampm=1 if sqid2==20330
replace strtampm=2 if sqid2==20331
replace strtampm=2 if sqid2==20332
replace strtampm=2 if sqid2==20333
replace strtampm=2 if sqid2==20334
replace strtampm=2 if sqid2==20335
replace strtampm=1 if sqid2==20369
replace strtampm=2 if sqid2==20373
replace strtampm=2 if sqid2==20390
replace strtampm=2 if sqid2==20412
replace strtampm=2 if sqid2==20429
replace strtampm=1 if sqid2==20435
replace strtampm=2 if sqid2==20466
replace strtampm=2 if sqid2==20468
replace strtampm=2 if sqid2==20636
replace strtampm=2 if sqid2==20949
replace strtampm=1 if sqid2==20963
replace strtampm=2 if sqid2==21250
replace strtampm=2 if sqid2==21179
replace strtampm=2 if sqid2==21189
replace strtampm=2 if sqid2==21021
replace strtampm=1 if sqid2==21022
replace strtampm=2 if sqid2==21076
replace strtampm=2 if sqid2==21361
replace strtampm=2 if sqid2==13057
replace strtampm=2 if sqid2==13194
replace strtampm=2 if sqid2==13020
replace strttime=500 if sqid2==13056
replace strttime=200 if sqid2==13057
log close
end
```

STOPTIME.ADO

```
/*STATEMENTS FOR MISSING STOP TIME AND STOP TIME AM/PM (VALUES PROVIDED
BY WESTAT)*/
program define stoptime
set more 1
log using stoptime, replace
replace stopampm=2 if sqid2==10336
replace stopampm=1 if sqid2==10331
replace stopampm=2 if sqid2==10324
replace stopampm=2 if sqid2==10286
replace stopampm=2 if sqid2==10284
replace stopampm=2 if sqid2==10283
replace stopampm=2 if sqid2==10209
replace stopampm=2 if sqid2==10204
replace stopampm=2 if sqid2==10199
replace stopampm=2 if sqid2==10198
replace stopampm=2 if sqid2==10197
replace stopampm=2 if sqid2==10189
replace stopampm=2 if sqid2==10188
replace stopampm=2 if sqid2==10124
replace stopampm=2 if sqid2==10097
replace stopampm=2 if sqid2==10094
replace stopampm=2 if sqid2==10093
replace stopampm=2 if sqid2==10087
replace stopampm=1 if sqid2==10086
replace stopampm=2 if sqid2==10085
replace stopampm=1 if sqid2==10084
replace stopampm=2 if sqid2==10062
replace stopampm=2 if sqid2==10057
replace stopampm=2 if sqid2==10033
replace stopampm=2 if sqid2==10362
replace stopampm=2 if sqid2==10364
replace stopampm=2 if sqid2==10370
replace stopampm=2 if sqid2==10372
replace stopampm=1 if sqid2==10374
replace stopampm=2 if sqid2==10428
replace stopampm=2 if sqid2==10445
replace stopampm=2 if sqid2==10464
replace stopampm=2 if sqid2==10489
replace stopampm=2 if sqid2==10490
replace stopampm=2 if sqid2==10502
replace stopampm=2 if sqid2==10503
replace stopampm=2 if sqid2==10504
replace stopampm=2 if sqid2==10506
replace stopampm=2 if sqid2==10508
replace stopampm=2 if sqid2==10572
replace stopampm=2 if sqid2==10593
replace stopampm=2 if sqid2==10600
replace stopampm=2 if sqid2==10715
replace stopampm=2 if sqid2==10721
replace stopampm=2 if sqid2==10729
```

```
replace stopampm=1 if sqid2==10743
replace stopampm=2 if sqid2==10751
replace stopampm=1 if sqid2==10752
replace stopampm=1 if sqid2==10757
replace stopampm=2 if sqid2==10758
replace stopampm=2 if sqid2==10776
replace stopampm=2 if sqid2==10799
replace stopampm=1 if sqid2==10800
replace stopampm=2 if sqid2==10905
replace stopampm=2 if sqid2==10917
replace stopampm=2 if sqid2==10918
replace stopampm=2 if sqid2==10929
replace stopampm=1 if sqid2==10969
replace stopampm=2 if sqid2==10982
replace stopampm=2 if sqid2==10987
replace stopampm=2 if sqid2==11010
replace stopampm=2 if sqid2==11012
replace stopampm=2 if sqid2==11018
replace stopampm=2 if sqid2==11047
replace stopampm=2 if sqid2==11193
replace stopampm=2 if sqid2==11202
replace stopampm=2 if sqid2==11203
replace stopampm=2 if sqid2==11240
replace stopampm=2 if sqid2==11242
replace stopampm=2 if sqid2==11274
replace stopampm=2 if sqid2==11360
replace stopampm=1 if sqid2==11497
replace stopampm=2 if sqid2==11502
replace stopampm=2 if sqid2==11518
replace stopampm=2 if sqid2==11594
replace stopampm=2 if sqid2==11775
replace stopampm=2 if sqid2==11799
replace stopampm=2 if sqid2==11824
replace stopampm=2 if sqid2==11885
replace stopampm=2 if sqid2==11908
replace stopampm=2 if sqid2==11909
replace stopampm=2 if sqid2==11915
replace stopampm=1 if sqid2==12065
replace stopampm=2 if sqid2==12562
replace stopampm=2 if sqid2==20007
replace stopampm=2 if sqid2==20047
replace stopampm=2 if sqid2==20060
replace stopampm=2 if sqid2==20071
replace stopampm=2 if sqid2==20073
replace stopampm=1 if sqid2==20093
replace stopampm=2 if sqid2==20114
replace stopampm=2 if sqid2==20116
replace stopampm=2 if sqid2==20118
replace stopampm=2 if sqid2==20119
replace stopampm=2 if sqid2==20177
replace stopampm=2 if sqid2==20178
replace stopampm=2 if sqid2==20269
```

```
replace stopampm=2 if sqid2==20299
replace stopampm=2 if sqid2==20300
replace stopampm=2 if sqid2==20301
replace stopampm=2 if sqid2==20308
replace stopampm=2 if sqid2==20327
replace stopampm=2 if sqid2==20328
replace stopampm=2 if sqid2==20329
replace stopampm=1 if sqid2==20330
replace stopampm=2 if sqid2==20331
replace stopampm=2 if sqid2==20332
replace stopampm=2 if sqid2==20333
replace stopampm=2 if sqid2==20334
replace stopampm=2 if sqid2==20335
replace stopampm=2 if sqid2==20359
replace stopampm=1 if sqid2==20369
replace stopampm=2 if sqid2==20374
replace stopampm=2 if sqid2==20412
replace stopampm=2 if sqid2==20415
replace stopampm=2 if sqid2==20463
replace stopampm=2 if sqid2==20492
replace stopampm=2 if sqid2==11640
replace stopampm=2 if sqid2==11709
replace stopampm=2 if sqid2==11759
replace stopampm=2 if sqid2==11762
replace stopampm=2 if sqid2==20556
replace stopampm=2 if sqid2==20592
replace stopampm=2 if sqid2==20677
replace stopampm=2 if sqid2==20706
replace stopampm=2 if sqid2==21179
replace stopampm=1 if sqid2==21182
replace stopampm=2 if sqid2==12214
replace stopampm=2 if sqid2==12351
replace stopampm=2 if sqid2==12354
replace stopampm=1 if sqid2==12375
replace stopampm=2 if sqid2==12380
replace stopampm=2 if sqid2==12441
replace stopampm=2 if sqid2==12524
replace stopampm=2 if sqid2==20736
replace stopampm=2 if sqid2==12739
replace stopampm=2 if sqid2==12751
replace stopampm=2 if sqid2==20946
replace stopampm=2 if sqid2==21006
replace stopampm=1 if sqid2==13104
replace stopampm=2 if sqid2==20887
replace stopampm=1 if sqid2==21539
replace stopampm=1 if sqid2==10470
replace stoptime=520 if sqid2==12214
/*12562 was terminated at Section B; I returned to administer some Section C questions; length of
first and second contact added together; stoptime recoded below*/
replace stoptime=430 if sqid2==12562
log close
end
```

VTRECODE.ADO

```
/*CORRECTIONS FOR RECORDING AND SKIP ERRORS AT VOTING QUESTIONS W1, W2,
& W3 AND RECONSIDERATION QUESTIONS W7 AND C17 TO C22*/
program define vtrecode
log using vtrecode, replace
/*12569 & 20956 Jehovah Witnesses who would not vote ■ w1 and w3 recoded 8 below so that these
two cases would be counted as "no" votes in the analysis of wtp*/
replace w1=8 if sqid2==12569 | sqid2==20956
replace w3=8 if sqid2==12569 | sqid2==20956
/*10015: w1 blank ■ verbatim and skip record indicate R voted against; w1 coded against below*/
replace w1=2 if sqid2==10015
/*10378: w1 and w2 blank ■ skip record and skip to w-3 indicate against at w-1; w1 coded against
and w2 missing below*/
replace w1=2 if sqid2==10378
replace w2=. if sqid2==10378
/*10394: w2 blank ■ skip record and w-6 verbatim both indicate R answered for at w2; w2 coded for
below*/
replace w2=1 if sqid2==10394
/*10459: w3 blank ■ skip record coded against and westat coded as against; no recoding needed*/
/*10612: w1 blank ■ w1 on skip record coded for and skip to w2 indicates same; w1 coded for
below*/
replace w1=1 if sqid2==10612
/*10732: w2 blank ■ skip record and w-6 verbatim both indicate R voted for at w2; w2 coded for
below*/
replace w2=1 if sqid2==10732
/*11097: w1, w2, w3 blank ■ skip record and w-4 verbatim both indicate R voted against at w1 and
w3: w1 and w3 coded against below*/
replace w1=2 if sqid2==11097
replace w3=2 if sqid2==11097
/*11693: w1 blank ■ verbatim at w1 indicates R is not sure as doesn't pay state taxes and would like
to read more about it; w1 recoded not sure below*/
replace w1=8 if sqid2==11693
/*20523: w1, w2, w3 blank ■ skip record coded against-against and skip to w-4 indicates same; w1
and w3 coded against and w2 missing*/
replace w1=2 if sqid2==20523
replace w2=. if sqid2==20523
replace w3=2 if sqid2==20523
/*20634: w1, w2, w3 blank ■ skip record and w-6 verbatim both indicate R voted for-for; w1 and
w2 coded for and w3 missing below*/
replace w1=1 if sqid2==20634
replace w2=1 if sqid2==20634
replace w3=. if sqid2==20634
/*20627: w1, w2, w3 blank ■ skip record indicates R voted against-against; w1 and w3 coded
against-against and w2 missing below*/
replace w1=2 if sqid2==20627
replace w2=. if sqid2==20627
replace w3=2 if sqid2==20627
/*20424: w2 blank ■ w2 verbatim was "don't know"; w2 coded not sure below*/
replace w2=8 if sqid2==20424
/*20331: w2 blank ■ skip record coded against and subsequent skip indicates same; w2 coded against
below*/
```

```
replace w2=2 if sqid2==20331
/*20371: w2 blank ■ skip record coded against and subsequent skip indicates same; w2 coded against below*/
replace w2=2 if sqid2==20371
/*20333: w3 blank ■ w3 verbatim indicates "same as w-1" which was don't know; w3 coded not sure below*/
replace w3=8 if sqid2==20333
/*20104: w3 blank ■ skip record and verbatim both R voted against; w3 coded against below*/
replace w3=2 if sqid2==20104
/*21085: w3 blank ■ sikp record and skip to w4 both indicate R voted against to w-3; w-3 coded as against below*/
replace w3=2 if sqid2==21085
/*12421: w2 asked incorrectly ■ R voted against at w1 and w2; cleaning statements will set w2 to missing and w3 to 9 (for not ascertained)*/
/*11952: w1 blank ■ w1 verbatim, skip record, and subsequent skip all indicate R said not sure to w1; w1 coded as not sure below*/
replace w1=8 if sqid2==11952
/*21213: w1 blank ■ skip record and subsquent skip to w-2 then w-7 indicate R voted for; w1 coded for below*/
replace w1=1 if sqid2==21213
/*20846: c18 not asked ■ (R changed mind about response; interviewer went back and re-asked some questions but then did not follow skips correctly so c17-c21 very confusing; at no point did R change to vote against) ■ coded below what appear to be answers on second go thru*/
replace c17=1 if sqid2==20846
replace c18=9 if sqid2==20846
replace c19=. if sqid2==20846
replace c20=. if sqid2==20846
replace c21=2 if sqid2==20846
/*20170: c17 coded twice by I and skips not implemented correctly ■ (2 and 4 coded at c17; 1 coded at c18; 2 coded at c19; and 3 coded at c21); R did not change vote at c18; coded below that appear to be answers given initial RE at c17*/
replace c17=2 if sqid2==20170
replace c18=1 if sqid2==20170
replace c19=. if sqid2==20170
replace c21=3 if sqid2==20170
/*10060: w7amt & w7 blank ■ skip record and subsequent skips both indicate R voted for at w7; w7 coded for below and w7amt coded 215*/
replace w7=1 if sqid2==10060
replace w7amt=215 if sqid2==10060
/*10401: w7amt & w7 blank ■ skip record and subsequent skips both indicate R voted for at w7; w7 coded for below and w7amt coded 80*/
replace w7=1 if sqid2==10401
replace w7amt=80 if sqid2==10401
/*10994: w7amt & w7 blank ■ skip record and subsequent skips both indicate R voted for at w7; w7 coded for below and w7amt coded 25*/
replace w7=1 if sqid2==10994
replace w7amt=25 if sqid2==10994
/*11261: w7amt & w7 blank ■ skip record and subsequent skips both indicate R voted for at w7; w7 coded for below and w7amt coded 140*/
replace w7=1 if sqid2==11261
replace w7amt=140 if sqid2==11261
/*11431: w7amt & w7 blank ■ skip record and subsequent skips both indicate R voted for at w7; w7
```

coded for below and w7amt coded 215*/
replace w7=1 if sqid2==11431
replace w7amt=215 if sqid2==11431
/*11708: w7amt & w7 blank ■ skip record and subsequent skips both indicate R voted for at w7; w7 coded for below and w7amt coded 215*/
replace w7=1 if sqid2==11708
replace w7amt=215 if sqid2==11708
/*20421: w7 blank ■ w7 verbatim was "refuse to vote for or against"; w7 coded as refused below*/
replace w7=7 if sqid2==20421
/*11845: w7 coded in for in pink ■ w1 & skip record both indicate R voted for at w7; w7 coded for below*/
replace w7=1 if sqid2==11845
/*11850: w7 coded in for in pink ■ w1 & skip record both indicate R voted for at w7; w7 coded for below*/
replace w7=1 if sqid2==11850
/*11851: w7 coded in for in pink ■ w1 & skip record both indicate R voted for at w7; w7 coded for below*/
replace w7=1 if sqid2==11851
/*11861: c16amt blank ■ 45 written in pink at c16amt and written in blank at c17; c16amt coded 45 below*/
replace c16amt=45 if sqid2==11861
/*21506: w7 blank ■ skip recoded coded for and box8 coded 1; w7 coded as for below*/
replace w7=1 if sqid2==21506
/*13025: w7 blank ■ skip recoded coded for and box8 coded 1; w7 coded as for below*/
replace w7=1 if sqid2==13025
/*10888: box 8 miscoded by I as 2 instead of 1 but c17-c22 was asked ■ box8 recoded below so cleaning would clean out values*/
replace box8=1 if sqid2==10888 & box8==2
/*20419: box 8 miscoded by I as 2 instead of 1 so c17-c22 not asked ■ box8 recoded below so cleaning would catch error*/
replace box8=1 if sqid2==20419 & box8==2
/*10172: box 8 miscoded by I as 2 instead of 1 so c17-c22 not asked ■ box8 recoded below so cleaning would catch error*/
replace box8=1 if sqid2==10172 & box8==2
/*10660: box 8 miscoded by I as 2 instead of 1 so c17-c22 not asked ■ box8 recoded below so cleaning would catch error*/
replace box8=1 if sqid2==10660 & box8==2
/*12361: box 8 miscoded by I as 2 instead of 1 so c17-c22 not asked ■ box8 recoded below so cleaning would catch error*/
replace box8=1 if sqid2==12361 & box8==2
/*13116: box 8 blank ■ c17-c22 not asked when should have been ■ box8 recoded below so cleaning would catch error*/
replace box8=1 if sqid2==13116 & box8==2
/*21013: box8 coded 1 incorrectly (R voted against at w7) ■ R said very difficult at c17 and, at c18, vote against; as consistent with w7 response, box8 recoded as 2 below so c-series would be correctly cleaned*/
replace box8=2 if sqid2==21013 & box8==1
/*10171: box8 blank so cleaning didn't detect that c17 and c19 asked incorrectly ■ box8 coded 2 below so cleaning would catch error*/
replace box8=2 if sqid2==10171
/*12371: box8 miscoded 1 ■ c17 and c19 asked incorrectly; box8 recoded 2 below so cleaning would catch error*/

```
replace box8=2 if sqid2==12371 & box8==1
log close
end
```

Appendix C.8
Verbatim Coding Schemata

A-7A **Is there anything I have told you about these four fish and bird species that you would like me to repeat? What is that?**

1. **Questions about what is CAUSING this problem.**

   "Why are they having these problems?"

2. **Questions about these SPECIES living ELSEWHERE or about whether they may become EXTINCT.**

   "Do we have these fish in other areas?" "Are they becoming extinct?"

3. **OTHER questions.**

A-11A **Before today, had you heard anything about the DDT and PCBs that are located in this particular place [located on the ocean bottom off California's South Coast]? If *yes* at A-11: What have you heard?**

1. **CLEAR mention of THIS particular deposit of DDT and PCBs in the ocean or ITS EFFECTS.**

   About THAT deposit/area. "DDT/PCBs in that area in the ocean." "That it had been dumped there." "Heard of that deposit/chemical deposit." "Heard of that area."

   About effects caused by THE DEPOSIT. "That it harms fish/Bald Eagle, Peregrine Falcon/causes reproduction problems." "It is causing health problems." "Falcons are harmed there."

   Reference to what they were told about this in the survey. "What you told me; what you're saying."

2. **POSSIBLE reference to THIS particular deposit and/or its effects.**

   Mention of the plant. "The plant closed."

   Mention of source of their information. "Read/heard about it." "In the papers."

   Effects. "I have heard that DDT was killing the sea animals." "Heard about the pelicans around Anacapa, that their egg shells were thin also."

   Mention of seeing on TV or reading about DDT cleanup in Torrance (Los Angeles) (on land). "I saw on TV that they are cleaning it up."

   Other. "That they had pumped chemicals there [not mentioned as being DDT/PCBs]" "That the waters are contaminated there."

3. **Comments NOT RELATED to this particular deposit and/or its effects.**

   Comments about chemicals/sewage along the coast without reference to the deposit. "Sewage problems on beaches."

   Mention of DDT/PCBs in general. "Use of DDT or PCBs." "Effects of DDT or PCBs in general."

   Other unrelated places or situations: "I've been to sewage treatment plants."

A-13A Do you have any questions about how this [program to cover up the contaminated sediment/deposit] would work?

1. **COST of program; PAYING for the program.**

"Who would pay?" "What is the cost?" "How much would we have to pay?" "Why doesn't someone else (such as the company) pay?" "Someone else should pay."

2. **Queries about WHETHER the program would work.**

General uncertainty/skepticism about effectiveness. "Do they know for sure it would work?" "Where have they done this before?"

Concern about particular problems. "Wouldn't ocean currents/earthquakes affect the deposit after it is covered up?" "Wouldn't small animals dig through the layer of uncontaminated sediment and reach the contaminated sediment?"

3. **Queries about HOW the program would work and its consequences**

New sediment. "How are they dropping it down?" "Where will the sediment come from?"

Time. "When would the program be carried out?" "I don't see why it would take a year."

Possible side effects. "Would the program harm the animals and plants that live on the bottom when the new sediment is put on top?"

4. **Queries about OTHER WAYS to take care of the deposit.**

"Why not have the Navy do it?" "Why not remove the sediment instead of covering it up?"

5. **OTHER QUESTIONS/COMMENTS**

"Is the company still in business?" "How important a fish is this?"

A-15A **Is there anything else you would like to know about either the speed-up program or the natural recovery process? What else would you like to know?**

1. **COST of program; PAYING for the program.**

"Who would pay?" "What is the cost?" "How much would we have to pay?" "Why doesn't someone else (such as the company) pay?" "Someone else should pay."

2. **Queries about WHETHER the program would work.**

General uncertainty/skepticism about effectiveness. "Do they know for sure it would work?" "Where have they done this before?"

Concern about particular problems. "Wouldn't ocean currents/earthquakes affect the deposit after it is covered up?" "Wouldn't small animals dig through the layer of uncontaminated sediment and reach the contaminated sediment?"

3. **Queries about HOW the program would work and its consequences**

New sediment. "How are they dropping it down?" "Where will the sediment come from?"

Time. "When would the program be carried out?" "I don't see why it would take a year."

Possible side effects. "What would happen to the animals and plants that live on the bottom when the new sediment is put on top?"

4. **Queries about OTHER WAYS to take care of the deposit.**

"Why not have the Navy do it?" "Why not remove the sediment instead of covering it up?"

5. **Queries about the NATURAL RECOVERY PROCESS.**

"How long would nature take to recover on its own?" "How long are DDT and PCBs harmful?"

A-15A (continued)

6. OTHER QUESTIONS/COMMENTS

"Is the company still in business?" "How important a fish is this?" "I don't think it is worth it."

W-1 & Page 19 **If an election were being held today and the total cost to your household would be a one time additional tax of $VARIOUS AMOUNTS, would you vote for the program to speed up recovery or would you vote against it? (Spontaneous comments.)**

1. **Questions HOW the payment system would work.**

   "Per household?" "Would that be every year for five years?"

2. **Comments about COST of the program to the RESPONDENT (or his or her household).**

   Negative comments. "That's a lot of money." "I don't have $___." "I can't afford it!" "I'd like to see it cleaned up, but hate to pay taxes."

   Positive comments. "That's not much money." "$___ is not much."

   Neutral comments. "One time payment only." "If I really only pay $___"

3. **Comments about TOTAL COST of the program IN GENERAL.**

   "Program cost is too high." "Numbers don't add up." "If all taxpayers pay, the amount is too high."

   "State can't afford this."

4. **CONCERNS about the PAYMENT system.**

   "Never seen a one time tax."

5. **OTHER COMMENTS**

   Statements for and against the program (other than cost) "If it were an endangered species and world wide I would vote for it." "Make it possible for people to enjoy the animals." "Other problems are more important."

   Other: "Want to know more about the program." "Why doesn't someone else pay for it." "I don't pay income tax." etc.

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W-4 Did you vote against the program because it isn't worth that much money to you, or because it would be somewhat difficult for your household to pay that much, or because of some other reason?

1. **COST is too HIGH**

Cost is too high for R. "I can't afford it." "I don't like to pay taxes/it would be difficult for me to pay."

Cost is too high for others. "Other people may not be able to afford it."

Cost is too high for what it would accomplish. "The program is very expensive."

2. **NOT THAT IMPORTANT**

Problem not that important. "Problem isn't a big deal/serious/important." "I don't care about it." "It won't help me."

Other problems are more important. "Rather spend money on other programs."

Let nature solve it. "Let nature take its own course." "Wildlife will recover anyway."

3. **CONCERNS about the program or payment plans**

Program does not do enough. "Very few animals would be helped."

Doubts about aspects of the program. "Program won't work." "Don't trust the State of California/Government." "Money will be wasted."

Concerns about payment plan. "It will cost more than you are telling me." "It (the tax) will be for more than one year."

Problem could/should be solved in other ways. (*e.g.*, transplanting birds; removing the sediment instead of covering it up; getting at the root cause etc.)

Other parties should pay. "State should use other money to pay for it." "People living nearby/ the owner of the plant should pay."

4. **Wants MORE INFORMATION to make a decision**

"Too many unanswered questions." "I don't have enough data."

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W-4 (continued)

5. OTHER

W-5 Could you tell me why you aren't sure?

1. COST is too HIGH

Cost is too high for R. "I can't afford it." "I don't like to pay taxes/it would be difficult for me to pay."

Cost is too high for others. "Other people may not be able to afford it."

Cost is too high for what it would accomplish. "The program is very expensive."

2. NOT THAT IMPORTANT

Problem not that important. "Problem isn't a big deal/serious/important." "I don't care about it." "It won't help me."

Other problems are more important. "Rather spend money on other programs."

Let nature solve it. "Let nature take its own course." "Wildlife will recover anyway."

3. CONCERNS about the program or payment plans

Program does not do enough. "Very few animals would be helped."

Doubts about aspects of the program. "Program won't work." "Don't trust the State of California/Government." "Money will be wasted."

Concerns about payment plan. "It will cost more than you are telling me." "It (the tax) will be for more than one year."

Problem could/should be solved in other ways. (*e.g.*, transplanting birds; removing the sediment instead of covering it up; getting at the root cause etc.)

Other parties should pay. "State should use other money to pay for it." "People living nearby/ the owner of the plant should pay."

4. Wants MORE INFORMATION to make a decision

"Too many unanswered questions." "I don't have enough data."

W-5 (continued)

5. OTHER

W-6 People have different reasons for voting for the program. Can you tell me what covering the contaminated sediments would do that made you willing to pay for it?

1. **Program will help the FOUR SPECIES of wildlife and/or it will help the AREA where they live**

   Program will help some or all of the animals affected by the deposit. "To help/save the fish/wildlife/animals to reproduce (faster)." "To save the fish and animals you told me about." "Bring back nature there." "Protect the wildlife."

   Program will help the area. "It will clean up the California coastline."

2. **Program will help OTHER ANIMALS BESIDES the four species.**

   "Simplistic to think that only 4 species are affected." "Other fish I'm sure are affected."

3. **Program will HASTEN the RECOVERY process.**

   "Natural process of recovery is too long." "Program gains forty five years." "Why wait?"

4. **Program will protect the ENVIRONMENT (IN GENERAL).**

   "For environmental purposes." "Make the earth healthier." "It would help the environment."

5. **Program will prevent PHYSICAL HARM to PEOPLE (including respondent)**

   "It may harm people." "I don't trust the people that say it doesn't affect humans." "I eat a lot of fish."

6. **RESPONDENT (including his or her household) is personally CONCERNED about the environment or would BENEFIT from the program personally in ways other than health.**

   "I'm an environmentalist/animal activist/concerned about wildlife." "I like animals." "I fish/am a sportsman/an outdoors person." "I have a concern for all species." "It would ease my conscience." "I could fish there."

W-6 (continued)

7. **Program will benefit OTHER PEOPLE (i.e., not the respondent) in ways other than health.**

Program will make it possible for others to enjoy animals. "Make it possible for people to see/enjoy the animals."

Program will benefit future generations. "Give a clean world to future generations." "Help future generations enjoy the ocean."

Program would help commercial fishermen. "The fishermen need the dollars from the fish they catch."

8. **PEOPLE (collectively) CAUSED the problem and/or are RESPONSIBLE for fixing it.**

"We caused it. We should fix it." "I don't like to see animals become extinct because of what us humans have created." "Make up for our past mistakes." "We need to protect the environment."

9. **The COST of the program is affordable/reasonable.**

"Cost is cheap." "Cost is worth it." "Fixing it up later will cost more."

11. **OTHER REASONS.**

"I don't know." "Would clean dirt be washed away?" "Not sure if it will really work but willing to give it a try" etc.

Appendix D
Main Study Survey Marginals

D.1 Tabulation of Close-Ended Responses
D.2 Tabulation of Open-Ended Responses
D.3 Recommended NOAA Panel Cross-Tabulations

Appendix D.1
Tabulation of Close-Ended Responses

Is this issue not important at all to you personally, not too important, somewhat important, very important, or extremely important — improving education in elementary and secondary schools?

Question: A-1A[a]	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
not important at all	0.59	11	0.58	10.73
not too important	2.05	38	2.16	40.07
somewhat important	7.59	141	8.11	150.67
very important	31.56	586	31.79	590.34
extremely important	57.46	1067	56.56	1050.40
not sure	0.59	11	0.60	11.19
not ascertained	0.16	3	0.19	3.60
% base	100.00	1857	100.00	1857.00

[a] In a small number of cases, respondents gave responses between the offered response categories, *e.g.*, "between [response choice 2] and [response choice 3]". For the tables in this appendix, these responses have been coded as *not sure*.

Reducing air pollution in the cities?

Question: A-1B	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
not important at all	0.86	16	0.91	16.99
not too important	3.23	60	3.48	64.58
somewhat important	18.79	349	18.61	345.56
very important	43.51	808	43.65	810.52
extremely important	32.96	612	32.72	607.56
not sure	0.54	10	0.53	9.90
not ascertained	0.11	2	0.10	1.88
% base	100.00	1857	100.00	1857.00

Maintaining local library services?

Question: A-1C	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
not important at all	1.45	27	1.53	28.42
not too important	4.58	85	4.72	87.65
somewhat important	21.49	399	21.51	399.47
very important	48.03	892	47.65	884.93
extremely important	24.02	446	24.06	446.79
not sure	0.22	4	0.25	4.56
not ascertained	0.22	4	0.28	5.19
% base	100.00	1857	100.00	1857.00

Reducing crime?

Question: A-1D	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
not important at all	0.27	5	0.27	4.94
not too important	0.48	9	0.43	7.94
somewhat important	3.12	58	3.16	58.66
very important	25.79	479	26.10	484.66
extremely important	70.01	1300	69.74	1295.15
not sure	0.05	1	0.05	0.85
not ascertained	0.27	5	0.26	4.81
% base	100.00	1857	100.00	1857.00

Protecting coastal areas from oil spills?

Question: A-1E	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
not important at all	1.35	25	1.53	28.49
not too important	3.45	64	3.63	67.35
somewhat important	17.93	333	18.01	334.41
very important	39.80	739	40.36	749.41
extremely important	36.67	681	35.74	663.69
not sure	0.59	11	0.52	9.64
not ascertained	0.22	4	0.22	4.01
% base	100.00	1857	100.00	1857.00

Finding ways to reduce state taxes?

Question: A-1F	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
not important at all	1.67	31	1.60	29.79
not too important	6.30	117	6.48	120.34
somewhat important	22.02	409	21.72	403.35
very important	33.23	617	33.05	613.82
extremely important	36.30	674	36.67	680.93
not sure	0.43	8	0.41	7.64
not ascertained	0.05	1	0.06	1.13
% base	100.00	1857	100.00	1857.00

For each one, I'd like you to tell me whether you think the money the State is spending on these programs should be reduced a great deal, reduced somewhat, stay the same, increased somewhat or increased a great deal. Building new state prisons?

Question: A-2A	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
reduced great deal	8.72	162	8.56	158.88
reduced somewhat	10.55	196	9.98	185.25
stay the same	25.26	469	25.57	474.91
increased somewhat	35.60	661	35.83	665.34
increased great deal	16.64	309	16.88	313.40
not sure	3.12	58	3.08	57.11
not ascertained	0.11	2	0.11	2.11
% base	100.00	1857	100.00	1857.00

Providing public transportation for Los Angeles?

Question: A-2B	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
reduced great deal	5.28	98	5.36	99.60
reduced somewhat	6.68	124	6.55	121.65
stay the same	32.31	600	32.58	605.09
increased somewhat	31.77	590	31.46	584.21
increased great deal	18.85	350	18.92	351.25
not sure	5.06	94	5.08	94.25
not ascertained	0.05	1	0.05	0.94
% base	100.00	1857	100.00	1857.00

Providing pay raises for professors at state colleges and universities?

Question: A-2C	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
reduced great deal	5.71	106	6.31	117.27
reduced somewhat	8.83	164	9.06	168.18
stay the same	42.70	793	42.70	792.99
increased somewhat	29.94	556	29.43	546.55
increased great deal	8.94	166	8.66	160.81
not sure	3.88	72	3.83	71.21
% base	100.00	1857	100.00	1857.00

Providing shelter for the homeless in big cities?

Question: A-2D	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
reduced great deal	3.50	65	3.68	68.37
reduced somewhat	5.22	97	5.53	102.62
stay the same	22.02	409	22.64	420.46
increased somewhat	40.06	744	39.77	738.62
increased great deal	26.93	500	26.13	485.16
refused	0.05	1	0.06	1.03
not sure	1.99	37	1.99	36.87
not ascertained	0.22	4	0.21	3.88
% base	100.00	1857	100.00	1857.00

Protecting endangered wildlife species?

Question: A-2E	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
reduced great deal	4.95	92	5.22	96.99
reduced somewhat	9.91	184	10.39	193.02
stay the same	34.19	635	34.64	643.24
increased somewhat	29.24	543	28.60	531.06
increased great deal	19.22	357	18.72	347.60
not sure	2.21	41	2.20	40.77
not ascertained	0.27	5	0.23	4.32
% base	100.00	1857	100.00	1857.00

Providing lifeguards at state beaches?

Question: A-2F	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
reduced great deal	2.48	46	2.39	44.35
reduced somewhat	7.05	131	6.87	127.59
stay the same	54.66	1015	55.10	1023.25
increased somewhat	21.97	408	21.70	402.99
increased great deal	9.53	177	9.36	173.76
not sure	4.31	80	4.58	85.07
% base	100.00	1857	100.00	1857.00

Have you ever been interviewed like this before to get your opinion about whether the State should or should not spend tax money for a particular purpose?

Question: A-3	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	4.85	90	4.79	88.87
no	94.56	1756	94.60	1756.68
not sure	0.54	10	0.57	10.52
not ascertained	0.05	1	0.05	0.94
% base	100.00	1857	100.00	1857.00

Have you ever lived in Los Angeles County or Orange County?

Question: A-4	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	32.32	405	32.58	392.52
no	67.52	846	67.23	809.82
not ascertained	0.16	2	0.19	2.30
% base	100.00	1253	100.00	1204.63

How many years have you lived in this county?

Question: A-5	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
less than 1 year	1.66	10	1.51	9.85
1 to 5 years	12.42	75	11.66	76.05
6 to 10 years	12.42	75	12.07	78.75
11 to 15 years	11.75	71	11.64	75.94
16 to 20 years	10.60	64	10.97	71.56
21 to 25 years	11.75	71	11.46	74.73
26 to 30 years	8.77	53	8.03	52.40
31 to 35 years	11.09	67	11.02	71.90
36 to 40 years	5.46	33	5.80	37.86
41 to 45 years	4.30	26	4.72	30.77
46 to 50 years	4.14	25	4.45	29.01
over 50 years	5.46	33	6.52	42.53
not ascertained	0.17	1	0.15	1.00
% base	100.00	604	100.00	652.37

Before today, had you heard anything at all about DDT?

Question: A-9	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	79.16	1470	79.86	1482.92
no	19.39	360	18.74	347.94
not sure	1.24	23	1.20	22.22
not ascertained	0.22	4	0.21	3.92
% base	100.00	1857	100.00	1857.00

How about PCBs? Had you heard anything about them before today?

Question: A-10	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	55.36	1028	55.99	1039.69
no	40.33	749	39.87	740.44
not sure	4.20	78	4.02	74.67
not ascertained	0.11	2	0.12	2.20
% base	100.00	1857	100.00	1857.00

Before today, had you heard anything about the DDT and PCBs that are located in this particular place?

Question: A-11	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	7.86	146	7.89	146.43
no	90.63	1683	90.75	1685.27
not sure	1.24	23	1.07	19.82
not ascertained	0.27	5	0.30	5.48
% base	100.00	1857	100.00	1857.00

Do you have any questions about how this [*speed-up program*] would work?

Question: A-13	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes[1]	14.43	268	14.63	271.70
no	85.03	1579	84.76	1573.96
not ascertained	0.54	10	0.61	11.34
% base	100.00	1857	100.00	1857.00

[1] If no answer category was circled by the interviewer at A-13 and there was a verbatim response recorded at follow-up question A-13A, A-13 was coded as a *yes*. This occured in 17 cases.

Is there anything else you would like to know about either the speed-up program or the natural recovery process?

Question: A-15	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes[2]	14.38	267	14.25	264.65
no	84.87	1576	84.92	1577.02
not ascertained	0.75	14	0.83	15.33
% base	100.00	1857	100.00	1857.00

[2] If no answer category was circled by the interviewer at A-15 and there was a verbatim response recorded at follow-up question A-15A, A-15 was coded as a *yes*. This occured in 6 cases.

If an election were being held today and the total cost to your household would be a one time additional tax of $[AMOUNT], would you vote for the program to speed up recovery or would you vote against it?

Question: W-1		unweighted		weighted	
		Percentage	Count	Percentage	Count
Cost Form	Category:				
1-$10	for	59.36	222	57.66	212.53
	against	35.29	132	37.36	137.71
	not sure	5.35	20	4.98	18.37
	% base	100.00	374	100.00	368.61
2-$25	Category:				
	for	51.42	181	51.61	181.66
	against	42.61	150	42.64	150.10
	not sure	5.97	21	5.76	20.26
	% base	100.00	352	100.00	352.02
3-$80	Category:				
	for	36.99	135	35.88	130.50
	against	54.52	199	55.54	202.00
	not sure	8.49	31	8.58	31.20
	% base	100.00	365	100.00	363.71
4-$140	Category:				
	for	31.69	122	31.43	123.61
	against	60.78	234	61.54	242.01
	not sure	7.53	29	7.03	27.64
	% base	100.00	385	100.00	393.27

It is possible that the final engineering cost estimates for the program would be higher than this. If this turns out to be the case and your household would have to pay a one time additional tax of $[HIGHER AMOUNT] instead of $[W-1 AMOUNT], would you vote for or against the program?

Question: W-2		unweighted		weighted	
		Percentage	Count	Percentage	Count
Cost Form	Category:				
1-$25	for	64.41	143	63.49	134.94
	against	25.68	57	26.58	56.50
	not sure	9.91	22	9.93	21.10
	% base	100.00	222	100.00	212.53
2-$45	Category:				
	for	63.54	115	64.59	117.34
	against	26.52	48	25.65	46.59
	not sure	9.94	18	9.76	17.73
	% base	100.00	181	100.00	181.66
3-$140	Category:				
	for	48.89	66	48.58	63.40
	against	40.00	54	40.64	53.04
	not sure	11.11	15	10.77	14.06
	% base	100.00	135	100.00	130.50
4-$215	Category:				
	for	45.90	56	46.61	57.62
	against	44.26	54	43.09	53.27
	not sure	9.84	12	10.29	12.72
	% base	100.00	122	100.00	123.61

W-2 (CONTINUED)

Question: W-2		unweighted		weighted	
		Percentage	Count	Percentage	Count
Cost Form	Category:				
5-$360	for	58.51	55	59.95	57.72
	against	30.85	29	29.93	28.82
	not sure	10.64	10	10.12	9.75
	% base	100.00	94	100.00	96.28

It is possible that the final engineering cost estimates for the program would be lower than this. If this turns out to be the case and your household would have to pay a one time additional tax of $[LOWER AMOUNT] instead of $[W-1 AMOUNT], would you vote for or against the program?

Question: W-3		unweighted		weighted	
		Percentage	Count	Percentage	Count
Cost Form	Category:				
1-$5	for	15.79	24	14.07	21.95
	against	75.66	115	77.37	120.76
	not sure	8.55	13	8.56	13.36
	% base	100.00	152	100.00	156.08
2-$10	Category:				
	for	16.96	29	16.76	28.55
	against	70.18	120	71.45	121.72
	not sure	12.87	22	11.79	20.09
	% base	100.00	171	100.00	170.36
3-$45	Category:				
	for	15.22	35	14.20	33.11
	against	73.91	170	73.97	172.49
	not sure	10.43	24	11.21	26.14
	not ascertained	0.43	1[3]	0.63	1.47
	% base	100.00	230	100.00	233.21

[3] As noted in the STATA recode file (see Appendix C.7), one respondent was asked follow-up choice question W-2 instead of W-3 (hence, W-2 was set to missing and W-3 was set to the "not ascertained" code of 9 in the cleaning process); however, this respondent was correctly asked W-4.

W-3 (CONTINUED)

Question: W-3		unweighted		weighted	
		Percentage	Count	Percentage	Count
4-$80	Category:				
	for	15.97	42	16.49	44.47
	against	74.52	196	73.99	199.51
	not sure	9.51	25	9.52	25.68
	% base	100.00	263	100.00	269.66
5-$140	Category:				
	for	9.41	27	9.39	26.59
	against	82.93	238	82.57	233.76
	not sure	7.67	22	8.04	22.76
	% base	100.00	287	100.00	283.11

Did you vote against the program because it isn't worth that much money to you, or because it would be somewhat difficult for your household to pay that much, or because of some other reason?

Question: W-4	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
is not that important	11.07	93	11.09	94.22
somewhat difficult to pay	14.52	122	13.83	117.52
other	72.62	610	73.31	622.96
not ascertained	1.79	15	1.77	15.01
% base	100.00	840	100.00	849.71

It is not unusual for some people to vote for the program because they are concerned that these DDT and PCBs may harm human health. Suppose human health is definitely not affected in this situation and the program would only speed up the recovery of these four species of fish and birds. Would you vote for or against the program if it cost your household $[LARGEST AMOUNT RESPONDENT VOTED FOR]?

Question: W-7	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
for	91.00	829	90.61	814.85
against	7.03	64	7.51	67.53
not sure	1.76	16	1.67	15.02
not ascertained	0.22	2	0.21	1.85
% base	100.00	911	100.00	899.26

First, did it seem to you that DDT and PCBs could cause the reproduction problems I told you about?

Question: B-1	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	93.54	1737	93.45	1735.44
no	2.64	49	2.54	47.25
not sure	3.72	69	3.89	72.29
not ascertained	0.11	2	0.11	2.02
% base	100.00	1857	100.00	1857.00

When you decided how to vote, did it seem to you that natural processes would take about fifty years to return things to normal?

Question: B-2	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes, about 50 years	69.52	1291	69.36	1288.04
no	18.31	340	18.40	341.72
not sure	11.74	218	11.82	219.48
not ascertained	0.43	8[4]	0.42	7.76
% base	100.00	1857	100.00	1857.00

[4] In 2 of these 8 cases, the interviewer apparently asked this filter question (as an answer category was coded for follow-up question B-3) but neglected to code the response.

Did it seem to you that it would take a lot more than 50 years or a lot less than 50?

Question: B-3	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
a lot more	20.89	117	20.76	116.85
a lot less	49.64	278	50.16	282.37
other	8.93	50	9.18	51.68
not sure	18.57	104	17.89	100.71
not ascertained	1.96	11	2.01	11.33
% base	100.00	560	100.00	562.94

When you decided how to vote, did it seem to you that the speed-up program would be completely effective in solving the reproduction problems within five years?

Question: B-4	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	52.18	969	52.21	969.62
no	26.93	500	26.90	499.56
not sure	20.41	379	20.42	379.15
not ascertained	0.48	9[5]	0.47	8.66
% base	100.00	1857	100.00	1857.00

[5] In 3 of these 9 cases, the interviewer apparently asked this filter question (as an answer category was coded for follow-up question B-5) but neglected to code the response.

Did it seem that the program would be . . .

Question: B-5	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
mostly effective	23.13	204	22.16	195.32
somewhat effective	51.70	456	51.72	455.84
not too effective	12.93	114	13.79	121.54
not at all effective	5.44	48	5.60	49.31
not sure	6.58	58	6.49	57.24
not ascertained	0.23	2	0.24	2.13
% base	100.00	882	100.00	881.39

When you decided how to vote, did you think your household would have to pay the special tax for the program for one year or for more than one year?

Question: B-6	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
one year	62.52	1161	62.43	1159.32
more than one year	28.38	527	28.38	527.01
not sure	8.29	154	8.34	154.89
not ascertained	0.81	15	0.85	15.78
% base	100.00	1857	100.00	1857.00

Thinking about everything I have told you during this interview, overall did it try to push you to vote one way or another, or did it let you make up your own mind about which way to vote?

Question: B-7	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
pushed one way or another	7.11	132	7.12	132.17
let me make up own mind	91.92	1707	91.98	1707.98
not sure	0.86	16	0.80	14.92
not ascertained	0.11	2[6]	0.10	1.94
% base	100.00	1857	100.00	1857.00

[6] In 1 of these 2 cases, the interviewer apparently asked this filter question (as an answer category was coded for follow-up question B-7a) but neglected to code the response.

Which way did you think it pushed you?

Question: B-7a	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
vote for program	75.94	101	75.63	100.65
vote against program	19.55	26	19.37	25.78
other	3.76	5	4.09	5.44
not ascertained	0.75	1	0.91	1.20
% base	100.00	133	100.00	133.08

All things considered, would you say the fish and bird reproduction problems I told you about in the South Coast are ...

Question: B-8	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
not serious at all	5.22	97	5.61	104.12
not too serious	19.12	355	19.50	362.15
somewhat serious	38.40	713	37.95	704.64
very serious	25.58	475	25.54	474.24
extremely serious	10.82	201	10.58	196.48
not sure	0.70	13	0.71	13.15
not ascertained	0.16	3	0.12	2.22
% base	100.00	1857	100.00	1857.00

In the past five years has anyone in your household gone fishing?

Question: B-9	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	49.27	915	48.27	896.31
no	50.24	933	51.28	952.35
not sure	0.38	7	0.37	6.96
not ascertained	0.11	2	0.07	1.39
% base	100.00	1857	100.00	1857.00

Is that saltwater fishing, freshwater fishing, or both?

Question: B-10	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
saltwater	17.92	164	18.67	167.31
freshwater	35.96	329	35.31	316.46
both	45.36	415	45.25	405.62
not sure	0.66	6	0.62	5.53
not ascertained	0.11	1	0.15	1.38
% base	100.00	915	100.00	896.31

In the past five years has anyone in your household gone boating?

Question: B-11	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	57.03	1059	56.19	1043.40
no	42.60	791	43.44	806.77
not sure	0.27	5	0.29	5.44
not ascertained	0.11	2	0.07	1.39
% base	100.00	1857	100.00	1857.00

Is that saltwater boating, freshwater boating, or both?

Question: B-12	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
saltwater	25.68	272	26.73	278.94
freshwater	29.27	310	28.39	296.23
both	44.57	472	44.36	462.80
not sure	0.19	2	0.12	1.24
not ascertained	0.28	3	0.40	4.18
% base	100.00	1059	100.00	1043.40

Does anyone in your household like to identify different species of birds?

Question: B-13	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	41.36	768	41.60	772.45
no	56.92	1057	56.86	1055.88
not sure	1.62	30	1.47	27.28
not ascertained	0.11	2	0.07	1.39
% base	100.00	1857	100.00	1857.00

How often do you personally watch television programs about animals and birds in the wild . . .

Question: B-14	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
very often	21.59	401	21.71	403.12
often	22.56	419	23.00	427.08
sometimes	36.13	671	36.13	670.85
rarely	14.97	278	14.55	270.14
never	4.36	81	4.28	79.56
not sure	0.11	2	0.12	2.32
not ascertained	0.27	5	0.21	3.92
% base	100.00	1857	100.00	1857.00

How often do people in your household go to the beach at the ocean . . .

Question: B-15	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
very often	10.93	203	10.58	196.45
often	20.19	375	19.91	369.81
sometimes	31.13	578	30.32	563.09
rarely	28.86	536	29.70	551.53
never	8.62	160	9.28	172.37
not sure	0.11	2	0.08	1.42
not ascertained	0.16	3	0.13	2.32
% base	100.00	1857	100.00	1857.00

How often do people in your household eat fish . . .

Question: B-16	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
very often	12.87	239	13.16	244.41
often	28.59	531	28.44	528.04
sometimes	34.52	641	34.75	645.39
rarely	19.28	358	19.07	354.08
never	4.58	85	4.46	82.86
not ascertained	0.16	3	0.12	2.22
% base	100.00	1857	100.00	1857.00

On another subject, would you say you think of yourself as an ...

Question: B-17	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
environmental activist	2.91	54	2.97	55.21
strong environmentalist	17.77	330	18.12	336.54
somewhat strong environmentalist	40.33	749	39.64	736.14
not particularly strong environmentalist	29.29	544	29.71	551.71
not an environmentalist at all	8.24	153	8.20	152.22
not sure	1.18	22	1.12	20.88
not ascertained	0.27	5	0.23	4.31
% base	100.00	1857	100.00	1857.00

First, in total, how many years have you lived in California?

Question: C-1	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
less than 1 year	0.70	13	0.62	11.53
1 to 5 years	7.27	135	6.90	128.16
6 to 10 years	7.97	148	7.54	140.08
11 to 15 years	8.67	161	8.28	153.79
16 to 20 years	8.62	160	8.49	157.75
21 to 25 years	10.66	198	9.96	184.88
26 to 30 years	11.52	214	10.71	198.95
31 to 35 years	10.99	204	11.06	205.41
36 to 40 years	8.62	160	8.65	160.68
41 to 45 years	7.49	139	7.76	144.16
46 to 50 years	6.03	112	6.45	119.77
over 50 years	11.36	211	13.48	250.27
not ascertained	0.11	2	0.08	1.57
% base	100.00	1857	100.00	1857.00

Have you ever been to Catalina or any of the other Channel Islands?

Question: C-2	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	46.53	864	47.50	882.06
no	53.20	988	52.24	970.09
not sure	0.22	4	0.24	4.49
not ascertained	0.05	1	0.02	0.37
% base	100.00	1857	100.00	1857.00

Was your most recent visit within the past five years?

Question: C-3	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes, past five years	46.41	401	45.54	401.73
no, longer ago	53.36	461	54.23	478.34
not sure	0.12	1	0.12	1.06
not ascertained	0.12	1	0.10	0.92
% base	100.00	864	100.00	882.06

Do you intend to move outside California in the next few years?

Question: C-4	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	15.62	290	14.93	277.27
no	71.46	1327	72.75	1350.89
refused	0.05	1	0.07	1.27
not sure	12.76	237	12.17	226.01
not ascertained	0.11	2	0.08	1.56
% base	100.00	1857	100.00	1857.00

Do you intend to move outside (L.A./Orange) County in the next few years?

Question: C-5	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	9.57	47	9.57	51.24
no	65.58	322	67.80	363.03
not sure	22.61	111	20.57	110.15
not ascertained	2.24	11	2.07	11.06
% base	100.00	491	100.00	535.48

In what month and year were you born? [coded into age categories below]

Question: AGE	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
18 to 25 years	10.61	197	9.33	173.24
26 to 30 years	11.31	210	10.01	185.97
31 to 35 years	14.32	266	13.41	249.04
36 to 40 years	11.58	215	10.93	202.89
41 to 45 years	12.55	233	12.63	234.47
46 to 50 years	9.75	181	9.49	176.24
51 to 55 years	6.52	121	6.54	121.51
56 to 60 years	5.01	93	5.13	95.34
61 to 65 years	4.90	91	5.38	99.81
66 to 70 years	3.45	64	4.32	80.28
71 to 75 years	3.39	63	4.27	79.30
76 to 80 years	3.55	66	4.59	85.26
81 to 85 years	2.15	40	2.78	51.63
over 85 years	0.92	17	1.19	22.02
% base	100.00	1857	100.00	1857.00

What is the highest year of school you completed or the highest degree you received?

Question: C-7	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
through 8th grade	2.42	45	2.58	47.88
9th, 10th, 11th, 12th grade (no diploma)	8.62	160	8.78	162.96
high school equivalent	2.53	47	2.68	49.79
high school graduate	20.41	379	20.65	383.42
some college but no degree	22.72	422	22.53	418.31
associates in occupational/vocational	4.42	82	4.30	79.87
associates in academic program	6.84	127	6.50	120.75
bachelors degree	21.49	399	21.35	396.51
masters degree	6.68	124	6.85	127.13
professional school degree	1.45	27	1.38	25.54
doctorate degree	1.56	29	1.65	30.72
refused	0.16	3	0.11	2.02
not sure	0.16	3	0.19	3.56
not ascertained	0.54	10	0.46	8.54
% base	100.00	1857	100.00	1857.00

During 1993, how many adults in your household, including yourself, worked for pay?

Question: C-8	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
0 adults	14.05	261	16.61	308.45
1 adult	37.00	687	35.38	656.94
2 adults	38.29	711	37.30	692.68
3 adults	7.05	131	7.03	130.55
4 adults	2.58	48	2.61	48.49
5 adults	0.65	12	0.71	13.21
6 or more	0.16	3	0.19	3.45
refused	0.05	1	0.06	1.03
not ascertained	0.16	3	0.12	2.21
% base	100.00	1857	100.00	1857.00

How many people live in this household who are younger than 18?

Question: C-9	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
0 children	58.21	1081	59.56	1106.03
1 child	17.23	320	16.51	306.60
2 children	15.24	283	14.95	277.54
3 children	6.25	116	6.12	113.74
4 children	1.83	34	1.80	33.45
5 children	0.48	9	0.45	8.35
6 or more	0.38	7	0.28	5.24
refused	0.05	1	0.06	1.03
not ascertained	0.32	6	0.27	5.02
% base	100.00	1857	100.00	1857.00

Do you have children of any age who live outside this household?

Question: C-10	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	38.40	713	41.16	764.41
no	61.44	1141	58.72	1090.38
not ascertained	0.16	3	0.12	2.21
% base	100.00	1857	100.00	1857.00

Do you have any grandchildren?

Question: C-11	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	64.24	458	67.82	518.40
no	34.64	247	31.59	241.48
refused	0.14	1	0.13	1.00
not ascertained	0.98	7	0.46	3.52
% base	100.00	713	100.00	764.41

Did anyone in your household have any income from social security or pensions in 1993?

Question: C-12	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	24.56	456	28.22	524.03
no	74.80	1389	71.17	1321.56
not sure	0.32	6	0.32	5.98
not ascertained	0.32	6	0.29	5.42
% base	100.00	1857	100.00	1857.00

Adding together all income for everyone in your household, which letter on this card best describes your household's total income for last year — 1993 — before taxes?

Question: C-13	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
under $10,000	9.15	170	8.59	159.57
$10,000 to $19,999	11.85	220	11.64	216.23
$20,000 to $29,999	14.27	265	14.50	269.23
$30,000 to $39,999	12.65	235	12.74	236.58
$40,000 to $49,999	8.78	163	8.73	162.06
$50,000 to $59,999	7.65	142	7.76	144.18
$60,000 to $69,999	7.11	132	7.31	135.69
$70,000 to $79,999	5.71	106	5.57	103.45
$80,000 to $99,999	4.58	85	4.76	88.32
$100,000 to $149,999	5.71	106	5.79	107.43
$150,000 or more	3.66	68	3.80	70.62
refused	5.87	109	5.75	106.70
not sure	2.69	50	2.77	51.42
not ascertained	0.32	6	0.30	5.52
% base	100.00	1857	100.00	1857.00

Did anyone in your household pay any California income taxes for last year, 1993, either by having taxes withheld from wages, retirement income, or other money received, or by sending money to the State with a tax form?

Question: C-14	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	45.38	177	43.32	162.81
no	51.28	200	53.36	200.53
not sure	1.54	6	1.24	4.67
not ascertained	1.79	7	2.07	7.78
% base	100.00	390	100.00	375.80

If things go as you expect, do you think your household's total income for this year will be about the same as last year, higher than last year, or lower than last year?

Question: C-15	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
same	47.12	875	48.40	898.80
higher	30.10	559	28.53	529.89
lower	17.82	331	18.25	338.92
refused	0.48	9	0.51	9.47
not sure	3.93	73	3.82	70.92
not ascertained	0.54	10	0.48	9.00
% base	100.00	1857	100.00	1857.00

How difficult would it be for your household to actually pay $[LARGEST AMOUNT RESPONDENT VOTED FOR] next year if the program passed? Would it be . . .

Question: C-17	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
very difficult	7.00	58	6.89	56.16
somewhat difficult	21.23	176	21.11	172.01
not too difficult	33.17	275	33.23	270.77
not difficult at all	36.55	303	36.47	297.19
refused	0.12	1	0.11	0.92
not sure	1.57	13	1.91	15.53
not ascertained	0.36	3	0.28	2.27
% base	100.00	829	100.00	814.85

Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $[LARGEST AMOUNT RESPONDENT VOTED FOR]?

Question: C-18	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
vote for	90.69	224	90.55	220.67
vote against	3.24	8	2.97	7.25
not sure	5.26	13	5.73	13.97
not ascertained	0.81	2	0.74	1.81
% base	100.00	247	100.00	243.70

How strongly do you favor the program if it cost your household this much money? Would you say . . .

Question: C-19	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
very strongly	25.61	148	25.69	145.91
strongly	51.90	300	50.72	288.06
not too strongly	17.47	101	18.16	103.12
not at all strongly	1.38	8	1.46	8.30
not sure	1.04	6	0.99	5.61
not ascertained	2.60	15	2.99	16.97
% base	100.00	578	100.00	567.96

Now that you have had a chance to think a bit more about this, would you vote "For" or "Against" the program if it cost your household $[LARGEST AMOUNT RESPONDENT VOTED FOR]?

Question: C-20	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
vote for	94.78	109	93.95	109.94
vote against	1.74	2	1.75	2.05
not sure	0.87	1	1.07	1.25
not ascertained	2.61	3	3.23	3.78
% base	100.00	115	100.00	117.02

How strongly do you favor the program if it cost your household this much money? Would you say . . .

Question: C-21	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
very strongly	21.10	50	20.24	47.49
strongly	58.65	139	59.60	139.85
not too strongly	17.72	42	18.17	42.63
does not favor plan	0.42	1	0.29	0.69
not sure	1.27	3	0.79	1.86
not ascertained	0.84	2	0.91	2.12
% base	100.00	237	100.00	234.64

Generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . . university scientists?

Question: C-24A	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
great deal	29.56	549	29.09	540.19
somewhat	57.46	1067	57.36	1065.26
hardly any	7.27	135	7.70	143.00
none	3.02	56	3.00	55.74
not sure	2.42	45	2.59	48.13
not ascertained	0.27	5	0.25	4.69
% base	100.00	1857	100.00	1857.00

Generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . . U.S. Congress?

Question: C-24B	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
great deal	3.93	73	4.09	75.96
somewhat	42.27	785	42.12	782.26
hardly any	33.12	615	32.71	607.38
none	19.33	359	19.88	369.18
not sure	1.24	23	1.12	20.76
not ascertained	0.11	2	0.08	1.46
% base	100.00	1857	100.00	1857.00

Generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . . scientists who work for industry?

Question: C-24C	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
great deal	14.27	265	14.62	271.48
somewhat	57.51	1068	57.55	1068.77
hardly any	18.85	350	18.45	342.61
none	6.73	125	6.72	124.77
not sure	2.53	47	2.58	47.91
not ascertained	0.11	2	0.08	1.46
% base	100.00	1857	100.00	1857.00

Generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . . newspapers?

Question: C-24D	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
great deal	8.29	154	7.94	147.45
somewhat	49.87	926	49.43	917.99
hardly any	27.79	516	27.97	519.33
none	12.76	237	13.28	246.53
not sure	1.18	22	1.31	24.24
not ascertained	0.11	2	0.08	1.46
% base	100.00	1857	100.00	1857.00

Generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . . California state government?

Question: C-24E	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
great deal	3.93	73	4.03	74.86
somewhat	44.16	820	44.33	823.21
hardly any	32.90	611	32.34	600.47
none	17.45	324	17.82	330.99
not sure	1.45	27	1.40	26.01
not ascertained	0.11	2	0.08	1.46
% base	100.00	1857	100.00	1857.00

Generally speaking, would you say you have a great deal of confidence, some confidence, hardly any confidence, or no confidence at all in . . . large corporations?

Question: C-24F	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
great deal	4.58	85	4.66	86.51
somewhat	47.82	888	47.91	889.72
hardly any	30.21	561	29.77	552.78
none	14.75	274	14.98	278.19
refused	0.05	1	0.05	0.87
not sure	2.37	44	2.44	45.26
not ascertained	0.22	4	0.20	3.66
% base	100.00	1857	100.00	1857.00

How <u>much</u> of the time do you think we can trust the California state government to do what is <u>right</u>? Would you say . . .

Question: C-25	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
always	0.86	16	0.79	14.74
almost always	4.68	87	4.83	89.71
most of the time	16.69	310	16.63	308.84
some of the time	56.17	1043	56.02	1040.26
almost never	16.10	299	16.34	303.36
never	4.36	81	4.36	80.97
refused	0.11	2	0.10	1.94
not sure	0.92	17	0.85	15.72
not ascertained	0.11	2	0.08	1.46
% base	100.00	1857	100.00	1857.00

There are different ways for people to pay for new programs to protect the environment. One way is for the government to pay the cost. This will raise everyone's taxes. The other way is for businesses to pay the cost. This will make prices go up for everyone.

If you had to choose, would you prefer to pay for new environmental programs . .

Question: C-26	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
through higher taxes	29.29	544	29.64	550.38
through higher prices	44.96	835	44.56	827.39
either one/do not care which	6.03	112	5.94	110.35
neither	13.68	254	13.95	258.98
refused	0.05	1	0.05	0.91
not sure	5.12	95	5.09	94.52
not ascertained	0.86	16	0.78	14.47
% base	100.00	1857	100.00	1857.00

Do you usually speak English at home?

Question: C-27	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	90.36	1678	89.88	1669.04
no	7.75	144	8.07	149.79
other	1.72	32	1.93	35.86
not ascertained	0.16	3	0.12	2.31
% base	100.00	1857	100.00	1857.00

What language do you usually speak at home?

Question: C-27a	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
spanish	52.08	75	53.91	80.76
other language	36.11	52	33.24	49.78
not ascertained	11.81	17	12.85	19.25
% base	100.00	144	100.00	149.79

SEX (interviewer coded by observation)

Question: SEX	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
male	45.29	841	45.22	839.69
female	54.23	1007	54.31	1008.60
not ascertained	0.48	9	0.47	8.71
% base	100.00	1857	100.00	1857.00

RACE (interviewer coded by observation)

Question: RACE	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
white, not hispanic	66.07	1227	68.05	1263.70
white, hispanic	13.19	245	13.72	254.70
black, not hispanic	9.32	173	7.24	134.42
black, hispanic	0.43	8	0.40	7.44
asian	6.19	115	5.82	108.05
other	3.12	58	3.00	55.63
not ascertained	1.67	31	1.78	33.06
% base	100.00	1857	100.00	1857.00

What was the reaction of the respondent as you read through the material **beginning with A-3 through A-16**? (This is the descriptive material including the maps and charts.) How distracted was the respondent?

Question: D-1A	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
extremely	0.32	6	0.31	5.76
very	1.62	30	1.76	32.75
somewhat	8.62	160	8.36	155.16
slightly	19.87	369	19.58	363.67
not at all	69.14	1284	69.57	1291.95
not sure	0.11	2	0.12	2.25
not ascertained	0.32	6	0.29	5.45
% base	100.00	1857	100.00	1857.00

How attentive was the respondent?

Question: D-1B	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
extremely	26.93	500	26.77	497.16
very	58.48	1086	58.86	1093.07
somewhat	12.76	237	12.54	232.89
slightly	0.92	17	0.84	15.60
not at all	0.27	5	0.28	5.23
not sure	0.05	1	0.06	1.13
not ascertained	0.59	11	0.64	11.93
% base	100.00	1857	100.00	1857.00

How well did the respondent understand this material?

Question: D-1C	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
extremely	27.52	511	27.33	507.59
very	58.59	1088	58.45	1085.47
somewhat	11.79	219	12.10	224.78
slightly	0.97	18	0.93	17.30
not at all	0.05	1	0.04	0.83
not sure	0.32	6	0.33	6.07
not ascertained	0.75	14	0.81	14.96
% base	100.00	1857	100.00	1857.00

Did the respondent say anything suggesting that he or she had any difficulty understanding either the natural recovery process or the speed-up program?

Question: D-2	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	2.48	46	2.37	44.08
no	97.20	1805	97.33	1807.35
not ascertained	0.32	6	0.30	5.58
% base	100.00	1857	100.00	1857.00

Did the respondent have any difficulty understanding the vote questions (W-1 through W-3)?

Question: D-3	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	2.10	39	2.06	38.19
no	97.68	1814	97.74	1815.07
not ascertained	0.22	4	0.20	3.74
% base	100.00	1857	100.00	1857.00

When you asked the voting questions did you feel the respondent was impatient to finish the interview?

Question: D-4	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	14.54	270	15.01	278.71
no	82.93	1540	82.43	1530.68
not sure	1.83	34	1.90	35.31
not ascertained	0.70	13[7]	0.66	12.30
% base	100.00	1857	100.00	1857.00

[7] In 9 of these 13 cases, the interviewer apparently made a judgement about this question (as an answer category was coded for follow-up question D-4a) but neglected to code his/her response.

How impatient was the respondent?

Question: D-4a	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
very impatient	16.49	46	16.23	46.64
somewhat impatient	31.54	88	30.59	87.92
a little impatient	36.92	103	36.81	105.80
not very impatient	14.70	41	16.01	46.02
not ascertained	0.36	1	0.36	1.03
% base	100.00	279	100.00	287.41

How serious was the consideration the respondent gave to the decision about how to vote?

Question: D-5	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
extremely serious	25.04	465	24.74	459.44
very serious	55.84	1037	55.84	1036.90
somewhat serious	15.99	297	16.23	301.35
slightly serious	1.78	33	1.79	33.15
not at all serious	0.43	8	0.50	9.25
not sure	0.38	7	0.34	6.39
not ascertained	0.54	10	0.57	10.53
% base	100.00	1857	100.00	1857.00

Not counting you and the respondent, was anyone age 13 or older present when the respondent voted?

Question: D-6	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	19.28	358	19.70	365.87
no	78.08	1450	77.93	1447.10
others came in and out	2.37	44	2.10	39.06
not ascertained	0.27	5	0.27	4.98
% base	100.00	1857	100.00	1857.00

Do you think the other person(s) affected how the respondent voted or don't you know?

Question: D-6a	unweighted		weighted	
	Percentage	Count	Percentage	Count
Category:				
yes	3.73	15	4.19	16.95
no	89.30	359	88.66	359.00
do not know	6.47	26	6.59	26.68
not ascertained	0.50	2	0.57	2.29
% base	100.00	402	100.00	404.92

Appendix D.2
Tabulation of Open-Ended Responses

A-7A:	Is there anything I have told you about these four fish and bird species that you would like me to repeat? What is that?	
Respondent Category	N	Percentage[a]
Questions about what is CAUSING this problem.	23	40.35%
Questions about these SPECIES living ELSEWHERE or about whether they may become EXTINCT.	28	49.12%
OTHER questions.	18	31.58%

[a] Percentaging base is the number of respondents who gave a verbatim response to this question. Percentages total more than 100 percent as multiple responses allowed.

A-11A:	Before today, had you heard anything about the DDT and PCBs that are located in this particular place? What have you heard?	
Respondent Category	N	Percentage[a]
CLEAR mention of THIS particular deposit of DDT and PCBs in the ocean or ITS EFFECTS.	59	44.70%
POSSIBLE reference to THIS particular deposit and/or its effects.	83	62.88%
Comments NOT RELATED to this particular deposit and/or its effects.	22	16.67%

[a] Percentaging base is the number of respondents who gave a verbatim response to this question. Percentages total more than 100 percent as multiple responses allowed.

A-13A: **Do you have any questions about how this [*accelerated recovery program*] would work?**

Respondent Category	N	Percentage[a]
COST of program; PAYING for the program.	73	28.40%
Queries about WHETHER the program would work.	76	29.57%
Queries about HOW the program would work and its consequences	93	36.19%
Queries about OTHER WAYS to take care of the deposit.	42	16.34%
OTHER QUESTIONS/COMMENTS	44	17.12%

[a] Percentaging base is the number of respondents who gave a verbatim response to this question. Percentages total more than 100 percent as multiple responses allowed.

A-15A: **Is there anything else you would like to know about either the speed-up program or the natural recovery process? What else would you like to know?**

Respondent Category	N	Percentage[a]
COST of program; PAYING for the program.	138	53.08%
Queries about WHETHER the program would work.	47	18.08%
Queries about HOW the program would work and its consequences	50	19.23%
Queries about OTHER WAYS to take care of the deposit.	12	4.62%
Queries about the NATURAL RECOVERY PROCESS.	30	11.54%
OTHER QUESTIONS/COMMENTS	38	14.62%

[a] Percentaging base is the number of respondents who gave a verbatim response to this question. Percentages total more than 100 percent as multiple responses allowed.

W-1: If an election were being held today and the total cost to your household would be a one time additional tax of $[W1AMT], would you vote for the program to speed up recovery or would you vote against it? (*Spontaneous comments*)

Respondent Category	N	Percentage[a]
Questions HOW the payment system would work.	48	9.45%
Comments about COST of the program to the RESPONDENT (or his or her household).	183	36.02%
Comments about TOTAL COST of the program IN GENERAL.	50	9.84%
CONCERNS about the PAYMENT system.	77	15.16%
OTHER COMMENTS	326	64.17%

[a] Percentaging base is the number of respondents who gave a verbatim response to this question. Percentages total more than 100 percent as multiple responses allowed.

W-4: Did you vote against the program because it isn't worth that much money to you, or because it would be somewhat difficult for your household to pay that much, or because of some other reason? [If *other* reason, PROBE]

Respondent Category	N	Percentage[a]
COST is too HIGH	88	14.64%
NOT THAT IMPORTANT	425	70.72%
CONCERNS about the program or payment plans	175	29.12%
Wants MORE INFORMATION to make a decision	17	2.83%
OTHER	77	12.81%

[a] Percentaging base is the number of respondents who gave a "other" verbatim response. Percentages total more than 100 percent as multiple responses allowed.

W-5: Could you tell me why you aren't sure?		
Respondent Category	N	Percentage[a]
COST is too HIGH	27	27.27%
NOT THAT IMPORTANT	41	41.41%
CONCERNS about the program or payment plans	31	31.31%
Wants MORE INFORMATION to make a decision	23	22.23%
OTHER	30	30.30%

[a] Percentaging base is the number of respondents who answered this question. Percentages total more than 100 percent as multiple responses allowed.

W-6: People have different reasons for voting for the program. Can you tell me what covering the contaminated sediments would do that made you willing to pay for it?

Respondent Category	N	Percentage[a]
Program will help the TWO SPECIES of fish and/or it will help the AREA where they live	652	71.89%
Program will help OTHER ANIMALS BESIDES the two fish species	68	7.50%
Program will HASTEN the RECOVERY process	197	21.72%
Program will protect the ENVIRONMENT (IN GENERAL)[b]	17	1.87%
Program will prevent PHYSICAL HARM to PEOPLE (including respondent)	126	13.89%
RESPONDENT (or his or her household) is personally CONCERNED about the environment or would BENEFIT from the program personally in ways other than health.	149	16.43%
Program will benefit OTHER PEOPLE (i.e., not the respondent) in ways other than health.	109	12.02%
PEOPLE (collectively) CAUSED the problem and/or are RESPONSIBLE for fixing it	123	13.56%
The COST of the program is affordable/reasonable.	89	9.81%
OTHER REASONS	141	15.55%

[a] Percentaging base is the number of respondents who gave a verbatim response to this question. Percentages total more than 100 percent as multiple responses allowed.

[b] Those coded as "protect environment" are those who did *not* clarify this thought by giving any other type of reason in their answer to W-6. The total percent who originally gave reasons (*i.e.*, response before interviewer probed) coded in this category was 17.4.

Appendix D.3
Recommended NOAA Panel Cross-Tabulations

CROSS-TABULATION OF C13 AND W1[1]

c13	w1 0	w1 1	Total
1	99 58.24 9.91	71 41.76 10.25	170 100.00 10.05
2	117 53.18 11.71	103 46.82 14.86	220 100.00 13.00
3	145 54.72 14.51	120 45.28 17.32	265 100.00 15.66
4	123 52.34 12.31	112 47.66 16.16	235 100.00 13.89
5	92 56.44 9.21	71 43.56 10.25	163 100.00 9.63
6	92 64.79 9.21	50 35.21 7.22	142 100.00 8.39
7	83 62.88 8.31	49 37.12 7.07	132 100.00 7.80
8	72 67.92 7.21	34 32.08 4.91	106 100.00 6.26
9	54 63.53 5.41	31 36.47 4.47	85 100.00 5.02
10	70 66.04 7.01	36 33.96 5.19	106 100.00 6.26
11	52 76.47 5.21	16 23.53 2.31	68 100.00 4.02
Total	999 59.04 100.00	693 40.96 100.00	1692 100.00 100.00

Pearson chi2(10) = 27.6358 Pr = 0.002

[1] In the cross-tabulations reported in this appendix, not sure, refused, and not ascertained responses have been dropped as well as the small number of cases in which respondents gave responses between the offered response categories, *e.g.*, "between [response choice two] and [response choice three]".

CROSS-TABULATION OF C13 AND W1CH

c13	w1ch 0	1	Total
1	112 65.88 10.55	58 34.12 9.21	170 100.00 10.05
2	129 58.64 12.15	91 41.36 14.44	220 100.00 13.00
3	160 60.38 15.07	105 39.62 16.67	265 100.00 15.66
4	128 54.47 12.05	107 45.53 16.98	235 100.00 13.89
5	98 60.12 9.23	65 39.88 10.32	163 100.00 9.63
6	93 65.49 8.76	49 34.51 7.78	142 100.00 8.39
7	85 64.39 8.00	47 35.61 7.46	132 100.00 7.80
8	75 70.75 7.06	31 29.25 4.92	106 100.00 6.26
9	56 65.88 5.27	29 34.12 4.60	85 100.00 5.02
10	72 67.92 6.78	34 32.08 5.40	106 100.00 6.26
11	54 79.41 5.08	14 20.59 2.22	68 100.00 4.02
Total	1062 62.77 100.00	630 37.23 100.00	1692 100.00 100.00

Pearson chi2(10) = 23.4884 Pr = 0.009

CROSS-TABULATION OF A11 AND W1

a11	w1 0	w1 1	Total
1	75 51.37 6.88	71 48.63 9.61	146 100.00 7.98
2	1015 60.31 93.12	668 39.69 90.39	1683 100.00 92.02
Total	1090 59.60 100.00	739 40.40 100.00	1829 100.00 100.00

Pearson chi2(1) = 4.4583 Pr = 0.035

CROSS-TABULATION OF A11 AND W1CH

a11	w1ch 0	w1ch 1	Total
1	81 55.48 6.96	65 44.52 9.76	146 100.00 7.98
2	1082 64.29 93.04	601 35.71 90.24	1683 100.00 92.02
Total	1163 63.59 100.00	666 36.41 100.00	1829 100.00 100.00

Pearson chi2(1) = 4.5040 Pr = 0.034

CROSS-TABULATION OF C2 AND W1

c2	w1 0	w1 1	Total
1	525 60.76 47.68	339 39.24 45.14	864 100.00 46.65
2	576 58.30 52.32	412 41.70 54.86	988 100.00 53.35
Total	1101 59.45 100.00	751 40.55 100.00	1852 100.00 100.00

Pearson chi2(1) = 1.1611 Pr = 0.281

CROSS-TABULATION OF C2 AND W1CH

c2	w1ch 0	w1ch 1	Total
1	550 63.66 46.77	314 36.34 46.45	864 100.00 46.65
2	626 63.36 53.23	362 36.64 53.55	988 100.00 53.35
Total	1176 63.50 100.00	676 36.50 100.00	1852 100.00 100.00

Pearson chi2(1) = 0.0176 Pr = 0.895

CROSS-TABULATION OF C3 AND W1

c3 \ w1	0	1	Total
1	235 58.60 44.93	166 41.40 48.97	401 100.00 46.52
2	288 62.47 55.07	173 37.53 51.03	461 100.00 53.48
Total	523 60.67 100.00	339 39.33 100.00	862 100.00 100.00

Pearson chi2(1) = 1.3457 Pr = 0.246

CROSS-TABULATION OF C3 AND W1CH

c3 \ w1ch	0	1	Total
1	242 60.35 44.16	159 39.65 50.64	401 100.00 46.52
2	306 66.38 55.84	155 33.62 49.36	461 100.00 53.48
Total	548 63.57 100.00	314 36.43 100.00	862 100.00 100.00

Pearson chi2(1) = 3.3654 Pr = 0.067

CROSS-TABULATION OF SWATREC AND W1

swatrec	w1 0	1	Total
0	493	276	769
	64.11	35.89	100.00
	44.70	36.60	41.41
1	610	478	1088
	56.07	43.93	100.00
	55.30	63.40	58.59
Total	1103	754	1857
	59.40	40.60	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 12.0854 Pr = 0.000

CROSS-TABULATION OF SWATREC AND W1CH

swatrec	w1ch 0	1	Total
0	527	242	769
	68.53	31.47	100.00
	44.74	35.64	41.41
1	651	437	1088
	59.83	40.17	100.00
	55.26	64.36	58.59
Total	1178	679	1857
	63.44	36.56	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 14.6890 Pr = 0.000

CROSS-TABULATION OF B13 AND W1

b13	w1 0	w1 1	Total
1	413	355	768
	53.78	46.22	100.00
	38.13	47.84	42.08
2	670	387	1057
	63.39	36.61	100.00
	61.87	52.16	57.92
Total	1083	742	1825
	59.34	40.66	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 17.0292 Pr = 0.000

CROSS-TABULATION OF B13 AND W1CH

b13	w1ch 0	w1ch 1	Total
1	443	325	768
	57.68	42.32	100.00
	38.29	48.65	42.08
2	714	343	1057
	67.55	32.45	100.00
	61.71	51.35	57.92
Total	1157	668	1825
	63.40	36.60	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 18.6635 Pr = 0.000

CROSS-TABULATION OF A1B AND W1

a1b	w1 0	w1 1	Total
1	12 75.00 1.10	4 25.00 0.53	16 100.00 0.87
2	48 80.00 4.39	12 20.00 1.60	60 100.00 3.25
3	257 73.64 23.49	92 26.36 12.25	349 100.00 18.92
4	476 58.91 43.51	332 41.09 44.21	808 100.00 43.79
5	301 49.18 27.51	311 50.82 41.41	612 100.00 33.17
Total	1094 59.30 100.00	751 40.70 100.00	1845 100.00 100.00

Pearson chi2(4) = 68.0198 Pr = 0.000

CROSS-TABULATION OF A1B AND W1CH

a1b	w1ch 0	w1ch 1	Total
1	13 81.25 1.11	3 18.75 0.44	16 100.00 0.87
2	51 85.00 4.36	9 15.00 1.33	60 100.00 3.25
3	267 76.50 22.84	82 23.50 12.13	349 100.00 18.92
4	509 63.00 43.54	299 37.00 44.23	808 100.00 43.79
5	329 53.76 28.14	283 46.24 41.86	612 100.00 33.17
Total	1169 63.36 100.00	676 36.64 100.00	1845 100.00 100.00

Pearson chi2(4) = 64.6336 Pr = 0.000

CROSS-TABULATION OF A1E AND W1

a1e	w1 0	w1 1	Total
1	23	2	25
	92.00	8.00	100.00
	2.11	0.27	1.36
2	52	12	64
	81.25	18.75	100.00
	4.77	1.60	3.47
3	242	91	333
	72.67	27.33	100.00
	22.18	12.12	18.08
4	437	302	739
	59.13	40.87	100.00
	40.05	40.21	40.12
5	337	344	681
	49.49	50.51	100.00
	30.89	45.81	36.97
Total	1091	751	1842
	59.23	40.77	100.00
	100.00	100.00	100.00

Pearson chi2(4) = 75.6652 Pr = 0.000

CROSS-TABULATION OF A1E AND W1CH

a1e	w1ch 0	w1ch 1	Total
1	24	1	25
	96.00	4.00	100.00
	2.06	0.15	1.36
2	53	11	64
	82.81	17.19	100.00
	4.55	1.62	3.47
3	251	82	333
	75.38	24.62	100.00
	21.55	12.11	18.08
4	475	264	739
	64.28	35.72	100.00
	40.77	39.00	40.12
5	362	319	681
	53.16	46.84	100.00
	31.07	47.12	36.97
Total	1165	677	1842
	63.25	36.75	100.00
	100.00	100.00	100.00

Pearson chi2(4) = 73.3113 Pr = 0.000

CROSS-TABULATION OF A2E AND W1

a2e	w1 0	w1 1	Total
1	80	12	92
	86.96	13.04	100.00
	7.49	1.62	5.08
2	136	48	184
	73.91	26.09	100.00
	12.73	6.46	10.16
3	441	194	635
	69.45	30.55	100.00
	41.29	26.11	35.06
4	277	266	543
	51.01	48.99	100.00
	25.94	35.80	29.98
5	134	223	357
	37.54	62.46	100.00
	12.55	30.01	19.71
Total	1068	743	1811
	58.97	41.03	100.00
	100.00	100.00	100.00

Pearson chi2(4) = 157.5865 Pr = 0.000

CROSS-TABULATION OF A2E AND W1CH

a2e	w1ch 0	w1ch 1	Total
1	82	10	92
	89.13	10.87	100.00
	7.17	1.50	5.08
2	149	35	184
	80.98	19.02	100.00
	13.04	5.24	10.16
3	459	176	635
	72.28	27.72	100.00
	40.16	26.35	35.06
4	306	237	543
	56.35	43.65	100.00
	26.77	35.48	29.98
5	147	210	357
	41.18	58.82	100.00
	12.86	31.44	19.71
Total	1143	668	1811
	63.11	36.89	100.00
	100.00	100.00	100.00

Pearson chi2(4) = 159.3658 Pr = 0.000

CROSS-TABULATION OF B17 AND W1

b17	w1 0	w1 1	Total
1	21 38.89 1.94	33 61.11 4.41	54 100.00 2.95
2	168 50.91 15.54	162 49.09 21.63	330 100.00 18.03
3	415 55.41 38.39	334 44.59 44.59	749 100.00 40.93
4	362 66.54 33.49	182 33.46 24.30	544 100.00 29.73
5	115 75.16 10.64	38 24.84 5.07	153 100.00 8.36
Total	1081 59.07 100.00	749 40.93 100.00	1830 100.00 100.00

Pearson chi2(4) = 51.3028 Pr = 0.000

CROSS-TABULATION OF B17 AND W1CH

b17	w1ch 0	w1ch 1	Total
1	26 48.15 2.25	28 51.85 4.15	54 100.00 2.95
2	180 54.55 15.58	150 45.45 22.22	330 100.00 18.03
3	448 59.81 38.79	301 40.19 44.59	749 100.00 40.93
4	379 69.67 32.81	165 30.33 24.44	544 100.00 29.73
5	122 79.74 10.56	31 20.26 4.59	153 100.00 8.36
Total	1155 63.11 100.00	675 36.89 100.00	1830 100.00 100.00

Pearson chi2(4) = 47.3133 Pr = 0.000

CROSS-TABULATION OF C24C AND W1

c24c	w1 0	w1 1	Total
1	148	117	265
	55.85	44.15	100.00
	13.88	15.77	14.66
2	630	438	1068
	58.99	41.01	100.00
	59.10	59.03	59.07
3	212	138	350
	60.57	39.43	100.00
	19.89	18.60	19.36
4	76	49	125
	60.80	39.20	100.00
	7.13	6.60	6.91
Total	1066	742	1808
	58.96	41.04	100.00
	100.00	100.00	100.00

Pearson chi2(3) = 1.6108 Pr = 0.657

CROSS-TABULATION OF C24C AND W1CH

c24c	w1ch 0	w1ch 1	Total
1	159	106	265
	60.00	40.00	100.00
	13.96	15.84	14.66
2	672	396	1068
	62.92	37.08	100.00
	59.00	59.19	59.07
3	225	125	350
	64.29	35.71	100.00
	19.75	18.68	19.36
4	83	42	125
	66.40	33.60	100.00
	7.29	6.28	6.91
Total	1139	669	1808
	63.00	37.00	100.00
	100.00	100.00	100.00

Pearson chi2(3) = 1.8941 Pr = 0.595

CROSS-TABULATION OF C24F AND W1

c24f	w1 0	w1 1	Total
1	54	31	85
	63.53	36.47	100.00
	5.06	4.18	4.70
2	535	353	888
	60.25	39.75	100.00
	50.14	47.64	49.12
3	316	245	561
	56.33	43.67	100.00
	29.62	33.06	31.03
4	162	112	274
	59.12	40.88	100.00
	15.18	15.11	15.15
Total	1067	741	1808
	59.02	40.98	100.00
	100.00	100.00	100.00

Pearson chi2(3) = 2.9501 Pr = 0.399

CROSS-TABULATION OF C24F AND W1CH

c24f	w1ch 0	w1ch 1	Total
1	59	26	85
	69.41	30.59	100.00
	5.18	3.89	4.70
2	572	316	888
	64.41	35.59	100.00
	50.18	47.31	49.12
3	339	222	561
	60.43	39.57	100.00
	29.74	33.23	31.03
4	170	104	274
	62.04	37.96	100.00
	14.91	15.57	15.15
Total	1140	668	1808
	63.05	36.95	100.00
	100.00	100.00	100.00

Pearson chi2(3) = 3.9612 Pr = 0.266

CROSS-TABULATION OF SCOAST AND W1

scoast	w1 0	w1 1	Total
0	768 61.29 69.63	485 38.71 64.32	1253 100.00 67.47
1	335 55.46 30.37	269 44.54 35.68	604 100.00 32.53
Total	1103 59.40 100.00	754 40.60 100.00	1857 100.00 100.00

Pearson chi2(1) = 5.7423 Pr = 0.017

CROSS-TABULATION OF SCOAST AND W1CH

scoast	w1ch 0	w1ch 1	Total
0	816 65.12 69.27	437 34.88 64.36	1253 100.00 67.47
1	362 59.93 30.73	242 40.07 35.64	604 100.00 32.53
Total	1178 63.44 100.00	679 36.56 100.00	1857 100.00 100.00

Pearson chi2(1) = 4.7327 Pr = 0.030

CROSS-TABULATION OF FARNORTH AND W1

farnorth	w1 0	1	Total
0	958 58.27 86.85	686 41.73 90.98	1644 100.00 88.53
1	145 68.08 13.15	68 31.92 9.02	213 100.00 11.47
Total	1103 59.40 100.00	754 40.60 100.00	1857 100.00 100.00

Pearson chi2(1) = 7.5133 Pr = 0.006

CROSS-TABULATION OF FARNORTH AND W1CH

farnorth	w1ch 0	1	Total
0	1026 62.41 87.10	618 37.59 91.02	1644 100.00 88.53
1	152 71.36 12.90	61 28.64 8.98	213 100.00 11.47
Total	1178 63.44 100.00	679 36.56 100.00	1857 100.00 100.00

Pearson chi2(1) = 6.5161 Pr = 0.011

CROSS-TABULATION OF D1C AND W1

d1c	w1 0	w1 1	Total
1	326	185	511
	63.80	36.20	100.00
	29.88	24.80	27.82
2	629	459	1088
	57.81	42.19	100.00
	57.65	61.53	59.23
3	126	93	219
	57.53	42.47	100.00
	11.55	12.47	11.92
4	10	8	18
	55.56	44.44	100.00
	0.92	1.07	0.98
5	0	1	1
	0.00	100.00	100.00
	0.00	0.13	0.05
Total	1091	746	1837
	59.39	40.61	100.00
	100.00	100.00	100.00

Pearson chi2(4) = 7.1214 Pr = 0.130

CROSS-TABULATION OF D1C AND W1CH

d1c	w1ch 0	w1ch 1	Total
1	340	171	511
	66.54	33.46	100.00
	29.18	25.45	27.82
2	665	423	1088
	61.12	38.88	100.00
	57.08	62.95	59.23
3	148	71	219
	67.58	32.42	100.00
	12.70	10.57	11.92
4	12	6	18
	66.67	33.33	100.00
	1.03	0.89	0.98
5	0	1	1
	0.00	100.00	100.00
	0.00	0.15	0.05
Total	1165	672	1837
	63.42	36.58	100.00
	100.00	100.00	100.00

Pearson chi2(4) = 8.0660 Pr = 0.089

CROSS-TABULATION OF D2 AND W1

d2 \ w1	0	1	Total
1	26	20	46
	56.52	43.48	100.00
	2.36	2.66	2.49
2	1074	731	1805
	59.50	40.50	100.00
	97.64	97.34	97.51
Total	1100	751	1851
	59.43	40.57	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 0.1652 Pr = 0.684

CROSS-TABULATION OF D2 AND W1CH

d2 \ w1ch	0	1	Total
1	33	13	46
	71.74	28.26	100.00
	2.81	1.92	2.49
2	1142	663	1805
	63.27	36.73	100.00
	97.19	98.08	97.51
Total	1175	676	1851
	63.48	36.52	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 1.3883 Pr = 0.239

CROSS-TABULATION OF D3 AND W1

d3	w1 0	w1 1	Total
1	19	20	39
	48.72	51.28	100.00
	1.73	2.66	2.10
2	1082	732	1814
	59.65	40.35	100.00
	98.27	97.34	97.90
Total	1101	752	1853
	59.42	40.58	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 1.8913 Pr = 0.169

CROSS-TABULATION OF D3 AND W1CH

d3	w1ch 0	w1ch 1	Total
1	26	13	39
	66.67	33.33	100.00
	2.21	1.92	2.10
2	1150	664	1814
	63.40	36.60	100.00
	97.79	98.08	97.90
Total	1176	677	1853
	63.46	36.54	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 0.1762 Pr = 0.675

CROSS-TABULATION OF B1 AND W1

b1 \ w1	0	1	Total
1	1013 58.32 96.48	724 41.68 98.37	1737 100.00 97.26
2	37 75.51 3.52	12 24.49 1.63	49 100.00 2.74
Total	1050 58.79 100.00	736 41.21 100.00	1786 100.00 100.00

Pearson chi2(1) = 5.8133 Pr = 0.016

CROSS-TABULATION OF B1 AND W1CH

b1 \ w1ch	0	1	Total
1	1083 62.35 96.52	654 37.65 98.49	1737 100.00 97.26
2	39 79.59 3.48	10 20.41 1.51	49 100.00 2.74
Total	1122 62.82 100.00	664 37.18 100.00	1786 100.00 100.00

Pearson chi2(1) = 6.0665 Pr = 0.014

CROSS-TABULATION OF MORETIME AND W1

moretime	w1 0	w1 1	Total
0	1057 60.75 95.83	683 39.25 90.58	1740 100.00 93.70
1	46 39.32 4.17	71 60.68 9.42	117 100.00 6.30
Total	1103 59.40 100.00	754 40.60 100.00	1857 100.00 100.00

Pearson chi2(1) = 20.8776 Pr = 0.000

CROSS-TABULATION OF MORETIME AND W1CH

moretime	w1ch 0	w1ch 1	Total
0	1128 64.83 95.76	612 35.17 90.13	1740 100.00 93.70
1	50 42.74 4.24	67 57.26 9.87	117 100.00 6.30
Total	1178 63.44 100.00	679 36.56 100.00	1857 100.00 100.00

Pearson chi2(1) = 23.0687 Pr = 0.000

CROSS-TABULATION OF LESSTIME AND W1

lesstime	w1 0	1	Total
0	900 57.00 81.60	679 43.00 90.05	1579 100.00 85.03
1	203 73.02 18.40	75 26.98 9.95	278 100.00 14.97
Total	1103 59.40 100.00	754 40.60 100.00	1857 100.00 100.00

Pearson chi2(1) = 25.1655 Pr = 0.000

CROSS-TABULATION OF LESSTIME AND W1CH

lesstime	w1ch 0	1	Total
0	961 60.86 81.58	618 39.14 91.02	1579 100.00 85.03
1	217 78.06 18.42	61 21.94 8.98	278 100.00 14.97
Total	1178 63.44 100.00	679 36.56 100.00	1857 100.00 100.00

Pearson chi2(1) = 30.1364 Pr = 0.000

CROSS-TABULATION OF PWORKS AND W1

pworks	w1 0	w1 1	Total
0	527 77.05 47.78	157 22.95 20.82	684 100.00 36.83
1	576 49.10 52.22	597 50.90 79.18	1173 100.00 63.17
Total	1103 59.40 100.00	754 40.60 100.00	1857 100.00 100.00

Pearson chi2(1) = 139.8723 Pr = 0.000

CROSS-TABULATION OF PWORKS AND W1CH

pworks	w1ch 0	w1ch 1	Total
0	551 80.56 46.77	133 19.44 19.59	684 100.00 36.83
1	627 53.45 53.23	546 46.55 80.41	1173 100.00 63.17
Total	1178 63.44 100.00	679 36.56 100.00	1857 100.00 100.00

Pearson chi2(1) = 136.8301 Pr = 0.000

CROSS-TABULATION OF PNOTWORK AND W1

pnotwork	w1 0	1	Total
0	946 55.81 85.77	749 44.19 99.34	1695 100.00 91.28
1	157 96.91 14.23	5 3.09 0.66	162 100.00 8.72
Total	1103 59.40 100.00	754 40.60 100.00	1857 100.00 100.00

Pearson chi2(1) = 103.5818 Pr = 0.000

CROSS-TABULATION OF PNOTWORK AND W1CH

pnotwork	w1ch 0	1	Total
0	1020 60.18 86.59	675 39.82 99.41	1695 100.00 91.28
1	158 97.53 13.41	4 2.47 0.59	162 100.00 8.72
Total	1178 63.44 100.00	679 36.56 100.00	1857 100.00 100.00

Pearson chi2(1) = 88.9514 Pr = 0.000

CROSS-TABULATION OF PAYMORE AND W1

paymore	w1 0	w1 1	Total
0	621 53.49 63.76	540 46.51 75.63	1161 100.00 68.78
1	353 66.98 36.24	174 33.02 24.37	527 100.00 31.22
Total	974 57.70 100.00	714 42.30 100.00	1688 100.00 100.00

Pearson chi2(1) = 27.0442 Pr = 0.000

CROSS-TABULATION OF PAYMORE AND W1CH

paymore	w1ch 0	w1ch 1	Total
0	673 57.97 64.65	488 42.03 75.43	1161 100.00 68.78
1	368 69.83 35.35	159 30.17 24.57	527 100.00 31.22
Total	1041 61.67 100.00	647 38.33 100.00	1688 100.00 100.00

Pearson chi2(1) = 21.5761 Pr = 0.000

CROSS-TABULATION OF D4 AND W1

d4	w1 0	w1 1	Total
1	187	83	270
	69.26	30.74	100.00
	17.38	11.31	14.92
2	889	651	1540
	57.73	42.27	100.00
	82.62	88.69	85.08
Total	1076	734	1810
	59.45	40.55	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 12.6725 Pr = 0.000

CROSS-TABULATION OF D4 AND W1CH

d4	w1ch 0	w1ch 1	Total
1	200	70	270
	74.07	25.93	100.00
	17.42	10.57	14.92
2	948	592	1540
	61.56	38.44	100.00
	82.58	89.43	85.08
Total	1148	662	1810
	63.43	36.57	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 15.5120 Pr = 0.000

Appendix E
Main Study Estimation Approach

1. Basic Models

1.1. Notation

The general structure of the basic econometric model for survey responses has several components. The first component is an unobserved (or latent) variable y^* representing the respondent's evaluation of the good offered in the contingent valuation survey. The *observed* response to a survey question about his or her evaluation is the second component. We will denote this response by y. This response is determined by the latent WTP assumed to be implied by a respondent's choices, according to the nature of the survey question. For example, the simplest question asks the respondent whether he or she would vote for a program that will cost the respondent ten dollars and the respondent answers with a "for" or "not for" answer. The relationship between y^* and y is the third component of the basic model. In such models, this relationship is often called the *observation rule* and we will denote it by the function $\tau(\cdot)$: $y = \tau(y^*)$.

1.1.1. The Latent Variable

Many of the differences among the models described here (and elsewhere) are differences in the probability distributions specified for y^*. Given an observation rule τ, the distribution of y is completely determined by the distribution one specifies for y^*. Returning to the example, the survey question suggests the simple observation rule

$$\tau(y^*) = \begin{Bmatrix} 0 \text{ if } y^* < 10 \\ 1 \text{ if } y^* \geq 10 \end{Bmatrix}$$

where the value $y = 1$ denotes a "for" response and $y = 0$ denotes a "not for" response. If we specify that y^* has the cumulative distribution function (c.d.f.) $F(y^*)$, then the probability density function (p.d.f.) of y is the binomial

$$\Pr\{ y = Y \} = F(10)^{y} [1-F(10)]^{1-y} , \; Y = 0, 1 .$$

When analyzed as the marginal distribution of y^*, one can estimate the function F at points where the survey asks respondents to make a choice. The value $10 in our example is such a point. When the y^* are analyzed conditional on explanatory variables, it is convenient to use parametric models that specify a parametric c.d.f. for y^*. For example, F is frequently specified to be normal (Gaussian) with mean μ and scale σ,

$$F(z) = \int_{-\infty}^{z} \frac{1}{\sigma}\phi\left(\frac{s-\mu}{\sigma}\right) ds \quad \text{where} \quad \phi(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{z^2}{2}\right)$$

and then μ, and possibly σ, are specified as functions of the explanatory variables. Nonparametric models do not restrict the function F to a particular parametric family. In either case, one can use the method of maximum likelihood to derive and compute estimators for the unknown parameters.

1.2. Observation Rules

In this section, we describe the likelihood functions for various formats of a valuation question. These functions are the basis for maximum likelihood estimation of the parameters of the models.

1.2.1. Single-Bound

The simplest observation rule establishes a bound, either an upper bound or a lower bound, on the latent y^*. This is the example we used above. The bound, sometimes referred to as a *cut*, is usually an observed variable. The researcher chooses different bound values in order to identify the cumulative distribution function (c.d.f.) $F(y^*)$ at various points of its

support. Denoting the bounding variable by c, the observation rule for single-bound data is

$$\tau(y^*) = \begin{Bmatrix} 0 \text{ if } y^* < c \\ 1 \text{ if } y^* \geq c \end{Bmatrix} .$$

The log-likelihood for a single observation is, therefore,

$$L(F;y) = y \cdot \ln F(c) + (1-y) \cdot \ln [\ 1-F(c)\ ] ,$$

because

$$\Pr\{\ y = 0\} = \Pr\{\ y^* \leq c\ \} .$$

1.2.2. Double-Bound

In single-bound data, the experimenter determines two intervals, $(-\infty, c)$ and $[c, \infty)$, and observes which interval contains y^*. The double-bound observation rule establishes three intervals into which latent y^* might fall: $(-\infty, c_1)$, $[c_1, c_2)$, and $[c_2, \infty)$. Thus, the observation rule for double-bound data can be written as

$$\tau(y^*) = \begin{Bmatrix} 1 \text{ if } y^* < c_1 \\ 2 \text{ if } c_1 \leq y^* < c_2 \\ 3 \text{ if } c_2 \leq y^* \end{Bmatrix} .$$

The log-likelihood for a single observation is, therefore,

$$\begin{aligned} L(F;y) = {} & 1\{y=1\} \cdot \ln F(c_1) + 1\{y=2\} \cdot \ln [\ F(c_2) - F(c_1)\ ] \\ & + 1\{y=3\} \cdot \ln [\ 1-F(c_2)\ ] \end{aligned} ,$$

where $1\{\ \cdot\ \}$ denotes the indicator function.

We can write this log-likelihood more compactly if we change our notation. Let $c_1(y)$ be the (possibly infinite) lower bound observed for y^* and let $c_2(y)$ be the (possibly infinite) upper bound. Then

$$\Pr\{\, y = Y \,\} = F\left[c_2(Y)\right] - F\left[c_1(y)\right]$$

and

$$L(F;y) = \ln\left[\, F\left(c_2(y)\right) - F\left(c_1(y)\right) \,\right],$$

where it is understood that $F(-\infty) = 0$, and $F(\infty) = 1$.

2. Classical Nonparametric Estimation

2.1. Introduction to the Turnbull (1976) Model

Without covariates, the y^* can be analyzed as independent and identically distributed random variables. Given all the interval boundary values, upper and lower, the most that one can hope to estimate is the probabilities of falling between the boundary values. Let

$$0 \equiv c_{(0)} < c_{(1)} < c_{(2)} < \cdots < c_{(M)} < c_{(M+1)} \equiv \infty$$

be *ordered* values of the M observed finite boundaries.[1] Then the likelihood function of the observed y depends only on the M parameters

$$0 < F\left(c_{(1)}\right) < F\left(c_{(2)}\right) < \cdots < F\left(c_{(M)}\right) < 1 \,.$$

For example, the probability (likelihood) that y^* falls in between the boundary values c_1 and c_2 is

$$\Pr\{\, c_1 < y \le c_2 \,\} = F\left(c_2\right) - F\left(c_1\right),$$

assuming that $c_1 < c_2$.

Given an arbitrary possibility of observed pairs, upper and lower, of boundaries in any data set, a convenient reparametrization of the likelihood function in terms of the probabilities

[1] The parentheses around the subscripts denote an ordering. This is a common notation for order statistics, and we use it here in an analogous way. Note that in many applications, $c_{(0)}=-\infty$; we define $c_{(0)}=$ because the willingness to pay values cover non-negative values.

of each of the mutually exclusive intervals determined by the $c_{(m)}$'s; that is,

$$p_1 = F\left(c_{(1)}\right),\ p_2 = F\left(c_{(2)}\right) - F\left(c_{(1)}\right),\ \ldots,\ p_M = F\left(c_{(M)}\right) - F\left(c_{(M-1)}\right).$$

We can always write the probability of an arbitrary interval, say $[c_1,c_2]$, in terms of the probabilities of the sub-intervals it contains. The analytical expression is

$$\Pr\{\, c_1 < y^* \le c_2 \,\} = \sum_{m=1}^{M+1} 1\{\, c_1 < c_{(m)} \,\}\cdot 1\{\, c_2 \ge c_{(m)} \,\}\cdot p_m$$

$$= \sum_{m=1}^{M} d_m \cdot p_m + d_{M+1} \quad ,$$

where $c_{(0)} = 0$, $c_{(M+1)} = \infty$,

$$d_m \equiv 1\{\, c_1 < c_{(m)} \,\}\cdot 1\{\, c_2 \ge c_{(m)} \,\} - 1\{\, c_1 < c_{(M+1)} \,\}\cdot 1\{\, c_2 \ge c_{M+1} \,\},\ m = 1, \ldots, M,$$

$$d_{M+1} \equiv 1\{\, c_1 < c_{(M+1)} \,\}\cdot 1\{\, c_2 \ge c_{(M+1)} \,\} ,$$

since

$$p_{M+1} = 1 - \sum_{m=1}^{M} p_m .$$

Therefore, given a vector of dummy variables $d = [d_m;\ m = 1,\ldots,M]$ the log-likelihood function for an observation can be written

$$L = \ln\,(d'p + d_{M+1})$$

as a function of the linear index $d'p$. This specification embodies the Turnbull model in which F is not restricted to belong to parametric families such as the normal family of distributions. Given a fixed number of cut points, the specification remains parametric in the sense that the parameter vector p is finite-dimensional.

Note that every element of p must be positive and less than or equal to one for the implied probabilities to fall in the unit interval. This constraint is always satisfied by the MLE because near zero probabilities yield log-likelihood values approaching negative infinity.

Estimation of confidence intervals and statistical inference for the Turnbull estimator follow standard lines for maximum likelihood methods applied to parametric models. The limiting distribution of the maximum likelihood estimator will be multivariate normal. Based on this limiting distribution, one estimates the variance matrix for the p_m parameters using the information matrix, which is

$$\mathrm{E}\left(\frac{\partial^2 L}{\partial p \partial p'}\right) = \mathrm{E}\left[\frac{dd'}{(d'p + d_{M+1})}\right].$$

An estimator for the covariance matrix of the maximum likelihood estimator for p is

$$\hat{\mathrm{Var}}(\hat{p}) = \left[\sum_{n=1}^{N} \frac{d_n\, d_n'}{(d_n'\, \hat{p} + d_{M+1,n})^2}\right]^{-1},$$

where $\hat{p}$ denotes the estimate of p and N observations on d are indexed by n.

2.2. Estimation of a Lower-Bound on the Expectation

Because the c.d.f. of y^* is identifiable at the boundary points $0 < c_{(1)} < c_{(2)} < \ldots < c_{(M)} < \infty$, a lower bound on the expectation of y^* is also identifiable. In our notation, the expectation of y^* is

$$\mathrm{E}(y^*) = \int_0^\infty y^* dF(y^*)$$

$$= \sum_{m=1}^{M+1} \int_{c_{(m-1)}}^{c_{(m)}} y^* dF(y^*) .$$

This moment of the distribution of y^* is not identifiable because the c.d.f. $F(y^*)$ is not identifiable at every point in the support of y^*. If one replaces y^* in the integrals above by the finite lower

value of each interval,[2] one constructs a lower bound on $E(y^*)$:

$$\mu_L(c) = \sum_{m=1}^{M+1} c_{(m-1)} \int_{c_{(m-1)}}^{c_{(m)}} dF(y^*) \le E(y^*) .$$

This moment is identifiable, because $\mu_L(c)$ is a function of the identifiable points on $F(y^*)$:

$$\begin{aligned}
\mu_L(c) &= \sum_{m=1}^{M+1} c_{(m-1)} \int_{c_{(m-1)}}^{c_{(m)}} dF(y^*) \\
&= \sum_{m=1}^{M+1} c_{(m-1)} \left[F(c_{(m)}) - F(c_{(m-1)}) \right] \\
&= \sum_{m=1}^{M+1} c_{(m-1)} p_m \\
&= c_l' p ,
\end{aligned}$$

where we denote the vector of lower bound values $[c_{(m)}; m = 0,\ldots,M]$ by c_L. Using the maximum likelihood estimator for p, $\hat{p}$, the estimator for $\mu_L(c)$ is $\hat{\mu}_L(c) = c_l' \hat{p}$. The variance of this estimator can be estimated using the estimator for $\mathrm{Var}(\hat{p})$ given above:

$$\begin{aligned}
\hat{\mathrm{Var}}[\hat{\mu}_L(c)] &= c_L' \hat{\mathrm{Var}}(\hat{p}) c_L \\
&= c_L' \left(\left[\sum_{n=1}^{N} \frac{d_n d_n'}{(d_n' \hat{p} + d_{M+1,n})^2} \right]^{-1} \right) c_L .
\end{aligned}$$

If an upper bound on the support of the distribution of y^* is available, then a similar estimator for an upper bound on the expectation can be computed.

Estimators for $\mu_L(c)$ from two data sets can be used to test whether the underlying distributions are identical. Given random sampling, the analysis follows conventional lines. Under the null hypothesis that the distributions are the same, the statistic

[2] All of the lower bounds are finite because the support of y^* is bounded below by zero in this discussion. In general, the Turnbull estimator can be applied to distributions over the real line without finite lower bounds. In such cases, this lower bound on the mean is not identifiable.

$$\frac{\hat{\mu}_{L,1}(c) - \hat{\mu}_{L,2}(c)}{\sqrt{\hat{\mathrm{Var}}[\hat{\mu}_{L,1}(c)] + \hat{\mathrm{Var}}[\hat{\mu}_{L,2}(c)]}}$$

converges in distribution to a standard normal random variable as the sample size approaches infinity. One uses critical values from this distribution to construct one-sided or two-sided tests of the null hypothesis.

2.3. Likelihood Ratio Test

One can also compute a likelihood ratio test of the equality of c.d.f.'s. Two distribution functions can possess the same $\mu_L(c)$ while their values for p differ. The likelihood ratio test is a test for whether all of the elements of p are the same in two populations. The test can be computed by calculating the maximized log-likelihood function for each sample, L_1 and L_2 , and for the combined sample, L_C. Then $LRT = 2(L_1 + L_2 - L_C)$ has a limiting chi-square distribution under the null hypothesis that all the elements of p are equal in both sampling populations. The degrees of freedom equal the number of elements in p, which we have denoted by M.

This test may not be as powerful as the previous one, even though it tests a more restrictive null hypothesis. The lower bound test has fewer degrees of freedom and can be a one-sided test. Both of these factors will contribute to its power relative to the likelihood ratio test.

2.4. Weighting

If the sample of respondents is not random, then it may be possible to reweight the data in the log-likelihood function to compensate. Suppose that the analyst observes characteristics of respondents, denoted by x, which are dependently distributed with the outcome y. For a

random sample, the unweighted sample average log-likelihood function is converging to

$$\begin{aligned} \mathrm{E}\,[L(y;\theta)] &= \mathrm{E}\{\ \mathrm{E}\,[L(y;\theta)\,|x]\ \} \\ &= \int \mathrm{E}\,[L(y;\theta)\,|x]\ r(x)\ dx\ , \end{aligned}$$

which achieves its maximum at the true parameter value θ_0. The consistency of the maximum likelihood estimator rests on this fact. When the sample is not random, and the respondents with characteristics x are sampled with p.d.f. $s(x)$, then the unweighted sample average log-likelihood function is converging to

$$\int \mathrm{E}\,[L(y;\theta)\,|x]\ s(x)\ dx\ ,$$

which generally obtains its maximum at some value of the parameter vector θ other than θ_0.

When the analyst also observes the sampling weights, $w(x)=r(x)/s(x)$, then it is possible to weight the sample log-likelihood function to correct for the bias in the sample. The weighted log-likelihood function $L(y;\theta)w(x)$ has expectation

$$\begin{aligned} \int \mathrm{E}\,[L(y;\theta)\ w(x)\,|x]\ s(x)\ dx &= \int \mathrm{E}\,[L(y;\theta)\,|x]\ w(x)\ s(x)\ dx \\ &= \mathrm{E}\,[L(y;\theta)]\ . \end{aligned}$$

The weights correct the sampling bias that would otherwise appear in the maximum likelihood estimator.

3. Parametric Models of the Distribution Function

When the y^* are analyzed conditionally on explanatory variables, analysts frequently use parametric specifications for the distribution function F (Nelson, 1982). *One alters the specification compared to the Turnbull model by introducing location and scale parameters.* The standardized variable $(\ln y^*-\mu)/\sigma$, where μ and σ are parameters to be estimated, rather than y^* itself, is assigned a parametric distribution function. In this way, μ is associated with the central

tendency, or *location*, of ln y^* and σ is associated with the dispersion, or *scale*. The scale parameter σ is restricted to be strictly positive.

3.1. The Location

One generally specifies models that permit the location of the distribution of y^* to vary with such observed characteristics of the respondent. Denote such explanatory variables as x_k ($k = 1,\ldots,K$). These can enter the specification of the location in the standard linear form:

$$\mu = \mu(x,\beta) = x_1\beta_1 + x_2\beta_2 + \cdots + x_k\beta_k .$$

3.2 Distributions

3.2.1. Log-Normal

In survival analysis, researchers commonly specify a familiar distribution function for ln y^* because the support of this transformed random variable is the entire real line and popular distributions, like the normal distribution have such a support.[3] In the normal case, y^* is log-normally distributed across survey respondents with mean μ and variance σ^2: $F(y^*) = \Phi[(\ln y^* - \mu)/\sigma]$ where $\Phi(\cdot)$ denotes the c.d.f. of the standard normal distribution. The c.d.f. of the standard normal distribution does not have a "closed-form" expression. It can be expressed in the integral form

$$\Phi(z) = \int_{-\infty}^{z} \phi(s)ds \quad \text{where} \quad \phi(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{z^2}{2}\right)$$

but it is approximated numerically on computers. Under the log normal specification,

3 Note that while parameterized differently, the probit model with a log-stimulus variable has the same likelihood function as the single-bounded, log-normal survival model.

$$E(y^*) = \exp\left(\mu + \frac{1}{2}\sigma^2\right)$$

and

$$\Pr\{ \ln y^* \leq \mu \} = \Pr\{ y^* \leq \exp(\mu) \} = \frac{1}{2} .$$

3.2.2. Weibull

The Weibull specification sets

$$F(y^*) = 1 - \exp\left[- \exp\left(-\frac{\ln y^* - \mu}{\sigma}\right)\right] .$$

This distribution effectively takes a distribution function on the positive real line, the exponential distribution, and converts it into a distribution over the real line with an additional exponential-log transformation. Like the log-normal, there is a closed form expression for the expectation of y^*:

$$E(y^*) = \exp(\mu)\Gamma(1+\sigma)$$

so that both the log-normal and the Weibull specifications set the expectation of y^* proportional to $\exp(\mu)$. The models differ in the effect of scale parameters on the expectation of y^*.

3.4 Statistical Inference

Statistical inference in these models frequently centers on the analysis of the β coefficients in the specification for μ. The standard classical methods for maximum likelihood apply. The variance matrix of the sampling distribution for the estimator is estimated with the inverse of an estimator for the information matrix. The elements of this matrix can be used to compute confidence intervals or test statistics for point hypotheses. It is frequently more

convenient to compute hypothesis tests for multivariate hypotheses using the likelihood ratio test.

Appendix F
Supplemental Analysis Tables

§ 1 Introduction

This appendix presents supplemental tables referred to in Chapters 9, 10, and 11. In section 2, the variable definitions and parameter estimates used in the income imputation equation are presented. In section 3, definitions for the variables included in the construct validity equation are provided. Section 4 provides an estimate of the multivariate choice model dropping the observations with missing income values. Section 5 provides tables for the double-bounded choice measures referred to in Chapter 9. Section 6 presents tables referred to in Chapter 10. Finally, Section 7 presents tables referred to in Chapter 11 which contain lower-bound estimates of the mean using the weighted choice measures.

§ 2 Income Imputation

In question C-13, respondents were asked to select one of the 11 household income categories (or intervals) from a show card. The lowest interval was $0 to $10,000 and the highest, $150,000 or more. The mean income for each interval category from the 1990 Census for California households was used as the income value for those respondents who selected an income category. In most cases, the mean estimate for each interval was fairly close to the mid-point of the interval. The two exceptions were the lowest interval (mean=$2,402) and the open-ended, $150,000 or more interval (mean=$212,953).

Some respondents (165 out of 1857 or 9%) chose not to provide information regarding their household income. For those respondents, the log of household income was imputed using a regression equation which predicted the log of income from those respondents who provided this information.[1] Table F.1 provides definitions of the variables

[1] The log of income, rather than income, was predicted because this was the variable used in the construct validity equation and hence a possible transformation bias was avoided.

used in the equation and Table F.2, the income prediction equation. The principal predictor variable in the regression equation was the log of 1990 median household income by block group (as reported by the U.S. Census Bureau). Other variables included the type of dwelling unit the household lived in, the number of employed adults in the household, as well as the educational level, sex, race, and age of the respondent. The equation also took into account whether the household spoke English at home.

Table F.1 Definitions for Variables Used in Income Equation

LCENINC is the log of the median census block income (1990 census).
SFAM equals one if the respondent resides in a single-family home (CIS Screener) and zero otherwise.
THOUSE equals one if the respondent resides in a townhouse (CIS Screener) and zero otherwise.
EMP1 equals one if the respondent indicated that exactly one adult in his/her household worked for pay during 1993 (C-8; 1) and zero otherwise.
EMP2 equals one if the respondent indicated that exactly two adults in his/her household worked for pay during 1993 (C-8; 2) and zero otherwise.
EMP3 equals one if the respondent indicated that exactly three adults in his/her household worked for pay during 1993 (C-8; 3) and zero otherwise.
EMP4 equals one if the respondent indicated that exactly four adults in his/her household worked for pay during 1993 (C-8; 4) and zero otherwise.
EMP5 equals one if the respondent indicated that exactly five adult in his/her household worked for pay during 1993 (C-8; 5) and zero otherwise.
EMP6 equals one if the respondent indicated that six or more adults in his/her household worked for pay during 1993 (C-8; 6) and zero otherwise.
HSCHOOL equals one if the respondent indicated that the highest educational degree received was a high school diploma (C-7; 4) and zero otherwise.
SCOLLEGE equals one if the respondent indicated that the highest level of education he/she has completed was some college but not the equivalent of an associates degree in an academic program (C7; 5) or that he/she had earned a diploma in an occupational or vocational program (C-7; 6) and zero otherwise.
COLAAD equals one if the respondent indicated that the highest educational degree received was an associates degree from an academic program (C-7; 7) and zero otherwise.
COLGRAD equals one if the respondent indicated that the highest educational degree received was a bachelor's degree (C-7; 8) and zero otherwise.

Table F.1 Definitions for Variables Used in Income Equation

MASTERS equals one if the respondent indicated that the highest educational degree received was a master's degree (C-7; 9) and zero otherwise.
PDEGREE equals one if the respondent indicated that the highest educational degree received was a professional school degree (*e.g.*, M.D., J.D.) (C-7; 10) and zero otherwise.
DDEGREE equals one if the respondent indicated that the highest educational degree received was a doctorate degree (C-7; 11) and zero otherwise.
MALE equals one if the respondent is a male (C-30; 1) and zero otherwise.
HISPANIC equals one if the respondent is white and of Hispanic decent (C-31; 2) and zero otherwise.
BLACK equals one if the respondent is black and of Hispanic decent or black and not of Hispanic decent (C-31; 3, 4) and zero otherwise.
ASIAN equals one if the respondent is of Asian decent (C-31; 5) and zero otherwise.
AGE equals the age of the respondent (C-6); missing values were replaced by the sample mean age of 43.
AGE2 equals the square of the respondent's age (C-6).
ENGNH1 equals one if English is not usually spoken in the respondent's home (C-27; 2) and zero otherwise.

Table F.2 Log Income Prediction Equation

Variable	Coefficient	Standard Error	Variable Mean
CONSTANT	1.2812	0.5017	—
LCENINC	0.6192	0.0486	10.5088
SFAM	0.3018	0.0455	0.5951
THOUSE	0.1983	0.1085	0.0377
EMP1	0.4710	0.0784	0.3700
EMP2	0.9662	0.0821	0.3829
EMP3	1.0508	0.1065	0.0705
EMP4	1.0089	0.1452	0.0259
EMP5	0.9695	0.2698	0.0065
EMP6	1.9149	0.5825	0.0016
HSCHOOL	0.1595	0.0702	0.2041
SCOLLEGE	0.3730	0.0683	0.2714
COLAAD	0.4890	0.0953	0.0684
COLGRAD	0.5959	0.0730	0.2149
MASTERS	0.6663	0.0965	0.0668
PDEGREE	1.0156	0.1770	0.0145
DDEGREE	0.6337	0.1747	0.0156
MALE	0.1206	0.0399	0.4529
HISPANIC	-0.1401	0.0663	0.1319
BLACK	-0.1257	0.0685	0.0975
ASIAN	-0.2362	0.0892	0.0619
AGE	0.0572	0.0073	44.3229
AGE2	-0.0005	7.5E-05	2239.2100
ENGNH1	-0.2023	0.0838	0.0775
N = 1692; Adjusted R^2 = 0.447			

§ 3 Construct Validity Variable Definitions

Table F.3 contains the exact definitions of the variables used in the multivariate choice function presented in Table 9.7 of Chapter 9.

Table F.3 Construct Validity Equation Variable Definitions

LW1AMNT is the log of the amount asked in question W-1.
INC is the mean household income taken from the 1990 California Census for households with incomes in the interval indicated by the respondent in C-13. Missing income responses were replaced by the values generated by the Income Imputation Equation (see Table F.2).
LINC1 is the log of INC if it is less than the median California household income ($35,173)[a] and zero otherwise.
LINC2 is the log of INC if it is $\geq$ $35,173 but < $150,000 and zero otherwise.
LINC3 is the log of INC if it is $\geq$ $150,000 and zero otherwise.
EDUC equals one if the respondent has an AA college degree or higher and zero otherwise.
NOTAX equals one if the respondent indicated that no one in his/her household paid California income taxes, had taxes withheld from wages, retirement income or other money received, or sent money to the State with a tax form (C-14; 2) and zero otherwise.
COASTIP equals one if the respondent considered protecting coastal areas from oil spills to be extremely important (A-1.e; 5) and zero otherwise.
COASTNIP equals one if the respondent considered protecting coastal areas from oil spills to be not important at all (A-1.e; 1) and zero otherwise.
WILDSP equals one if the respondent indicated that spending on programs for protecting endangered wildlife species should be increased (A-2.e; 4 or 5) and zero otherwise.
WILDNSP equals one if the respondent indicated that spending on programs for protecting endangered wildlife species should be reduced (A-2.e; 1 or 2) and zero otherwise.
NONSENV equals one if the respondent indicated that he/she is not a particularly strong environmentalist, not an environmentalist at all, or unsure (B-17; 4, 5, or 8) and zero otherwise.
MORETIME equals one if the respondent indicated that when deciding how to vote, he/she thought it would take a lot more than 50 years for natural processes to return things that had been affected by DDT and PCBs to normal (B-3; 1) and zero otherwise.
LESSTIME equals one if the respondent indicated that when deciding how to vote, he/she thought it would take a lot less than 50 years for natural processes to return things that had been affected by DDT and PCBs to normal (B-3; 2) and zero otherwise.
PWORKS equals one if the respondent indicated that when deciding how to vote, he/she thought the speed-up program would be completely effective (B-4; 1) or mostly effective (B-5; 1) and zero otherwise.

Table F.3 Construct Validity Equation Variable Definitions

PNOTWORK equals one if the respondent indicated that when deciding how to vote, he/she thought the speed-up program would not be too effective or would be not effective at all (B-5; 3 or 4) and zero otherwise.
QUESPROG equals one if the respondent had questions regarding the cost of DDT and PCB removal speed-up program, how it worked, or the natural recovery process (A-13; 1 and A-15; 1) and zero otherwise.
PAYMORE equals one if the respondent indicated that when deciding how to vote, he/she thought the payment of the special tax for the speed-up program would be required for more than one year or was not sure (B-6; 2 or 8) and zero otherwise.
PAYVEH equals one if the respondent indicated that he/she would prefer to pay for new programs to protect the environment through higher taxes or is indifferent between paying for it through higher taxes or prices (C-26; 1 or 3) and zero otherwise.
CONFCGV equals one if the respondent indicated that he/she has a great deal of confidence in the California state government (C-24.e; 1) and zero otherwise.
NCONFCGV equals one if the respondent indicated that he/she has no confidence in the California state government (C-24.e; 4) and zero otherwise.
LOWSPEND equals one if the respondent indicated spending should be increased (response 4 or 5) on one or fewer of the five categories of programs listed in question A-2 (excluding A-2.e) and zero otherwise.
SWATREC equals one if the respondent indicated anyone from his/her household participated in saltwater recreation in the form of saltwater fishing during the past five years (B10; 1 or 3), saltwater boating during the past five years (B-12; 1 or 3), or going to the beach often or very often (B-15; 1 or 2) and zero otherwise.
BIRDWATC equals one if the respondent indicated that anyone in his/her household likes to identify different species of birds (B-13; 1) and zero otherwise.
TVBIRDS equals one if the respondent indicated that he/she personally watches television programs about animals and birds in the wild often or very often (B-14; 1, or 2) and zero otherwise.
EATFISH equals one if the respondent indicates that people in respondent's household eat fish very often, often (B-16; 1,or 2) and zero otherwise.
SCOAST equals one if the respondent is a resident of Los Angeles or Orange County (Box 7) and zero otherwise.
FARNORTH equals one if the respondent resides in PSU's north of San Francisco Bay Area and zero otherwise.

[a] U.S. Bureau of the Census (1993).

§ 4 Construct Validity with Missing Income Responses Dropped

Table F.4 Multivariate Analysis of Construct Validity: Probit Estimates for W1CH Choice Measure with Missing Income Observations Dropped

Variable	Coding	Parameter Estimate	Z-Statistic	p-value	Variable Mean
CONSTANT	Equal to 1 for all respondents	-.9817	-1.54	.125	—
LW1AMT	log of W1AMT	-.4067	-12.26	.000	4.070
LINC1	log of income if < median California household income ($35,173); 0 otherwise	.1611	2.58	.010	5.067
LINC2	log of income if ≥ to $35,173 and < $150,000; 0 otherwise	.1347	2.39	.017	4.816
LINC3	log of income if ≥ or equal to $150,000; 0 otherwise	.1021	1.90	.057	0.493
EDUC	College Associates degree or higher=1; 0 otherwise	-.1895	-2.32	.020	0.389
NOTAX	did not pay California taxes=1; 0 otherwise	.4341	3.01	.003	0.118
COASTIP	A-1c Protect coastal area extremely important=1; 0 otherwise	.1865	2.40	.016	0.367
COASTNIP	A-1e Protect coastal area not important=1; 0 otherwise	-.4793	-0.89	.374	0.012
WILDSP	A-2e increase endangered wildlife spending=1; 0 otherwise	.4166	5.07	.000	0.484
WILDNSP	A-2e decrease endangered wildlife spending=1; 0 otherwise	-.2834	-2.19	.029	0.152
NONSENV	B17 not at least a somewhat strong environmentalist=1; 0 otherwise	-.2600	-3.19	.001	0.382

Variable	Coding	Parameter Estimate	Z-Statistic	p-value	Variable Mean
MORETIME	B3 natural recovery a lot more time=1; 0 otherwise	.5415	3.50	.000	0.062
LESSTIME	B3 natural recovery a lot less time=1; 0 otherwise	-.2577	-2.29	.022	0.148
PWORKS	B4 and B5 expect program to be completely or mostly effective=1; 0 otherwise	.6037	7.10	.000	0.645
PNOTWORK	B5 expect program to be not too effective or not at all effective=1; 0 otherwise	-1.2633	-4.29	.000	0.082
QUESPROG	At A-13 or A-15 asked question about how program worked or its cost explanation=1; 0 otherwise	-.3251	-3.77	.000	0.245
PAYMORE	B6 does not think will only have to pay special tax one year=1; 0 otherwise	-.2917	-3.59	.000	0.352
PAYVEH	C-26 Prefer tax vehicle over higher prices=1; 0 otherwise	.4326	5.77	.000	0.361
CONFCGV	C-24e Great deal of confidence in California State Government=1; 0 otherwise	.2670	1.43	.154	0.040
NCONFCGV	C-24e No confidence in California government=1; 0 otherwise	-.2403	-2.34	.019	0.170
LOWSPEND	wants increased spending on one or none of programs (A-2a, A-2b, A-2c, A-2d and A-2f)=1; 0 otherwise	-.2962	-3.25	.001	0.258

Variable	Coding	Parameter Estimate	Z-Statistic	p-value	Variable Mean
SWATREC	B-10, B-12, B-15 participate in saltwater boating or fishing or often go to beach=1; 0 otherwise	.2139	2.74	.006	0.589
BIRDWATC	B13 birdwatcher=1; 0 otherwise	.1574	2.02	.043	0.416
TVBIRDS	B14 often watch tv programs about animals and birds=1; 0 otherwise	.1738	2.24	.025	0.445
EATFISH	B16 Household often eats fish=1; 0 otherwise	.1984	2.64	.008	0.416
SCOAST	Los Angeles or Orange Counties=1; 0 otherwise	.1216	1.50	.134	0.316
FARNORTH	North of San Francisco Bay Area=1; 0 otherwise	-.2080	-1.72	.086	0.118
N = 1692 Log (L) = -802.30 Pseudo R^2 = .282					

§ 5 Choice Measure Tables Using Double-Bounded Interval Data

Table F.5 WDB Choice Measure by W1AMT

W1AMT	Not For/Not For	Not For/For	For/Not For	For/For
$10	34.2%	6.4%	21.1%	38.2%
$25	40.3%	8.2%	18.6%	32.7%
$80	53.4%	9.6%	18.9%	18.1%
$140	57.4%	10.9%	17.1%	14.6%
$215	68.2%	7.1%	10.2%	14.4%
$\chi^2_{(12)} = 153.89$; $p < 0.001$				

Table F.6 WDBCH Choice Measure by W1AMT

W1AMT	Not For/Not For	Not For/For	For/Not For	For/For
$10	38.5%	5.6%	19.5%	36.4%
$25	46.0%	7.7%	15.1%	31.3%
$80	59.5%	7.7%	15.3%	17.5%
$140	65.5%	8.1%	13.0%	13.5%
$215	72.2%	5.5%	8.7%	13.7%
$\chi^2_{(12)} = 146.37$; $p < 0.001$				

Table F.7 Turnbull Estimate of WTP Distribution and Lower Bound Mean: WDBCH Choice Measure [N=1857]

Lower-Bound of Interval	Upper-Bound of Interval	Probability of Voting *For* at Upper Bound	Z-Statistic	Change in Density
$0	$5	0.657	19.29	0.343
$5	$10	0.602	4.84	0.055
$10	$25	0.470	10.96	0.132
$25	$45	0.366	8.28	0.104
$45	$80	0.314	5.76	0.052
$80	$140	0.216	10.26	0.098
$140	$215	0.142	9.21	0.074
$215	$360	0.087	6.52	0.055
$360	∞	0.000	—	0.087

Log-Likelihood . . . . . -2037.25
Estimate of lower-bound mean $67.69
Standard error of the estimate $2.92

Table F.8 Multivariate Choice Analysis of Construct Validity: Log-Normal Survival Model for WDBCH Choice Measure

Variable	Coding	Parameter Estimate	Z-Statistic	p-value	Variable Mean
CONSTANT		-.8363	-0.80	.424	—
LNSIGMA	log of scale parameter	.6525	17.86	.000	—
LINC1	log of income if < median California household income ($35,173); 0 otherwise	.2577	2.50	.012	5.078
LINC2	log of income if ≥ to $35,173 and < $150,000; 0 otherwise	.2174	2.33	.020	4.849
LINC3	log of income if ≥ or equal to $150,000; 0 otherwise	.1455	1.63	.103	0.449
EDUC	College Associates degree or higher=1; 0 otherwise	-.2023	-1.53	.127	0.380
NOTAX	did not pay California taxes=1; 0 otherwise	.7126	2.96	.003	0.108

Variable	Coding	Parameter Estimate	Z-Statistic	p-value	Variable Mean
COASTIP	A-1c Protect coastal area extremely important=1; 0 otherwise	.2332	1.85	.065	0.367
COASTNIP	A-1e Protect coastal area not important=1; 0 otherwise	-1.1610	-1.46	.145	0.014
WILDSP	A-2e increase endangered wildlife spending=1; 0 otherwise	.8172	6.05	.000	0.485
WILDNSP	A-2e decrease endangered wildlife spending=1; 0 otherwise	-.5007	-2.36	.018	0.149
NONSENV	B17 not at least a somewhat strong environmentalist=1; 0 otherwise	-.4084	-3.10	.002	0.386
MORETIME	B3 natural recovery a lot more time=1; 0 otherwise	.8285	3.40	.000	0.063
LESSTIME	B3 natural recovery a lot less time=1; 0 otherwise	-.7472	-4.00	.000	0.149
PWORKS	B4 and B5 expect program to be completely or mostly effective=1; 0 otherwise	1.1565	8.32	.000	0.632
PNOTWORK	B5 expect program to be not too effective or not at all effective=1; 0 otherwise	-2.4431	-5.71	.000	0.087
QUESPROG	At A-13 or A-15 asked question about how program worked or its cost explanation=1; 0 otherwise	-.2582	-1.86	.062	0.244
PAYMORE	B6 does not think will only have to pay special tax one year=1; 0 otherwise	-.3571	-2.73	.006	0.367
PAYVEH	C-26 Prefer tax vehicle over higher prices=1; 0 otherwise	.7266	5.85	.000	0.353
CONFCGV	C-24e Great deal of confidence in California State Government=1; 0 otherwise	.6115	2.03	.042	0.039
NCONFCGV	C-24e No confidence in California government=1; 0 otherwise	-.3891	-2.34	.019	0.175

Variable	Coding	Parameter Estimate	Z-Statistic	p-value	Variable Mean
LOWSPEND	wants increased spending on one or none of programs (A-2a, A-2b, A-2c, A-2d and A-2f); 0 otherwise	-.4509	-3.07	.002	0.261
SWATREC	B-10, B-12, B-15 participate in saltwater boating or fishing or often go to beach=1; 0 otherwise	.2781	2.21	.027	0.586
BIRDWATC	B13 birdwatcher=1; 0 otherwise	.3256	2.57	.010	0.414
TVBIRDS	B14 often watch tv programs about animals and birds=1; 0 otherwise	.3650	2.88	.004	0.442
EATFISH	B16 Household often eats fish=1; 0 otherwise	.1869	1.54	.125	0.415
SCOAST	Los Angeles or Orange Counties=1; 0 otherwise	.4067	3.10	.002	0.325
FARNORTH	North of San Francisco Bay Area=1; 0 otherwise	-.3444	-1.75	.081	0.115
N = 1857 Log (L) = -1753.80					

Table F.9 WDBCHNT Choice Measure by W1AMT

W1AMT	Not For/Not For	Not For/For	For/Not For	For/For
$10	44.7%	5.1%	18.5%	31.8%
$25	53.1%	7.1%	11.9%	27.8%
$80	63.3%	6.9%	13.2%	16.7%
$140	69.1%	7.3%	12.0%	11.7%
$215	75.9%	5.5%	7.4%	11.3%
$\chi^2_{(12)} = 126.73$; $p < .001$				

Table F.10 Turnbull Estimate of WTP Distribution and Lower-Bound Mean: WDBCHNT Choice Measure [N=1857]

Lower-Bound of Interval	Upper-Bound of Interval	Probability of Voting *For* at Upper Bound	Z-Statistic	Change in Density
$0	$5	0.587	22.70	0.413
$5	$10	0.536	4.56	0.051
$10	$25	0.411	10.54	0.125
$25	$45	0.326	7.22	0.085
$45	$80	0.279	5.39	0.047
$80	$140	0.193	9.53	0.086
$140	$215	0.122	9.01	0.071
$215	$360	0.074	6.01	0.048
$360	∞	0.000	—	0.074

Log-Likelihood . . . . . -1922.83
Estimate of lower-bound mean $59.52
Standard error of the estimate $2.78

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Table F.11 Tests of Difference in Variable Distributions Across the Base and Scope Samples[2]

Variable	p-value	Variable	p-value	Variable	p-value
A-1a	0.631	B-11	0.510	C-24c	0.679
A-1b	0.479	B-12	0.740	C-24d	0.385
A-1c	0.358	B-13	0.232	C-24e	0.552
A-1d	0.766	B-14	0.384	C-24f	0.873
A-1e	0.580	B-15	0.060	C-25	0.104
A-1f	0.585	B-16	0.184	C-26	0.798
A-2a	0.508	B-17	0.285	C-27	0.650
A-2b	0.406	C-1	0.744	C-27a	0.782
A-2c	0.119	C-2	0.983	C-28	0.916
A-2d	0.042	C-3	0.674	AGE	0.699
A-2e	0.087	C-4	0.823	SEX	0.621
A-2f	0.690	C-5	0.465	RACE	0.116
A-3	0.522	C-7	0.973	PSU	0.926
A-4	0.658	C-8	0.088	D-1a	0.085
A-5	0.915	C-9	0.987	D-1b	0.415
A-7	0.447	C-10	0.579	D-1c	0.806
A-9	0.859	C-11	0.393	D-2	0.575
A-10	0.346	C-12	0.193	D-3	0.866
A-11	0.248	C-13	0.549	D-4	0.706
A-13	0.140	C-14	0.848	D-4a	0.479
A-15	0.341	C-15	0.829	D-5	0.209
B-9	0.313	C-24a	0.860	D-6	0.278
B-10	0.758	C-24b	0.697	D-6a	0.662

[2] The p-values reported in Table F.11 are from χ^2 tests performed on the contingency table of the variables (dropping NOT SURE/REFUSED/NOT ASCERTAINED categories) by survey version (base/scope). In a small number of instances, respondents gave responses between the offered response categories, e.g., "between [response choice two] and [response choice three]." For these tests, these respondents were dropped.

Table F.12 Turnbull Scope Estimate of WTP Distribution and Lower-Bound Mean: Using WDBCH Choice Measure [N=953]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Z-Statistic	Change in Density
$0	$5	0.425	23.11	0.575
$5	$10	0.388	2.72	0.037
$10	$25	0.263	7.54	0.125
$25	$45	0.192	4.81	0.071
$45	$80	0.154	3.72	0.038
$80	$140	0.107	5.19	0.047
$140	$215	0.055	5.77	0.052
$215	$360	0.023	3.90	0.032
$360	∞	0.000	—	0.023

Log-Likelihood . . . . . -793.75
Estimate of lower-bound mean $31.27
Standard error of the estimate $2.61

Table F.13 Turnbull Scope Estimate of WTP Distribution and Lower-Bound Mean: Using WDBCHNT Choice Measure [N=953]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Z-Statistic	Change in Density
$0	$5	0.366	26.39	0.634
$5	$10	0.334	2.50	0.032
$10	$25	0.222	7.08	0.112
$25	$45	0.160	4.52	0.062
$45	$80	0.132	3.17	0.028
$80	$140	0.097	4.45	0.035
$140	$215	0.049	5.57	0.048
$215	$360	0.017	3.99	0.032
$360	∞	0.000	—	0.017

Log-Likelihood . . . . . -719.78
Estimate of lower-bound mean $26.72
Standard error of the estimate $2.40

Table F.14 Turnbull Scope Double-Bounded Likelihood Ratio Tests

	WDBCH	WDBCHNT
SAMPLE	Log Likelihood	Log Likelihood
Combined	-2887.37	-2694.89
Base	-2037.25	-1922.83
Scope	-793.75	-719.78
Likelihood Ratio Test	$\chi^2_{(8)} = 112.75$; $p < 0.001$	$\chi^2_{(8)} = 104.56$; $p < 0.001$

Table F.15 Parametric Single-Bounded Scope Test

Parametric Distribution	p-value	Parametric Distribution	p-value
W1-LNOR-LOC	$p < 0.001$	**W1**-WEB-LOC	$p < 0.001$
W1-LNOR-LRT	$p < 0.001$	**W1**-WEB-LRT	$p < 0.001$
W1CH-LNOR-LOC	$p < 0.001$	**W1CH**-WEB-LOC	$p < 0.001$
W1CH-LNOR-LRT	$p < 0.001$	**W1CH**-WEB-LRT	$p < 0.001$
W1CHNT-LNOR-LOC	$p < 0.001$	**W1CHNT**-WEB-LOC	$p < 0.001$
W1CHNT-LNOR-LRT	$p < 0.001$	**W1CHNT**-WEB-LRT	$p < 0.001$

LNOR=Log normal distribution; WEB=Weibull Distribution; LOC=t-test on location parameter; LRT=likelihood ratio test allowing both location and scale parameter to differ.

Table F.16 Parametric Double-Bounded Scope Test

Parametric Distribution	p-value	Parametric Distribution	p-value
WDB-LNOR-LOC	$p < 0.001$	**WDB**-WEB-LOC	$p < 0.001$
WDB-LNOR-LRT	$p < 0.001$	**WDB**-WEB-LRT	$p < 0.001$
WDBCH-LNOR-LOC	$p < 0.001$	**WDBCH**-WEB-LOC	$p < 0.001$
WDBCH-LNOR-LRT	$p < 0.001$	**WDBCH**-WEB-LRT	$p < 0.001$
WDBCHNT-LNOR-LOC	$p < 0.001$	**WDBCHNT**-WEB-LOC	$p < 0.001$
WDBCHNT-LNOR-LRT	$p < 0.001$	**WDBCHNT**-WEB-LRT	$p < 0.001$

LNOR=Log normal distribution; WEB=Weibull Distribution; LOC=t-test on location parameter; LRT=likelihood ratio test allowing both location and scale parameter to differ.

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Table F.17 Weighted Turnbull Estimate of WTP Distribution and Lower-Bound Mean: Using W1CH Choice Measure [N=1857]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Z-Statistic	Change in Density
$0	$10	0.540	17.72	0.460
$10	$25	0.467	1.97	0.073
$25	$80	0.315	4.21	0.152
$80	$140	0.265	1.52	0.050
$140	$215	0.230	1.12	0.035
$215	∞	0.000	—	0.230

Log-Likelihood . . . . . -1156.17
Estimate of lower-bound mean $62.88
Standard error of the estimate $2.54

Table F.18 Weighted Turnbull Estimate of WTP Distribution and Lower-Bound Mean: Using WDBCH Choice Measure [N=1857]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Z-Statistic	Change in Density
$0	$5	0.642	20.11	0.358
$5	$10	0.591	4.63	0.051
$10	$25	0.461	10.81	0.130
$25	$45	0.360	8.12	0.101
$45	$80	0.312	5.40	0.048
$80	$140	0.217	10.14	0.095
$140	$215	0.144	9.16	0.073
$215	$360	0.090	6.43	0.054
$360	∞	0.000	—	0.090

Log-Likelihood . . . . . -2022.88
Estimate of lower-bound mean $68.05
Standard error of the estimate $2.95

Table F.19 Weighted Turnbull Estimate of WTP Distribution and Lower-Bound Mean: Using WDBCHNT Choice Measure [N=1857]

Lower Bound of Interval	Upper Bound of Interval	Probability of Voting *For* at Upper Bound	Z-Statistic	Change in Density
$0	$5	0.576	23.39	0.424
$5	$10	0.529	4.36	0.047
$10	$25	0.405	10.45	0.124
$25	$45	0.324	7.06	0.081
$45	$80	0.280	5.15	0.044
$80	$140	0.195	9.52	0.085
$140	$215	0.125	8.96	0.070
$215	$360	0.079	5.89	0.046
$360	∞	0.000	—	0.079

Log-Likelihood . . . . . -1914.37
Estimate of lower-bound mean $60.31
Standard error of the estimate $2.81