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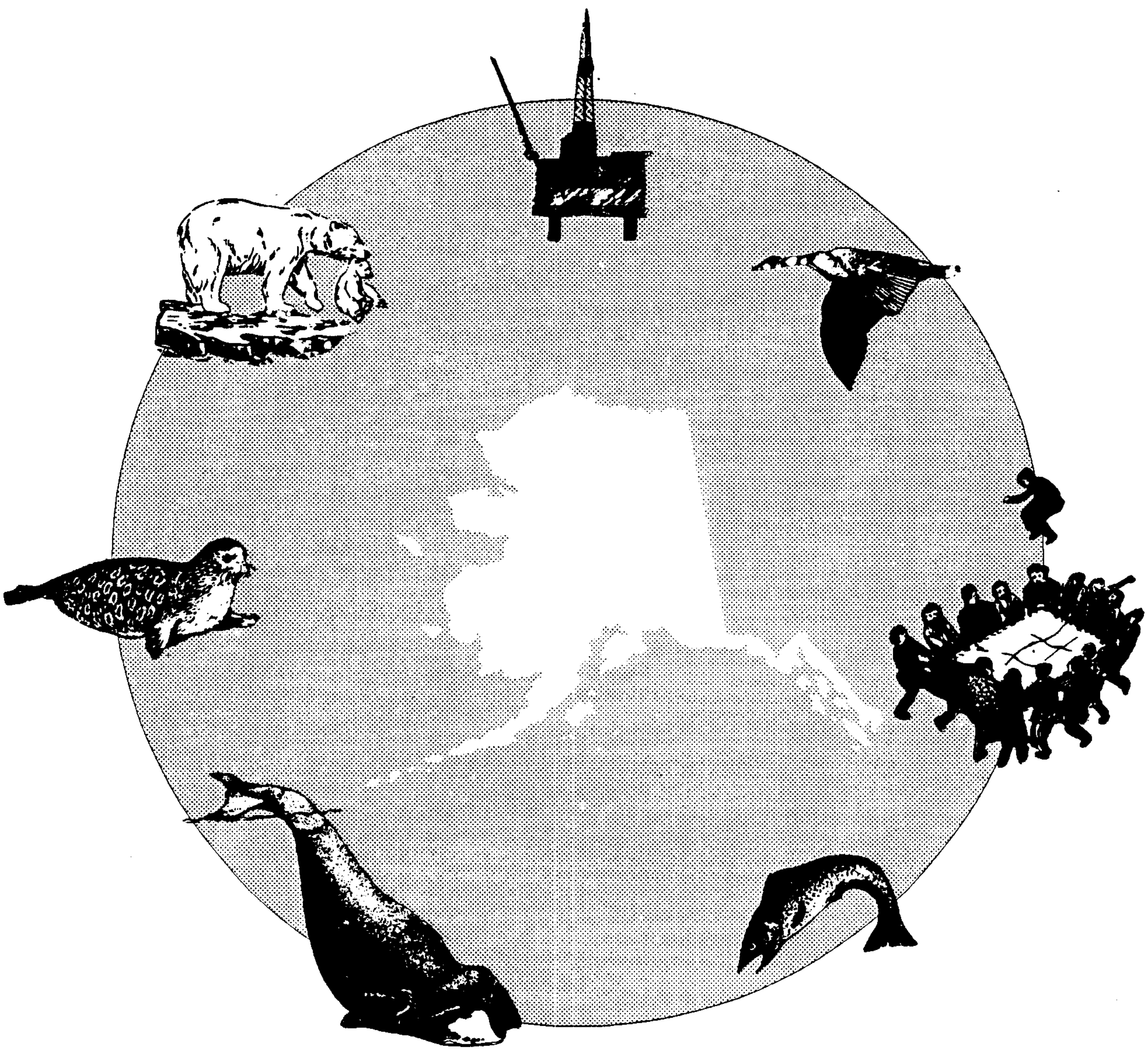
Social Indicators Study of Alaskan Coastal Villages

V. Research Methodology for the *Exxon Valdez* Spill Area, 1988-1992



U.S. Department of the Interior
Minerals Management Service
Alaska Outer Continental Shelf Region

Social Indicators Study of Alaskan Coastal Villages

V. Research Methodology

for the Exxon Valdez Spill Area, 1988-1992

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Alaska OCS Region
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Submitted by:

Human Relations Area Files, Inc.

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Alaska OCS Environmental Studies Program

Social Indicators Study of Alaskan Coastal Villages
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Prepared by Joseph Jorgensen, the principal investigator and project manager. The author appreciates the efforts of the Minerals Management Service technical editors in Anchorage who helped edit this report.

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GLOSSARY OF ACRONYMS

ADF&G	Alaska Department of Fish and Game
ANCSA	Alaska Native Claims Settlement Act
AOSIS	Alaska OCS Social Indicators System
AQI	AOSIS Questionnaire Instrument (In variable names or table headers, Questionnaire Instrument or QI refers to AQI.)
EXXONC	A panel of AQI respondents comprising persons residing in the regions whose waters were encroached by the oil from the spill (Prince William Sound Alaska Peninsula, Cook Inlet, and Kodiak Island). These respondents were interviewed in 1989S, 1991W, and 1992W (EXXONC).
EXXONKI.PAN	KIP postspill panel comprising respondents in Cordova, Valdez, Seldovia, Kenai, Tyonek, Chignik, Kodiak City, and Old Harbor. Interviewed in 1989 and reinterviewed in 1991.
HRAF	Human Relations Area Files
I	Initial interviewee
IP	Institutional Protocol
KI	See "KIP"
KIP	Key Informant Protocol (In variable names or table headers, KI refers to Key Informant Protocol.)
KIS	Key Informant Summary
K1C	An AQI panel of respondents from Kodiak City and Old Harbor on Kodiak Island (K1C). This panel was interviewed five times, twice prior to the oil spill and three times after it (see KP92).
K2C	An AQI panel comprising residents from the Kodiak Island villages of Kodiak City, Karluk, and Old Harbor (K2C). This panel was interviewed on three occasions following the oil spill (990W, 1991W, and 1992W) (see KP92 and K2C92).

GLOSSARY OF ACRONYMS
(Continued)

K2C92	K2C panel respondents from Old Harbor, Karluk, and Kodiak City who were reinterviewed by ADF&G researchers in 1992 (see KP92).
KOKIPAN	Kodiak City-Old Harbor Key Informant Protocol Panel (Prespill), interviewed in 1988 and reinterviewed in 1989. A few respondents were reinterviewed following the spill.
KODPRE	Kodiak Island pretest (postspill) sample of initial interview respondents for 1990. Respondents drawn from the villages of Kodiak City, Old Harbor, and Karluk.
KODPST1	Kodiak Island posttest (postspill) sample number 1, 1991. Initial interview respondents drawn from the villages of Kodiak City, Karluk, and Old Harbor.
KODPST2	Kodiak Island posttest (postspill) sample number 2, 1992. Initial interview respondents drawn from the villages of Kodiak City, Old Harbor, and Karluk, and also from Larsen Bay and Ouzinkie.
KP92	A panel of Kodiak Island respondents comprising all respondents from the villages of Kodiak City and Old Harbor in K1C and K2C. These respondents were reinterviewed in 1992 by ADF&G researchers. The K2C92 represent a separate panel of the K2C respondents who were reinterviewed in 1992 and include Karluk respondents who were dropped from KP92.
PANEL88-9	Panel comprising all persons initially interviewed in 1988W (prior to the spill) and 1989S (soon after the spill) (*N112*).
MMS	Minerals Management Service, U.S. Department of the Interior
OCS	Outer Continental Shelf
OMB	Office of Management and Budget
NANA	Northwest Alaska Native Association
PRE	Proportional reduction of error
PWS	Prince William Sound
QI	See "AQI"

GLOSSARY OF ACRONYMS
(Continued)

R	Respondent
RFP	Request for proposal
RI	Reinterviewee
SE	Social Effects research project data from ADF&G Subsistence Division
USDOI	U.S. Department of the Interior

GLOSSARY

Construct Validity	The fit between measure and construct.
Ecological Fallacy	Attributing to Sample B the results from Sample A (see "Specification Error").
External Validity	Relative validity or the generalizability of a causal inference.
History	Responses conditioned by historical context in which (1) some event affects a village or a group of villages, but not all, or (2) responses of several respondents are dependent or interdependent rather than independent from one another--this last is a special form of autocorrelation often referred to as Galton's Problem in the anthropological literature.
Internal Validity	The absolute validity of an inference.
Item Reliability	The proportion of variance in a measure due to the "true" construct.
Nonresponse	Differential subject loss.
Panel	A sample of respondents selected at random from a larger sample of persons initially interviewed in a "pretest" or "posttest." Panel respondents are reinterviewed in subsequent research waves.
Reactivity	A reactive response is a subjective response (see "Test Artifacts").
Regression As a Threat to Validity in Panel Responses	Statistical regression poses many threats, such as when respondents respond to high ranks on ordinal questions in one wave of research (t_1) and lower ranks on the same questions in a subsequent wave or research (t_2). Contrariwise, persons who respond to lower ranks during the first wave respond to higher ranks in a subsequent wave. Regression of this type, a statistical phenomenon, is not easily attributed to any known factor, but regression is always to the population mean of a group and is always a threat to internal validity in a pretest-posttest design. The factors that account for regression or pretest and posttest measures on the same items by the same respondents (panel members) are not obvious or "intuitive" (Cook and Campbell 1979: 53).

GLOSSARY
(Continued)

Reliability	Measures of whether persons give similar answers to similar questions on the same interview, on different interviews, to different interviewers, and so forth.
Reliability, Item	See "Item Reliability."
Reliability, Over-Time R_{13}	Over-time reliability = $r_{12}r_{23}/r_{13}$. The reliability coefficient is an estimate of the reliability of r_{13}, free of the effects of temporal instability.
Specification Error	Attributing to A the responses of B without any measure to connect A and B.
Stability	See "Stationariness."
Stationariness S_{13}	Over-time stationariness or stability = $r^2_{13}/r_{12}r_{23}$.
Statistical Conclusion Validity	The probabilistic basis of an inference.
Test Artifacts	Instrument reactivity wherein initial interviews bias responses to reinterviews of the same items by the same respondents.
Test Effect	See "Test Artifacts."
Validity	See "Construct Validity," "External Validity," "Internal Validity," and "Statistical Conclusion Validity."

PART ONE: INTRODUCTION AND PROJECT OVERVIEW

CHAPTER 1
INTRODUCTION

I. PROJECT OVERVIEW

The Exxon Valdez foundered on Bligh Reef, just outside Prince William Sound, on March 24, 1989. That accident, which spilled nearly 11 million gallons of North Slope crude oil in and around Prince William Sound, affected the biological, abiological, and social environments of a large area in south-central Alaska. It also affected the research that my associates and I had been conducting for about 2½ years.

We began a large project in late 1986 among 31 Alaska villages located from Kaktovik on the coast of the Beaufort Sea (Arctic Ocean) to Kodiak City on Kodiak Island south of the Alaska Peninsula and completed three waves of interviewing (winters of 1987, 1988, and 1989) before the Exxon Valdez oil spill occurred. The spill site--located about 300 miles northeast of Kodiak City and 360 miles northeast of Old Harbor on Kodiak Island--was in an area beyond the periphery of our sample. These two Kodiak Island communities were the sole villages among the 31 in the original study whose traditional territories were affected by the vast slick and blobs of oil that spread southwest along the Kenai Peninsula and Kodiak Island by currents and wind, then northeast up Cook Inlet toward Anchorage by currents and tides. Oil began washing up on Kodiak Island beaches on April 17, about 3 weeks after the spill.

Five months after the spill, we expanded our research to several villages directly affected by the oil. In this volume, we focus on the research design and the research conducted among villages located within that area. The spill-area research is, however, a piece of the larger project begun in 1986. One of the goals of the original research was to determine the consequences of oil-related factors on village life. An oil spill is an "oil-related" factor that can have consequences for village life in Alaska. Here we analyze the research methodology, including the complex sampling design, we employed in studying the spill area. In so doing, it is necessary to provide a brief outline of the original research and its relation to the Exxon Valdez spill-area research.

II. AN INTRODUCTION TO THE SOCIAL INDICATORS RESEARCH DESIGN AND TO THE RELATION OF THE ORIGINAL SAMPLE TO THE EXXON VALDEZ SPILL SAMPLE

In late 1986, several colleagues and I, as principal investigator, embarked on an analysis of contemporary life in 31 Alaska villages in seven ANCSA (Alaska Native Claims Settlement Act) regions located from Kaktovik on the coast of the Beaufort Sea (Arctic Ocean) to Kodiak City on Kodiak Island south of the Alaska Peninsula. We had been charged by the Minerals Management Service (MMS), U. S. Department of the Interior (USDOI), to develop from several methodologies and several data sets two sets of indicators that would be sensitive to social and economic change.

The research design, including demographic information about the 31 villages and the seven regions in which they are located, appears in Social Indicators Study of Coastal Alaskan Villages II. Research Methodology: Design, Sampling, Reliability, and Validity (also referred to as Social Indicators Study II) (Jorgensen1993). Ethnographic and historical information about the study villages and regions appear in Social Indicators Study of Coastal Alaskan Villages I. Key Informant Summaries Volumes 1 and 2 (also referred to as Social Indicators Study I, Vols. 1 and/or 2) (Human Relations Area Files [HRAF] 1992). Analysis of the multiple data sets, over-time, appears in Social Indicators Study of Coastal Alaskan Villages III. Analysis (also referred to as Social Indicators Study III) (Jorgensen 1993).

The rationale behind developing two sets of social indicators is that small subsets of those indicators can be used to monitor Alaskan villages and determine whether oil-related activities are affecting them. It is frequently the case that multiple factors, rather than a single factor, account for social change. In order to know whether oil-related factors are responsible for changes wrought in villages, MMS requested that we pay special attention to distinguishing differences, should they exist, between Natives and non-Natives, between villages that possessed well-developed infrastructures and services and those that did not, and between Outer Continental Shelf (OCS) oil-related activities and other activities that may affect village organizations, village economies, village politics, and life within villages. The

31 villages in the original sample were selected to provide contrasts along each of these dimensions.

I.A. Validity: An Introduction

Validity is a central concern in the Social Indicators project. The research design we prepared and implemented in late 1986 and revised and implemented in 1989 for the spill area seeks to reduce threats to validity. There are strengths but also weaknesses in every data set and each methodology employed in social science. Weaknesses are threats to validity. Therefore, the Social Indicators research project was designed to use several methodologies to collect several data sets. The strengths of each method and data set were intended to offset the weakness inherent in one or more of the other methods and data sets. A complex system of multiple panels, sampling, interviewing and reinterviewing, and several controls were designed to generate valid results. The validation methodology for the original portion of the study required 4 years for completion. The spill-area study was constrained by money and time. The bulk of the spill-area research was conducted over 2 years and three research waves (spring of 1989 through the winter of 1990-1991). A research wave conducted by the Alaska Department of Fish and Game (ADF&G) in which some questions that were asked were compatible with questions in our two principal research instruments--a questionnaire and a protocol--allowed for some validity tests that we had not anticipated when we concluded our field research in 1991 (discussed in Chapters 2 and 7).

Several types of validity are known to the social science research literature, including *apparent* or *face* validity (the obviousness of the relationship between an observational procedure and what it is intended to observe), *instrumental* or *criterion* validity (the correspondence between an observation and a different and accepted observation of the same thing), *construct* or *theoretical* validity (the fit between a measure and a construct), and *statistical conclusion* or *testing* validity (the real and determinate, i.e., probabilistic, basis of an inference). Several more types of validity have been defined and used by social scientists, including *internal* and *external* validity. Internal and external validity are crucial to this study, but both must satisfy the requirements of construct and statistical conclusion validity. The difference between them is the universe to which conclusions are attributed.

The many types of validity recognized by social scientists are neither unique nor distinct. To eliminate the inherent confusion, we follow Cook and Campbell (1979), who propose a validity system composed of internal, external, construct, and statistical conclusion validities. We introduce each briefly, then discuss these items more fully in relation to this study.

Internal validity refers to the absolute validity of an inference. To illustrate, assume that research leads to the inference that *X* causes *Y*, say that public transfers (X) cause diminished work incentive (*Y*). Yet if we exercise controls and determine that some other factors, such as access to capital and inadequate opportunity, cause diminished work incentive and public transfers do not, then the initial inference is false. In this example, the factor public transfer (*X*) is a threat to the internal validity of the inference.

External validity refers to relative validity or the generalizability of a causal inference. If public transfers "*cause*"[1] diminished work incentive only where access to the locus of political power is severely limited (for example, in a community or in a region, state, or nation), then the inference is only relatively true. Aspects of the research milieu, such as ready access to the locus of power, that prevent *X* (public transfers) from causing *Y* (diminished work incentive) in the real world--meaning the rest of the world--are threats to the external validity of inference.

Construct validity refers to the fit between measure and construct. For example, if respondents (R's) uniformly reply that they do not drink alcohol but the majority in fact do drink alcohol, the question surely measures something of interest, but it does not measure whether a person drinks alcohol. If a questionnaire item measures something other than what it intends to measure, inferences are invalid. Any factor that weakens the fit between measure and construct is a threat to the construct validity of inference.

[1]Cause is placed within quotation marks to reflect the rather colloquial meaning of cause in social science research. Cause is a probabilistic statement in the social sciences; causes are usually attributed to multiple factors; and causes are best demonstrated retrodictively rather than predictively.

Statistical conclusion validity refers to the probabilistic basis of an inference. The validity of *X* causes *Y* with 95-percent confidence or that *X* determines *Y* less than 5 times in 100 by chance depends on statistical assumptions. If these assumptions are unwarranted, the level of confidence is misstated with invalid consequences. Any factor that renders model assumptions less plausible is a threat to the statistical conclusion validity of inference.

I.B. The Solomon Four Group Design with Nested Panels

In the design for the original Social Indicators study, we "nested" two small panels inside two "pretest" and two "posttest" samples. As the terms imply, the research is longitudinal. Pretest samples are composed of persons selected at random in each of the 31 villages and administered a questionnaire. Posttest samples are composed of persons selected at random in each of the same 31 villages 2 years later and administered the same questionnaire. Pretest respondents are not replaced in the village universe from which the posttest samples are drawn. Thus, pretest respondents cannot be selected for the posttest. "Sampling without replacement" of the original sample respondents into the sampling universe is a crucial feature of the design through which we seek to control for reactivity (subjective responses conditioned by prior responses of the same person to identical questions).

Although pretest respondents are not returned to the sampling universe when posttest respondents are selected, "panels" are drawn from the pretest sample; hence, panels are "embedded" in the pretest-posttest design. In our research, panels are composed of 33 percent of the samples, selected at random, from the pretest samples. The respondents selected from the pretest samples for the panels are reinterviewed with the same instruments in two subsequent years (thus, they are interviewed in three research waves). Through panels we seek to control for threats to validity posed by the "ecological fallacy," that is, attributing to group B responses from group A. when the two groups have different memberships.

Our nested panels design is a subspecies of the design named the "Solomon Four Group" by Campbell and Stanley (1966). Whereas it took 4 years to fully assess the economy, power, and validity of the original sampling design, as we progressed through each field-research wave we were able to increase the controls we exercised over threats to internal and external validity. Statistical power increased as a function of the increased number of controls we exercised. By the end of the second field-research season, for example, it was possible to conduct the first statistical and empirical tests of longitudinal-item stability, item reliability, and test artifacts (reactivity)--three crucial controls in our sample design for validity.[2]

Because of the relative complexity of the original design, Figure 1-1 is provided to facilitate understanding. The sampling and interviewing schedule is designed so that after the second year (1989 W) through the fourth year (1990 W), systematic comparisons can be made between samples of initial interviewees drawn without replacement and panels of reinterviewees (controls for testing artifacts). Comparisons also can be made (1) within panels by correlating responses to the same questions by the same respondents at two (or more) points in time (controls for "stationariness" and for "reliability") and (2) between instruments (AQI is the acronym for the AOSIS Questionnaire Instrument and KIP is the acronym for the Key Informant Protocol).[3]

Reasonable controls for external and internal validity[4] for the original samples[5] were completed at the end of the fourth field session in the winter of 1990. Figure 1-1 demonstrates that a pretest sample was drawn at random in villages in our Schedule A sample in 1987 and a similar sample was drawn from villages in our Schedule B sample in 1988. Panels were selected at random from each of the

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[2]Stability or stationariness is the measure of the true stability of an item "over-time." Over-time refers to measures of the same item taken from the same respondents at three points in time so that the first response is correlated with the second response, the second response is correlated with the third response, and the first response is correlated with the third response. More complete descriptions of over-time stability and over-time reliability and the equations by which they are calculated are described below. "Test artifacts," also known as test effects or artifacts of testing, are reactive (subjective) responses to identical questions previously asked of a respondent. Test artifacts are more fully described below.

[3]The AQI is a forced-choice instrument. The KIP facilitates open-ended discussions on a variety of topics that do not yield easily to forced-choice options. These instruments are discussed more fully below.

[4]"Within reason" is a simple qualification: we have exercised all controls we can think of for internal and external validity, including tests for stationariness, reliability, construct validity, and statistical conclusion validity.

[5]The original sample was divided into two schedules, A and B. Schedule A comprised villages in four Native corporation regions. Schedule B comprised villages in three different Native corporation regions. Pretests in Schedule A communities were administered in the winter of 1987. They were administered in Schedule B communities in 1988.

pretest samples and reinterviewed in two successive waves (1988 and 1989 for the A Panel, 1989 and 1990 for the B Panel). Posttest samples were selected at random and without replacement from the pretest samples for Schedule A in 1989 and for Schedule B in 1990. The sequencing of the interviews among pretest, posttest, and panel respondents was designed to provide tests for stationariness and testing artifacts each year and also to provide flexibility so that posttest samples could be drawn to accommodate discoveries from the analyses of pretest and panel responses.

If it is demonstrated that variables (questions) have good construct validity, are stationary, and are not subject to "testing effect," statistical power is increased in two ways: the pretest and posttest samples (7A, 8B, 9AD, and 0BD) can be merged to increase sample size (thereby decreasing sample error), and panel covariances that require small *N*'s can be employed, the latter being extremely sensitive to small differences in theoretical contrasts. Although statistical power is increased by the use of panels embedded in the pretest-posttest sampling design, we usually opt for the most conservative rather than the least conservative measure of inference. We do so to increase the likelihood that the differences we discover in our theoretical constructs are real and determinate.

We used the flexibility inherent in the Solomon Four Group Design to add villages to our study following the Exxon Valdez spill, to increase the size of the Schedule B posttest sample, and also to increase the proportion of non-Natives in that sample. We had undersampled non-Natives in the pretest sample for Schedule B because we did not want non-Native responses to swamp Native responses and lose the advantage provided by our strategy to sample villages by theoretical contrasts. Yet between 1988 and 1989, we discovered highly significant differences between Natives and non-Natives in a large variety of contrasts. Inasmuch as non-Natives far outnumber Natives in the Kodiak area, we increased the proportion of non-Natives in our posttest sample for Schedule B to provide better contrasts between combined pretest samples (A and B) against combined posttest samples (A and B).

	A SCHEDULE			B SCHEDULE		
YEAR	**AQI**	**AQI**	**KIP**	**AQI**	**AQI**	**KIP**
1990 W				0B3 (93) ↑	0BD (144) [*POST*]	
1989 W	9A3 (92) ↑	9AD (168) [*POST*]	KIA2 (62) ↑	9B2 (101) ↑		KIB2 (46) ↑
1988 W	8A2 (114) ↑		↑ ↑ ↑	8B (206) [*PRE*]		KIB (60)
1987 W	7A (342) [*PRE*]		KIA (112)			
	AQI	**AQI**	**KIP**	**AQI**	**AQI**	**KIP**

FIGURE 1-1. SOCIAL INDICATORS PROJECT SOLOMON FOUR GROUP SAMPLING DESIGN, ORIGINAL 31 VILLAGES DIVIDED INTO SCHEDULE A VILLAGES AND SCHEDULE B VILLAGES.

Legend: AQI = AOSIS questionnaire interviews, KIP = key investigator protocol interviews, A = Schedule A sample (North Slope, NANA, Calista, Aleutian-Pribilofs), and B = Schedule B sample (Bering Straits, Bristol Bay, Kodiak).

Initial Interviews and the Year Administered (Questionnaire) 7A, 8B [PRETESTS]; 9AD, 0BD [POSTTESTS]: The number before the letter represents the year the initial interview was administered (e.g. , 7 represents 1987); D following the number and A or B represent second sets of initial interviews we refer to as posttests (new samples in each schedule drawn without replacement of original interviewees into the sampling universe).

Initial Interviews (Protocol) KIA, KIB: KI represents the key informant protocol (or KIP); A or B represents the schedule.

Panels: P = panel. Random samples drawn from initial AQI [PRE 7A, 8B] samples in each schedule are reinterviewed. The first waves, selected from the initial interview samples, are designated 7AP and 8BP but are not distinguished from the pretest sample in the figure. There are two waves of reinterviews for the QI panels for A and B. There also is one wave of reinterviews for the entire KIP samples for A and B. A subset of the KIP panels for Schedules A and B (see KIAB above) is reinterviewed in one wave, and a smaller panel of Kodiak villages alone is reinterviewed a second time (KIAB2) (see the analysis of Schedule C in a separate report). The numbers 2, 3 following the panel's year (#) and schedule (alpha) represent the wave of the reinterview (e.g., 8A2 = 1988, Schedule A questionnaire panel, second wave).

As is apparent in Figure 1-1, at the end of the field research for the second year (1988 W) the two pretest samples, jointly, comprise 548[6] respondents. Those respondents reside in 31 villages which, in turn, are located in seven ANCSA regions located throughout coastal Alaska from the eastern Beaufort Sea on the north to Kodiak Island on the southwest. Panels drawn from those samples had been constituted by the second year, and the A Panel had been reinterviewed (wave 2). By the end of the third year (1989 W), a posttest sample for Schedule A comprising 168 respondents had been drawn without replacement of persons in the pretest sample. The A Panel had been reinterviewed a second time (wave 3), and the B Panel had been reinterviewed a first time (wave 2). By the end of the fourth year (1990 W), a posttest sample of 130 respondents had been drawn without replacement for Schedule B villages, and the B Panel had been reinterviewed a second time (wave 3).[7]

Statistical power was increased and threats to internal and external validity were controlled as the research progressed, i.e., as pretest and posttest samples grew, and as panels were reinterviewed. The division of the original seven-region sample into two parts--Schedules A and B--was required by time and money constraints, not because of the requirements of a natural or social division that rationalized the stratification.

I.C. Effects of the Spill on the Solomon Four Group Sampling Design

In response to the foundering of the Exxon Valdez a second Solomon Four Group sampling design was created to study the spill-affected villages. Because the oil spill occurred in an area which, for the most part, was not represented in our original Solomon Four Group sample design, the exceptions being the villages of Kodiak City and Old Harbor on Kodiak Island, we added villages in the Cook Inlet,

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[6]The research design originally accommodated 532 Schedule A and Schedule B respondents for the first 2 years. At the conclusion of the first wave of the A panel, MMS added the village of Kaktovik on the North Slope to the study. Lease-sale-date changes and Government and industry planning made it imperative that Kaktovik, located east of Prudhoe Bay, be added to the sample. The MMS anticipates that oil-related activities will affect that village in the near future. Kaktovik was added and studied in the first wave of the B panel.

[7]The Exxon Valdez oil spill was sandwiched between the third and fourth years of field work. A pretest sample (Schedule C) was drawn (1989 S), and AQI and KIP panels from that sample were reinterviewed about 19 months later (1989 W). Posttest AQI and KIP samples also were drawn and interviewed in the winter of 1991.

Prince William Sound, and Alaska Peninsula areas to our study. We also added a Kodiak Island village (Karluk) and initial (new) respondents in Kodiak City and Old Harbor. It was necessary to create a pretest sample (1989 wave), a posttest sample (1991 wave), and panels from the 1989 research wave among AQI and KIP respondents. The design is complex, because some panel respondents were reinterviewed in 1990 and 1991, others in 1991 alone. The design also included respondents from Aleutian Pribilof and Bristol Bay villages (commercial-fishing areas that may have suffered secondary effects from the spill).

Figure 1-2 provides a simplified summary of the Solomon Four Group design as applied to the spill-area research. More complete figures appear in Chapters 2 (AQI) and 7 (KIP). Modifications entailed adding 10 villages, 566 AQI respondents, and 316 KIP respondents to our study. We call the affected regions sampled for this inquiry the Exxon Valdez spill area, or the spill-area sample. From time to time, we also refer to it as "Schedule C" to distinguish it from the original study area, referred to as "Schedules A & B." We actually administered 724 AQI interviews, 158 of which were reinterviews. To explain the discrepancy between 566 AQI interviews and 724 AQI interviews requires that we return to a discussion of our research design and to the design's relation to our scientific goals. Initial interviews among persons never before interviewed, and reinterviews among some of those persons, are crucial to reduce threats to validity.

The 724 administrations of the questionnaire do not represent 724 different people. Rather, the interviews are divided into initial interviews and reinterviews. And the initial interviews are divided into pretest and posttest samples with pretest respondents being interviewed during one research wave and posttest respondents being interviewed 1 or 2 years later. By special features of the research design, 566 persons in the spill area received initial interviews over the life of the study, and 140

	QUESTIONNAIRE SAMPLES (AQI)				PROTOCOL SAMPLES (KIP)		
YEAR	Kodiak 1 Panel	Exxon Spill Pre-Post	Spill Area Panel	Kodiak 2 Panel	Kodiak 1 Panel	Exxon Spill Pre-Post	Kodiak 2 Panel
1991W	18*N*	159*N* +	95*N*	27*N*	2*N*	100*N*	72*N*
	↑	|	↑	↑	↑	*Posttest*	↑
	↑	|	↑	↑	↑		↑
1990W	18*N*	57*N*	→ → → → →→ → ↗		4*N*		↑
	↑	*Posttest*	↑		↑		↑
	↑	*1&2*	↑		↑		↑
1989S	↑		→ → ↗		↑	216*N*	→ → ↗
	↑	300*N* +			↑	*Pretest*	
SPILL	↑	50*N*			↑		
3/89	↑	*(1988)*			↑		
	18*N*	*Pretest*			14*N*		
1989W	↑	*1&2*			↑		
	↑				↑		
	50*N*				16*N*		
1988W	*Pretest*				*Pretest*		

FIGURE 1-2. SOCIAL INDICATORS SAMPLING DESIGN (SIMPLIFIED), QUESTIONNAIRE AND PROTOCOL INSTRUMENTS, EXXON VALDEZ SPILL AREA, 1988-1991.

persons were reinterviewed on one or two occasions in subsequent years for a total of 158 AQI reinterviews.

Three reinterview panels comprising respondents whose villages were directly affected by the Exxon Valdez oil spill were created. Because of time and money constraints, the largest panel--which comprised respondents from all sample villages in the affected area--was interviewed a few months after the spill in 1989 and reinterviewed only once (in the winter of 1991) (95*N*).[8] One small Kodiak sample

[8] The reinterview panel referred to here was drawn from a schedule created in 1989 that incorporated villages affected by the Exxon Valdez oil spill of March 24, 1989. These respondents and the villages in which they resided had not been (continued...)

whose respondents reside in Kodiak City, Karluk, and Old Harbor was interviewed in 1990 and reinterviewed in 1991 (Kodiak 2 = 27*N*). And a second small sample (Kodiak 1 = 18*N*) of Kodiak City and Old Harbor respondents is the sole panel for which measures of prespill (two waves) and postspill (two-waves) responses are available (1988, 1989W, 1989S, 1991).

One group of initial interviews, referred to as a pretest sample, was administered a year prior to the Exxon Valdez oil spill (in the winter of 1988) to 50 residents of two Kodiak Island villages (Kodiak City and Old Harbor). Following the spill in the summer of 1989, a second pretest sample was administered initial interviews. For some tests, this sample of 300 residents of 11 villages[9] is merged with the 1988 pretest sample. For other tests, they are separated for the obvious reason that one was drawn and interviewed prior to the spill and the other after the spill.

Posttest interviewing without replacement was required by our research design. These initial interviews, that is, interviews administered to persons in the sample villages who had not been interviewed previously, were conducted among 57 respondents in Kodiak Island villages in 1990 and 159 respondents in Kodiak, Prince William Sound, and Cook Inlet villages in 1991.

Although the AQI sample households in each sample village were drawn at random from a list of all occupied households in that village, the individual R's selected to represent each household were selected by objective stratification criteria in the study design (over 18 years of age, alternating male and female in each successive interview).

I.D. Theoretical Contrasts by Types of Villages

Returning to the questions with which we were charged by MMS and the manner in which we sought to answer them, to determine whether differences at the

[8](...continued)
incorporated in the original study. There was neither time nor resources to administer a third wave (second reinterview) of questionnaires to these respondents, or to draw a posttest sample of initial interviewees.

[9]The postspill pretest sample villages are located in five Native regions: Kodiak, Cook Inlet, Prince William Sound, Aleutian-Pribilof Islands, and Bristol Bay. The first three mentioned regions were directly affected by the spill. The last two were incorporated to serve as controls.

level of the village obtain between Natives and non-Natives, we created two subsamples from our total original sample in which the populations of *Native* villages were more than 75 percent Natives and those of *Mixed* villages were more than 25 percent non-Natives. For many issues, it was necessary to refine *Mixed:Native* contrasts, and in those instances contrasts between **Natives** and **non-Natives** were made.

To determine whether infrastructure, private- and public-sector business activities, services, and population size accounted for differences in responses to social and economic changes, we created a second set of subsamples: *Hub* and *Periphery*. *Hub* villages have considerable infrastructure for business, transportation, and services and for public- and private-sector economic activity; and they occupy a central economic place within a geographic area that comprises several *periphery* villages. *Periphery* villages have limited infrastructure, limited private sectors and public sectors, and small populations within a geographic area whose economy is dominated by a hub.

To determine whether oil-related activities affect villages, we divided the total sample into *Test* and *Control* subsamples. *Test* villages are located close to areas in which some or all of the following occur or are expected to occur: oil-lease area sales, transportation lanes, potential reserves, proven reserves, pipelines, onshore supply bases, nearshore staging areas, or airports servicing offshore activities.

Each of the sets of contrasts provided powerful differences over a range of variables in every one of the topics addressed in our original inquiry: public- and private-sector economies, subsistence resources, use of subsistence resources, education, income, household organization, ability to speak Native languages, and so on. In that research as well, two sets of contrasts--*Mixed:Native* and *Hub: Periphery*--yielded subsamples that are very similar but not quite identical. The similarities in the contrasts with their opposites (*Native* and *Periphery*) were so close in the original sample that they did not require distinctions between the two sets for most of the analysis.

We tested several other theoretical contrasts throughout the course of our research, dropping some and retaining others. A contrast between subsamples that distinguished villages that gained more than 60 percent of their total income from commercial fishing and villages that gained less than 40 percent of their total income from commercial fishing (*Comm Fish:Noncom Fish*) proved to be important to our research when the Exxon Valdez foundered. Oil spread through Prince William Sound, Kenai Peninsula, Alaska Peninsula, Kodiak Island, and Cook Inlet commercial-fishing waters.

Only two villages in our original sample--Kodiak City and Old Harbor--were directly affected by the spill. In 1989, we created a new sample of 10 villages, including the Kodiak Island villages of Kodiak City and Old Harbor, to study the consequences of the oil spill for villagers. The results of that research appear in Social Indicators Study of Coastal Alaska Villages IV. Key Informant Summaries, Parts 1 and 2 (also referred to as Social Indicators Study IV, Parts 1 and/or 2 [HRAF 1993]).

I.E. The Questionnaire and Protocol Instruments--Multimethods and Multidata Sets

In late 1986, MMS provided us with a questionnaire with which to survey village residents. Questionnaires, because they are forced-choice instruments, are fraught with problems that threaten their validity. In response, we developed a research design that incorporated data from sources other than the questionnaire. The intention was to reduce threats to validity by using several types of data collected in different ways and from different sources than the questionnaire survey. We developed a protocol--an open-ended device to guide questions--with which to interview villagers, and we also developed a list of questions to ask persons who occupied key positions within the village. Casual observations and chance discussions, too, the stuff of "participant-observation" methods in ethnographic research, were parts of our multimethod, multidata set research design. As our research progressed over four separate research waves from early 1987 through early 1990, we tested annually to determine whether the questions we were asking provided reliable and valid responses. Responses to the questions were tallied as variables, and the variables were tested to determine whether some or all of them produced significant differences when we contrasted them by subsamples of the population.

I.F. Measuring Change: Controlling for Artifacts of Testing, History, Regression, and the Ecological Fallacy (Specification Error)

Here we seek to determine whether the responses in the pretest are similar or different from responses in the posttest. If the respondents in the two samples are the same persons, or if some of them are the same persons, the posttest responses may be conditioned by pretest responses to the same questions. In these instances the responses may be reactive, or they may be subjective responses. Reactive responses are referred to as "artifacts of testing," or "test effects."

Whereas a pretest-posttest sampling design in which posttest respondents are selected without replacement of pretest respondents can avert threats to validity caused by reactivity, a sampling design such as this causes a problem of its own, referred to as the "ecological fallacy," or "specification error." In brief, if we attribute to the pretest results obtained in the analysis of the posttest--whether responses are similar between the two, suggesting no change, or different between the two, suggesting change--we commit the fallacy of specifying that the posttest sample was similar to the pretest sample at the time the pretest respondents were interviewed and of specifying that the pretest respondents were similar to the posttest respondents at the time the posttest respondents were interviewed. That is specification error. There is no direct measure of the pretest or the posttest respondents at the same two points in time.

We sought to overcome the threats to validity posed by specification error by embedding panels in our pretest-posttest design. Panels allow us to reduce the threat to validity posed by specification error (attributing to the pretest the responses of the posttest and vice versa when pretest and posttest are unrelated samples). The pretest and posttest samples allow us to check threats to validity within panels from history, regression, and testing effect.

In brief, *history* are responses conditioned by historical context in which some event affects a village or a group of villages, but not all, or in which responses of several respondents are dependent or interdependent rather than independent from one another. *Regression* as meant here is a statistical phenomenon that can pose many threats, such as when respondents respond to high ranks on ordinal questions in one wave of research (t_1) and lower ranks on the same questions in a subsequent wave or research (t_2); or, on the contrary, persons respond to lower ranks during the first wave and to higher ranks in a subsequent wave.[10]

The analysis of three waves of panel data obtained from questionnaires and protocols, in conjunction with the data collected from questionnaire and protocol methods among the pretest and posttest samples, allows us to test our concluding hypotheses about stability and change.

Let me reiterate the crucial features of the design. Differences between pretest and posttest samples suggested whether and what kind of changes occurred in the original 31 villages between 1987-1988 and 1989-1990. But because the posttest sample was drawn without replacement of the pretest sample, conclusions about change based on comparisons of pretest and posttest samples suffer from the threat to validity of specification error. Because of specification error, the analysis of stability and change requires panel data. We controlled for ecological fallacy by embedding panels in the research design. Panels are composed of subsamples of respondents drawn from the pretest samples. Those respondents are reinterviewed in subsequent waves after their initial interviews. Differences over time as detected between pretest and posttest responses, and between waves of panel responses, are clues to change. Social indicators should be sensitive to change, while also demonstrating stability (stationariness) and reliability.

II. A BRIEF HISTORY OF THE INSTRUMENTS IN THE RESEARCH DESIGN

II.A. Introduction

Throughout this report we often refer to "AQI respondents" or "AQI informants" and "KIP respondents" or "KIP informants." These references are to the persons who comprise the study's subjects. The AQI respondents are the respondents who were

[10]History and regression, as threats to validity, are defined and discussed more fully in Section III.B, Threats to Internal and External Validity.

administered AOSIS questionnaires by questionnaire interviewers. The KIP respondents are persons who were administered KIP's by key interviewers. We identify these persons by I for interviewee, RI for reinterviewee, or R for respondent.

Each of the methodologies (AQI and KIP) produced a unique data set. A third method, less formal and comprising anthropological observations, informed the two formal methodologies and facilitated interpretation.[11] The multimethod and multidata set design is structured so that the strength of each formal method compensates for the weakness of the other method, and the informal method allows for close analysis of the construct validity of items in each formal method.

Stephen Braund and Associates prepared the questionnaire, referred to here as AQI but referred to by MMS as AOSIS (Alaska OCS Social Indicators System) and pretested it among 86 Native informants resident in nine villages in 1985 (Braund, Kruse and Andrews 1985:94, 135, 146-147).[12] Office of Management and Budget (OMB) approval[13] was sought to administer the AOSIS questionnaire to a large sample of respondents among the original seven regions[14] in the study area.

The OMB granted approval but required that at the conclusion of the first year's field research, a report be submitted that analyzed the validity and sensitivity of each item in the AQI. Should threats to item validity be solved and sensitivity issues answered in a satisfactory way, OMB would grant a second year of field research. Following the second year's research, OMB required a second report that

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[11]Traditional anthropological observations include focused discussions using an institutional protocol with prominent persons in villages (elected leaders, persons appointed to public offices of all kinds, religious leaders, school teachers, business persons); having conversations with persons; collecting prices for goods and services; mapping the houses and other structures in the village; attending and observing village activities; and reviewing histories, ethnographies, and public records about the village. A copy of the Institutional Protocol appears in the Appendix. The interviews with prominent persons were seldom hasty, allowing for open exchange of information. We used protocols in a second, more systematic, fashion for many of the same reasons that we employed them among prominent persons--to gain greater depth of understanding. After selecting informants and administering questionnaires to them, we next selected at random 30 percent of the persons who responded to the questionnaire to respond to our KIP. Responses to these questions were not "forced choices." They allowed depth of understanding that facilitated interpretation of questionnaire responses (see the Appendix).

[12]The history of the AOSIS questionnaire instrument is discussed on pp. 4-6, Social Indicators Study II (Jorgensen 1993).

[13]The OMB approval was required by provisions of the Paperwork Reduction Act of 1977 (see the guidelines created by OMB in 5 CFR 1320.6).

[14]The original study regions include the North Slope, NANA, Bering Straits, Calista, Bristol Bay, Aleutian-Pribilof Islands, and Kodiak.

assessed the validity of the sampling design. Should the sampling design work as we proposed, then OMB would grant permission to complete the 4-year research project.

The OMB's requirements were satisfied. The methodology, data, and analyses that were employed to satisfy OMB demands, as well as the goals of our research design--which were formulated to reduce threats to internal and external validity--are reported in Social Indicators Study II (Jorgensen 1993).

II.A. Effects of the Spill on the AQI and KIP

The second Social Indicator system is built upon the KIP. As we made ready to study the villages in the spill area, we were uncertain about many topics that should be studied--aspects of household and village life that were affected by the spill and aspects that were not. In addition, in the conduct of our research in the original research area in the winters of 1987, 1988, and 1989, we discovered that many topics we had inquired about through the AOSIS questionnaire were not adequately elicited and measured by that instrument. Some items suffered from poor construct validity, some violated cultural expectations and received low responses, some items did not correlate highly and positively with other items that addressed the same topic, and so forth. Most importantly, many questionnaire items that sought to elicit information on traditional customs and beliefs, including subsistence practices, had not passed our reliability and validity tests. So, when we prepared to enter the field in the summer of 1989 following the oil spill, the AQI was bereft of questions that would elicit information we considered to be critical to an accurate assessment of the consequences of the oil spill on traditional practices and beliefs.

The inherent flexibility of the protocol and the many issues about which we were uncertain and for which we had no questions prompted us to introduce in the protocol many new topics about the oil spill, traditional customs and beliefs, political knowledge and practices, and household economics. The protocol proved to be a versatile instrument in our research design, sufficiently flexible to incorporate new versions of questions that had to be dropped from the questionnaire as well as new questions to accommodate the consequences of the Exxon Valdez oil spill.

To take advantage of the protocol's ability to elicit information focused on the oil spill, we increased the proportion of KIP respondents to 72 percent (216*N*) of the postspill AQI pretest sample (300*N*) for 1989. The KIP sample was selected at random from the 1989 AQI pretest sample.

The KIP comprises 242 topics. Questions were open-ended and were administered face-to-face. Because of the nature of the topics, it is unlikely that a single informant was asked every one of the 242 questions. It was unnecessary to do so because every informant provided information on many of the 242 topics before the questions could be asked.

To assess the item reliability and validity of the KIP variables while controlling for the "ecological fallacy," reinterviews were administered among 72 (of the 216) respondents from the KIP postspill pretest sample for 1989. Costs were important in our decision to reinterview only 72 (33%) of our original 216 KIP respondents in the Schedule C pretest.[15] We selected the KIP reinterview respondents at random from that original KIP pretest sample (216*N*). During the posttest year (1991) when we reinterviewed the panels that initially had been interviewed after the oil spill in 1989, we selected our AOSIS questionnaire posttest sample (159*N*) and drew a 63-percent random sample (100*N*) from it for our KIP posttest sample. This allowed us to test for testing artifacts, regression, and history in the KIP panel (see Section III.B for definitions of regression and history).

In addition to the samples we created in the oil-spill area, all respondents in the Aleutian Pribilof, Bristol Bay, and Kodiak villages who were members of KIP samples, AQI panels (persons who were selected for reinterviewing with the AQI), or both, created in 1987 and 1988[16] were reinterviewed in 1989 and 1990 with a version of the KIP modified for use among the spill-area villages during those same

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[15]It is confusing to mention the relations among the samples and panels so frequently, but the pretest KIP sample (216*N*) is a 72-percent random sample of the pretest AOSIS questionnaire sample (300*N*), and the KIP panel is a 33-percent random sample of the pretest KIP sample.

[16]The Aleutian-Pribilof villages belong to Schedule A; the Bristol Bay and Kodiak villages belong to Schedule B. The villages in these three areas were threatened by the Exxon Valdez oil spill of March 24, 1989. The Kodiak villages and some of the Bristol Bay villages (on the south side of the Alaskan Peninsula) were directly affected by the spill. Because we had prespill measures for some villages in these areas, we drew these respondents together in a new panel to be interviewed at the same times the Schedule C respondents were interviewed.

periods. We intended to use those data in our inquiry as controls for the data we collected in the spill area. But because our informants in the regions north of Kodiak wearied of our questions (they had been reinterviewed only 5 months earlier) and because we did not have sufficient funds to reinterview them again in 1991, those regions are not represented in the following analysis.

The MMS has funded studies that have employed one (Braund, Kruse, and Andrews 1985) or two (Louis Berger & Associates 1983) of the methods we employ here to assess Alaskan social change. In subsequent chapters, we demonstrate the methods we employed to test the reliability, validity, and sensitivity of the two systems. The multiple methods and multiple data sets are brought together in a technique called "triangulation." In triangulation, multiple methodologies and multiple data sets are employed so that the strengths of each will compensate for weaknesses in one or more of its sisters. Let us next provide a general introduction to the topic of validity and the ways in which we seek to remove threats to validity in our research.

III. THREATS TO VALIDITY AND MEASURES TO AVERT THOSE THREATS IN SOCIAL INDICATORS RESEARCH

III.A. AQI and KIP Validity Issues

In regards to the survey instrument, but also to the protocol, our first concern was *construct* validity: we asked whether the questions in the instruments were measuring what they were supposed to be measuring. Construct validity assumes a theory about relations. Questions are formulated to elicit data that will measure the relations posited by the theory. In assessing construct validity in both instruments, we had to determine the quality of the relationship between an observation and the element of the construct or theory that it represented.

The second concern was determining *statistical conclusion* validity. Statistical conclusion validity can be separated from construct validity for analytical purposes, but the two are interdependent in the Social Indicators research design. To assess statistical conclusion validity we asked two questions about relations posited by some theory: (1) is the relation "real"? and (2) is the relation "determinate"? Relational statements minimally require the definition and measurement of at least two observations. Construct validity, the fit between a measure and a construct, is crucial to and entailed by all analyses of statistical conclusion validity, to wit: regardless of the sampling distribution (statistical assumptions) employed, items must be accurately defined and must be linked to the phenomena to which they are supposed to be linked according to the theory. The observations also must fit the sampling distribution that is used to measure probabilities.

The criteria for statistical conclusion validity require that whenever one item in the relation varies, the other item in the relation varies (the relation is "real" or "covaries" in statistical terms). The criteria further require that no other source or sources of influence intervene to alter that relation (the relation is "determinate"). Hence, any comparison between two items that seeks to measure a relation also must be controlled to determine whether other factors intervene to influence (wash out, reduce, or strengthen) that relation.

The basis of the inference that no other factors intervene is relative to all of the controls that a researcher can think of and marshall in the analysis. It is the nature of social inquiry that someone can always think of other factors that may intervene, so all conclusions, in this sense, are "concluding hypotheses." Nevertheless, this inference is probabilistic and depends on statistical assumptions. All things being equal and assuming that the researcher has applied controls for every factor that can be reasonably adduced, a determinate relation is one in which no factors other than those that have been specified account for the relation.

If the statistical assumptions are unwarranted (the factors do not meet, say, the scale assumptions of the sampling distribution) or if all potential intervening factors have not been controlled, then the inference is unwarranted and invalid. By definition, then, statistical conclusion validity requires multivariate analysis to evaluate relations, and the factors (variables) in those relations must satisfy the assumptions of the sampling distribution on which probability values are based.

Internal and *external* validity refer to ways in which we assess construct validity and statistical conclusion validity. Internal validity asks whether trustworthy conclusions can be drawn about the sample from the research. External validity asks whether research results can be generalized to the universe from which the sample was drawn.

While internal and external validity are distinct, their threats are controlled by static design features in the Social Indicators research, such as pretest/posttest contrasts of independent samples without replacement, pretest/posttest contrasts of reinterview panels, control groups of various kinds, a multiple sampling methodology that includes longitudinal sampling, multiple methodologies and multiple data sets, and so forth.

III.B. Threats to Internal and External Validity

The research design is inextricably tied to our pursuit of valid conclusions. We employed a variant of the Solomon Four Group Design because it is the strongest design possible to eliminate threats to validity in survey research.

In preparation for the first year's inquiry, the Human Relations Area Files (HRAF) research team anticipated five important threats to internal validity: (1) *test artifacts* (essentially instrument reactivity wherein initial interviews bias responses to interviews), (2) *history* (that is, responses conditioned by historical context in which some event affects a village, or a group of villages, but not all, or in which responses of several respondents are dependent or interdependent rather than independent from one another--this last is a special form of autocorrelation often referred to as Galton's Problem in the anthropological literature), (3) *reliability* (whether persons give similar answers to similar questions on the same interview, on different interviews, to different interviewers, and so forth), (4) *nonresponse* (differential subject loss), and (5) *regression* (statistical regression poses many threats, such as when respondents respond to high ranks on ordinal questions in one wave of research [t_1] and lower ranks on the same questions in a subsequent wave or research [t_2]; on the contrary, persons who respond to lower ranks during the first wave respond to higher ranks in a subsequent wave).[17]

[17]Regression of this type, a statistical phenomenon, is not easily attributed to any known factor, but regression is always to the population mean of a group and is always a threat to internal validity in a pretest-posttest design where high pretest scorers score lower on the posttest and low pretest scorers score higher on the posttest (see Cook and Campbell 1979:53). The factors that account for regression or pretest and posttest measures on the same items by the same respondents (panel (continued...)

We recognized that issues of construct validity for the AOSIS instrument had to be addressed before entering the field in 1987, that further issues of internal validity had to be addressed at the conclusion of the first field session (results of the AOSIS instrument administered to Schedule A respondents in 1987), and that still more threats to internal and external validity, such as *regression effect, over-time stationariness,* and *over-time reliability*, would have to be addressed in subsequent years. But for 1987, threats to the generalizability of the results from problems of construct validity, or nonresponse, or interinstrument reliability could not await the completion of the fourth year's analysis. We therefore developed a short set of debriefing questions for each R that was administered at the end of each interview. Sensitivity issues, in particular, were pinpointed in the debriefing discussions. They proved crucial to an assessment of the construct validity of some questions and served to inform the research team members about remedies. Those remedies were implemented with MMS approval.

The threats to external validity are much the same as the threats to internal validity. They are history (do different histories cause persons sharing those histories to respond in a similar fashion and different from persons sharing different histories?), test artifacts (do respondents react subjectively to the instrument upon being reinterviewed?), and construct validity (are the instrument's questions appropriate for the entire sample population and do they link observations to labels in the same way throughout the entire sample?).

III.C. Sampling Bias and Threats to Validity

The question of sampling bias is intimately connected to threats to validity. In part, sample bias is determined through analysis of history or Galton's Problem (independence of responses and independence of correlations). The KIP

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[17](...continued) members) are not obvious, or "intuitive" (Cook and Campbell 1979:53). Respondent memories may lapse between pretest and posttest, or they may supply an estimate as a response in the pretest and a different estimate in the posttest. Any number of factors can occasion the changes, but they are not due to error. The magnitude of a regression "depends on the test-retest reliability of a measure and on the difference between the mean of a deliberately selected subgroup (our panels) and the mean of the population (the pretest sample on Kodiak Island, 1988, and the pretest sample in the Exxon Valdez spill area, 1989) from which the subgroup was chosen. The higher the reliability and the smaller the difference, the less will be the regression" (Cook and Campbell 1979:53).

administered to one-third of all persons who responded to the questionnaire instrument assisted us in determining one aspect of potential sampling bias. The KIP requires the collection of genealogies from the key informant subsample of the questionnaire sample so that kinship relations could be assessed among persons included in the random sample. The relevance of the household key informant genealogical data is that every person within two degrees of collaterality and three degrees of lineality of each respondent can be traced to Ego and to one another.

Ego, that is, the R, was assigned a unique interview number when the questionnaire was administered. That same number was used when the genealogy was recorded. Any relative or relatives of that person who were drawn at random for the questionnaire sample also received unique interview numbers. Thus, when two or more persons who were drawn at random for the questionnaire sample appear in the same genealogy, we have a way to measure their kinship relation(s) and to determine whether their responses to the AOSIS instrument (and the KIP) may be influenced by their relatedness (and all that entails, including sharing, visiting, cooperating, and the like).

These data allow us to determine whether or not family networks are overrepresented. We summarize similarities and differences of responses among R's related by kinship in dependency correlation matrices for "overrepresented" and "not overrepresented" villages. Whereas one goal was to correct for kinship network dependencies (an historical artifact), a second goal was to use these brief genealogies to understand village compositions and intervillage relations. This understanding evinces itself in our narratives here and especially in Social Indicators Study III (Jorgensen 1994).

III.D. The Logic of the Validity Analysis

Our tests for threats to validity in the original research unfolded over 4 years. These tests benefitted the Exxon Valdez spill-area research because many items that did not pass our several validity, sensitivity, reliability, and stability tests were eliminated. We subjected the Exxon Valdez data to the same tests and report the results of the methodological inquiry described in subsequent chapters.

(1) In late 1986, before we entered the field, we assessed the AOSIS instrument item by item for questionable construct validity. We anticipated problems with responses (and nonresponses) to many questions. At the conclusion of the first field research wave in 1987, analysis of the responses allowed us to check our impressions about construct validity problems among all items, including those that we anticipated would present problems before we entered the field. Some questions that were anticipated to violate customs of Native societies did precisely that.

(2) Following each research wave, responses to each question were analyzed for variance and response rate. Construct validity problems were suggested when either variance or response rates were low.

(3) Construct validity problems occurred because some questions violated linguistic conventions. Other questions suffered because one-to-one correspondences between words and concepts between English and the several Inupiaq and Yupik dialects could not be obtained, even though the AQI was translated into the Native dialects, then translated back into English.

(4) Construct validity was further evaluated through controls in the research design that allowed us to correlate attitudinal responses with objective responses within the questionnaire and, necessarily, to assess reliability as well as the fit of measures to observations.

(5) The KIP provided some interinstrument, identical-respondent reliability checks with the AQI. The KIP was administered to one-third of the R's selected at random from the AQI sample. The KIP's advantage is that it facilitates discussion of topics in a less structured and more detailed fashion than does the AOSIS questionnaire. In order to avert boredom and, perhaps, resentment over redundancy in the instruments, similar questions in the two were few in number, but sufficient to allow correlations between the KIP and the AQI.

Our strategy to assess validity within instruments included correlational and multivariate methods (see 6 and 7 below). Here, we sought to establish whether relations were "real".

(6) For zero-order correlations (correlation of a relation of two parts, say, variables *a* and *b*), we selected the rather stringent coefficient value of .50 as the minimum acceptable correlation to establish a "real" relation between two variables. A .50 value for proportional reduction of error (PRE) statistics, such as Goodman and Kruskal's Gamma (γ), or factor analytic squared error statements reduces the errors in our guesses by half. Higher gammas, of course, reflect greater reduction of errors in our guesses.

For interval data, r^2 values of .50 are interpreted as explaining 50 percent of the variation in the relation. We interpret PRE and r^2 values of .5 (+ or -) as strong relations between variables. A rather high value (.5) was selected because the issue we addressed was strength of the relation and not significance of the relation.

(7) Multivariate analyses--factor analysis, multiple regression analysis, cluster analysis, and multidimensional scale analysis--were used to evaluate the relations among all variables within each of the sets of topics (sections A-E) in the questionnaire. Variables within a set, by construct, should measure related phenomena. As such, their internal correlations should be higher, on average, than their external correlations. We began our multivariate analysis within topical sets (Respondent Characteristics), assessing the regression effects of R characteristics on the polychoric, polyserial, and Pearsonian correlations for each item. We then extended the multivariate analysis among items within each set (Reliability) by developing confirmatory factor analytic models (maximum likelihood).

Research during the second year (1988) allowed us to exercise explicit controls for threats to AOSIS's internal validity posed by history and regression. Regression effect (the tendency of high and low responses at one point in time [t_0] to regress toward the mean at a second point in time [t_1]) cannot be assessed until the second year and then can be assessed only if there are two distinct samples measured on the same variables. One of those samples must be a panel of respondents reinterviewed on identical questions posed to them in a previous wave, and the other sample must be composed of respondents interviewed for the first time. Responses in the two samples must be compared. After the second field session, it was possible to begin our analysis of item reliability and stability over time and our analysis of theoretical contrasts.

At the conclusion of field research in the third year, two panels and one posttest sample had been interviewed. As the design unfolded, we increased the number of contrasts within panels, between panels, and between panels and independent pretest and posttest samples. By late 1989, then, we had several means to assess threats to internal and external validity, including over-time (2- and 3-year) tests of stationariness of each item, over-time tests of the reliability of each item, test effect (testing artifact) for each item, and theoretical contrasts for each item.

The final field-research wave completed the embedded panel and posttest research, allowing us to complete the over-time stationariness and reliability tests and the analysis of testing artifacts and theoretical contrasts for the study.

III.E. Some Important Measures to Avert Threats to Validity

Theory has a salient role in construct validity and statistical conclusion validity. In the original research and in the Exxon Valdez spill-area research reported here, we integrate empirical measures with cognitive attitudinal measures. Several features of our analysis facilitated our evaluation of construct validity and statistical conclusion validity.

Nonresponse: The analysis of nonresponse patterns at the conclusion of the first research wave in 1987 prompted the deletion of many items and changes to many more items in the AQI. We recognized that sample bias due to refusals could pose a fatal threat to statistical conclusion validity.

Telephone interviewing posed an especially ominous nonresponse bias in the Alaska sample: home-telephone densities among our respondents ranged from 10 percent to 100 percent among the sample villages. Furthermore, there was high monthly variability in the termination of residential-telephone service. Thus, telephone interviewing in village Alaska, on its face, posed a threat to validity because it defined as ineligible residents in some of the households in 29 villages in the 31-village sample. Only 2 villages in the sample had 100-percent residential-telephone densities; 14 had less than 65-percent densities, and 9 had less than 40 percent. We did not use telephone-interviewing methods, although they were originally recommended.

In the original study, as well as in the Exxon Valdez spill sample, we took the precaution of minimizing nonresponse by ensuring that each household in each sample village had a nonzero probability of selection. We accomplished this by mapping every occupied house in each village that we entered. A number *1, 2, 3,...n* was assigned to each, and a table of random numbers was consulted to select the houses from which R's would be selected (alternating male and female after a random start).

In theory, nonresponse bias may be corrected by poststratification. In practice, poststratification is a complicated hit-or-miss procedure with no guarantees (Sudman 1983:183-4). We opted not to use this procedure.

A second type of nonresponse occurs when the respondent from a selected household refuses to be interviewed. Telephone interviews ordinarily have lower response rates than face-to-face interviews: a person who hangs up the telephone is less apt to slam the door in the face of an interviewer, particularly one who resides in R's village or region, speaks the Native language of the region, and carries instruments written in the local language as well as in English.

The sampling technique and interviewing procedure in 1987 resulted in negligible nonresponse rates. This is different and separable, of course, from nonresponse to particular items. At the conclusion of the first year's research, biases due to nonresponse on particular items remained a viable threat to validity. The AQI R's could, and sometimes did, answer "don't know" on items. Thus, we checked each "nonresponse" for potential bias.

Sensitivity: "Sensitivity" is, perhaps, more commonsensical than either validity or reliability, but it is also a crucial issue in assessing reliability and validity. Sensitivity here refers to questions that are too sensitive to elicit meaningful responses. Questions may evoke reluctance to respond because they violate social norms or conventions, invade privacy, or cause personal discomfort or even anguish to the respondent. Alert questionnaire interviewers, whether or not they are Natives (in the current instance), quickly sense when questions cause discomfort and enter domains that should not be opened. Nonresponses, reliable but wrong responses, abrupt terminations of interviews, and even ill will can be generated by sensitive questions.

Some items in the AQI employed in 1987, for example, which ask R's to assess the effectiveness of elected officials, did not elicit responses from as many as 50 percent of the 348 R's. While items of this sort might not seem sensitive in some other population, the 1987 sample respondents found these items too sensitive.

<u>Variance</u>:

Univariate: We inspected the univariate frequencies for each AOSIS question (variable) to provide the quickest available means to determine the variation in responses. Whereas inspections of univariate frequencies are useful in discovering low response rates and modest or high item variation, univariate analysis is only the first step in a longer process that requires the analysis of covariance--a bivariate and multivariate procedure.

Bivariate, multivariate: There were about 16,000 bivariate relations in the AQI used in 1987. Descriptive multivariate matrix-reducing techniques (metric and nonmetric factor analyses and nonmetric multidimensional scale analysis) were applied to coefficients derived from the bivariate relations within each topical section in the AQI. The rationale for calculating bivariate relations within topics is drawn from standard social science experience--relations within topical sets are more highly correlated than relations across topical sets. If variance and covariance cannot be achieved within sets, covariance will not be obtained across sets.

The multivariate analysis does not conclude with intratopic procedures in the first year or subsequent years. In the first year, each AQI item was correlated with several respondent characteristics--including sex, age, ethnicity, education, income, length of residence in the village, and marital status--in a procedure to discover invariant and variant responses. Variance and covariance, as we explain above, are intimately connected to construct validity. When an item elicits the same response across a population, issues of measurement are moot. But it is not known whether the fit between the observation and the construct is valid. Variance, then, is not a sufficient condition of construct validity, but lack of variance is a signal to assess the construct validity of the items in question.

If variance is high or low in response to an item, theoretically consistent covariances are required as well. Items B6 and B7 of the AQI, for example, which ask R's to characterize their ability to run and lift--all things being equal--should covary with age: older R's would be expected to have more difficulty running and lifting than younger R's. If these items do not covary with age, their construct validity would be in question and so must be checked. The items presumably would measure something other than physical vigor among the respondents. On the other hand, all populations are not the same, and Native populations that exhibit high dependencies on resource extraction may well diverge from non-Natives in physical abilities.

We discovered little variation in a wide variety of questions measuring affective attitudes. The lack of variation in many of these questions and the very low covariation coefficients between questions appear to have been caused by the violation of cultural conventions in some instances and nontranslatability due to the violation of linguistic conventions in others. Many questions, then, were not measuring what they were supposed to be measuring: these are problems of construct validity.

IV. RELIABILITY: AN INTRODUCTION

Reliability is intimately and inextricably related to validity. Reliability in the metalanguage of statistical research has several meanings:

- If an informant gives the same answer to the same question at two or more points in time, the question is said to have "test-retest" reliability.
- If two different interviewers receive similar answers from the same informant to the same question, that question is said to have "interobserver" reliability.
- If similar but nonidentical questions receive similar responses from an individual informant, then these questions are said to have "equivalent-tests" reliability.

Variations on reliability accrue as various controls are exercised for samples drawn at several points in time from the same population (with replacement and without replacement) and as questions are altered--maintaining similarity but not sameness.

Item reliability is an important issue in any assessment of validity because responses to questions must be reliable in order to demonstrate that a relation is real (covaries) in a statistical sense. But a perfectly reliable item may be untrue. For example, responding at two points in time to two or more investigators, respondents in a longitudinal sample drawn at random from members of the Church of Jesus Christ of Latter-Day Saints (Mormons) may uniformly answer a question about the consumption of alcohol in the same way: namely, the respondents do not consume alcohol. The answer is highly reliable (interobserver, test-retest), but it may not be correct. Mormons may be reluctant to provide the correct answer because it violates their religious code, hence it is a sensitive question that may elicit a wrong but reliable answer. Correctness is a question for construct validity--the fit between a label and the observation.

Below we will have several occasions to address the reliability of AQI and KIP items. The type of validity involved in any particular problem is always arguable. For example, nonresponse is a reliability issue, but it is also treated as a threat to statistical validity. Nonresponse could just as easily be treated as a threat to construct validity. But as we have pointed out, construct validity is always a prior question in the assessment of statistical conclusion validity. If nonresponse to an item reflects a sensitivity problem, then the item does not measure what it purports to measure. Rather, it indicates a sensitive topic.

Item reliability, by recent convention (e.g., Borhnstedt 1983), is defined as the proportion of variance in a measure due to the "true" construct. Hence, reliability cannot be expressed independent of construct validity. Nevertheless, highly reliable responses can, indeed, be incorrect. We seek to assess the construct validity of the responses to AOSIS questions.

V. FITTING THE EXXON VALDEZ SPILL SAMPLE WITH THE ORIGINAL RESEARCH DESIGN

In 1988, as part of the pretest research in our original sample design, we administered AQI interviews to 40 residents of Kodiak City and KIP interviews to 13 of those same persons (selected at random from the 40). Kodiak City's population is predominantly non-Native. We also administered AQI interviews to 10 residents of Old Harbor and KIP interviews to 3 of those same persons. Old Harbor's population is predominantly Native. The economies of both villages are based on commercial fishing.

During the winter of 1989, immediately prior to the spill, we created a panel from the pretest respondents that initially had been interviewed in 1988. We reinterviewed 23 of those same AQI respondents--18 in Kodiak City (a 45% random sample of the pretest sample) and 5 in Old Harbor (a 50% random sample of the pretest sample)--with the AOSIS questionnaire in part to determine whether changes had occurred in the year since they were first interviewed.

In 1988, our research design also required that we draw a 30- to 33-percent sample from the AQI sample and administer protocols to them. The rationale was to gain greater depth of knowledge than is possible from a forced-choice instrument and also to provide an interinstrument, intrarespondent reliability test. In 1989, we sought all 16 original KIP respondents but were able to locate only 14 of them. One lesson we were quick to learn from our attempts to locate every KIP respondent 1 year after their initial interview (a lesson we learned again in 1990 when we attempted to reinterview every person in our AQI panel who had been interviewed in 1988 and 1989) is that commercial-fishing villages near and below the Alaska Peninsula experience high rates of turnover of short-term residents. We also learned about the seasonal migration of some long-term residents who move from Anchorage, from Seattle, or from even more distant places to Kodiak, Cordova, Kenai, Chignik, and other commercial-fishing villages at the onset of the commercial-fishing season and move out at the season's end.

We learned, then, about population instability (not to be confused with item stationariness) from our attempts to reinterview panel respondents. But we also began to learn about population stability: panels select for the most stable persons in pretest and posttest samples. They select for persons who are employed, or who are elderly and unemployed Natives, who have resided in villages for a decade or more and who participate in village affairs.

The initial interviews and reinterviews using the AQI and the KIP provide evidence to evaluate stationariness as well as change before the spill. Two subsequent waves of reinterviews among the 18 AQI panel respondents provide evidence to evaluate factors of village, household, and individual life that were not influenced by the spill as well as factors that were influenced by the spill.[18] We were able to reinterview only four of the original KIP sample after the spill (during the summer of 1989 and the winter of 1991). The protocol was longer, required more thought, and almost always stimulated discussions between the interviewer and the person interviewed. As a consequence, the research team was reluctant to ask all 14 persons who responded to the protocol in February and early March 1989 to respond to our questions again in August or September 1989.

V.A. Expanding the Sample to Include the Spill Area

The Kodiak Island sample was not sufficient to analyze the consequences of the spill for the entire affected area. Neither Prince William Sound nor Cook Inlet villages were represented in the earlier research waves. When MMS studies personnel designed the request for proposal (RFP) to create two social indicator systems, it was known that oil reserves were meager in the OCS area south and east of the Kenai Peninsula. Leasing activity was not anticipated, at least not in the foreseeable future. So, MMS attention turned to the areas north and west of the Gulf of Alaska, with the exceptions of the Kodiak and Aleutian islands.

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[18]The panel, which comprised 18 Kodiak City and Old Harbor respondents, was interviewed in 1988 and reinterviewed in the winter of 1989, the winter of 1990, and the winter of 1991. Of these 18 persons, 8 also were administred protocol interviews in 1988 and reinterviews in the winter of 1989, and 4 were reinterviewed with the protocols a second time following the spill (summer 1989).

During the winter of 1992, the researchers for the Subsistence Division of the Alaska Department of Fish and Game reinterviewed 16 of the 18 panel members using a short list of AQI and KIP questions in addition to an extensive instrument that was intended to measure social effects of the Exxon Valdez oil spill. The AQI and KIP data collected in the 1992 inquiry are analyzed here.

The Exxon Valdez spill was the largest oil-spill accident in Alaska, nearly 11 million gallons. It was not the first such accident, nor has it been the last. However, the several smaller spills that preceded it did not require massive efforts to control and were not nearly so disruptive to normal village affairs. The MMS sought to respond quickly to the spill. The social and economic studies section in Anchorage requested funds from the Washington, D.C., office to gather information on the subsistence-extraction, social, economic, and political consequences of the spill. Within hours, however, postspill politics, economics, and legal strategies became intertwined in such a way as to reduce the likelihood that the research could be conducted, even if funds were made available.

The intertwining was not so tight as to thwart all efforts to collect information about the consequences of the spill:

- Residents of the affected villages voiced strong opinions about the complicity and ineffectiveness of State and Federal Governments, about the responsibilities of Exxon and the Alyeska consortium, and about the consequences of the oil for the environment and for their livelihoods. Given the strength of the criticisms that were levelled by residents in the spill area, it was not assumed that researchers operating under Federal contract would be welcome in some of the affected villages.
- Attorneys for the Native regional nonprofit corporation for Prince William Sound desired to control all information that might be collected from Natives whose villages belonged to the regional corporation.
- The closing of commercial fisheries by the Commercial Fisheries Division of the Alaska Department of Fish and Game, coupled with scientific reports disseminated among villagers by the Subsistence Division of the Alaska Department of Fish and Game that the fish normally harvested were not toxic, created hostile criticism of State practices and the knowledge possessed by State regulators.
- Budget constraints at MMS made a quick response impossible.

■ And the regulatory authority exercised by the OMB reduced the likelihood of a quick commencement of the research, even if funds could be located. Five months elapsed between the spill and the onset of data collection in the spill-affected area.[19]

By the time funding had been secured and the emergency research had been approved, it was reported to us that the attorneys representing the Native villages in Prince William Sound would not allow us to conduct research in member villages without their approval. We sought, but were not accorded, approval to study four small Native villages in the spill area that were members of the Prince William Sound nonprofit corporation (Tatitlek, Chenega, English Bay, and Port Graham). No explanation was offered for the failure to grant approval to study the villages, although it was averred by employees of the regional corporation that villagers were wearied by researchers and other interlopers in their villages.

Although some of the small Native villages in the Prince William Sound region were not available for interviewing, the larger villages were open to us. Unaware of Prince William Sound's attorneys' rules, one of our researchers conducted interviews in Tatitlek in 1989.[20] Our study met no resistance in the Cook Inlet, Kodiak Island, and Alaska Peninsula regions, although some persons in Valdez declined to be interviewed. We studied the large villages whose populations were predominantly non-Native and several small villages whose populations were predominantly Native in those regions in 1989, 1990, and 1991.

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[19] The MMS science research budget is set 1 or 2 years prior to any given research season. Identifying sources of funds for emergency research was the problem within MMS. No funds were available, so they had to be made available from unused funds in ongoing research projects. From the outside looking in, it appeared as if MMS budgetary policy for emergency research was based on the "rob Peter to pay Paul" principle. The second problem was posed by OMB's authority to regulate the Paperwork Reduction Act. The OMB had to approve the questionnaire and protocol to be used in the inquiry because more than nine respondents were to be asked the same questions and also had to approve the total amount of time that could be spent administering the research instruments.

[20] As an interesting aside, it was claimed that Natives were wearied by questions from reporters and researchers and that they were overwhelmed by spill-cleanup workers. We did not meet inordinate reluctance or resistance in interviewing Natives in Tatitlek or elsewhere in the spill area. In 1990 and subsequently, attorneys for the Prince William Sound Native regional nonprofit corporation sought copies of all of our data for all research waves in all villages, apparently to be used in their litigation against Exxon and other parties responsible for damages incurred by Native villages and villagers. It appears that legal strategies designed to control information were closer to the truth in accounting for why our research team was not granted permission to enter Prince William Sound Native villages than was the suggestion that Natives were being protected at their own behest from redundant questions and tiresome questioners. Indeed, when our emergency research funding was exhausted in the early fall of 1989, we were invited by village officials to study English Bay and Port Graham in the Prince William Sound area. They expressed no reluctance to be studied. Unfortunately, we could not comply.

V.B. Recent "Social Effects" Inquiry in the Spill Area Conducted by the Alaska Department of Fish and Game

In 1992, the Subsistence Division of the ADF&G began an ambitious Social Effects research project under contract with MMS. The Social Effects research was conducted in conjunction with subsistence-harvest research regularly conducted by the Subsistence Division among residents of Alaska's villages. The benefits of the Social Effects research project for the current research are fivefold:

- The ADF&G researchers employed a Solomon Four Group research design, fashioned from the design employed here, to create a pretest-posttest sampling design with embedded panels that is integrated with our design.
- The ADF&G researchers incorporated several AQI and KIP questions into their Social Effects instrument.
- Many of our panel respondents were reinterviewed by Social Effects researchers, thereby allowing us to complete three waves of research for two of our most important panels, albeit on a small sample of AQI and KIP questions.
- Many respondents who had been interviewed once and only once in our pretest and posttest samples were reinterviewed by ADF&G researchers, thereby allowing us to create new panels that facilitate tests of validity, reliability, stationariness, and test artifacts.
- Data were collected in several Native villages, some of which were off limits to our researchers when we embarked on our postspill research in 1989, and some of which we did not have sufficient funds to study. In addition to the inclusion of most of the villages in our Exxon Valdez spill sample, the ADF&G study includes the Prince William Sound villages of Tatitlek (sampled only once in our inquiry), Chenega, Port Graham, and Nanwalek (English Bay) and the Kodiak Island villages of Ouzinkie and Larsen Bay. These data allow us to understand better the differences between Natives and non-Natives, as well as the similarities and differences of villages dominated by Natives and those dominated by non-Natives.

V.C. The Problem of "Controls" when All Villages are "Test" Villages

At the outset of the research, we sought to maintain the theoretical contrasts we had exercised during the first three waves of research among the original study villages.[21] The MMS wanted us to distinguish differences, if they existed, between villages that were affected by OCS oil-related activities and those that were not, between villages whose populations were predominantly Natives and those that were not, and between villages that had well-developed infrastructures and superstructures and those that did not. It was not possible to maintain all of the theoretical contrasts, particularly the contrast that distinguished villages that either were affected or were likely to be affected by oil-related activities (we label this contrast *Test:Control* in the earlier reports).

All villages in the Prince William Sound, Kodiak Island, Alaska Peninsula, and Cook Inlet areas were affected by "oil-related activities," so all were *Test* villages. In our search to identify *Control* villages for the first wave of postspill research in the summer of 1989, we included two *Native* villages, False Pass and Ekwok, located outside the spill area. False Pass is an Aleutian Island village whose location near Katan Bay was presumed to be the likely route the oil spill would follow if it diffused through the Aleutians into Bristol Bay. Ekwok is a commercial-fishing village located 60 miles upriver from the mouth of the Nushagak River in Bristol Bay. The slick did not penetrate False Pass or Bristol Bay, and the tiny sizes of the *Control* villages did not justify the expense involved in returning to them during the posttest research.

In the study of the original villages, too, it was possible to obtain balanced contrasts between villages whose populations were greater than 75 percent Native and villages whose populations were less than 75 percent Native (*Native:Mixed*). These contrasts proved to be highly significant in the study of the villages from Kodiak to Kaktovik. Even this contrast masked highly significant differences that were discovered when race/ethnicity was controlled and **non-Native** and **Native** respondents were contrasted. In the spill area, on the other hand, the total population is overwhelmingly non-Native. The large villages of Kodiak City (6,650),

[21] The Schedule A and B villages are the 30 located from Kodiak on the south to Kaktovik in the North Slope Borough on the north. Twenty villages, referred to as Schedule A, initially were studied in 1987. Ten villages, referred to as Schedule B, initially were studied in 1988. The Kodiak villages were classified in Schedule B. The A and B were parts of a single Solomon Four Group sampling design.

Kenai (6,500), Valdez (3,300), Cordova (2,580), Seward (2,500), Homer (4,300), and Soldotna (3,700) are dominated by non-Natives who, in turn, dominate commerce in the hinterland. Although tiny relative to Anchorage, Fairbanks, or Juneau, these "large" villages serve as metropolises to surrounding communities. The Native villages--such as Tatitlek (105), Chenega (80), Tyonek (160), Chignik (120), and Karluk (80)--are so small and so underdeveloped as to serve as hinterland to Kodiak City, Kenai, and Valdez et al. The inability to study some of the Native-dominated villages in Prince William Sound except in 1992, and then with a limited set of questions, has reduced the power of the *Native:Mixed* contrasts. **Native:Non-Native** (respondent) contrasts will be made by aggregating the entire sample and contrasting the ethnic/racial groups.

It was possible to contrast villages that had well-developed infrastructures (including transportation, roads, sewers, buildings, electricity, and public lighting) and well-developed superstructures (including businesses, services, and complex public and private sectors) with those that did not. We classify villages that have well-developed transportation, businesses, and services as *Hubs* and villages with modestly developed infrastructure and superstructures that are dependent on hubs or metropoli, such as Anchorage, for many goods and services as *Periphery*. The *Hub:Periphery* contrast provides significant information about the consequences of the spill. In our sample, Cordova is the sole large village that is not classified as *Hub*. Whereas Cordova has a well-developed infrastructure and services, it is an end point in transportation services. It does not serve as an economic, transportation, and service *hub* to outlying communities. Indeed, because Cordova is dependent on transportation and goods from Anchorage and Valdez, and because it is not a transportation hub, it exercised less control of, and enjoyed less access to, transportation during the spill-cleanup operation than did the *Hub* communities in the spill area. As a consequence, the community sustained some consequences from cleanup operations that were less obvious in other villages.

We introduced several other theoretical contrasts in the earlier study with varying results: *Borough:Not Borough*, *Native Regions* (seven were contrasted collectively via analysis of variance, and also by comparing each one versus all others), *Native Languages* (Pacific Yupik vs. Central Yupik [mainland] vs. Central Siberian Yupik [St. Lawrence Island] vs. Inupiaq) and *Commercial Fish:Noncommercial Fish*. In the last mentioned, we contrasted villages in which over 60 percent of village income was gained from commercial-fishing-related business with villages in which less than 40 percent of total income was gained from commercial-fishing-related business (fishing, freeze-processing, canning, and selling and repairing boats and equipment).

Commercial-fishing and fishing-related businesses are important in almost every village in the spill area, much as every village in the spill area is a *Test* village. Yet some large villages, such as Valdez and Kenai, and some small villages, such at Tyonek, do not gain 60 percent of their total income from commercial fishing, so the contrast is made here. Moreover, whether or not villages received 60 percent or more of total income from commercial fishing, commercial fishing was severely disrupted in most villages affected by the oil spill. Paradoxically, a few fisherman in Valdez, and this may also be true elsewhere, benefitted from the spill both by getting record catches and by receiving compensation payments from Exxon for fish that either were not caught or could not be caught. The paradox is not that some fishermen's catches were large and that they were also compensated by Exxon, but that the fishermen were based in Valdez, Alyeska's onloading transportation terminal, the site from which the Exxon Valdez embarked. The spill occurred immediately outside Prince William Sound. Many Prince William Sound fishing areas were not affected by the spill, whereas the areas fished by Cordova fishermen were. By all accounts, the villages that benefitted most from the oil industry--Valdez and Kenai (in that order)--also benefitted most from the spill and from commercial fishing in 1989 (see Edward Robbins' chapter on Valdez in Part 1 and Lynn Robbins' chapter on Kenai in Part 2 of Social Indicators Study IV (HRAF 1993).

Our research design required multiple methods and generated three data sets: the AQI data, the KIP data, and the KIS (or Key Informant Summary) data from an Institutional Protocol (a set of topics addressed to elected and appointed leaders, businessmen, school officials, and the like) and from traditional anthropological observations (ethnographic observations). We create two indicator systems, one from the AQI data and one from the KIP data. The data collected by the key investigators informs the interpretation of the data collected by more objective methods.

The complexities of the questionnaire research design and the protocol design, although embedded in one another, recommend that we treat the two data sets separately. We begin with the AQI. In each village during each research wave, the AQI sample was always selected first (after mapping the houses in the villages, assigning numbers to the occupied houses, and then selecting respondent households from a table of random numbers). The KIP sample was selected from the AQI sample. We drew random samples and administered protocol interviews to respondents equalling 72 percent of the AQI sample in 1989 and 63 percent in 1991. We also drew a 24-percent sample of the summer 1989 KIP sample and reinterviewed those persons in 1991.

We begin with an analysis of the AQI (Part Two) and then turn to the KIP (Part Three).

PART 2: THE AOSIS QUESTIONNAIRE INSTRUMENT

CHAPTER 2
RESEARCH DESIGN

I. INTRODUCTION

I.A. Solomon Four Group Research Design

The Solomon Four Group research design created for the Exxon Valdez oil-spill study is an offshoot of the research design implemented in the analysis of Schedule A and B villages. As with its precursor, the design was implemented to control internal and external threats to validity while decreasing sample size and increasing statistical power. There are 40 villages in the spill area whose aggregate population was about 57,500 in 1990. Several villages have fewer than 90 residents; two have more than 6,000 residents. Our sample of 10 villages[22] has an aggregate population of about 20,550, or 36 percent of the population for the entire spill area. Our sample was drawn so that it was nonrandom with respect to the entire population of the area but random with respect to each subpopulation. Just as every household in a village need not be interviewed, households in every village need not be interviewed. We did not want to overrepresent or underrepresent several theoretically important subpopulations among the 40 villages, so we stratified the 40 villages along three dimensions: (1) race/ethnicity; (2) village infrastructure, superstructure, and transportation; and (3) commercial fishing-related businesses as a proportion of total income. The 10 villages in our study were selected to represent these strata. The stratified random sample, which may be transformed so that it approaches a simple random sample, when complemented by embedded panels, provides the best compromise among cost, theoretical considerations, and statistical power. All things being equal, theoretical considerations are the most important of the three because they address the reasons for which the research was conducted.[23]

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[22]There are 12 villages in the total sample that we created in 1989. Two--False Pass and Ekwok--are located outside the spill area. Respondents in those villages were administered questionnaires and protocols during the summer of 1989 only. For reasons explained in the text, respondents in these villages were not reinterviewed. The ADF&G's Social Effects study in 1992 did not include Tyonek, thus reducing our comparisons to nine villages; but it included five villages not previously studied by the Social Indicators researchers: Chenega, Port Graham, Nanwalek (English Bay), Larsen Bay, and Ouzinkie.

[23]Social Indicators Study II (Jorgensen 1993:68-70) explicates how variance is bounded in panel designs. Panel variances will always be smaller than "separate-sample" variances, just as designs without replacement (such as ours) always have smaller errors of the estimate than comparable samples drawn with replacement.

Table 2-1 is the sampling frame for the spill study. In selecting villages for the sample we sought to overrepresent the small Native villages relative to the Native population in the spill area because our evidence from the Schedule A and B villages demonstrated that Natives were much more dependent for subsistence on the harvests of naturally occurring resources than were non-Natives. We also sought to represent large villages whose economies had mixed bases (such as Valdez and Kenai, which possessed oil-related businesses, tourism, commercial fishing-related businesses, and robust public sectors), and large villages whose economies were predominantly based on commercial fishing-related business. As is evident, the three criteria on which we based our theoretical contrasts vary independently: all *Periphery* villages are not also *Native*, the economies of all *Hub* villages are not predominantly based on *Commercial Fishing*, and so forth.

The sampling frame for the ADF&G's Social Effects Study in 1992 includes all of the villages listed in Table 2-1 and in addition includes Chenega, Nanwalek (English Bay), and Port Graham of Prince William Sound, and Larsen Bay and Ouzinkie of Kodiak Island. Table 2-2 lists the *N*'s for all villages and community characteristics for the villages not sampled in the previous research waves of the Social Indicators Project.

Native:Non-Native (ethnic/racial) differences proved to be the most powerful contrast among all theoretical contrasts in the Schedule A and B data. Because there are so few *Native* villages in the spill area and because several of those villages could not be studied because of lawyers' objections, the **Native:Non-Native** distinction, which contrasts Native respondents with non-Native respondents, is important in the following analysis. The Social Effects posttest sample for 1992 (*N535*) has a much higher proportion of Native respondents (43.6%) than either the postspill pretest (30.2%) or posttest (31.4%) samples in the Social Indicators Project. The Social Effects data are helpful in testing **Native:Non-Native** differences and similarities in 1992.

During the winter of 1988, every house in Kodiak City and Old Harbor was mapped. Occupied houses were distinguished from unoccupied houses, and the

Table 2-1

SAMPLING FRAME BY REGIONS, VILLAGES, AND COMMUNITY CHARACTERISTICS, 1988-1991

REGION	VILLAGE	POP	CHARACTERISTICS		
PRESPILL			*Hub:Periphery*	*Mixed:Native*[a]	*Comm Fish: Noncom*
Kodiak	Kodiak	6,070	**Hub**	**Mixed**	**Comm Fish**
	Old Harbor	360	Periphery	Native	**Comm Fish**
POSTSPILL					
Aleutians	False Pass[b]	85	Periphery	Native	**Comm Fish**
Bristol Bay	Ekwok[b]	120	Periphery	Native	**Comm Fish**
(Alaska Peninsula)	Chignik	120	Periphery	Native	**Comm Fish**
Kodiak	Kodiak	6,650	**Hub**	**Mixed**	**Comm Fish**
	Old Harbor	320	Periphery	Native	**Comm Fish**
	Karluk[c]	80	Periphery	Native	**Comm Fish**
Cook Inlet	Kenai	6,500	**Hub**	**Mixed**	Noncom Fish
	Tyonek	160	Periphery	Native	Noncom Fish
Prince William	Seldovia	535	Periphery	**Mixed**	Noncom Fish
Sound	Valdez	3,300	**Hub**	**Mixed**	Noncom Fish[d]
	Tatitlek[b]	105	Periphery	Native	**Comm Fish**
	Cordova-Eyak	2,580	Periphery	**Mixed**	**Comm Fish**

[a] The *Mixed:Native* contrast suggests that Native respondents are overrepresented, inasmuch as seven sample villages are classified as *Native* and five villages are classified as *Mixed*. In fact, the *Mixed* villages are so large in comparison with *Native* villages, and the proportions of non-Natives are so great in these villages, that random sampling of households produced the following proportions of Native and **non-Native** respondents in the pretest and posttest samples:

Sample	Race/Ethnicity of Respondents: Alaska Native	Race/Ethnicity of Respondents: Non-Native
Pretest (1988-1989) (*N350*)	30.2%	69.8%
Posttest (1990-1991) (*N216*)	31.4%	68.6%

[b] Respondents in the three villages marked by a [b] were interviewed in 1989 following the spill but not subsequently.

[c] Karluk respondents were interviewed in the 1990 and 1991 posttest waves but not previously.

[d] Valdez residents have been engaged in commercial fishing-related businesses for several decades, but oil transport and the public sector dominate the local economy. The former accounts for about 6 percent and the latter for about 69 percent of total income.

Table 2-2

POSTSPILL POSTTEST SAMPLING FRAME BY REGIONS, VILLAGES, SAMPLE *N*s, AND COMMUNITY CHARACTERISTICS (SOCIAL EFFECTS DATA COLLECTED BY ALASKA DEPARTMENT OF FISH AND GAME RESEARCHERS) 1992

REGION	VILLAGE	*N*	CHARACTERISTICS		
POSTSPILL			*Hub:Periphery*	*Mixed:Native+*	*Comm Fish: Noncom*
(Alaska Peninsula)	Chignik	46	Periphery	Native	Comm Fish
Kodiak	Kodiak	50	Hub	Mixed	Comm Fish
	Old Harbor	29	Periphery	Native	Comm Fish
	Karluk	10	Periphery	Native	Comm Fish
	Ouzinkie	32	Periphery	Native	Comm Fish
	Larsen Bay	38	Periphery	Mixed	Comm Fish
Cook Inlet	Kenai	46	Hub	Mixed	Noncom Fish
	Seldovia	53	Periphery	Mixed	Noncom Fish
Prince William Sound	Valdez	58	Hub	Mixed	Noncom Fish
	Tatitlek	15	Periphery	Native	Comm Fish
	Cordova-Eyak	64	Periphery	Mixed	Comm Fish
	Port Graham	46	Periphery	Native	Comm Fish
	Nanwalek		Periphery	Native	Comm Fish
	(English Bay)	29	Periphery	Native	Comm Fish
	Chenega	16			

occupied houses comprised the sampling universe for each village. Each occupied house was assigned a number *1,2,...n*. A table of random numbers was consulted to select households in the proportions established before entering the field. Rejections were replaced by returning to the original stopping place in the table of random numbers. The sample was completed by selecting random numbers and the houses to which they were assigned until the proportion for the village was reached. We sought a 5-percent sample of Kodiak households (pretest and posttest combined) and a 25-percent sample of Old Harbor (pretest and posttest combined). If Kodiak City had been represented in strict proportion to the entire Schedule A and B sample, 70 percent of whose villages had less than one-twelfth, 24 percent less than one-third, and 6 percent less than one-half as many households as Kodiak City, Kodiak City's weight would influence the statistical comparisons in such a way as to blur the distinctions that MMS wanted to test. So we chose to represent the largest villages with 5- to 7.5-percent samples and the smaller villages with 15- to 25-percent samples.

Upon embarking on research following the spill, we sought to increase the proportion of households sampled in both *Native* and *Mixed* villages. The smallest *Native* villages are sampled at 55-percent to 85-percent proportions of households: the smaller the village, the greater the proportion. We sought 9-percent to 10-percent samples in the largest villages, 11 percent to 12 percent in the next largest, and 20 percent in the third-largest villages. Table 2-3 lists the total households in sample villages and the proportions sampled in each village.

Table 2-3

SAMPLING FRAME FOR EXXON VALDEZ SPILL RESEARCH, PROPORTIONS OF HOUSEHOLDS BY VILLAGE IN PRETEST AND POSTTEST SAMPLES, 1988-1991

Village	Total Village Households	Proportion Households Interviewed	Pretest No. Households Interviewed	Posttest No. Households Interviewed
False Pass	21	48	10	
Ekwok	30	57	17	
Kodiak	1,662	10	40[a]	125
Old Harbor	80	40	10[a]	22
Karluk	20	85		17
Chignik	30	77	15	8
Kenai	1,625	8	92	35
Tyonek	40	58	15	8
Seldovia	133	21	16	12
Valdez	825	12	69	26
Cordova	645	11	52	20
Tatitlek	26	54	14	

[a] These households are the only ones that were interviewed in 1988 (prespill and pretest). All others were interviewed for the first time in summer 1989.

Upon entering the field in summer 1989 to conduct emergency research following the Exxon Valdez oil spill, the same procedure used in the earlier research to select households at random was followed--mapping the houses, selecting occupied houses from a table of random numbers, and interviewing an adult member of the household (alternating women and men). Again we sought proportions that would not prevent us from making the theoretical contrasts deemed most important to the inquiry.

I.B. Solomon Four Group Design with Nested Panels

Figure 2-1 is a graphic representation of the complex AOSIS sampling design for the Exxon Valdez spill study. The figure is intended to facilitate understanding of the way in which the design works to reduce threats to validity. Four panels, three very small and one large, are nested within the pretest-posttest samples. In the original study of the Schedule A and B villages, the sampling and interviewing schedule was designed to be conducted over four research waves--1987 through 1990--so that pretest (1987 and 1988) and posttest (1989 and 1990) samples were drawn and interviewed in both Schedule A and B villages. In addition, panels were drawn from each pretest sample and reinterviewed in each of the 2 years following the initial interviews. As we progressed through each research wave (each field season), we increased the controls that we exercised over threats to internal and external validity.

Funds were not available to implement a complete Solomon Four Group sampling design for the Exxon Valdez spill study. We were resourceful in exercising as many controls as we could muster, given limited funds. The overlap between the Schedule B pretest and posttest samples and the Exxon Valdez spill pretest and posttest samples (Kodiak and Old Harbor were sampled in both schedules), made it possible to link the Kodiak-Old Harbor respondents in the Schedule B pretest sample (1988W, 50*N*) with the Exxon Valdez pretest (1989S, 350*N*), and the Kodiak-Old Harbor respondents in the Schedule B posttest (1990W, 57*N*) with the Exxon Valdez posttest (1991W, 159*N*). While administering the Schedule B posttest, we used the occasion to conduct initial interviews in Karluk as well as Kodiak and Old Harbor (1990W, 57*N*). The phasing of pretest sampling over two successive field sessions and the same for posttest sampling allows us to test for significance of differences with the responses of panel members reinterviewed during

Year	Reinterview Panel Kodiak-Old Harbor Prespill & Postspill	Initial Interview Sample Kodiak-Old Harbor Prespill	Initial Interview Samples Prince William Sound/ Cook Inlet/Kodiak Island/ Alaska Peninsula Postspill Pretest Posttest	Reinterview Panel Prince Wm. Sound/Cook Inlet/Kodiak Postspill	Reinterview Panel Kodiak-Old Harbor-Karluk Postspill
1991W	18N		Posttest = 216*N* 159N	95N	27N
1990W	18N		57N		
1989S			Pretest = 350*N* 300N		
Exxon Valdez Spill 3/89					
1989W	18N				
1988W		50N			

FIGURE 2-1. SOCIAL INDICATORS PROJECT EXXON VALDEZ SPILL SOLOMON FOUR GROUP SAMPLING DESIGN, AOSIS QUESTIONNAIRE INSTRUMENT, 1988-1991

Legend: Double Underline = Two initial interview samples that comprise the pretest sample in the Four Group Design. At various points in the analysis the 1988 (prespill) and 1989 (postspill) subsamples are separated.

Outline = Two initial interview samples that comprise the posttest sample in the Four Group Design. At various points the 1990 and 1991 subsamples are separated for analysis.

→ ← ↗ ↖ = The initial interview samples (pretest and posttest) from which panels are drawn.

the same year when the various initial interviews were administered to pretest and posttest respondents. Thus we can test panel responses for reactivity, and we also can test panel responses over time to assess reliability and stability.

Of the three panels nested in the design, the Kodiak-Old Harbor (prespill and postspill) panel (18*N*) is excellent for assessing stability and change in relation to the Exxon Valdez oil spill. The results are generalizable to the *Mixed* and *Native* villages on Kodiak Island alone. The respondents in this panel, comprising a 28-percent random sample drawn from the pretest sample, were interviewed on four occasions--two prior to the spill and two following the spill (1988W, 1989W, 1990W, 1991W). These four observations make possible the calculation of two sets of over-time reliability and over-time stationariness coefficients.[24] In addition, these same respondents were administered protocol interviews during summer 1989 (the protocol sample design appears in Fig. 2-2), providing interinstrument-reliability checks in addition to deeper and more comprehensive information than can be obtained from the questionnaire.

Budgetary constraints required that the large panel comprising a random sample of respondents drawn from the 1989S pretest sample (the sample drawn in response to the Exxon Valdez oil spill) be reinterviewed only once, in 1991 (95*N*). A single longitudinal reliability coefficient can be obtained from this panel (r_{12}), but tests for significance of difference between the panel and the posttest (1991W, 159*N*) are crucial in the design because they allow us to measure test artifacts in the panel while controlling for specification error (ecological fallacy) in comparing pretest results with posttest results.

The third panel, comprising Kodiak City, Old Harbor, and Karluk, was provided by a simple opportunity to piggy-back on the original Schedule B research design. During winter 1990, we administered the posttest interviews for the Schedule B portion of our original research design to respondents (selected without replacement) in Kodiak and Old Harbor. We also interviewed respondents in Karluk. A panel of

[24]Over-time coefficients (3 waves) are calculated for 1988/1989, 1989/1990, 1988/1990; and 1989/1990, 1990/1991, 1989/1991. The first-order relations are r_{12} r_{23} r_{13}.

Year	Reinterview Panel	Renterview Panel	Initial Interview Samples	Reinterview Panel	Reinterview Panel	Reinterview Panel
	Kodiak-Old Harbor Prespill & Postspill[a] Also→ Merged in 1992 (30N)[b]	Kodiak-Old Harbor-Karluk Postspill ←Also Merged in 1992 (30N)	Prince William Sound/ Cook Inlet/Kodiak Island/ Alaska Peninsula Postspill Pretest Posttest	Prince Wm. Sound/Cook Inlet/Kodiak Postspill *(Exxon C Panel)*	Pretest Respondents First Interviewed in 1988/89 but not in Exxon C Panel[c] *(Q Pre Panel)*	Posttest Respondents Initially Interviewed in 1990/91[c] *(Q Post Panel)*
1992W	16N	14N	Posttest = 535*N*	51N	112N	91N
			Posttest = 216*N*			
1991W	18N	27N	159N	95N		
1990W	18N		57N			
			Pretest =			
1989S			350*N*			

See the preceding Four Group Design figure for the prespill panel origins.

FIGURE 2-2. SOCIAL EFFECTS POSTTEST SAMPLE AND PANEL SOLOMON FOUR GROUP DESIGN AND ITS ARTICULATION WITH THE SOCIAL INDICATORS RESEARCH DESIGN, AOSIS QUESTIONNAIRE INSTRUMENT, 1992

[a]The *18N* prespill Kodiak panel was initially interviewed in winter 1988 and reinterviewed in winter 1989 prior to the Exxon Valdez foundering.

[b]The prespill and postspill Kodiak Island panels were merged for some tests inasmuch as the sample *N*'s for both panels are small and because all members of both panels had been interviewed in 1990 and 1991. The attrition rate in the postspill Kodiak Island sample is considerable between 1991 and 1992 (nearly 50%).

[c]All reinterview respondents are merged into a single panel (215*N*) and contrasted with the 1992 posttest sample in some tests.

27 respondents was selected at random from the 57 persons interviewed in 1990 and reinterviewed in winter 1991. This panel provides contrasts with all other panels, as well as with the posttest sample drawn for 1991 (159*N*).

The Exxon Valdez-spill sample yielded 746 AOSIS questionnaire interviews: 566 initial interviews and 180 reinterviews. Fifty initial interviews and 18 reinterviews were administered before the spill. The prespill total represents a mere 9 percent of all questionnaire interviews administered in the Exxon Valdez spill research. Overlap with the Schedule B research accounts for all 68 of the prespill interviews and 68 of the postspill interviews (50 of the 57*N* posttest, and the 18 panel responses in 1990W). In the complete Schedule A, B, and C (Exxon Valdez) research design, 2,006 AOSIS questionnaires were administered, 136 of which overlap and appear in the analyses here and in Social Indicators Study III. Analysis (Jorgensen 1993).

II. SOCIAL EFFECTS DATA FOR 1992

The Social Effects Project data set compiled by ADF&G researchers in 1992 comprises 535 initial interviews (I) and 215 reinterviews of respondents previously interviewed one or more times by Social Indicators Project researchers between 1988 and 1991. This very large sample has limited utility for the current project because a few questions in the Social Effects instrument were similar to AQI and KIP questions. First we must lay bare the relations between the Social Indicators and the Social Effects data sets. Figure 2-2 demonstrates the relations among the panels that were created pursuant to the Social Indicators research and continued in the Social Effects research. It also shows the creation of new panels from Social Indicators pretest and posttest samples, and how panels were merged to increase statistical power.

III. VALIDITY IN THE RESEARCH DESIGN

Validity was a central concern in all phases of the Social Indicators Research Project. The Solomon Four Group research design with embedded panels seeks to reduce threats to validity. Our design integrates questionnaire data that are derived from a forced-choice instrument, protocol data that are derived from an open-response instrument, and anthropological observations that are derived from focused conversations with key informants (elected leaders, managers and business operators, educators, priests and pastors, decision-makers and care providers in public-sector institutions, and casual or catch-as-catch-can observations and discussions).

Strengths and weaknesses are inherent in each of these data sets. The complex sampling design in which we obtain initial interviews for pretest and posttest samples, and reinterviews for panels drawn from all but the Social Effects Project's 1992 posttest sample, allows us to exercise controls designed to generate valid results. We are interested in *construct* validity and *statistical conclusion* validity. Internal validity asks whether trustworthy conclusions can be drawn about the sample from the research. External validity asks whether research results can be generalized to the universe from which the sample was drawn.

In regards to the AOSIS questionnaire, we assessed the threats to *construct* validity in the course of our analysis of Schedule A and B data.[25] This obviates the need to assess construct validity for those questions here. Our attention is addressed to the topics of *internal* and *external* validity. While internal and external validity are distinct, their threats are controlled by static design features in the Social Indicators research, such as pretest/posttest contrasts of independent samples without replacement, pretest/posttest contrasts with reinterview panels, correlations of panel responses to identical questions administered over time, contrasts of theoretical control groups of various kinds, a multiple sampling methodology that includes longitudinal sampling, multiple methodologies, and multiple data sets pinned to those methods.

[25]The analysis of validity topics for the Schedule A and B data appears in Social Indicators Study II. Research Methodology (Jorgensen 1993).

CHAPTER 3
NONRESPONSE

I. NONRESPONSE AS A THREAT TO VALIDITY

Nonresponse to questionnaire items, also referred to as "differential subject loss," posed problems throughout the course of our inquiry from winter 1987, when we conducted the initial interviews among Schedule A villages, through winter 1991, when we conducted the final set of interviews among Schedule C villages.

In the following set of tables nonresponse to AOSIS questionnaire items is measured for each item in four ways. The samples are divided by two sets of theoretical contrasts: *Hub v. Periphery* and *Comm Fish v. Noncom Fish*. Within each contrast, responses to pretest and posttest interviews are presented. The following column headings are used to distinguish among samples: the pretest sample is listed under the heading .89X. It comprises the Kodiak-Old Harbor prespill sample responses obtained in 1988, and the responses obtained from the respondents in the Alaska Peninsula, Cook Inlet, Prince William Sound, Bristol Bay (Ekwok), and Aleutian-Pribilof (False Pass) Regions 5 months after the Exxon Valdez oil spill in summer 1989. The "8" in .89X refers to 1988, the "9" to 1989. The posttest sample is listed under the heading .01X and comprises the postspill interviews conducted among a new sample of Kodiak Region respondents (selected without replacement from earlier samples) in 1990 (hence the "0" in .01X), and a new sample of respondents selected without replacement from villages in the Kodiak, Alaska Peninsula, Cook Inlet, and Prince William Sound Regions in 1991.

At the outset of our research among Schedule A and B villages, we set 10 percent nonresponse as the level we did not want to exceed. Item reliability decreases as nonresponse to that item increases, so we determined to identify items with high nonresponse rates. It was our goal to determine the probable cause of low responses and to jettison items that could not be accounted for by common mistakes, such as asking a non-Native if they voted in recent Native corporation elections, or asking recent migrants to a village whether they voted in the most recent city elections, and so forth. Our rationale, the decisions we made, and an accounting of the questions we jettisoned because they had low response rates, as well as the questions we retained--even if their response rates were marginal (10- to 12-% nonresponse), are discussed at length in Social Indicators Study II (Jorgensen 1993).

While investigating the AOSIS items in this research we used the 10-percent nonresponse rate as an indicator of either a construct-validity problem, a sensitive (personal) question that a respondent does not want to answer, or a question that was asked of a person either to whom it should not have been asked or for whom the response should have been NA (not applicable). The reader is spared most of this analysis--only the results are provided here. As in our previous work, while assessing these data we discovered that field researchers on occasion did not record anything on the questionnaire instruments for questions that they did not ask informants because they knew those questions were not applicable for that respondent (e.g., field researchers did not ask Anglos whether they were satisfied with their ability to use their Native language (E10)). Because they forgot to score the response as NA, the empty responses in the questionnaires are interpreted as nonresponses in the electronic data set. These errors are not threats to validity, but they are errors that must be corrected.

In order to determine whether an item's low response rate is a threat to reliability and validity, it is important to distinguish the pretest from the posttest responses to the same questions, and to determine similarities and differences between them. We learned during Schedule A and B research that items with low response rates may be affected by particular subsamples of the population, such as whether respondents reside in large, complexly organized villages that provide many kinds of employment and many services, or small, homogeneous villages whose infrastructure and services are modest. We also learned that making simple changes in question structure--the specific question asked--between waves of the research can increase responses. Simple structural change to questions can reduce ambiguity, remove empirically unwarranted conjunctions, and the like.

The pretest and posttest samples are separated so that we can determine whether nonresponse to items increased or decreased between the pretest and the posttest. In a later section, the panel waves are separated by year (research waves 1-4) so that annual comparisons can be made between waves and the panels, and so that panel responses can be compared with pretest and posttest responses. The AOSIS items are evaluated here by analyzing two sets of theoretical contrasts and two samples (pretest/posttest). The rationale for the theoretical contrasts follows: if nonresponse on an item (or several items) is low among *Hub* respondents, it is important to analyze *Periphery* respondents for the same item(s), and vice versa. Our previous research demonstrated that residents of *Hub* communities are different from residents of *Periphery* communities. *Hub* respondents are younger, have resided in the villages in which they were interviewed for shorter periods, relocate their residence more often (and more recently), hail from communities outside Alaska more frequently, are less apt to be married (currently), and less often vote in local elections than is expected of residents of *Periphery* communities.

Given these striking demographic differences between residents in different types of communities, nonresponse must be assessed in relation to expectations about the communities. Inasmuch as we sampled Cook Inlet, Prince William Sound, and Kodiak Island communities during the oil-spill-cleanup period in summer 1989, and because the large *Hub* communities, particularly Valdez, had influxes of temporary workers, some of whom appear in our pretest sample, we shall seek to determine whether transiency accounts for nonresponse on some items in the *Hub* subsample but not in the *Periphery* subsample. Likewise, we shall seek to determine whether questions posed in regard to Native customs and exclusive Native practices were inadvertently recorded as nonresponses among non-Native respondents. The gross contrast for this is in the contrast between the *Native* subsample and the *Mixed* subsample.

It is not suggested that the size and complexity of the infrastructure and superstructure of a village alone, or that transiency alone, or that racial/ethnic factors alone account for low responses in one part of the contrast but not the other. For example, the *Hub* villages of Valdez and Kenai are different from all other *Hubs* in that oil-related businesses account for the majority of employment and income in each. Our field researchers noted the reluctance of several respondents to answer questions about some aspect of the Exxon Valdez oil spill (its causes and consequences), whether they were directly engaged in oil-related businesses or whether--as restauranteurs, dry goods merchants, or the like--they served the owners and employees of the oil businesses. Thus, economic factors in some *Hub* villages were different from economic factors in others, and the differences provide short cuts in accounting for some failures to respond to AOSIS questions.

I.A. Nonresponse in the *Hub:Periphery* Contrast

The two left-hand columns of Table 3-1 list proportions of nonresponses to AOSIS questionnaire items by initial respondents in the *Hub* pretest subsample (.89X) and the *Hub* posttest subsample (.01X). The two right-hand columns list the responses of the *Periphery* pretest and posttest subsamples. The *Hub* villages have much larger specific populations (village by village) than do the *Periphery* villages, and also a much larger aggregate population than do the *Periphery* villages in the spill area. Thus, even though we sought to represent the small, peripheral, and also the Native-dominated villages at a much greater rate than the large *Hub* villages (so that the *Periphery* and *Native* villages would not be swamped by the weight of *Hub*- and *Mixed*-village respondents), *Hub* respondents account for 62 percent of the total sample (combined samples, *Hub N = 350, Periphery N = 216*).

The question addressed here is whether high rates of nonresponse occur in the sample and, if so, whether attributes of the types of villages in which respondents reside--or some other factors for which controls can be exercised--account for those rates.

Overall, 13 AOSIS items yielded nonresponse rates greater than 10 percent in the *Hub* subsample (pretest and posttest combined), and 4 AOSIS items yielded nonresponse rates greater than 10 percent in the *Periphery* subsample (all in the posttest). Almost all of the differences are accounted for by the differences between the types of villages. The contrast is marked: only one among the 61 AOSIS items, D22 (Did you vote in the most recent village corporation election?), generated low responses in both halves of the contrast (posttest sample only). Our

Table 3-1

NONRESPONSE RATES FOR QUESTIONNAIRE INSTRUMENT ITEMS: SCHEDULE C PRETEST AND POSTTEST SAMPLES BY THEORETICAL CONTRAST: *HUB* V. *PERIPHERY* [*Hub* .89X *N* = 201; .01X *N* = 136] [*Periphery* .89X *N* = 149; .01X *N* = 80]

NOMINAL VARIABLES	NONRESPONSE RATES (PERCENT) FOR HUB		NONRESPONSE RATES (PERCENT) FOR PERIPHERY	
	Pretest	Posttest	Pretest	Posttest
	.89X[a]	.01X[b]	.89X[a]	.01X[b]
A28 Subsistence food yesterday	1.0	0.7	0.0	1.3
A30 Subsistence food day before	0.5	0.7	0.7	0.0
B9 Incapacitated past 2 weeks	0.0	25.0	2.0	1.3
C6N Employed last year	0.5	0.0	0.0	0.0
C12 Work out of village last year	0.5	6.6	0.0	3.8
C15 Leave for Exxon Valdez work	0.0	0.0	0.0	0.0
C20B Financial gain Exxon Valdez	NA	26.5	NA	5.0
D3 Commercial fish/own busns	4.0	2.2	4.1	5.0
D19 Vote city council election	3.0	4.4	2.0	25.0
D20 Vote statewide election	2.0	5.9	0.7	1.3
D22 Vote village corp election	5.0	25.7	0.7	28.9
D23 Vote region corp election	5.0	25.7	0.7	0.0
D24 Where were you born	1.0	1.5	2.0	0.0
D26 Reside before moving here	6.5	0.7	8.7	10.0
D28 Race of respondent	2.0	19.9	10.0	1.3
D29 Currently married	0.5	0.0	1.3	0.0
D29A Race of spouse	10.9	8.1	2.0	2.1
E50 Will oil search create jobs	2.0	1.4	4.7	0.0
E58 Cause of Exxon Valdez spill	19.9	0.0	5.4	1.3
HTYPE Household type	0.5	6.6	0.7	0.0
PPEMP Public-private employment	3.1	7.5	3.3	4.8
RSEX Sex of respondent	0.0	0.0	0.0	0.0

[a] .89X is the combined sample of initial (not panel) interviews in Schedule C communities, designated "pretest."

[b] .01X is the combined sample of discretionary interviews (not reinterviews) conducted during 1990 and 1991 in Schedule C communities, designated "posttest."

Table 3-1 (continued)

ORDINAL VARIABLES	NONRESPONSE RATES (PERCENT) FOR HUB		NONRESPONSE RATES (PERCENT) FOR PERIPHERY	
	Pretest	Posttest	Pretest	Posttest
	.89X	.01X	.89X	.01X
A25A Game since Exxon Valdez	0.0	9.6	6.7	7.5
A26A Game last 5 years	3.5	2.9	0.0	0.0
A26A2 Fish since Exxon Valdez	7.0	3.7	6.7	8.8
A26B Fish last 5 years	9.0	9.6	8.1	0.0
A31 Who harvested food	1.4	0.0	1.0	0.0
A32 Eat with rels/other HHs	1.0	4.4	2.7	1.3
A32B Food since Exxon Valdez	0.5	0.7	0.7	1.3
A33 Percent meat/fish in diet	1.0	0.7	1.3	1.3
A38 Use Native language home	14.4	20.6	3.9	2.2
B1 Describe your health	0.5	25.0	0.0	0.0
C1 Years education	0.5	0.7	0.7	0.0
C20 Financial loss Exxon Valdez	0.0	NA	0.0	NA
C20A Reimbursement for loss	NA	25.7	NA	5.0
D6 Is household better off now	6.0	0.7	1.3	0.0
D9 Access to drinking water	0.5	0.0	0.7	0.0
D10 Waste water removal	0.5	22.8	0.0	8.8
D12 Difficulty in heating house	1.0	0.0	2.0	0.0
D24 Community in which born	1.0	1.5	2.0	0.0
D26 Previous residence	6.5	0.7	8.7	10.0
E10 Ability in Native language	12.4	17.6	1.3	6.7
E12 Social ties other comm	6.5	2.2	3.4	2.5
E29 Feelings current income	1.0	0.7	0.0	0.0
E52 Feelings about oil	1.0	1.4	8.1	1.3

INTERVAL VARIABLES	NONRESPONSE RATES (PERCENT) FOR HUB		NONRESPONSE RATES (PERCENT) FOR PERIPHERY	
	Pretest	Posttest	Pretest	Posttest
	.89X	.01X	.89X	.01X
C6M Total months employed last year	0.5	0.7	0.0	0.0
C12M Time employed outside village	3.0	0.0	0.0	0.0
C13 Gained Exxon employment	1.5	1.5	0.7	1.3
C16 Employment loss from spill	3.0	4.4	5.4	13.8
C18 Relocate due to spill	10.4	4.4	7.4	13.8
C19 Property loss due to spill	2.0	0.7	0.7	2.5
D2 Annual household income	7.5	2.2	6.7	1.3
D4 Smallest income needed	6.5	2.2	2.7	0.0
D8 Rooms in house	1.0	0.0	0.7	0.0
D13 Days visiting friends/relatives	1.0	0.0	0.0	0.0
D16 No. public meetings last month	0.0	0.0	0.7	1.3
D25 Years resided in village	0.0	0.0	0.7	2.5
D27 Visit in other community	1.5	1.4	2.0	0.0
RAGE Respondent's age	1.0	1.5	0.0	0.0
HSIZE Household size	0.0	0.0	0.0	1.3

subclassification analysis does not account for relatively low responses by Natives to Question D22 in the posttest sample. For reasons about which we can only speculate, Native respondents in the posttest sample in both *Hub* and *Periphery* villages were less likely to have voted in the most recent village corporation election than was the case for the pretest respondents.

Items A38 and E10 (whether and how much the respondent claims the Native language is used in the home, and how satisfied the respondent is with his/her own control of his/her Native language) provide marked contrasts between *Hub:Periphery* in pretest and posttest. The high nonresponse rates in *Hub* villages are very interesting. In both pretest and posttest, more than 10 percent of Native respondents in *Hub* villages did not answer these questions, whereas their congeners in *Periphery* villages did respond. It is plausible, although only a suggestion, that the longer a Native resides in a *Hub* village--particularly one of the very large, complex *Hubs* such as Kenai, Kodiak, and Valdez, the more reluctant they are to provide information about their Native-language competence, particularly if they think that their competence has waned.

The question about whether the search for oil will create jobs (E50) has an interesting history over the life of our project. Responses vary by occupation, race/ethnicity, and context. The question asks whether the search for oil will create jobs, not whether respondents are favorably disposed to the search for oil. Most respondents have opinions about oil research; and most respondents answer E50, although that question has marginal reliability in the pretest sample (10.9%). We therefore subclassified the responses of *Hub* respondents by race/ethnicity and by research wave (prespill 1988 and postspill 1989). We learned that the question was less often answered by non-Natives than Natives at a rate of 2:1. There is no obvious explanation for the difference. By contrast, nonresponse to (E50) is not a problem in *Periphery* villages.

Responses to the cause of the Exxon Valdez oil spill (E58) pose a different problem. The spill had not occurred prior to our research wave in winter 1988 (or winter 1989, for that matter), so pretest responses for 1988 are not tallied for item

E58. In summer 1989, however, nearly four times as many *Hub* respondents (19.9%) as *Periphery* respondents did not answer the question. Through subclassification we learned that response rates were lowest in Valdez and Kenai, the two *Hub* villages in which oil-related businesses account for the greatest proportion of employment and income.[26] Indeed, non-Native respondents in Valdez and Kenai account for 88 percent of all refusals by *Hub* respondents to answer the question. Nonresponse to E58 among *Hub* (but not *Periphery*) appears to be a sensitive indicator of a more complex web of relations in those communities.

High nonresponse rates to items C20, C20A, and C20B among *Hub* respondents in the posttest are a function of incorrect ratings of "*missing data*" for persons who either were not resident in the spill area during the spill event, or who sustained no financial loss directly from the spill. One field researcher failed to ask questions pertaining to the respondent's health (B1, B9), accounting for the 25-percent nonresponse rates for those items among *Hub* posttest respondents.

Among respondents residing in *Periphery* villages, about 14 percent did not answer questions C18 and C19, which assess whether the respondent lost employment because of the spill, and whether the respondent relocated as a consequence of the spill--whatever the reasons may have been. Although the response rates are low for C18 and C19, these questions do not appear to have construct-validity problems. The low responses among persons interviewed in *Periphery* villages may be fortuitous, although the reason does not appear to be related to ethnicity or occupation (a few non-Natives [4] and a few Natives [7] did not answer the questions).

No AOSIS items in the *Hub:Periphery* contrast appear to threaten validity. Nonresponse rates greater than 10 percent are, in almost every instance, accounted

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[26]See Edward Robbins, "Valdez," pp. 33-132, in Social Indicators Study of Alaskan Coastal Villages IV. Key Informant Summaries. Schedule C Communities, Part 1 (Cordova, Tatitlek, Valdez) (HRAF 1993). He reports that employees of Alyeska and other oil-related businesses were reluctant to answer questions directly related to the causes and the consequences of the oil spill. Managerial employees were forbidden by company policy to discuss the spill with researchers and media representatives. Regardless of company policies, many employees were reluctant to discuss the spill because of a variety of reasons, many of which could occur to the same person--respondent or not. The spill caused some acrimony, which many persons engaged in oil-related businesses or in goods and service businesses such as local restaurants, grocery stores, and dry goods stores would prefer to avoid.

for by differences either in race/ethnicity or village complexity and size, or both. Some high nonresponse rates are trivial and consequences of innocent errors, i.e., entering some responses as "missing" when they should have been entered as NA. These last-mentioned errors have been corrected and do not influence the bivariate and multivariate analyses.

I.B. Nonresponse in the *Comm Fish:Noncom Fish* Contrast

The *Comm Fish:Noncom Fish* contrast provides some markedly different nonresponse reliability issues from those attributable to the *Hub:Periphery* contrast. The obvious point is that some *Hub* villages are commercial fishing villages and some are not, and some *Periphery* villages are commercial fishing villages and some are not. Tables 2-1 and 2-2 (Chapter 2) demonstrate each village's classification in each theoretical contrast. Of major importance here is that 60 percent of the total incomes of two *Hub* villages, Kenai and Valdez, is not derived from commercial fishing-related business (*Noncom Fish*). Kenai and Valdez are lumped with tiny Tyonek and moderate-sized Seldovia as the only noncommercial fishing villages in our Exxon Valdez-spill-area sample. This is not to say that commercial fishermen do not reside in those villages or that commercial fishing-related enterprises do not occur within them. Commercial fishermen reside in each village. In addition, Kenai and Valdez have several fish processing plants (canneries and plants that flash-freeze fish) and businesses that outfit fishermen and provide repairs.

The two remaining large villages in the Exxon Valdez-spill-area sample, Kodiak City and Cordova, are commercial fishing villages (*Comm Fish*). Among the four largest villages, only Cordova is not a *Hub* community. The theoretical contrasts were created so that the factor at the base of each contrast could, but need not, vary independently from the factor at the base of each other contrast.

Table 3-2, when compared with Table 3-1, demonstrates the differences in nonresponse rates on AQI items between the *Hub:Periphery* and *Comm Fish:Noncom Fish* contrasts. Eleven AQI items received nonresponse rates greater than 10 percent in the *Comm Fish* contrast, as did nine AQI items in the *Noncom Fish* contrast.

Table 3-2

NONRESPONSE RATES FOR QUESTIONNAIRE INSTRUMENT ITEMS: SCHEDULE C PRETEST AND POSTTEST SAMPLES BY THEORETICAL CONTRAST: *COMMERCIAL FISHING* V. *NONCOMMERCIAL FISHING*
[*Comm Fish* .89X *N* = 158; .01X *N* = 135]
[*Noncom Fish* .89X *N* = 192; .01x *N* = 81]

NOMINAL VARIABLES	NONRESPONSE RATES (PERCENT) FOR COMM FISH		NONRESPONSE RATES (PERCENT) FOR NONCOM FISH	
	Pretest .89X[a]	Posttest .01X[b]	Pretest .89X	Posttest .01X
A28 Subsistence food yesterday	0.6	1.5	0.5	0.0
A30 Subsistence food day before	0.6	0.7	0.5	0.0
B9 Incapacitated past 2 weeks	0.6	0.7	0.5	0.0
C6N Employed last year	0.6	0.0	0.0	0.0
C12 Work out of village last year	0.6	5.9	0.0	4.9
C15 Leave for Exxon Valdez work	0.0	0.0	0.0	0.0
C20B Financial gain from Exxon Valdez	NA	2.8	NA	5.0
D3 Commercial fish/own busns	3.1	4.4	4.7	1.2
D19 Vote city council election	1.3	13.3	3.6	9.9
D20 Vote statewide election	0.0	5.9	2.6	1.2
D22 Vote village corp election	12.0	35.7	21.8	23.5
D23 Vote region corp election	12.0	0.4	21.8	23.5
D24 Where were you born	1.9	0.7	1.0	1.2
D26 Reside before moving here	5.7	4.4	2.6	3.7
D28 Race of respondent	10.4	3.7	0.5	0.0
D29 Currently married	1.9	0.0	0.0	0.0
D29A Race of spouse	12.0	0.0	13.6	18.0
E50 Will oil search create jobs	4.4	0.7	2.1	1.2
E58 Cause of Exxon Valdez spill	3.7	1.5	6.3	3.7
HTYPE Household type	0.6	6.7	0.0	1.2
PPEMP Public-private employment	1.9	5.9	5.0	7.1
RSEX Sex of respondent	0.0	0.0	0.0	0.0

[a] .89X is the combined sample of initial (not panel) interviews in Schedule C communities, designated "pretest."

[b] .01X is the combined sample of discretionary interviews (not reinterviews) conducted during 1990 and 1991 in Schedule C communities, designated "posttest."

Table 3-2 (continued)

ORDINAL VARIABLES	NONRESPONSE RATES (PERCENT) FOR COMM FISH		NONRESPONSE RATES (PERCENT) FOR NONCOM FISH	
	Pretest	Posttest	Pretest	Posttest
	.89X	.01X	.89X	.01X
A25A Game since Exxon Valdez	16.0	7.4	19.7	9.7
A26A Game last 5 years	6.7	14.1	13.7	11.0
A26A2 Fish since Exxon Valdez	12.6	2.1	7.7	0.5
A26B Fish last 5 years	5.8	8.9	4.7	11.3
A31 Who harvested food	1.2	0.0	0.0	0.0
A32 Eat with rels/other HHs	2.5	4.4	1.0	1.2
A32B Food since Exxon Valdez	0.6	1.5	0.5	0.0
A33 Percent meat/fish in diet	1.3	1.5	1.0	0.0
A38 Use Native language home	0.4	0.0	30.0	10.0
B1 Describe your health	0.0	8.9	0.5	42.0
C1 Years education	0.6	0.7	0.5	0.0
C20 Financial loss from Exxon Valdez	0.0	3.6	0.0	0.0
C20A Reimbursement for loss	NA	19.4	NA	0.0
D6 Is household better off now	1.9	0.0	5.7	1.2
D9 Access to drinking water	0.6	0.0	0.5	0.0
D10 Waste water removal	0.0	19.4	0.5	0.0
D12 Difficulty in heating house	1.3	0.0	1.6	0.0
D24 Community in which born	1.9	0.7	1.0	1.2
D26 Previous residence	5.7	4.4	2.6	3.7
E10 Ability in Native language	13.2	0.4	17.6	7.6
E12 Social ties other comm	6.9	3.0	3.6	1.2
E29 Feelings current income	0.0	0.0	1.0	1.2
E52 Feelings about oil	0.6	2.4	6.8	1.2

INTERVAL VARIABLES	NONRESPONSE RATES (PERCENT) FOR COMM FISH		NONRESPONSE RATES (PERCENT) FOR NONCOM FISH	
	Pretest	Posttest	Pretest	Posttest
	.89X	.01X	.89X	.01X
C6M Total months employed last year	0.6	0.0	0.0	1.2
C12M Time employed outside village	3.8	1.5	0.0	1.2
C13 Gained Exxon Valdez employment	0.6	2.4	1.6	1.2
C16 Employment loss from spill	3.2	11.8	4.7	8.6
C18 Relocate due to spill	6.3	8.1	11.5	7.4
C19 Loss of property due to spill	0.6	3.5	2.1	3.7
D2 Annual household income	8.2	0.7	6.3	2.5
D4 Smallest income needed	2.5	0.7	6.8	0.0
D8 Rooms in house	0.6	0.0	1.0	0.0
D13 Days visiting friends/relatives	0.0	0.0	1.0	0.0
D16 Number public meetings last month	0.6	0.7	0.0	0.0
D25 Years resided in village	0.6	1.5	0.0	0.0
D27 Visit in other community	1.9	0.7	1.6	1.2
RAGE Respondent's age	0.6	0.0	0.0	0.0
HSIZE Household size	0.0	0.0	0.0	0.0

Six items yielded high nonresponse rates in both halves of the contrast: three of those questions were asked of Natives only; three apply to all respondents. Items D22 and D23 (questions measuring whether Natives voted in the most recent village corporation and regional corporation elections) exceeded 10 percent nonresponses in three of four contrasts (pretest and posttest). Item E10 (which measures Native respondents' affective attitudes about whether they are satisfied with their Native-language competence) generated high nonresponse rates in both halves of the pretest contrast but not the posttest.

Nonresponses for D29A (measuring race of spouse) and A26A (measuring the respondents' estimates of whether game is more, the same as, or less available in the present than 5 years earlier) also exceeded 10 percent in three of the four contrasts, whereas nonresponse rates for A25A (estimates of game available for harvesting since the Exxon Valdez spill) were high for both halves of the contrast only during the initial wave of postspill research in summer 1989.

Nonresponses for the remaining AQI items--12 in all--are sprinkled throughout the table and appear only once: four in the pretest and four in the posttest among *Comm Fish* respondents, and three in the pretest and two in the posttest among *Noncom Fish* respondents.

The questions that address Natives alone--D22, D23, E10--are interesting. Recall that Natives residing in *Periphery* villages responded at high rates to these three questions in pretest and posttest samples, with the exception of D22 in the posttest. Native respondents in *Hub* villages failed to respond to all three of these questions in both pretest and posttest samples. Two factors appear to account for the high rates of nonresponse to D22, D23, and E10 in both *Comm Fish* and *Noncom Fish*: (1) large villages with complex infrastructures and superstructures are classified in each half of the contrast, and (2) Native residents of the largest villages in the Exxon Valdez spill area are less apt to respond to questions about whether they exercise their franchise to participate in Native corporations than are their congeners in small, simple villages. A large number of unknown factors may be operating to restrict responses of from 12 to 36 percent of Natives in *Comm Fish* and *Noncom Fish* villages to these items. Among them may be the dissolution of some of the village corporations in which respondents were shareholders (hence the response should have been "NA" rather than "missing"; or persons were not residing in the villages or in the regions in which they were shareholders, and whether or not they voted in either or both corporation elections in which they are shareholders, they misconstrued the question as asking if they voted in the Native corporation election of the village and region in which they currently resided. This last-mentioned possibility suggests a construct-validity problem.

Upon exercising controls for the length of time Natives have resided in the villages in which they were interviewed and for the places in which they were born, we learn that 85 percent of Natives who did not respond to Items D22 and D23 in the pretest samples (both halves of the contrast) either had resided in those villages for less than 5 years or were not born in the region (or were not born in Alaska), or both. The respondents' birthplace (in a different region or outside Alaska) accounts for 77 percent of the nonresponses. In the posttest samples, 25 percent of the nonresponses are attributable to persons born outside the region or outside Alaska. Our data sets do not contain information on the village corporations in which respondents are shareholders, so we cannot determine whether those corporations are viable. It is reasonable to conclude that D22 and D23 posed construct-validity problems for some respondents, or that some interviewers failed to make clear what appropriate responses would be.

Item E10 received high nonresponse rates in the pretest but not the posttest. The affective attitudinal variables, including E10, had a complex history in the Schedule A and B portion of the research. Most of the affective attitudinal variables had no longitudinal reliability. Item E10 is one of five survivors from over 50 affective attitudinal variables used in the original AQI. No controls that we exercised accounted for the high nonresponse rates in the pretest sample. It is possible that the question was not asked of the respondents by a couple of our interviewers during summer 1989, but was rated as missing rather than NA. We have no reason to conclude that E10 poses a reliability problem.

Responses to Items A25A (availability of game) and A26A2 (availability of fish) in summer 1989, in comparison with the period prior to the Exxon Valdez oil spill, produced high nonresponse rates. The same question did not produce high nonresponses in 1991. Fully 85 percent of the nonresponses in the pretest sample are attributable to persons who did not hunt (the variable measuring hunting of land mammals is CACT1 and sea mammals CACT2) and/or did not fish (the variable measuring fishing is CACT5). These responses should have been rated NA. The problem was corrected in 1991, and Item A25A does not pose a construct-validity problem.

Oddly, Item A26A, measuring the availability of game now (whenever the interview was administered is "now") as opposed to 5 years earlier, suffered from the same problem that afflicted the ratings of A25A and A26A2: 85 percent of the nonresponses in the *Noncom Fish* pretest sample are accounted for by persons who do not hunt. Dissimilar to Items A25A and A26A2, the rating problem for this item was not corrected in the posttest: 62 percent of the nonresponses are attributable to persons who do not hunt. Item A26A is not a construct-validity problem, and its use in pairwise bivariate analysis will not threaten validity.

High nonresponse rates in the few remaining items occurred only once. A few, such as Items C16, C18, and C20A, which address two kinds of losses due to the oil spill, and C20A (whether respondents received reimbursement from Exxon for those losses) received high nonresponses in three of 10 measures, whereas two other measures of losses due to the oil spill (C19, C20) had high response rates in all eight measures. These questions do not appear to threaten validity.

The nonresponse analysis suggests that Items D22 and D23 pose threats to validity. Whereas these items have high response (low nonresponse) rates in *Periphery* villages, the obverse is true among *Hub* villages and in the *Comm Fish:Noncom Fish* contrast.

CHAPTER 4
ITEM RELIABILITY WITH THEORETICAL CONTRASTS

I. INTRATOPIC RELIABILITY

Here we examine item reliability through a second method loosely referred to as intratopic reliability.[27] AQI items are organized into six sections. Each section embraces several questions, also referred to as "items" and "variables," focused on a single topic. For example, the two questions in the B section ask the respondents to provide self-reports of their health. It is a *sine qua non* of social research that pairs of variables that address features of the same topic, such as personal health, will be more highly correlated, in general, than pairs of variables in which each is focused on a different topic, such as B1 (personal health) and D2 (income). This expectation is based on the assumption that items within topics, logically and empirically, should yield high positive correlations because of the similarity of the underlying theme on which all variables in the topic are based.

In order to avert any misperceptions we seldom use correlation or covariation coefficients in this research. Throughout most of the analysis we employ proportional reduction of error (PRE) coefficients. In addition, all items within a topic need not yield high positive PRE's. For example, we expect to obtain negative PRE coefficients in every sample when measuring the relation between B1 (which asks the respondent to rate his or her health from [1] "very poor" to [5] "very good") and B9 (which asks the respondents whether illness or injury had restricted their everyday activities within the past 2 weeks [dichotomous]). If a person's health is very good, it should not be impaired by illness or injury (and vice versa).

We classify PRE coefficients ≥.50 as "strong." For example, if the PRE coefficient for the bivariate relation $\gamma_{12} = +.65$, knowledge of the distribution of Variable 1 reduces our error in predicting the distribution of Variable 2 by 65 percent (and vice versa). We deem each variable in the pair "reliable" if each obtains several PRE coefficients ≥.50 in relations with other variables within the set. The number of strong PRE coefficients expected for any variable varies with the number

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[27]Relations between items within the same section also are referred to as "internal," or "within topic."

of items within the set. For sets with 5 to 10 items, we require 2; for sets with 11 to 15, we require 3; for sets with 16 to 20, we require 4; and for sets with more than 20, we require 5 PRE coefficients ≥.50. The greater the number of strong PRE coefficients within a set, the greater the mutual predictability. The reliability of an item whose response rates are high across samples is further confirmed by obtaining several strong PRE coefficients in the intratopic test within each sample.

In order to test for intratopic reliability the variables within each set were grouped with only members of that set. Next, the matrices of PRE coefficients were calculated between every pair of variables (items) in the set. We then analyzed the matrices of bivariate PRE coefficients in two fashions. First, we counted all PRE coefficients in each topical matrix, such as AQI Section A, and divided that number by the number of PRE coefficients ≥±.50 in the matrix (thus, yielding a percentage of strong PRE scores to all PRE scores). Next, we determined the average number of PRE coefficients ≥±.50 for variables within each section, excluding variables that had no PRE score ≥.50. The results appear in Tables 4-1 and 4-2.

Throughout we are interested in the percentage of strong PRE scores (disregarding signs) for each section and the average strong PRE scores (disregarding signs) for each variable within each section; and we also are interested in the differences in the percentages and averages between the halves of each theoretical contrast. It is possible to have low total percentages or low total averages for sets of variables within a section, but still to have high reliability because of high percentages of high averages in one-half of a theoretical contrast, but low in the other half. The idea of the theoretical contrasts is that differences obtain between, say *Hub* and *Periphery*, and that different responses to the same variables will be observed through the contrasts.

In Table 4-1 we see that total pretest and posttest averages for the six sections are very similar, varying from 14 percent to 76 percent. Whereas 14 percent is a very high proportion of PRE scores ≥.50, 76 percent is extremely high. And whereas zero (for the B section) suggests that those items should be dropped, there are only two items in the set, and each was selected for the Exxon Valdez spill sample

Table 4-1

INTRATOPIC RELIABILITY, PERCENTAGE OF PRE COEFFICIENTS ≥.50 FOR RELATIONS BETWEEN ALL PAIRS OF VARIABLES WITHIN EACH AOSIS SECTION A-E, PRETEST AND POSTTEST TOTAL SAMPLES AND THEORETICAL CONTRASTS

Section	***N***	**Total**	***Hub***	***Periphery***	***Mixed***	***Native***	***Comm Fish***	***Noncom***
Pretest		**Pretest**	**Pretest**		**Pretest**		**Pretest**	
A	11	16%	15%	9%	13%	13%	13%	16%
B	2	0%	0%	0%	0%	0%	0%	0%
C	13	15%	17%	24%	13%	36%	35%	17%
D	23	17%[a]	12%	13%	10%	15%	12%	22%
E	7	10%	15%	5%	20%	5%	0%	19%
ACT	16	76%	68%	65%	48%	70%	68%	85%
Posttest		**Posttest**	**Posttest**		**Posttest**		**Posttest**	
A	10	16%	14%	10%	14%	19%	18%	33%
B	2	100%	100%	100%	100%	100%	100%	100%
C	22	21%	34%	26%	25%	35%	24%	51%
D	24	14%	21%	25%	15%	29%	15%	17%
E	9	10%	10%	10%	10%	25%	25%	14%
ACT	16	73%	79%	92%	80%	99%	77%	56%

[a] Because of the large proportion of interval variables in the D section, Pearson's r rather than Goodman and Kruskal's γ is used to describe the relations between pairs of variables. Pearson's rs, whose probabilities of occurring by chance are <1 in 10,000 (P<.000), were tallied as PRE ≥ .50.

Table 4-2

INTRATOPIC RELIABILITY, AVERAGE NUMBER OF PRE COEFFICIENTS ≥.50 FOR VARIABLES WITHIN EACH AOSIS SECTION A-E [EXCLUDING VARIABLES THAT HAD NO PRE SCORE ≥.50], PRETEST AND POSTTEST TOTAL SAMPLES AND THEORETICAL CONTRASTS

Section	*N*	Total	*Hub*	*Periphery*	*Mixed*	*Native*	*Comm Fish*	*Noncom*
Pretest		**Pretest**	**Pretest**		**Pretest**		**Pretest**	
A	11	5.0	2.3	2.0	1.8	1.9	1.3	1.6
B	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	13	2.1	2.2	3.4	2.0	4.3	3.8	1.8
D	23	5.2	3.6	4.1	2.8	4.2	2.5	4.4
E	7	1.3	1.3	1.0	1.6	1.0	0.0	1.2
ACT	16	11.4	7.5	7.2	6.4	7.6	10.3	14.0
Posttest		**Posttest**	**Posttest**		**Posttest**		**Posttest**	
A	10	2.0	2.0	1.0	2.0	1.6	1.8	3.3
B	2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
C	22	5.2	7.4	5.7	5.4	7.7	5.4	11.8
D	24	3.5	4.5	5.4	3.2	6.2	3.1	3.7
E	9	1.0	2.0	1.0	1.3	1.0	2.0	1.0
ACT	16	11.0	10.4	13.8	12.1	14.9	11.5	7.9

because we learned in the Schedule A and B research that although they negatively predict one another, B1 positively predicts a host of variables that measure "good health," rendering the other variables redundant; and B9 positively predicts a host of variables that measure "poor health and infirmities," rendering those measures redundant as well. In general, the percentages and averages for the sets are high, conforming to our requirements for intratopic reliability.

Section E, comprising seven to nine affective attitudinal variables in the Exxon Valdez spill sample, has posed a variety of threats to validity throughout the course of this study and the larger study of which this is a part. There were 47 affective attitudinal questions in the initial AOSIS questionnaire that was administered in the first wave of Schedule A and B research. Affective attitudinal variables measure how respondents *feel* about, say, their current income: are they "not satisfied," "somewhat satisfied," or "completely satisfied?" Whereas the "income" question survived our tests, it was one of three to do so in its original form.[28] Three other survivors were altered by converting them to cognitive attitudinal questions.[29] Cognitive questions ask what a respondent *thinks* or *knows*. Forty-one affective attitudinal questions were fraught with construct-validity problems or reliability problems, or they violated Native customs and were dropped from the study. We employed the six surviving questions here and added one new one.[30]

Responses to Section E variables were markedly different by theoretical contrasts, including **Native:Non-Native** (racial/ethnic) contrast (not to be confused with *Native:Mixed* village contrasts). Thus, although the total percentages and item averages are low, the differences revealed by the E variables are important.

If the Section E variables are the exceptions on the low side, the Section ACT variables are the exceptions on the high side. The highest percentages are registered by the 16 traditional activities variables (ACT) that measure whether, how often, and with whom respondents engage in hunting various species of land and sea mammals, fishing for several species of fish during summer and winter, establishing camps for the purpose of extraction, and maintaining equipment necessary for those pursuits. ACT variables are highly involuted in these samples, much as they are in the Schedule A and B samples referred to above: if respondents hunt land mammals, and if they tend to do so frequently, it is likely that they will fish

[28]The variables that survived the Schedule A and B tests for reliability and validity are E10 (How do you feel about your ability to speak your Native language?), E12 (How do you feel about the social ties you have to people in other communities?), and E29 (How do you feel about the income you [and your family] have?).

[29]The three cognitive attitudinal questions in Section E that survived our tests for reliability and validity are E50 (If the federal government lets oil companies search for oil in your region, do you think that the search for oil will create more jobs for residents of the region?); E51 (Do you think the search for oil offshore in this area would reduce the amount of fish and game, increase the amount of fish and game, or not change the amount of fish and game?). E51, as is evident, provides a false conjunction that bothered many Natives to the point that they refused to answer. It is possible for land mammals to increase, yet for sea mammals to decrease, or for fish to increase but for land mammals and birds to decrease. We resurrected the question from Schedule B responses, even though it provided a false conjunction. We sought to correct the problem by bifurcating the question in the final waves of the research; E51A (Do you think the search for oil would reduce...fish...?); E51B (Do you think the search for oil would reduce...game...?'); and E52 (Thinking about all the good things and bad things that might happen, do you think that the search for oil off shore in this area is a good idea, a bad idea, or do you have mixed feelings about it?). (E52 has its problems, even after modification, because of the mixture of cognitive and attitudinal questions: thoughts and feelings.)

[30]For item E58 (Who or what do you think is responsible for the Exxon Valdez oil spill of 3/24/89?), response possibilities range from 0 (respondent has no thoughts about the cause) to 7 (respondent assigned cause to a host of factors from the captain's errors to negligence on the part of the Federal Government).

frequently as well. And if they engage in one activity with relatives, it is likely that they will engage in other traditional activities with relatives. To the contrary, if respondents do not hunt land mammals, it is likely that they do not fish either; and they almost surely do not establish camps away from their homes.

It is evident that the remaining theoretical contrasts (Sections A, C, and D) yield differences in percentages and averages of strong PRE coefficients. These differences are analyzed at the appropriate places in the text. The expectations for differences are explicated elsewhere in our reports. Here let us call brief attention to the differences in the percentage of strong PRE scores for ACT variables between the *Native* and *Mixed* villages. Given the nature of the contrast--small, simple, homogeneous Native villages vs. large, complex, heterogeneous mixed-racial villages, we expect differences between them in the number of strong PRE coefficients in both the pretest and posttest samples. Likewise, we expect higher PRE scores for *Periphery* than for *Hub* villages. The difference between *Hub* and *Periphery* is significant in the posttest but not the pretest. Sample differences between pretest and posttest account for the differences, but those differences are not relevant here. The AQI items have high intratopic reliability.

CHAPTER 5
STABILITY AND CHANGE OVER TIME

I. INTRODUCTION

Stationariness, or the stability of an item, is a measure of the relationship of a variable to itself over time. For example, a set of identical respondents is asked to provide responses to an identical question, say the amount of their annual earned income, at three points in time. The responses provided at the first request are correlated with the responses provided at the second request to measure the relationship of the variable to itself at two points in time. We want to know whether the responses are similar or different, and if so, how similar or how different. The responses provided at the second request are then correlated with responses to the identical question at the third point in time. Then the first and third sets of responses are correlated.

The relationship of a variable to itself over time is measured in three temporal periods: t_1 initial, t_2 transitional, t_3 change. The longitudinal correlations for an item must correlate $\geq \pm.50$ at t_1t_2 (r_{12}) at t_2t_3 (r_{23}), and at t_1t_3 (r_{13}) to satisfy the requirements for stationariness; but simple longitudinal correlations alone, calculated at three points in time, are not sufficient to estimate the stationariness of an item. The longitudinal correlations calculated for the relation between each pair of research waves, e.g., r_{12} at t_1t_2, allow us to estimate the reliability of an item. The estimate of stability requires that we divide the product of the longitudinal correlations for the first and second time periods and for the second and third time periods into the squared value for the longitudinal correlation for the first and third time periods. Stationariness is measured over three time periods, events, or research waves as S_{13} or S_{24} (or any other series of 3 time periods) ($S_{13} = r^2_{13}/r_{12}r_{23}$). It is necessary to compare measures at three points in time to validly attribute change in an indicator system to some specific factor; and that measure must represent the stationariness of the item over the two most distant periods, divided by the relations of the most proximate periods. Our research design is built on this requirement.

Stability of items is necessary to overcome threats to AOSIS's internal validity that are posed by "history," "testing artifacts" (also known as "test effects" and "reactivity"), and "regression."[31] History and regression are threats to validity only if an indicator is unstable or "nonstationary." The threats to validity mentioned here and the way in which measures of stability are used to control for these threats are discussed in Social Indicators Study II, where a much fuller discussion of stationariness is presented. We refer to stability and stationariness as synonymous.

Every item in an indicator study cannot be so stationary that not one of them is sensitive to interventions or exogenous factors. We must know whether items are stationary and how stationary they are in order to assess their sensitivity to change. In the Schedule A and B portion of this research project, we dropped all AQI items that proved to be unstable and unreliable and threatened the internal validity of the research. In the instance of the Exxon Valdez spill sample, we retained the most stable and reliable items. These items provide contrasts with the behavior of the identical items in the Schedule A and B study. Some new items were added following the 1989 Exxon Valdez oil spill because they pertain specifically to postspill issues. We must have items in our indicator system that are sensitive to large interventions as well as items that are not.

The five waves of AQI research conducted from winter 1988 through winter 1991 (see Figs. 2-1 and 2-2) have utilities other than the analysis of validity and reliability.[32] The waves of research allow us to assess change. Much of what we can test about change, and much of what we can discover about change (relations we did not anticipate beforehand but learned from analysis of the data), is derived from the analysis of the most stationary and least stationary items. First, fluctuations in the sizes (strength .00 to 1.00) and direction (or $\pm$) of longitudinal correlations for an item are required to analyze change. Change is not reflected in a single fashion through fluctuations in longitudinal correlations. For example, correlations less than unity ($< +1.00$) will be produced from wave to wave for changes in respondents' ages, or for an increase in education completed among respondents who continue to

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[31]These threats to validity are defined in Chapter 1.

[32]The sixth wave conducted in 1992 by the ADF&G in their Social Effects Project is evaluated here, although the variables for which data were obtained are a small subset of the AQI and KIP instruments.

acquire formal educations, or for respondents' incomes if for no cause other than inflation. Wider fluctuations to items measuring the use of the environment, employment, public political activities, or migration (and other demographic factors), for example, are expected to accompany large exogenous interventions such as a massive oil spill, a precipitous drop in international oil prices, or an abrupt termination of a wide variety of social service programs sponsored by Federal or State Governments.

The discussion of the Exxon Valdez spill sample in Chapter 2 reveals that, including the Social Effects data, we have five measures of one AQI panel comprising respondents from Kodiak City and Old Harbor on Kodiak Island (K1C). Two of the four research waves were conducted prior to the spill and three after it. Two large panels were interviewed three times each: the largest, comprising respondents from all regions whose local waters were encroached on by oil from the spill, were interviewed in 1989S, 1991W, and 1992W (EXXONC). The smaller panel, comprising residents from the Kodiak Island villages of Kodiak City, Karluk, and Old Harbor, was interviewed in 1990W, 1991W, and 1992W (K2C). The five research waves through the small Kodiak Island panel yield three measures of stationariness.[33] The large panels yield longitudinal correlations for the majority of variables, but they also yield measures of stability for a few variables.[34]

The completion of the 1992 research wave by the Social Effects research team allows us to create two new panels. One comprises respondents initially interviewed in either the 1988 prespill pretest, the 1989 prespill posttest, or the 1989 postspill posttest. If these persons had not been reinterviewed, they were sought for reinterviewing in 1992. Those respondents who were located and reinterviewed in 1992 comprise one panel (longitudinal correlations only). A second panel comprises respondents initially interviewed in the 1991 posttest and then reinterviewed in

[33]By years, the first measure is obtained for 1988-1989, 1989-1990, 1988-1990; the second measure is obtained for 1989-1990, 1990-1991, 1989-1991; the third measure is obtained for 1990-1991, 1991-1992, 1990-1992. It is, of course, possible to obtain other measures of stability from these data, e.g., 1988-1990, 1990-1992, 1988-1992.

[34]The AQI and KIP items in the Social Effects data sets allow us to obtain several measures of stability for the EXXONC and K2C panels. We obtain longitudinal correlations for the two large panels for all items not included in the Social Effects instrument.

1992. Panel responses (reinterviews) are compared for significant differences with pretest and posttest responses (initial interviews) to estimate whether reactivity, history, or regression has affected the former, while controlling for specification error (ecological fallacy) in application of the results from the latter. We address the relations between stationariness and testing artifacts in Chapter 6.

Reliability is inextricably related to stability and validity. The term has several meanings in the metalanguage of statistics and social research. The meanings relevant to the current project are presented in Social Indicators Study II. Our several measures of reliability are complex inasmuch as we exercise many controls for samples drawn at several points in time from the same population (with and without replacement). Briefly, however, if responses from the same informant at two or more points in time are the same, or if two different observers receive the same answer to the same (or similar) question from the same respondent, or if answers by the same respondent to similar (but not identical) questions on two different instruments are similar, then the item(s) being measured is said to be reliable. It is possible, of course, for a perfectly reliable item to be untrue. Poor construct validity can yield reliable but untrue answers. For that very reason in the Schedule A and B research and also in this research, we exercise a wide variety of controls to evaluate threats to construct validity, including nonresponse. At base, responses to questions must be reliable in order to demonstrate that a relation is real (covaries) in a statistical sense.

The over-time measure of reliability (R_{13}) is similar to the measure of stationariness in that longitudinal correlations for a single item are calculated for a set of identical respondents at three points in time. The over-time measure of reliability differs from stationariness. The reliability coefficient is an estimate of the reliability of r_{13}, free of the effects of temporal instability. Over-time reliability (R_{13}) is calculated $r_{12}r_{23}/r_{13}$. This estimate is used in conjunction with the estimate of true stability, or stationariness. If unreliability is present, the observed correlation will be an *underestimate* of stability.

David S. Moyer (pers. commun. 1993) has demonstrated the relationship of S_{13} to R_{13} by deriving r_{13}. He demonstrates that $S_{13} * R_{13} = r_{13}$: $S_{13} * R_{13} = (r^2_{13}/r_{12}*r_{23}) * (r_{12}*r_{23}/r_{13})$ = [by cancellation of the 2 "$r_{12} * r_{23}$"s] $= (r^2_{13}/r_{12}* r_{23}) * (r_{12}*r_{23}/r_{13}) = r^2_{13}/r_{13} = r_{13}$. Thus $S_{13} * R_{13} = r_{13}$.

The equation is shaped like a hyperbola. As is pointed out in Social Indicators Study II, because the equation takes the form k = xy where 0<k<1, stationariness can be high and reliability low or vice versa. Each coefficient must be assessed and interpreted.

II. PRESPILL/POSTSPILL KODIAK ISLAND PANEL: STABILITY AND CHANGE

The first Kodiak Island panel (K1C) is unique among all panels in the Exxon Valdez study in that the respondents were interviewed and reinterviewed prior to the oil spill. The K1C panel and the pretest sample from which it was selected provide our sole measures of prespill responses within the spill-affected area. The K1C panel also is unique among all of the panels in that its respondents were reinterviewed four times (5 research waves), two before the spill and three after. The five waves allow us to calculate several over-time reliability and stationariness coefficients. We do so for 1988W-1990 (R_{13}, S_{13}) and 1989W-1991 (R_{24},S_{24}), and for the variables in the Social Effects data set we also calculate reliability and stability for 1989W-90, 1990-92, and 1989W-92 using the conventional notation (R_{13}, S_{13}).[35] In addition, we calculate longitudinal correlations for 1988 and 1991 (r_{14}). Other strengths of the panel are: (1) it is a random sample drawn from the 1988 pretest sample (Schedule B) in the villages of Kodiak City and Old Harbor on Kodiak Island, the responses for which we demonstrated to be devoid of testing artifacts (reactivity), regression, and history; and (2), it is stratified into *Hub-Mixed* (Kodiak City) and *Periphery-Native* (Old Harbor) contrasts, which extends its generalizability for Kodiak Island.

[35] The "W" suffix for 1988W and 1989W represents the winter research wave. The 1989W wave preceded the Exxon Valdez oil spill. The 1989S (summer) wave followed the spill.

The weaknesses of the panel are: (1) it is very small ($N = 18$);[36] (2) generalizations derived from it are restricted to Kodiak Island and not generalizable to the entirety of the spill area; and (3) the economies of both villages are based on commercial fishing (*Comm Fish*), i.e., the sample does not provide contrasts with villages in which 60 percent or more of the total income is generated by private-sector businesses and public-sector agencies other than commercial fishing-related businesses.

II.A. Nominal Variables

We begin assessment of reliability and stability of items with this small panel (see Table 5-1). It is important to scan the longitudinal correlations (ϕ for the dichotomous relations, Cramer's V for 2XN or nondichotomous relations)[37] for the nominal variables, all of which are positive. In assessing the longitudinal correlations, it is important to determine strength. The higher the positive correlation, the more similar are the responses on the same topics by the same subjects at two points in time (1988 and 1989 [r_{12}], 1988 and 1991 [r_{14}], and so forth). We use .50 as the marker for strong correlations and ask: Is each longitudinal correlation >.50 or <.50? It is important to keep in mind that it is possible, as for Item B9 (Have you been incapacitated and unable to work for the past two weeks?), to have weak longitudinal correlations for an item for Waves 1 and 2 (r_{12} = .30), 2 and 3 (r_{23} = .12), and 1 and 3 (r_{13} = .05), yet have a strong over-time reliability coefficient for the three measures (R_{13} = .72). This is an

[36] Two respondents could not be located by Social Effects researchers in 1992, so the panel is reduced to *N16* for the 1989W-90, 1990-92, 1989W-92 tests.

[37] In choosing a PRE statistic for nominal data, I considered Guttman's λ--a reversible measure, Pearson's ϕ^2, and Goodman and Kruskal's τ ($\tau = \phi^2$ in a 4-cell table). I decided to use ϕ^2 rather than τ because it is better known, is a function of Pearson's r (ϕ also is known as r_4 for a 4-cell table), and is easily integrated into the R and S analyses. It has the problem of not achieving unity when the marginal sets are not identical, but no PRE statistic for nominal data satisfied every request I wanted to make of it. Cramér's V is simply ϕ for a 2XN table. V =

$$\sqrt{X^2}/N\min(r-1,c-1)$$

$$V^2 = X^2/N\min(r-1,c-1) = \phi^2/Min(r-1,c-1)$$

Table 5-1

LONGITUDINAL CORRELATIONS, RELIABILITY AND STABILITY COEFFICIENTS, INITIAL KODIAK PANEL [*KODIAK1C.PAN*, WINTER 1988 (N = 18)], QUESTIONNAIRE INSTRUMENT, 1988-1991[a]

	RELIABILITY AND STABILITY TESTS									
NOMINAL VARIABLES (ϕ)	88*[b]89 ϕ_{12}	89*90 ϕ_{23}	90*91 ϕ_{34}	88*90 ϕ_{13}	89*91 ϕ_{24}	88*91 ϕ_{14}	REL R_{13}	STA S_{13}	REL R_{24}	STA S_{24}
A28 Subsistence food yesterday	.40	.32	.08	.08	.20	.25	1.60	.05	.13	1.56
A30 Subsistence food day before	.03	.40	.40	.03	.53	.25	.40	.08	.30	1.76
B9 Incapacitated past 2 weeks	.30	.12	.38	.05	.32	.15	.72	.07	.14	2.25
C6N Employed last year	.44	.79	1.00	.35	.79	.35	.99	.35	1.00	.79
C12 Work out of village last year	.44	.65	.65	.43	.44	.47	.67	.65	.96	.46
D3 Commercial fish/own business	.51	.72	.80	.51	.53	.57	.72	.71	1.09	.49
D19 Vote city council election	.80	.60	.72	.43	.88	.71	1.16	.39	.49	1.79
D20 Vote statewide election	.52	.88	.61	.61	.78	.72	.75	.81	.69	1.13
D22 Vote village corp election	.32	.25	.25	.32	.72	.32	.25	1.28	.09	8.29
D23 Vote region corp election	NA	1.00	1.0	NA	.91	.32	NA	NA	1.10	.83
D24 Where were you born	.75	.79	.80	.66	.74	.74	.90	.74	.85	.87
D26 Reside before moving here	.65	.88	.53	.72	.57	.67	.79	.91	.82	.70
D28 Race of respondent	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D29 Currently married	1.00	.86	1.0	.83	.86	.83	1.04	.80	1.00	.86
D29A Race of spouse	.82	1.00	1.0	.75	.90	.67	1.09	.69	1.11	.81
E50 Will oil search create jobs	.47	.27	.11	.30	.03	.47	.42	.71	.99	.03
RSEX Sex of respondent	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08
HTYPE Household type	.62	.74	.77	.44	.74	.67	1.04	.42	.77	.96
E58 Cause of Exxon Valdez spill	NA	NA	.67	NA	NA	NA	NA	NA	NA	NA
PPEMP Public-private employment	.58	.42	1.00	.78	.58	.67	.31	2.50	.72	.80

[a]Longitudinal correlations measure six intervals (4 waves) within K1C panel. The reliability for each variable over 3 years is expressed twice, once for the period 1988-1990 (R_{13}) and once for the period 1989-1991 (R_{24}) ($R_{24} = r_{23}r_{34}/r_{24}$). Stability coefficients over the same 3-year periods are expressed as S_{13} and S_{24} ($S_{24} = r^2_{24}/r_{23}r_{34}$). Reliability and stability for nominal variables are derived from Pearson's Phi (ϕ) and Cramer's V.

[b]* = No Variation

Table 5-1 (continued)

RELIABILITY AND STABILITY TESTS

(Note: Longitudinal coefficients γ_{12} - γ_{14} are derived from Goodman and Kruskal's γ; over-time stationariness and reliability are calculated from Pearsonian *r*s [not shown])[c]

ORDINAL VARIABLES (γ)[c]		88*89 γ_{12}	89*90 γ_{23}	90*91 γ_{34}	88*90 γ_{13}	89*91 γ_{24}	88*91 γ_{14}	REL R_{13}	STA S_{13}	REL R_{24}	STA S_{24}
A26A	Game available the last 5 years	.27	.55	.51	.30	.25	.00	.11	1.66	.86	.21
A26B	Fish available the last 5 years	.07	.11	.58	.43	.29	.09	.01	34.72	.04	5.65
A31	Who harvested food eaten recently	.43	.73	.33	.33	-.13	.05	.82	.29	-.29	.48
A32	Eat with relatives in their households	.82	-1.00	1.00	.17	-1.00	-1.00	2.49	-.01	-.24	.46
A33	Percent meat/fish in annual diet	.82	.13	.38	.05	-.95	-.28	1.01	.10	-.08	6.58
A38	Use Native language home	1.00	1.00	1.00	1.00	.17	.33	.65	1.34	-6.21	.01
B1	Describe your health	.71	.76	.82	.57	.56	.53	.67	.76	1.48	.17
C1	Years of education completed	.99	1.00	1.00	.96	1.0	.91	1.02	.80	.91	.99
D6	Is household better off now than earlier	1.00	.96	-.02	.52	.34	.27	2.96	.06	2.13	-.08
D9	Access to drinking water	-1.00	-1.00	.76	-1.00	-1.00	.87	.02	16.90	.45	-.27
D10	Waste water removal	1.00	-1.00	.38	1.00	-1.00	.69	.32	-.46	.27	-2.47
D12	Difficulty in heating house	.85	1.00	.51	.50	.64	.89	1.02	.26	.29	1.35
D24	Community in which born	.83	.98	1.00	.90	.94	.94	.85	.93	1.73	.86
D26	Most recent residence before here	.58	1.00	.58	.57	.73	.62	.40	.92	.50	-1.01
E10	Ability in Native language	1.00	NA	.76	.75	NA	.14	NA	NA	NA	NA
E12	Social ties with other communities	1.00	.65	.60	1.00	.50	1.00	.53	1.19	.62	.60
E29	Feelings about amount of current income	.40	.67	.59	.71	-.15	.82	.29	1.02	-1.34	.06
A25A	Game available since Exxon oil spill	NA	NA	.63	NA	NA	NA	NA	NA	NA	NA
A26A2	Fish available since Exxon oil spill	NA	NA	.50	NA	NA	NA	NA	NA	NA	NA
A32B	Native foods since <u>Exxon Valdez</u> spill	NA	NA	.57	NA	NA	NA	NA	NA	NA	NA
C20	Financial loss from <u>Exxon Valdez</u>	NA	NA	*	NA	NA	NA	NA	NA	NA	NA
E52	Feelings about oil exploration	NA	NA	.88	-.17	NA	-.21	NA	NA	NA	NA

[c] Please note that the longitudinal coefficients for the ordinal variables are expressed as Goodman and Kruskal gammas (γ or Γ). They are not Pearsonian *r*s. Gammas are presented here because they fit the scale assumptions of the variables. The stability (s_{13}) and reliability (R_{13}) coefficients for the ordinal variables, however, are derived from Pearson's *r*. The *r* coefficients are not presented here.

Table 5-1 (continued)[d]

INTERVAL VARIABLES (*r*)	STABILITY TESTS									
	88*89	89*90	90*91	88*90	89*91	88*91	REL	STA	REL	STA
	r_{12}	r_{23}	r_{34}	r_{13}	r_{24}	r_{14}	R_{13}	S_{13}	R_{24}	S_{24}
C6M Total months employed last year	.84	.65	.84	.49	.88	.71	1.11	.44	.62	1.42
C12M Time employed outside the village	.36	.32	.31	-.06	.44	.05	-1.92	.03	.23	1.95
D2 Annual household income	.90	.92	.90	.91	.82	.87	.92	1.00	.95	.91
D4 Smallest income family requires annually	.86	.68	.63	.78	.72	.62	.75	1.04	.60	1.21
D8 Rooms in house	.19	.80	.66	.55	.54	.74	.28	1.99	.98	.55
D13 Days visited friends/relatives	-.12	.57	.54	.16	.68	-.17	-.43	-.37	.45	1.50
D16 No. of public meetings attended last month	.65	.64	.80	.35	.65	.50	1.19	.29	.79	.83
D25 Years resided in the village	.68	.81	.92	.71	.86	.78	.78	.92	.87	.99
D27 Recent visits to other communities	.49	.76	.46	.44	.35	.21	.85	.52	1.00	.35
RAGE Respondent's age	1.00	.70	.45	.70	.83	.66	1.00	.70	.38	2.19
HSIZE Household size	.66	.83	.83	.53	.90	.64	1.04	.51	.77	1.18
C13 Employment due to Exxon Valdez spill	NA	NA	.46	NA	NA	NA	NA	NA	NA	NA
C16 Employment loss from Exxon Valdez spill	NA	NA	.79	NA	NA	NA	NA	NA	NA	NA
C18 Relocation due to Exxon Valdez spill	NA	NA	*	NA	NA	NA	NA	NA	NA	NA
C19 Property loss due to Exxon Valdez spill	NA	NA	*	NA	NA	NA	NA	NA	NA	NA

[d]Longitudinal correlations are Pearson's *r*. Over-time reliability and stability coefficients are derived from Pearson's *r*.

instance of high reliability among very weak correlations. These three reliable longitudinal correlations are not stationary; indeed, they are very unstable (S_{13} = .07). We can observe the instability by inspecting the correlations. There were considerable changes in respondent illness and injuries between 1988 and 1990.

If high reliability does not imply that longitudinal correlations are strong, low stability does not imply that the item should be dropped from the matrix. If items are not stable over-time, we must evaluate those items in relation to other items and in relation to context because unstable points can reflect change. We are interested in the strength of the longitudinal correlations as well as their reliability and stationariness over time.

By simple inspection the nominal items can be organized into two groups, one comprising variables whose longitudinal reliability coefficients range from .50 to 1.00 and whose stability coefficients range from .65 to 1.28, and the other whose longitudinal reliability coefficients range from .03 to 1.00 and whose stability coefficients range from .03 to .49 and 1.56 to 8.29. In the first group, longitudinal correlations >.50 outnumber correlations <.50 by 51:2. In the second group, longitudinal correlations <.50 outnumber those >.50 by 34:7.

The group with strong longitudinal correlations, high reliability, and high stability measures whether respondents are commercial fishermen or self-employed (D3), voted in the most recent statewide election (D20), voted in the most recent regional corporation election (D23), consistently reported the place where they were born (D24)[38], consistently reported their last place of residence before moving to the village in which they were interviewed (D26), consistently reported their race/ethnicity (D28), maintained their marital status (D29), consistently reported the race of their spouse (if married) (D29A), consistently reported their sex (RSEX), and maintained their public or private source of employment (PPEMP).

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[38]It was important to assure that the same person in the household responded to the questionnaire during each wave of the panel. Unless the same person responded during each research wave, we had no way to control for reactivity or for sexual balance. (Our sampling design selected households at random; from a random start we took the first adult to respond as our first respondent. At the next household, we sought an adult of the opposite sex of the respondent in the previous household. Although our sole interest was not in assuring that panel respondents were the same persons in each wave, Items D24, D26, D28, and RSEX allow only for faulty memories or interviewer error, or errors in entering data into electronic format.

The AQI questions in this group elicit empirical information that is not controversial and for which response rates are very high. Item D22 (whether Native respondents voted in the most recent village corporation election) yields weak longitudinal correlations, fraught in part with some misclassifications of non-Native responses as "No" in one wave and NA in another. This question is subject to other problems of commission by interviewers rather than respondents (see Chapter 3).

The second group provides evidence that longitudinal correlations can be weak while producing strong over-time reliability coefficients (B9, C6N, C12). Weak over-time reliability and stability coefficients are the more common results of weak longitudinal correlations. The several measures of the 22 nominal variables in Table 5-1 fit our expectations: the group of items whose longitudinal correlations are weak is distinguished by low reliability (<.50 or >1.50) and instability (<.50 or >1.50). Over-time reliability is high for three items on one of the 3-year sequences but not the other. The group with strong longitudinal correlations is complemented with strong over-time reliability and stationariness coefficients.

The second group of items is especially interesting because of the nature of the information they provide--reports about subsistence food in recent meals (A28, A30), reports about whether and where respondents worked in the past year (C6N, C12), self-reports about whether illness or injuries have restricted persons from engaging in everyday activities in the past 2 weeks, and opinions (cognitive attitudes) about the relation between the search for oil and the creation of local jobs.

Each of the items in the second group appears to be sensitive to exogenous factors--such as laws or regulations affecting the use of naturally occurring resources, natural but untoward events, such as protracted drought or protracted storms, or "normal" accidents, such as oil spills or well blowouts. Persons can lose jobs or gain jobs, and they can sustain injuries or illness. The environment can be affected in a significant way--creating a surfeit or causing a significant decrease, or affecting the quality of naturally occurring resources.

A recent example of the way in which a law influenced Alaska's environment is the consequences of the extension in 1977 of the seaward U.S. boundary to 200 miles offshore. Salmon harvests for commercial set-net fishermen operating out of small villages in the Calista, Norton Sound, and NANA Regions increased steadily from 1978 through 1982. The harvests did not decline until 1983, when the technology employed by large Asian fleets of drift-netters (with longlines and nets exceeding 100 miles in length) and floating processors began operating along the edges of the 200-mile boundary, and more efficient fishing fleets with floating processors and tenders expanded within territorial waters.

We anticipated weak reliability and instability among the very items in which they occur in Table 5-1. We detected the instability in the analysis of Schedules A and B when we compared panel reinterview responses with posttest samples in 1989 and 1990. Responses from posttest respondents in commercial fishing villages in 1989 and 1990 were similar to responses from panel respondents in commercial fishing villages prior to and after the spill.

In Table 5-1 we added a second wave of postspill reinterviews (Wave 4, 1991) that is compared in a later section with responses from the other two panels and from one subsample of our posttest sample.

II.B. Ordinal Variables

The ordinal variables can be organized into two groups similar to those we distinguished in the nominal data.[39] The group for which longitudinal PRE measures are strong and positive, and for which reliability is high and over-time relations are stable, includes several items that measure personal attributes, including use of the Native respondent's Native language at home (A38), the ability to speak that language (E10),[40] self-reports of general personal health over the preceding year (B1), and years of education completed (C1). Responses about personal health and education indicate modest changes, but those changes were expected. We expect health to worsen some as age increases beyond 55, and we expect education to increase some for respondents from ages 18 to 30. A question that inquires about

[39] The longitudinal correlations for the ordinal items are γs. The reliability and stability coefficients are calculated from Pearsonian rs, not γs.

[40] Data were insufficient to calculate stability and reliability coefficients for this item.

the maintenance of social ties with persons in other communities (E12), a customary social behavior in small Alaskan villages, has reasonable stability and reliability, as does a question that asks whether a respondent has difficulty in heating his or her house (D12).

Items for which longitudinal correlations fluctuate considerably, producing low stationariness, address topics pertaining to the environment and the economy. More specifically, these topics address cognitive attitudes about the availability and harvests of naturally occurring resources (A26A, A26B); the person(s) responsible for harvesting those resources (A31); the amount of those resources in the respondent's annual diet (A33); and the persons with whom those resources are shared (A32).

In relation to management of the household and village environment, the questions measuring access to potable water (D9) and the means by which waste water is managed (D10) produce several negative longitudinal PRE scores, low over-time reliability, and low stability. And, in relation to household economics, the items measuring whether respondents think their households are financially better off now than they were 5 years earlier (D6) and whether they are satisfied with their incomes (E29) are unstable.

The reliability and stability analysis suggests that marked changes occurred in the respondents' assessments of the availability of naturally occurring resources after the spill, in the manner and amounts in which those resources were harvested and used, and in their assessments of their household incomes and financial status. These data also suggest that access to drinking water and the means by which waste water was removed had changed during the period of observation. It is plausible that the Exxon Valdez oil spill was the event that influenced the changes identified here and also the changes we measured among comparable items in the nominal data set.

II.C. Interval Variables

The interval-level variables are interesting because of the behavior of the income and employment items. Items D2 (measures the annual income of the respondent's household) and D4 (measures the respondent's estimate of the minimal income the family requires for a year) produce strong longitudinal correlations, high reliability, and high stability coefficients for two over-time periods (S_{13}, S_{24}). Thus, income changed only modestly over the 4-year period, and the same is true for the respondents' estimates of the amount of income that their households require. Item D2 is based on a simple calculation of total annual income. Item D4 is based on an interpolation based on the relation of income to expenses. Throughout the analysis of Schedule A and B responses it was evident that D4 was interpreted on the basis of approximate but actual income and approximate but actual expenses. Respondents did not answer the question as if they had unlimited wants.

Although the measures of income and minimal income required demonstrate high stability, two other economic variables--one measuring the total number of months employed (C6M) and the other measuring the time the respondent was employed outside the village (C12M)--yield unstable over-time coefficients. The total months in which the respondent was employed (C6M) demonstrates the greatest differences between 1988 and 1990 (r_{13} = .49) and between 1989 and 1990 (r_{23} = .65), or for the two measures prior to the spill with the measure for the first winter following the spill. The time employed outside the village (C12M) yields much lower longitudinal correlations than the unrefined measure of time employed without respect to where employment occurs (C6M). Indeed, the longitudinal correlation for 1988 and 1990 is negative, indicating a reversal from no employment outside the village to some employment outside the village. The longitudinal correlation of time employed outside the village for 1988 and 1991 (C12M r_{14} = .05) demonstrates that 2 years after the spill, the employment pattern for respondents had not returned to the prespill pattern.

Thus, although income and minimal income needs did not change significantly before and after the spill, the place and the total employment time did change in 1990 and 1991. Presumably, employment was affected by the oil spill.

There are several other indicators of change among the interval variables that may be of a piece with the items measuring time and place of employment. The longitudinal correlations are high and positive for the number of public meetings that respondents attended in the past month (D16) and for household size (HSIZE). The correlations are somewhat lower for the number of recent visits respondents have made to persons in other communities (D27). Yet all three demonstrate marked changes (low but positive correlations) between responses in 1988 and postspill responses. The greatest over-time instability occurs between 1988 and 1990.

A concluding hypothesis provides a rationale for the connections among the changes demonstrated among the interval variables in the small Kodiak panel (K1C). It has been demonstrated time and again that household composition and size are very sensitive to economic and employment factors.[41] For Natives, in particular, households expand and contract as economic exigencies dictate. Non-Native households more frequently contract rather than expand as exigencies dictate. It is expected that an event as large as the Exxon Valdez oil spill would affect employment (restricting some commercial fishing, stimulating spill-cleanup leasing and work, affecting local businesses, and the like) while perhaps maintaining incomes but requiring changes of workplace for many. As consequences, household sizes change as some persons relocate for employment and other persons move in with extant households in order to pool and share resources. Public meetings increase;[42] but some persons who had frequently attended public meetings in the past could not attend due to employment outside the community, while other persons who had not attended meetings in the past attended meetings following the spill because of the emergency of the topics under discussion.

Respondent's age (RAGE) and the years the respondent has resided in the village (D25) are stable and reliable, yet the greatest instability among all interval-level items is the number of days in which the respondents visited friends or relatives in the past week (D13) and the number of rooms in the respondent's house (D8). Some panel respondents in both Kodiak City and Old Harbor relocated

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[41] See Social Indicators Study III. Analysis (Jorgensen 1994) for the analysis of this topic among Schedule A and B data.

[42] Public meetings increased dramatically in all spill-affected villages for several months following the spill and continued to be organized at high rates in some villages through winter 1991 (see the chapters in Social Indicators Study of Alaskan Coastal Villages IV (HRAF 1993).

following the spill. Some relocations occurred within each village, and some relocations occurred between the villages. Relocations of respondents signal changes in the sizes of houses. Relocations also frequently signal changes in the sizes of households in which respondents reside (HSIZE). Relocations, either outside the village for temporary work or to other villages for more permanent residence, affect the frequency of visits with friends and relatives.

It is suggested here that several nominal, ordinal, and interval variables are stable and may have been affected not at all or only minimally by the Exxon Valdez oil spill. Several others appear to be sensitive to the spill, with some responding immediately between 1989 and 1990 and reverting to a more stable condition by 1991, and others remaining unstable for 2 years after the spill.

II.D. Incomplete Measures

Eight questions pertaining specifically to the Exxon Valdez oil spill were asked during the 1990 and 1991 research waves. The longitudinal correlations for seven of these items are $>+.50$, and the eighth is .46. Two showed no variation at all.

Respondents were rather consistent in 1990 and 1991 on the cause of the oil spill (E58 $\phi = .67$); on the amount of game (A25A $\gamma = .63$) and fish (A26A2 $\gamma = .50$) available since the Exxon Valdez oil spill; on the amount of native (wild, naturally occurring) foods in their diets since the spill (A32B $\gamma = .57$); and on their loss of employment (C13 $r = .79$), loss of property (C19 no variation), and relocation (C18 no variation) because of the spill.

Question E52 asks respondents to reflect on the consequences of the exploration for oil and then to provide their assessment of whether they think oil exploration is a good idea or a bad idea, or whether they harbor mixed feelings. In its original form E52 suffered from construct-validity problems and was dropped after the 1988 research wave. It was modified in 1989 and introduced to the Exxon Valdez-spill sample respondents in summer 1989. It was asked of the K1C panel respondents in 1990 and 1991. On one hand, the longitudinal correlations for E52 demonstrate high reliability for the 1990 and 1991 responses (E52 $\gamma_{34} = .88$). On the other hand, the prespill:postspill PRE coefficients are negative (E52 γ_{13} = -.17, γ_{14} = -.21). Simply put, E52 is highly sensitive to oil-related activities.

II.E. Prespill/Postspill Kodiak Island Panel: 1992

Sixteen members of the Kodiak1C panel were reinterviewed in 1992 by ADF&G researchers on 17 AQI questions. This small panel has considerable member stability: all 16 persons have been interviewed five times since winter 1988. It also is a rather accurate reflection of the aggregate proportions of non-Natives and Natives in the villages of Kodiak City and Old Harbor. Natives comprise 25 percent and non-Natives 75 percent of the panel. We must keep these proportions in mind when assessing the longitudinal correlations and over-time reliability and over-time stability coefficients for 1989 (prespill), 1990, and 1992 (Table 5-2).[43] The results are rather similar to the two measures of reliability and stability obtained for the 1988-1990 and 1989-1991 periods. Measures of whether respondents exercised their franchises in city council (D19) and statewide (D20) elections are reliable and stable. The sex (RSEX) and race (D28) of the respondents also were reported (and recorded) in the same way throughout the three research waves. Whereas the latter two items cannot change if we interview the identical panel respondents at three points in time, the measures of whether respondents exercise their franchises in city and statewide elections can change. These data are rather stable, although in 1992 voting behavior in city council elections was more similar to prespill voting behavior than to voting behavior in the year following the spill; yet the reverse is true for statewide voting during the period. There is no obvious significance to the differences in the two sets of measures before and after the spill.

Items A28, CACT4, and D3, to the contrary, suggest postspill changes, as does Item A32, the sole ordinal variable in the Social Effects instrument. When assessing Table 8 we observed that the longitudinal correlations, reliability, and stability coefficients fluctuated considerably in regard to topics pertaining to the environment

[43]Inasmuch as four waves yielding two over-time periods are analyzed for the 1988-1991 period for the Kodiak1C sample (Table 5-1), and because two panel respondents could not be located and reinterviewed in 1992, the analysis here is restricted to a measure immediately prior to the spill, a measure about 1 year after the spill, and a measure about 3 years after the spill.

Table 5-2

LONGITUDINAL CORRELATIONS, RELIABILITY AND STABILITY COEFFICIENTS WITH CONTROLS FOR TESTING ARTIFACTS, *KODIAK1C1992* PANEL (N = 16) 16 AOSIS VARIABLES, SCHEDULE C, QUESTIONNAIRE INSTRUMENT, 1989W-1990W-1992W[a]

	STABILITY TESTS				
	89*90 r_{12}	90*92 r_{23}	89*92 r_{13}	REL R_{13}	STA S_{13}
NOMINAL VARIABLES (ϕ)					
A28 Subsistence food yesterday	.24	.07	.03	.56	.05
D3 Commercial fish/own business	.86	.42	.54	.83	.36
D19 Vote city council election	.53	.53	.73	.38	.90
D20 Vote statewide election	.87	.71	.62	.62	.62
D22 Vote village corp election	.58	X	X	X	X
D23 Vote region corp election	X	X	X	X	X
D28 Race of respondent	1.00	1.00	1.00	1.00	1.00
E50 Will oil search create jobs	.23	.15	.22	1.61	.03
RSEX Sex of respondent	1.00	.88	.88	1.00	.88
CACT4 Camping to hunt/fish	.26	.50	.77	.17	4.56
ORDINAL VARIABLES (γ)					
A32 Eat with rels/other HHs	1.00	.54	.69	.13	2.10
INTERVAL VARIABLES (r)					
D2 Annual household income	.90	.40	.34	1.05	.32
D13 Days visiting friends/relatives	.48	.70	.57	.59	.96
D16 No. public meetings attended last month	.72	.56	.32	1.26	.26
D27 Visits to other communities	.86	.27	.27	.86	.32
RAGE Respondent's age	.68	.69	.99	.47	2.08
HSIZE Household size	.85	.94	.89	.89	.89

[a]The Kodiak1C92 panel is comprised of respondents from the villages of Kodiak and Old Harbor who were interviewed and reinterviewed on five occasions beginning in winter 1988, then again in winter 1989. These first two waves of interviews occurred prior to the Exxon Valdez oil spill. Subsequent interviews were conducted with these persons in the winters of 1990, 1991, and 1992. The pretest responses selected here are for winter 1989 immediately prior to the spill. The 1990 research wave was conducted about 10 months following the spill, and the 1992 wave about 34 months following the spill. Longitudinal correlations for the Kodiak panel measure three intervals--1989-1990, 1990-1992, and 1989-1992 (three waves). The reliability for each variable over three waves is expressed for the period 1989-1992 as R_{13} ($R_{13} = r_{12}r_{23}/r_{13}$). Stability coefficients over the same three waves are expressed as S_{13}($S_{13} = r^2_{13}/r_{12}r_{23}$). Reliability and stability for nominal variables are derived from Pearson's Phi (ϕ). Controls for stability are tested with the significance of difference of proportions. NS = Not significant. Probability (P) values <10 in 100 are expressed. Reliability and stability for ordinal and interval variables are obtained with Pearson's r, although longitudinal correlations for ordinal variables are expressed as Goodman and Kruskal's γ. + = No variation, both waves identical. * = No variation in one of the two waves. X = Missing data for one research wave.

and the economy. These four items fit that generalization. For instance, the longitudinal correlations for Item D3 (Table 5-2), which assess whether respondents are commercial fishermen (or own their own businesses), suggest more changes in business activities between 1990 and 1992 than between the season prior to the spill and the season following the spill. The changes are attributable solely to non-Native respondents. One person who had not been a commercial fisherman or self-employed immediately prior to the spill was engaged in spill cleanup as a private contractor during the 1989-1990 period. Two years later, two non-Natives who had not been self-employed in 1990 were commercial fishermen; and two persons who had been self-employed were no longer so engaged. The numbers are small, but the fluctuations are considerable among non-Natives. The ability to change occupations in the private sector, or to move in and out of businesses while residing in Alaska appears to be an important characteristic of non-Natives who reside in the commercial fishing areas of Alaska--the oil-spill area in particular. It is a characteristic shared by few Natives in the commercial fishing areas from Bristol Bay to Yakutat.

Many commercial fishermen reside in Alaska only during fishing seasons--some for only a year or two. We have noted the retention rates of respondents in our various panels. Native respondents are retained at greater rates than non-Natives; and respondents in small, homogeneous villages with modestly developed infrastructures and services are retained at greater rates than respondents in the large, complex, heterogeneous villages with well-developed infrastructures and services.

Item A28, which measures whether subsistence food was a part of meals eaten yesterday by respondents, appears to be more sensitive to exogenous factors than Item D3. In Table 5-2 we see that the prespill and postspill correlations (1989*1990, 1989*1992), and the postspill reliabilities (1990*1992) are very low and inconsistent, yielding low stability. The use of naturally occurring resources appears to have been affected by the oil spill, so much so that there is less rather than more reliability for the greater the number of years between the prespill and postspill measures. This suggests that there was no recovery to prespill practices in the "presence of wild foods in the respondent's meals yesterday." Some recovery between prespill and postspill practices in regards to wild foods in yesterday's meals is suggested in Table 5-1 (see the longitudinal correlation for A28 1988*1991 r14).

Although the panel is very small, we note that half (2) of the Native respondents whose meals (on the day prior to the interview) contained subsistence foods in winter 1989 did not in winter 1990. In 1992 wild foods had returned to the meals of those two respondents. It is plausible that the oil spill affected the amount of wild resources harvested during summer 1989 and hence available to those persons in winter 1990. The Native respondents in our sample, although not commercial fishermen, rely either on subsistence harvests in which they engage or on resources harvested by other members of their kinship and friendship networks. Whereas all of the Native villages on Kodiak Island gain the majority of their earned income from commercial fishing, Native fishermen are almost always under capitalized, own small boats, and fish close to shore. The inshore areas were most affected. This certainly influenced commercial and subsistence catches by Natives, thus perhaps accounting for two persons not having wild foods in their meals the day before they were interviewed.

Yet the reverse is the case for non-Natives. In 1989 one-quarter of the non-Natives (3) reported that wild foods were eaten the day prior to being interviewed. In 1990 half (6), and in 1992 two-thirds (8), reported that wild foods had been eaten the day prior to the interview. The increase in non-Native consumption of wild foods may reflect necessity as well as availability. Not one of the Natives in our panel was a commercial fisherman in the 3 years measured here. Forty percent of the non-Native respondents were commercial fishermen. Non-Native commercial fishermen by and large are better capitalized, have large and safer boats that are better equipped for communications than are most Native-owned vessels, and can and often do allocate small parts of their catches to household consumption. It is plausible as a concluding hypothesis that more non-Native commercial fishermen allocated parts of their catches to home consumption after the spill than before the spill. The inflation in food prices at the local store and drops in fish prices might have been one stimulus to eating more of the local catch.[44]

CACT4 is a composite measure that first determines whether respondents hunted and/or fished, and then whether respondents established camps in conjunction with their hunting and fishing activities. It is not nearly so common for residents of Kodiak Island Native villages as it is for residents of mainland *Native* villages or for Native residents of mainland *Mixed* villages to establish camps from which to harvest wild resources. Deer and waterfowl are plentiful in locations close to villages, as are a wide variety of anadromous and saltwater fishes. Kodiak City, 90 percent of whose population is non-Native, is much different from the *Native-Periphery* villages on the island. The population (about 6,700 in 1992) is huge by Alaska village standards, making access to wild resources, including those of the sea, more difficult than in the more remote *Native-Periphery* villages. Sheer competition for strategic resource sites near Kodiak City requires that persons establish camps to extract some wild resources, such as deer, that are not easily procured on day trips.

It is the case that only one of the four Native respondents established camps from which to harvest wild resources, and that person did so during every research wave. The more interesting behavior is noted among non-Natives. Five of twelve non-Native respondents established camps in 1988-1989, but they were joined by two more respondents in 1990 and 1992. The 17-percent increase in the proportion of non-Natives who established camps in 1990 and 1992 fits with the increase in the proportion of non-Natives who reported that wild foods were eaten in one or more of their meals the day before they were interviewed. If wild foods became more important to non-Native residents of Kodiak City, either because of the drop in commercial fish prices or the increase in food, dry goods, and labor prices following the spill, a few more persons established camps to harvest those resources after the spill than before the spill.

[44]We have regularly monitored the prices of a market basket of food, some dry goods including camping supplies, boats, and motors, and the price of labor for several key services in every study village. Food prices in Kodiak City were stable between the winters of 1988 and 1989 but jumped 10 percent between winters 1989 and 1990 (see Endter-Wada et al., 1992, "The Kodiak Region," pp. 748-757, in Social Indicators Study of Alaskan Coastal Villages I, Volume 2 [HRAF 1992]).

The ordinal variable A32 also reflects change. Item A32 measures whether a respondent ate any meals recently in a relative's household other than the respondent's, and if so, how many. In general, non-Natives have few relatives who reside in the same village in which the non-Native resides. If the non-Native has relatives in the village, they most often reside in the same household as the non-Native respondent. So, the number of potential relatives with whom non-Natives might dine with some regularity is very small. Sharing meals with relatives in households other than the respondent's is very rare among Kodiak Island panel members in Kodiak City. In every research wave about 80 percent of respondents had not shared a single meal with relatives (or friends) in a household other than the respondent's in the 2 days prior to the day that the interview was conducted.

Prior to the spill only one of 12 non-Natives had eaten any meals (1) with relatives outside the respondent's household in the 2 days prior to the interview. In 1990 two non-Natives ate meals with relatives in the relatives' homes. Moreover, those two persons shared all of their meals (6) in homes of relatives. So there was a modest increase in the number of persons who ate meals with relatives away from the respondent's home, and also an increase in the number of meals eaten with those relatives. In 1992 only one non-Native shared a meal (1) with relatives in the relatives' home. The prespill pattern seems to have been reestablished; to wit: among non-Natives, few people shared few meals.

Among Natives, sharing meals with relatives in the respondent's house as well as the houses of relatives is commonplace, in part because Natives frequently have many relatives in the villages in which the respondents reside. Half of the Native respondents ate meals with relatives in the homes of the relatives immediately prior to the spill and in each of the subsequent research waves. Yet even among Natives the numbers of meals shared increased from three or less in 1989 to four or more in 1990. In 1992 half of the Natives continued to eat with relatives in the homes of those relatives. The number of those meals decreased to three or less, paralleling the changes noted among non-Natives.

We must remember that this item only measures meals taken with relatives at the relative's home. It does not measure the number of meals that respondents host for relatives at the respondents' homes. Nevertheless, these results suggest that marked changes occurred soon after the spill; but by the winter of 1992 Native and non-Native practices had returned to prespill patterns of eating with relatives: Natives continued to be more communitarian, non-Natives less so.

Item E50 has proved to be responsive to exogenous factors in every test to which we subjected it. This item asks whether respondents think that the search for oil will create local jobs. It does not ask whether respondents think the search for oil is a good thing for the local area, is constructive for the local environment, is a threat to spiritual values, or the like. Nor does it ask whether respondents think that the transport of oil that results in massive spills will generate local employment. That the last mentioned occurred, in fact, is not in dispute. These caveats aside, the measures of E50 are highly volatile.

Prior to the spill all but one non-Native and half of the Native respondents thought that the search for oil would create local jobs. Following the spill in 1990 and 1992, not a single Native thought that the search for oil would create local jobs. Of the 12 non-Natives who thought that the search for oil would create local employment prior to the spill, one-quarter had changed their minds in 1990. In 1992 the one-quarter who thought that the search for oil would not create jobs in 1990 had reverted to the positions they held prior to the spill. Item E50 appears to be sensitive to the oil spill, although it does not measure the spill; and it also appears to discriminate between Natives and non-Natives. Non-Natives are more optimistic, perhaps desirous of business developments that may benefit them, than are Natives.

Income (Item D2) is highly responsive to exogenous and endogenous factors. Incomes for non-Natives in 1989 and 1990 varied only modestly. A majority earned over $50,000 annually. Only one person earned less than $30,000. Fishermen made large incomes in the two periods, whether they were fishing or engaged in the oil-spill cleanup. Incomes for three of the four Natives increased dramatically between the prespill and the first postspill measure in 1990. Three who had incomes lower than $10,000 in 1988-1989 earned nearly $20,000 each in the postspill period (1989-1990). The increase is attributable to spill-cleanup-related employment.

In 1992 all four Natives were employed, and their average incomes had increased to $25,000. The incomes of three non-Native respondents, to the contrary, had dropped an aggregate $55,000, while the incomes of nine non-Natives had remained at 1989 levels. The drop in non-Native incomes is likely attributable to the failure of fish prices to recover. The cause of the increase in Native incomes in 1991-1992 is not discernible from these correlations.

The measures of the number of days in which respondents visited friends or relatives in the past week (D13), the number of public meetings they attended in the past month (D16), and the number of recent visits they made to persons residing in other communities (D27) are similar to the prespill/postspill measures in Table 8. The greatest over-time instability occurs between 1989 and 1990 (prespill and postspill) for visits with friends or relatives (D13), while the greatest instability for the attendance at public meetings occurs between 1989 and 1992 (there were many fewer meetings to attend in 1992 than in 1990) (D16). Visits to other communities (D27) were likely facilitated by cleanup employment in 1990, but visiting decreased for non-Natives in 1992. The spill surely affected intra- and intervillage visiting as well as the number of public meetings that respondents attended in 1990 as opposed to 1992.

Respondent ages (RAGE) increased over the 3 years, decreasing reliability and stability measures as anticipated. Household sizes varied more greatly between the prespill-research wave (winter 1989) and the first postspill wave (winter 1990) than between the 1990 and 1992 waves. This is *prima facie* evidence that some changes in household composition occurred as relocations for temporary work caused households to lose some members, or because the lack of work or the inability to extract wild resources made it convenient for some persons or segments of families to co-reside with other families to pool scarce resources.

III. POSTSPILL KODIAK ISLAND PANEL: RELIABILITY AND CHANGE

III.A. Overview

In 1990, as part of the inquiry into Schedule A and B villages, we conducted posttest interviews among a random sample of respondents selected without replacement from previous samples drawn in Schedule B villages. Kodiak City and Old Harbor were among the Schedule B villages. We used the occasion to conduct interviews in Karluk, on the southeast side of the island.

In 1991 we drew a panel from the 1990 posttest respondents in Kodiak City, Old Harbor, and Karluk, which we refer to as K2C, and reinterviewed them. The 1990 and 1991 responses of the second Kodiak Island panel provide a contrast with the responses during the same research waves for the first Kodiak Island panel K1C.

All three villages represented in the K2C panel gain most of their incomes from commercial fishing (*Comm Fish*). The addition of Karluk provides greater representation of *Native* and *Periphery* villages in the K2C sample than in the K1C sample. The greater proportion of Native respondents in the K2C sample (14 Natives to 13 non-Natives) than in the K1C sample (6 Natives to 12 non-Natives) accounts for every significant difference noted between the two panels in 1990 and 1991 (see Table 5-3).

The first column of Table 5-3 tallies the longitudinal correlations (reliability coefficients) for AQI variables administered to the second Kodiak Island panel in 1990 and 1991 (r_{12}). Only 57 percent of the correlations are >.50 (26 of 46). On the basis of these results, the reliability of many of these items is in doubt. Yet we have learned from the longitudinal and over-time analyses of the K1C items that it is plausible to assume that many items whose longitudinal correlations fluctuate are expressions of sensitivity to change. Because we are restricted to a single longitudinal correlation for the K2C data set, it is instructive to compare the K2C correlations with the K1C results.

The second and third columns of Table 5-3 report the significance of difference of responses between the two Kodiak Island panels for each item in 1990 and in 1991. There are 104 instances among 58 items for which respondents in each panel

Table 5-3

LONGITUDINAL CORRELATIONS, *KODIAK2* PANEL [KODIAK-OLD HARBOR-KARLUK (*N* = 27)], AND TESTS OF SIGNIFICANCE OF DIFFERENCES WITH *KODIAK1* PANEL [KODIAK-OLD HARBOR [*N* = 18], QUESTIONNAIRE INSTRUMENT, 1990-1991[a]

	RELIABILITY KODIAK2	DIFFERENCES KODIAK 1 v. 2	
NOMINAL VARIABLES (ϕ)	90*91 ϕ_{12}	K1 v. K2 90*90	K1 v. K2 91*91
A28 Subsistence food yesterday	.35	NS	NS
A30 Subsistence food day before	.35	.07	NS
B9 Incapacitated past 2 weeks	.07	NS	NS
C6N Employed last year	.15	NS	NS
C12 Work away from village last year	.33	NS	NS
D3 Commercial fishing or own a business	.58	*	NS
D19 Vote in most recent city council election	.29	.08	NS
D20 Vote in most recent statewide election	.47	NS	NS
D22 Vote in most recent village corporation election	.55	.01	NS
D23 Vote in most recent regional corporation election	.56	.02	NS
D24 Where were you born	.61	NS	NS
D26 Where did you reside before moving here	.58	.07	NS
D28 Race of respondent	1.00	NS	NS
D29 Currently married	.79	NS	NS
D29A Race of spouse	.72	.07	NS
E50 Will oil search create jobs	.26	NS	NS
RSEX Sex of respondent	1.00	NS	NS
HTYPE Household type	.67	.001	NS
C15 Did you leave the village for Exxon Valdez work	?[b]	*[b]	NS
C20 Financial loss from Exxon Valdez spill	?	*	NS
E58 Cause of Exxon Valdez spill	?	*	NS
PPEMP Public-private employment	.51	NS	NS

[a]Longitudinal correlations (reliability) for the Kodiak 2 (AKA K2C) panel measure two intervals (2 waves: 1990, 1991). Longitudinal correlations (reliability) are expressed as ϕ_{12} for nominal variables. Reliability for nominal variables is derived from Pearson's Phi (ϕ) and Cramer's V. Controls for reliability of the nominal variables (differences between responses by Kodiak 1 [K1C] and Kodiak 2 panels) are tested with the significance of difference of proportions. Longitudinal correlations for ordinal variables are obtained with Goodman and Kruskal γs. Significance of differences between panel responses for each ordinal variable is obtained from the Kolmogorov-Smirnov test for two independent samples. Longitudinal correlations for interval variables are Pearson's *r*s. *t*-tests measure the significance of difference between two independent samples. NS = not significant. Probability (*P*) values <10 in 100 are expressed.

[b]? = No variation in responses for one wave; cannot calculate longitudinal reliability coefficient. * = No variation in K2 panel.

Table 5-3 (continued)

ORDINAL VARIABLES (γ)	RELIABILITY KODIAK2 90*91 γ_{12}	DIFFERENCES KODIAK 1 v. 2 K1 v. K2 90*90	K1 v. K2 91*91
A26A Game increase or decrease last 5 years	-.27	NS	NS
A26B Fish increase or decrease last 5 years	.68	.01	NS
A31 Who harvested food:self, others, other household	.30	NS	NS
A32 Eat with relatives in their houses	.52	NS	NS
A33 Percent meat/fish in diet last year	.49	NS	NS
A38 Frequency of use of Native language in the home	.18	NS	NS
B1 Describe your health	.89	NS	NS
C1 Years of education completed	.91	NS	NS
D6 Is household better off now than 5 years ago	.49	NS	NS
D9 Access to drinking water	.47	NS	NS
D10 Waste water removal	+	NS	NS
D12 Difficulty in heating house	.72	.01	NS
D24 Community in which respondent was born	.73	NS	NS
D26 Most recent previous residence of respondent	.95	NS	NS
E10 Ability to speak Native language	.64	NS	NS
E12 Social ties with persons in other communities	.30	NS	NS
E29 Feelings about adequacy of current income	.41	NS	NS
A25A Game availability since the <u>Exxon Valdez</u> spill	?	*	.03
A26A2 Fish availability since the <u>Exxon Valdez</u> spill	?	*	NS
A32B Am't wild food in diet since <u>Exxon Valdez</u> spill	?	*	NS
C20 Financial loss from <u>Exxon Valdez</u> oil spill	?	*	NS
E52 Feelings about oil exploration	?	*	NS

INTERVAL VARIABLES (*r*)	RELIABILITY KODIAK2 90*91 r_{12}	DIFFERENCES KODIAK 1 v. 2 K1 v. K2 90*90	K1 v. K2 91*91
C6M Total months employed last year	.54	NS	NS
C12M Time employed outside the village	.62	NS	NS
D2 Annual household income	.11	NS	NS
D4 Smallest annual income needed for family	.81	NS	NS
D8 Number of rooms in house	.66	.00	NS
D13 Days visiting friends/relatives in past week	.36	NS	NS
D16 Number of public meetings attended last month	.62	NS	NS
D25 Number of years respondent has resided in village	.23	NS	NS
D27 Visits to other communities in the past year	.15	NS	.08
RAGE Respondent's age	.92	NS	.02
HSIZE Household size	.62	NS	NS
C13 Employment due to <u>Exxon Valdez</u> spill	?	*	NS
C16 Employment loss because of <u>Exxon Valdez</u> spill	?	*	NS
C18 Relocation due to <u>Exxon Valdez</u> spill	?	*	NS
C19 Property loss due to <u>Exxon Valdez</u> spill	?	*	*

were queried in 1990 or 1991, or in both years. The distributions are not significantly different between the two panels in 92 of the 104 tests (see the 2 columns on the right-hand side). The differences between seven of the distributions would occur by chance fewer than five times in 100, and the differences in five more distributions can be attributed to chance seven or eight times in 100. All but two of the significant differences between the two occur in the 1990 research wave.

The difference in the proportion of Native respondents in the two panels (33% in K1C, 52% in K2C) and in the proportion of respondents in *Periphery* villages in the two samples (22% in K1C to 41% in K2C) accounts for the 12 differences. Because the proportion and absolute number of Natives (and residents of *Periphery* villages) in the K1C sample are smaller than in the K2C sample, small differences in behavior loom large in the correlations. For examples, in 1990 but not 1991, a greater proportion of K1C Natives than K2C Natives had wild foods in their meals 2 days before they were interviewed (A30), voted in village and regional corporation elections (D22, D23), and had most recently resided in or near the village in which they were interviewed (D26).

In addition to the vagaries that can occur in small samples, it is not coincidental that the most recent residence prior to the current residence of K1C Native respondents was in or near the village in which they were interviewed. Panel respondents must be stable (or locatable) to be retained in the panel. The third wave of research among the K1C panel was conducted in 1990. Two K1C panel members could not be located in 1989, and another could not be located in 1990; hence, the K1C:K2C difference on D26 (Where did you reside before moving here?) is not surprising.

The exceptions noted, it is evident that the panels are very similar. The AQI items that measure personal attributes of K2C respondents--including age, race/ethnicity, years of education completed, general health, ability to speak one's Native language, marital status, race of spouse, place of birth, most recent residence prior to current residence, and so forth--have high reliability. These items yielded strong, positive longitudinal correlations and high over-time reliability coefficients, and demonstrated high stationariness in the K1C panel. Among all of the measures of personal attributes in the K2C panel, only two items--race of spouse (D29A) and most recent prior residence (D26)--are significantly different from the K1C panel. The differences were significant (P = .07) in 1990 but not in 1991.

Several other variables that deal with personal characteristics produced high longitudinal reliability coefficients similar to the K1C results. They include whether the respondent (1) voted in the most recent regional corporation election and the most recent statewide election, (2) is a commercial fisherman or self-employed, and (3) is employed in the public or private sector.

The economic variables that proved to be reliable and stable over time in the K1C panel are not significantly different from comparable measures in the K2C panel. Item D4, which measures the smallest annual income required by the respondent's family, yields a strong, longitudinal reliability coefficient in the K2C panel. Yet the coefficient is weak for D2, the measure of annual income (D2 r_{12} = .11). The measure demonstrates that the incomes of K2C respondents varied more between 1990 and 1991 than was the case for K1C respondents, but the differences between the covariance for the two samples are not significant.

The sets of variables that appear to be sensitive to exogenous factors in the K1C panel behave similarly in the K2C panel. Some of those variables are related to the environment and the uses to which it is put, some are related to employment, and some are social activities that are related to environment or employment, or both.

Among the sensitive environment-related variables for which K1C and K2C responses are highly similar are the items that (1) assess whether wild foods were eaten in the past 2 days (A28, A30); (2) estimate the increase or decrease of game and fish between 5 years ago and the present (A26A, A26B); (3) specify the person(s) responsible for harvesting resources consumed in recent meals in the household (A31); and (4) estimate the proportion of wild food in the respondent's diet in the preceding year (A33).

One social activity related to the use of naturally occurring resources that appears to be sensitive to impacts on the environment, and whose measures for K1C and K2C in 1990 and 1991 are similar, is the frequency with which respondents share meals with relatives in the relatives' home (A32). Other social activities that may well be related to economic and employment factors that were affected by the oil spill's consequences for the environment are the number of public meetings attended during the past month (D16), the number of days spent visiting friends and relatives during the past week (D13), and the number of visits to other communities in the past year (D27).

Several variables that address employment and several variables that address respondent cognitive and affective assessments of their financial condition which appear to be sensitive to exogenous factors in the K1C panel yield low reliability coefficients in the K2C panel. The respondent's total months of employment in 1990 were different from total months of employment in 1991 (C6N), as were the time the respondent was employed away from the village (C12M), the respondent's feelings about the adequacy of his or her current income (E29), and the respondent's assessment of whether his or her household is (financially) better off now than 5 years ago (D6).

The results of the reliability analysis based on longitudinal coefficients for AQI items (K2C responses) support the concluding hypotheses about stable and less stable items, i.e., items sensitive to the oil spill, in the K1C panel.

III.B. 1992 Posttest Over-Time Reliability and Stationariness for a Merged Kodiak Island Panel Comprising K1C and K2C

In 1992 the Social Effects research team interviewed 16 members of the K1C panel and 14 members of the K2C panel. Although the sample sizes are extremely small, I chose to analyze the 1992 data for the K1C panel because the 16 respondents had been interviewed twice prior to the Exxon Valdez oil spill. Analysis of the 1992 data provided over-time measures that we can obtain from no other sample among our data sets. Here, however, we merge the K1C and K2C panels for three postspill research waves 1990W, 1991W, and 1992W. The results of the tests of significance of differences between K1C and K2C over 58 AQI items in Table 5-3 justify the merger of the 30 respondents. The *Native-Periphery* villages of Old Harbor and Karluk and the *Mixed-Hub* village of Kodiak City are represented. The representation by race/ethnicity is similar to the K1C panel rather than the K2C panel: 33 percent of the respondents are Native, 67 percent are non-Native. The proportions approximate the distributions of Natives and non-Natives on the island. We will see in some of the contrasts with the 1992 Kodiak Island posttest sample, in which a very large proportion of Natives (56%) is represented, that several differences are attributable to the proportional representations of Natives and non-Natives in the two samples.

Table 5-4 provides longitudinal correlations, over-time reliability coefficients, and over-time stationariness coefficients for the Kodiak92 panel, henceforth referred to as KP92. It also provides measures of significance of differences for 16 AQI items between the KP92 and the Kodiak Island pretest (postspill) (KODPRE 1990), posttest sample 1 (KODPST1 1991), and posttest 2 (KODPST2 1992) samples. The inclusion of the tests of significance of differences between the panel and the pretest-posttest samples allows us to assess testing artifacts.

We call attention to obvious similarities between KP92 items and those assessed above for the K1C and K2C panels. Several items have strong over-time reliability and stationariness, including exercises of the franchise (panel respondents, particularly Native respondents, vote in city council (D19) and statewide elections (D20)), the sizes of respondent households (HSIZE), and the establishment of camps for the extraction of wild resources (CACT4).

Household size consistently has proved to be sensitive to economic and environmental factors. Whether persons did or did not establish camps to harvest wild resources appeared to be sensitive to the Exxon Valdez oil spill (environmental factors) in the K1C panel. The indication here is that by 1991 and continuing into 1992, Kodiak Island household sizes and the practice of camping to harvest wild resources for household consumption had stabilized from the changes noted between 1989-1990 in the K1C sample.

Several of the AQI items are not stationary, as are the cases for the prespill/postspill measures for K1C and the postspill measures for K2C. Rather, they appear to be sensitive to environmental or economic changes. These AQI items

Table 5-4

LONGITUDINAL CORRELATIONS, RELIABILITY AND STABILITY COEFFICIENTS WITH CONTROLS FOR TESTING ARTIFACTS, *KODIAK92* PANEL (*N* = 30), AND TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN THE *KODIAK92* PANEL AND THE KODIAK ISLAND PRETEST SAMPLE (WINTER 1990, *N57*), KODIAK ISLAND POSTTEST SAMPLE 1 (WINTER 1990, *N50*), AND KODIAK ISLAND POSTTEST SAMPLE 2 (WINTER 1992, *N161*), 16 AOSIS VARIABLES SCHEDULE C, QUESTIONNAIRE INSTRUMENT, 1990-1991-1992[a]

	STABILITY TESTS					DIFFERENCES		
	90*91 r_{12}	91*92 r_{23}	90*92 r_{13}	REL R_{13}	STA S_{13}	KP92 v KODPRE 90*90	KP92 v KODPST1 91*91	KP92 v KODPST2 92*92
NOMINAL VARIABLES (ϕ)								
A28 Subsistence food yesterday	-.06	-.08	-.19	.03	7.22	NS	NS	.07
D3 Commercial fish/own business	.72	.29	.43	.49	.88	NS	NS	NS
D19 Vote city council election	.67	.69	.50	.92	.54	.01	.05	NS
D20 Vote statewide election	.61	.81	.61	.81	.76	NS	NS	NS
D22 Vote village corp election	.42	.50	*	*	*	.01	NS	NS
D23 Vote region corp election	*	*	*	*	*	NS	NS	NS
E50 Will oil search create jobs	.08	.50	.41	.10	4.20	NS	NS	NS
RSEX Sex of respondent	1.00	1.00	1.00	1.00	1.00	NS	NS	NS
CACT4 Camping to hunt/fish	.88	.90	.83	.50	1.08	NS	NS	NS
ORDINAL VARIABLES (γ)								
A32 Eat with rels/other HHs	.15	.45	.50	.01	6.05	NS	NS	NS
INTERVAL VARIABLES (r)								
D2 Annual household income	.69	.29	.32	.63	.51	.07	NS	NS
D13 Days visiting friends/relatives	.24	.60	.54	.27	2.08	NS	NS	NS
D16 No. public meetings attended last month	.75	.55	.33	1.25	.27	NS	NS	.04
D27 Visits to other communities	.50	.15	.44	.17	2.42	NS	NS	.05
RAGE Age of respondent	.51	.72	.73	.50	1.44	.01	.03	NS
HSIZE Household size	.78	.83	.73	.89	.82	NS	NS	NS

[a]The Kodiak92 panel (KP92) is composed of respondents from the villages of Old Harbor and Kodiak. The Kodiak Island samples for 1990 (KODPRE) and 1991 (KODPST1) comprise respondents from Kodiak, Old Harbor, and Karluk. The Kodiak Island sample for 1992 (KODPST2) comprises respondents from the three aforementioned villages, and also from Larsen Bay and Ouzinkie. Longitudinal correlations for the Kodiak92 panel measure three intervals: 1990-1991, 1991-1992, 1990-1992 (3 waves). The reliability for each variable over three waves is expressed for the period 1990-1992 as R_{13} ($R_{13} = r_{12}r_{23}/r_{13}$). Stability coefficients over the same three waves are expressed as S_{13} ($S_{13} = r^2_{13}/r_{12}r_{23}$). Reliability and stability for nominal variables are derived from Pearson's Phi (ϕ) and Cramer's V, and for ordinal and interval variables from Pearson's *r*. Controls for stability are tested with the significance of difference of proportions (nominal), the Kolmogorov-Smirnov independent samples test (ordinal), and the *t*-test for independent samples (interval). NS = Not significant. Probability (*P*) values <10 in 100 are expressed. Longitudinal correlations for ordinal variables are expressed as Goodman and Kruskal's γ. + = No variation, both waves identical. * = No variation in one of the two waves. X = Missing data for one of the samples.

dealing with recent meals comprise wild foods (A28), meals eaten with relatives in homes other than the respondent's (A32), the number of public meetings attended in the last month (D16), the number of days in which the respondent visited friends and relatives in the past week (D13), and the number of visits made to persons in distant communities (D27).

As did visits to persons in distant communities, the number of public meetings attended by respondents decreased in 1991 and 1992, with non-Natives attending fewer than Natives. The reason for the decrease among non-Natives is apparent: there were more public meetings during the 12 to 18 months following the spill than subsequently. Natives, to the contrary, regularly attend public meetings whether they reside in *Hub* or *Periphery* villages and whether provoked by disasters or less reactive and time-dependent issues. Village corporation, tribal council, city corporation, and extracurricular meetings held at Christian churches draw Native participation on a frequent basis.

Similarly, the number of days in which respondents visited with relatives or friends in the respondents' communities, and the frequency with which meals were shared with relatives in households other than the respondents' appear to have returned to normal in 1991 and 1992. That is, there was more visiting by Natives and non-Natives in 1990 than in subsequent years; but in 1991 and 1992, Natives continued to visit frequently, non-Natives less so. Non-Natives who shared up to six meals over 2 days in 1990, shared one or none in 1991 and 1992. Natives continued to share more meals after 1990 than did non-Natives.

More persons reported eating subsistence food in yesterday's meals (A28) in each succeeding research wave (from 47% yes in 1990 to 60% yes in 1992). Nevertheless, reversals in behavior were so dramatic as to generate negative longitudinal correlations (some respondents answered yes in 1990, no in 1991, and yes in 1992, and so forth). Native respondents reversed themselves less often than non-Natives.

The three columns in the "Differences" section of Table 5-4 contrast KP92 responses with pretest and posttest responses. There are nine significant differences among 48 contrasts between panel respondents and sample respondents. Five of those differences are attributable to panel respondents being older, earning higher incomes, and more frequently voting in city council elections than their counterparts in the KODPRE and KODPST1 samples. A characteristic of every panel we have investigated in the course of the Social Indicators Study is that persons who are selected for panels and who are reinterviewed in every research wave are, on average, older, have resided in the study villages longer, earn greater incomes, and vote more frequently than the means for the samples from which they were drawn. Comparisons with the samples from which many of the respondents were drawn (KODPRE) and with subsequent posttest samples (KODPST1, KODPST2) confirm our earlier discoveries that panels select for the most "stable" persons in Alaska villages--persons who are long-term residents, gainfully employed or the recipients of retirement or transfer incomes, or Natives dependent on combinations of wild-resource extraction, sharing, employment, and transfers. Natives tend to vote more frequently in a wider variety of elections than do non-Natives, even non-Natives who are long-term residents of the villages in which they are interviewed and reinterviewed.

Three significant differences are functions of the ethnic representations in the 1992 posttest (KODPST2). The Social Effects (ADF&G) research team studied many *Native-Periphery* villages not included in the sampling design of the Social Indicators Study. As a consequence, Native respondents comprise 56 percent of KODPST2. The significant differences between the third wave of KP92 and KODPST2 regarding whether subsistence foods were eaten yesterday (A28), the number of public meetings attended last month (D16), and the number of visits to other communities (D27) are attributable to the large proportion (56%) of Natives in KODPST2 and the small proportion (33%) of Natives in KP92.

Natives in the KODPST2 sample more frequently ate wild foods, attended public meetings, and visited friends and relatives in other communities than did either non-Native respondents in KODPST2 or panel respondents. It is evident from these contrasts that non-Natives used more wild resources, attended more public meetings, and travelled and visited more friends in distant villages for 1 to 2 years following the spill than they did in 1991 and 1992. By 1991, non-Native practices on these items were similar to prespill practices. Natives, whether in the panel or the pretest and posttest samples, demonstrate increases in these several communitarian customs as well; but even though slight decreases are registered in Native communitarian practices after 1990, they are continued at higher levels than are the cases for non-Natives.

IV. POSTSPILL EXXON VALDEZ SPILL-AREA PANEL (EXCLUDING KODIAK ISLAND): RELIABILITY AND CHANGE

IV.A. Overview

During winter 1991 we drew a 32-percent sample at random from the respondents in the Exxon Valdez oil-spill sample of 1989 (also known as the Schedule C pretest questionnaire sample). The responses of the 95 respondents selected for the EXXONC panel are correlated for 1989 and 1991 (see Table 5-5). Only a little over 50 percent of the longitudinal correlations are >.50, although all but one are positive.

The panel behaves similarly to all other panels in the course of our inquiry among Schedules A, B, and C. Valid measures of panels from wave to wave require that the identical respondents must be located and reinterviewed during each wave. The requirement for the stability of panel membership means that respondents who cannot be located in a reinterview wave are dropped from the panel so that the longitudinal correlations do not suffer from specification error. For example, if we attribute to the class B at t_2 a similarity or difference from the class $B\&A$ at t_1, and if B has been measured at t_2 but A has not, the generalization that is attributed to both $A\&B$ is a threat to validity.

The requirement that panel respondents must be reinterviewed in every wave evidently selects for persons who are secure in their employment or belong to households that are stable in time and place. The contrasts between the EXXONC panel and the 1991 posttest sample provide evidence which suggests the panel respondents are more secure economically and more secure in employment, in general, than are the posttest respondents. It is further assumed that if we were to

Table 5-5

LONGITUDINAL CORRELATIONS, EXXONC PANEL [CHIGNIK-TYONEK-SELDOVIA-KENAI-VALDEZ-CORDOVA-TATITLEK (*N* = 95)], AND TESTS OF SIGNIFICANCE OF DIFFERENCES WITH POSTTEST SAMPLE RESPONDENTS FROM THOSE SAME VILLAGES [SUMMER 1991 (*N* = 109)], QUESTIONNAIRE INSTRUMENT, 1989-1991[a]

	RELIABILITY EXXONC PANEL	DIFFERENCES EXXONC PANEL v. POSTTEST
NOMINAL VARIABLES (ϕ)	89*91 ϕ_{12}	EX v. POST 91*91
A28 Subsistence food yesterday	.35	NS
A30 Subsistence food day before	.28	NS
B9 Incapacitated past 2 weeks	.17	NS
C6N Employed last year	.63	.08
C12 Work away from village last year	.04	NS
D3 Commercial fishing or own a business	.53	.06
D19 Vote in most recent city council election	.43	.005
D20 Vote in most recent statewide election	.43	.005
D22 Vote in most recent village corporation election	.63	.02
D23 Vote in most recent regional corporation election	.63	.02
D24 Where were you born	.70	NS
D26 Where did you reside before moving here	.60	NS
D28 Race of respondent	1.00	NS
D29 Currently married	.55	NS
D29A Race of spouse	.68	NS
E50 Will oil search create jobs	.27	NS
RSEX Sex of respondent	1.00	NS
HTYPE Household type	.48	NS
C15 Did you leave the village for Exxon Valdez work	.48	NS
C20 Financial loss from Exxon Valdez spill	.53	NS
E58 Cause of Exxon Valdez spill	.32	NS
PPEMP Public-private employment	.33	NS

[a]Longitudinal correlations (reliability) for the EXXONC panel measure two intervals (2 waves: 1989 [summer following the spill] and 1991 [winter 22 months following the spill). Longitudinal correlations (reliability) are expressed as ϕ_{12} for nominal, γ_{12} for ordinal, and r_{12} for interval variables throughout the table. Reliability for nominal variables is derived from Pearson's Phi (ϕ) and Cramer's V. Controls for reliability of the nominal variables (differences between responses by posttest respondents in same communities as those in EXXONC panel) are tested with the significance of difference of proportions. Longitudinal correlations for ordinal variables are obtained with Goodman and Kruskal γs. Significance of differences between panel responses for each ordinal variable are obtained from the Kolmogorov-Smirnov test for two independent samples. Longitudinal correlations for interval variables are Pearson's *r*s. *t*-tests measure the significance of difference between two independent samples. NS = Not significant. Probability (*P*) values <10 in 100 are expressed.

Table 5-5 (continued)

ORDINAL VARIABLES (γ)	RELIABILITY EXXONC 89*91 γ_{12}	DIFFERENCES EXXONC v.POST EX v. POST 91*91
A26A Game increase or decrease last 5 years	.39	NS
A26B Fish increase or decrease last 5 years	.03	NS
A31 Who harvested food:self, others, other household	.33	NS
A32 Eat with relatives in their houses	.32	NS
A33 Percent meat/fish in diet last year	.60	NS
A38 Frequency of use of Native language in the home	.35	NS
B1 Describe your health	.46	NS
C1 Years of education completed	.89	NS
D6 Is household better off now than 5 years ago	.24	NS
D9 Access to drinking water	.71	NS
D10 Waste water removal	.94	NS
D12 Difficulty in heating house	.59	NS
D24 Community in which respondent was born	.87	NS
D26 Most recent previous residence of respondent	.84	NS
E10 Ability to speak Native language	.83	NS
E12 Social ties with persons in other communities	.32	NS
E29 Feelings about adequacy of current income	.56	NS
A25A Game availability since the Exxon Valdez spill	.07	NS
A26A2 Fish availability since the Exxon Valdez spill	.23	NS
A32B Amount wild food in diet since Exxon oil spill	.54	NS
C20 Financial loss from Exxon Valdez oil spill	.10	NS
E52 Feelings about oil exploration	.80	NS

INTERVAL VARIABLES (*r*)	RELIABILITY EXXONC 89*91 r_{12}	DIFFERENCES EXXONC v. POST EX v. POST 91*91
C6M Total months employed last year	.79	.05
C12M Time employed outside the village	.20	NS
D2 Annual household income	.81	.10
D4 Smallest annual income needed for family	.63	NS
D8 Number of rooms in house	.63	NS
D13 Days visiting friends/relatives in past week	.16	NS
D16 Number of public meetings attended last month	.45	NS
D25 Number of years respondent has resided in village	.88	.02
D27 Visits to other communities in the past year	.33	NS
RAGE Respondent's age	.76	NS
HSIZE Household size	.68	NS
C13 Employment due to Exxon Valdez spill	.71	NS
C16 Employment loss because of the Exxon spill	.36	.10
C18 Relocation due to Exxon Valdez spill	.06	NS
C19 Property loss due to Exxon Valdez spill	-.04	NS

draw a panel from the 1991 posttest sample for reinterviewing in 1992 or 1993, the posttest-sample respondents available for selection would be employed or would reside in economically stable households.

Turning now to the longitudinal coefficients for the 1989 and 1991 research waves, we see indications that EXXONC panel responses are similar in important respects to responses within the Kodiak Island panels. A set of variables with strong, positive reliability coefficients and a set with weak, positive reliability coefficients appear to reflect the same stability and the same indicators of change--much of it attributable to the Exxon Valdez oil spill--hypothesized above.

There are no Kodiak Island residents in the EXXONC panel. Moreover, the panel is dominated by respondents in villages that do not gain more than 60 percent of their income from commercial fishing and fishing-related businesses (Kenai, Valdez, Seldovia). The largest fishing village represented in the panel is Cordova. So we expect some differences from the Kodiak Island panels in the longitudinal correlations for the AQI items.

The strong, positive correlations that appear to represent stable aspects of village demographics and personal and household attributes are the respondent's sex, age, race, marital status, race of spouse, place of birth, most recent place of residence prior to the current residence, years of residence in the village, years of education completed, employment in the past year, annual income, and the smallest income required by the respondent's family. There also is high reliability in the Native respondent's exercise of the franchise in village corporation and regional corporation elections, and in the assessment of his or her ability to speak the Native language.

It is evident that panels select for long-term residents; and it is equally evident that the personal attributes of respondents--age, sex, education, employment, for example--undoubtedly influence the amount of time they spend in the villages in which they reside.

Most of the items that fluctuate between the pretest and posttest waves of the first Kodiak Island panel (K1C) and that yield weak correlations between the posttest waves of the second Kodiak Island panel (K2C) yield low longitudinal correlations in the EXXONC panel. These items focus on the environment or on the uses to which the environment is put (A28, A30, A26A, A26B, A33, A25A, A26A2, A32B); employment, particularly employment that is affected by the Exxon Valdez oil spill (C12, C15, C12M, C13, C16); property loss or relocation attributable to the spill (C18, C19, C20); attendance at public meetings (D16); and a variety of empirical measures of social behaviors that are customary in Alaskan villages (such as the type of household in which the respondent resides, the number of visits the respondent makes to friends and relatives in the respondent's village and in other villages, and the frequency with which the respondent shares meals in other persons' households). Also cognitive and affective attitudes pertaining to oil-related activities and to personal and family issues suggest fluctuations that reflect change. These include opinions about whether the search for oil will create jobs for local residents, the cause of the Exxon Valdez oil spill, the social ties respondent maintains with persons in other communities, and the respondent's feelings about the adequacy of his or her current income.

Several marked differences obtain between the EXXONC panel and the posttest sample (which serves as a control group). Assessment of the differences between the two emboldens our claim that panel respondents, in general, are more stable in place and income than are posttest respondents. One of the 10 significant differences between the distributions demonstrates that both Native and non-Native EXXONC respondents enjoy significantly higher rates of employment than their counterparts in the posttest (C6N). Panel respondents have resided in the villages in which they were reinterviewed for a significantly longer time than have posttest respondents. Measures that have complemented length of residence and suggest participation in community affairs are exercising the franchise in city and state elections. Non-Native panel respondents vote at significantly higher rates than non-Native posttest respondents (D19, D20), and Native panel respondents vote at significantly higher rates than Native posttest respondents (D22, D23). Panel respondents also are more apt to be commercial fishermen or to own their own businesses (self-employed) than are posttest respondents. The higher rates of employment and greater likelihood for panel respondents to own their own businesses is complemented by significantly greater months of employment in the past year (C6M), significantly greater incomes (D2), and significantly less loss of employment due to the Exxon Valdez oil spill (C16) than is true for the posttest respondents.

Posttest respondents, of course, lost more employment because of the spill. It is interesting that upon subclassifying and partialling for persons who claimed to gain employment because of the Exxon Valdez oil spill, the proportion of non-Natives who gained employment was three times that of Natives. Yet the proportion of Natives who left the village for spill-related work was six times that of non-Natives.

IV.B. 1992 Posttest Over-Time Reliability and Stationariness for the Postspill Exxon Valdez Spill-Area Panel (Excluding Kodiak Island)

In 1992 the Social Effects research team located and interviewed 51 members of the EXXONC panel (95*N*). Interviews conducted during winter 1992 (Wave 3) make it possible for us to test the EXXONC panel for over-time reliability and stationariness, albeit with a 54-percent opportunity sample of the original panel. Tests for significance of differences are made with the respondents in posttest1 (1991) and posttest2 (1992) who resided in the same villages as those represented in the EXXON92 panel (the EXXONC panel respondents interviewed in all 3 research waves).

Forty-six percent of the members of the EXXONC panel who were located by researchers and reinterviewed in 1991 could not be located and reinterviewed in 1992. In 1991 we sought to reinterview more members of the 1989 pretest sample than the 95 we eventually reinterviewed. The high attrition rate between the 1991 and 1992 research waves was anticipated. The inability to locate the same respondents from wave to wave is an indication of the mobility of residents in the Exxon Valdez spill area and also an indication of economic fluctuations. Economic fluctuation per se need not be the most important factor in determining whether persons are short-term or long-term residents of spill-area villages. To be sure, many persons poured into the spill area during the spill-cleanup period. But many persons have spent a single season or a single year at work in the fishing industry for decades and then have left, never to return. Many other persons return each fishing season to work in various commercial fishing-related capacities but do not make Alaska their year-around, long-term residence.

In Table 5-6 we see that sex (RSEX), race (D28), and age (RAGE) are reliable and stable over the three waves, as is voting in statewide elections. We presumed that these items would be stable, and we also presumed that voting in Native corporation elections (D22, D23) would be stable. They are--so much so that there was no variation in 1992: all Native panel respondents voted in corporation elections that year.

Although household incomes (D2) proved reliable (R = .68) and stationary (S = .64), and mean incomes varied only $1,800 throughout the three waves ($43,000, $44,800, $43,000, respectively), the longitudinal correlations between the 1989 and 1992 responses and the 1991 and 1992 responses demonstrate that personal incomes fluctuated considerably. It is important to note that in addition to considerable fluctuation in the incomes of 40 percent of the respondents, there is no evidence for a general increase in income over the 3-year period. An increase of about 9 percent reflecting inflation alone is expected; but, to the contrary, average panel-respondent income increased in 1991 and decreased in 1992, returning to the 1989 level (unadjusted dollars).

The greatest income fluctuations are among persons whose incomes were between $30,000 and $50,000 in 1989 (average $41,250). In 1992 the average income for these persons was $17,000 (a 60% drop from 1992). It is likely that the 1989 incomes were a function of spill-related employment. Such employment was not available in the period between the winters of 1991 and 1992, and its absence probably accounts for the plummeting of many incomes. The next greatest fluctuation occurs among persons earning between $10,000 and $30,000 in 1989 (average $20,555). Those same respondents averaged 63-percent greater incomes ($33,000) in 1992 than in 1989. Several of those persons had incomes greater than $50,000 in 1992. It is plausible that those persons whose incomes rebounded dramatically in 1992 benefited from more successful commercial fishing in 1992 than in 1989. These hypotheses are tested in the analysis volume, Social Indicators

Table 5-6

LONGITUDINAL CORRELATIONS, RELIABILITY AND STABILITY COEFFICIENTS WITH CONTROLS FOR TESTING ARTIFACTS, *EXXON92* PANEL (N = 50), AND TESTS OF SIGNIFICANCE OF DIFFERENCES WITH POSTTEST SAMPLE 1 (WINTER 1991, N = 101) AND POSTTEST SAMPLE 2 (WINTER 1992, N = 267), 16 AOSIS VARIABLES, SCHEDULE C, QUESTIONNAIRE INSTRUMENT, 1989-1991-1992[a]

	STABILITY TESTS					DIFFERENCES	
	89*91 r_{12}	91*92 r_{23}	89*92 r_{13}	REL R_{13}	STA S_{13}	EX92 v POST1 91*91	EX92 v POST2 92*92
NOMINAL VARIABLES (ϕ)							
A28 Subsistence food yesterday	.27	.16	.34	.18	2.89	NS	NS
D3 Commercial fish/own business	.66	.44	.35	.87	.41	.07	.02
D19 Vote city council election	.51	.79	.45	.90	2.03	.006	.03
D20 Vote statewide election	.68	-.90	-.69	.88	.78	.004	.001
D22 Vote village corp election	*	1.00	*	*	*	NS	NS
D23 Vote region corp election	*	*	*	*	*	NS	NS
D28 Race of respondent	1.00	.90	.90	1.00	.90	NS	.08
E50 Will oil search create jobs	.42	.69	.31	.93	.33	NS	NS
RSEX Sex of respondent	1.00	1.00	1.00	1.00	1.00	NS	NS
CACT4 Camping to hunt/fish	.81	.91	.72	.55	.69	X	N2
ORDINAL VARIABLES (γ)							
A32 Eat with rels/other HHs	.15	.45	.50	.01	9.57	NS	NS
INTERVAL VARIABLES (r)							
D2 Annual household income	.69	.29	.32	.63	.51	NS	NS
D13 Days visiting friends/relatives	.40	.24	.22	.50	.44	NS	NS
D16 No. public meetings attended last month	.47	.30	.29	.49	.60	NS	NS
D27 Visits to other communities	.32	.16	.43	.12	3.54	NS	NS
RAGE Respondent's age	.92	.92	.99	.85	1.17	NS	NS
HSIZE Household size	.72	.81	.85	.69	1.23	NS	NS

[a]The Exxon92 panel and posttest sample contrasts for 1991 and 1992 comprise respondents from the villages of Chignik, Seldovia, Kenai, Valdez, and Cordova. Tyonek was not studied in the 1992 posttest, so panel respondents from that village were dropped from the panel for these tests. Longitudinal correlations for the Exxon92 panel measure three intervals: 1989-1991, 1991-1992, 1989-1992 (3 waves). The reliability for each variable over three waves is expressed for the period 1989-1992 as R_{13} ($R_{13} = r_{12}r_{23}/r_{13}$). Stability coefficients over the same three waves are expressed as S_{13} ($S_{13} = r^2_{13}/r_{12}r_{23}$). Reliability and stability for nominal variables are derived from Pearson's Phi (ϕ) and Cramer's V. Controls for stability are tested with the significance of difference of proportions. NS = Not significant. Probability (P) values <10 in 100 are expressed. Reliability and stability for ordinal and interval variables are obtained with Pearson's r, although longitudinal correlations for ordinal variables are expressed as Goodman and Kruskal's γ. + = No variation, both waves identical. * = No variation in one of the two waves. X = Missing data for one of the samples.

Study VI. Analysis: Exxon Valdez Spill Sample, 1988-1992 (also referrred to as Social Indicators Study VI) (Jorgensen 1994).

In turning to items that have proved to be sensitive to sudden and large-scale changes to the environment, the economy, or both, we note low stationariness among the measures of traditional communitarian life, including whether persons ate wild foods yesterday (A28), ate frequently with relatives or friends in households other than the respondent's (A32), visited frequently with friends and relatives in the respondent's community (D13), and made several visits to friends or relatives in distant communities (D27). The greatest differences in responses on these items from research wave to research wave occur among non-Natives.

A direct measure of long-term consequences to commercial fishing from the Exxon Valdez oil spill and the drop in the market value of fish probably is reflected in Item D3. Many panel respondents who had fished commercially in 1989 (D3) did not in 1991 or 1992 (35%), and some who did not fish commercially in 1989 did so in 1992 (10%). The marked retreat from commercial fishing among panel members contrasts significantly with the posttest samples for 1991 and 1992, where greater proportions of respondents fished commercially. The posttests almost surely capture greater proportions of transitory commercial fishermen than does the panel.

The tests for similarities and differences with the posttest samples produced at least one surprise in regard to the factors that we claim reflect the "stability" of panels. Posttest respondents in 1991 and 1992 more frequently voted in city and statewide elections (D19, D20) than did panel respondents (there are no differences between Natives in the panel and posttests in voting in state and city elections). The differences between the voting behavior of non-Natives in the panel and in the posttests are puzzling. We anticipated that panel members would more likely exercise the franchise. Our expectation that panel members would attend significantly more public meetings than posttest respondents holds for 1992 but not for 1991.

A final measure of interest is whether respondents think that the search for oil will create local jobs (E50). The large majority of panel respondents, particularly non-Natives, replied "yes" in each wave, although persons were much less apt to think so in 1991 (60% favorable) than in 1989 or 1992 (about 80%). This is understandable given that Kenai and Valdez, two large villages whose economies are based on oil-related businesses, are heavily represented in the panel. In 1989 the spill created cleanup employment and perhaps defensive responses from persons whose incomes either directly or indirectly were generated by the oil industry. By 1992, the recession was a major issue in Alaska as elsewhere in the United States and may well have influenced a return to the opinions that respondents held prior to the spill. Average incomes, we have noted, dropped between 1991 and 1992.

In both posttest samples much smaller proportions of respondents (but not significantly smaller) thought the search for oil would create local jobs. In fact, the oil-spill cleanup created hundreds of local jobs; but the "search for oil" is not to be confused with the search for slicks and blobs during the oil-cleanup operation, although it may have been so confused by some respondents.

The EXXON92 panel has greater sample error than the EXXONC panel from which it was drawn. We note three differences among 17 items between the EXXONC:POSTTEST1 (Table 5-5) and the EXXON92:POSTTEST2 (Table 5-6) contrasts. Significant differences obtain between EXXONC and POSTTEST1 on voting in village corporation (D22) and regional corporation elections (D23), and on annual incomes (D2). Those differences disappear between the EXXON92 panel and POSTTEST1. EXXON92 respondents vote less frequently in Native corporation elections and enjoy greater incomes than POSTTEST1 respondents. The failure to include respondents from Tyonek (a *Native* village with low incomes) in the EXXON92 panel may account for some part of the differences. Natives comprise 12 percent of the panel compared with 23 percent of POSTTEST1. But other factors surely affect the outcomes. We exercise controls for age, sex, ethnicity, and employment as a commercial fisherman (self-employed or as an employee working for wages or a share of the catch) in assessing sample differences in Social Indicators Study VI (Jorgensen 1994).

It is evident that the small corpus of variables for which we have information on the EXXON92 panel and the POSTTEST2 sample severely limits their utility in the analysis volume (Social Indicators Study VI [Jorgensen 1994]).

V. TWO PANELS TO MEASURE RETENTION AND CHANGE IN THE EXXON VALDEZ SPILL-AREA AND SIGNIFICANCE TESTS WITH THE 1992 POSTTEST SAMPLE

The data collected in 1992 by the Social Effects research team made possible the creation of two panels. PANEL88-9 panel (*N112*) comprises all persons initially interviewed in 1988W (prior to the spill) and 1989S (soon after the spill). The initial interviewees in 1988 and 1989 are merged into a Wave 1 data set. The reinterviews of these respondents in 1992 is Wave 2. PANEL90-1 (*N91*) comprises all persons initially interviewed in 1990W and 1991W. The initial interviewees in 1990 and 1991 are merged into a Wave 1 data set. The reinterviews of these panel respondents in 1992 is Wave 2. The advantage of these panels over previous panels is that each is composed of respondents from villages representing the entire area affected by the Exxon Valdez oil spill, namely Kodiak Island, Prince William Sound, Cook Inlet, and the Alaska Peninsula.[45] One shortcoming of the panels is that there are so few AQI items on which they can be analyzed. A second is that so few of the respondents (*N23* of the *N112* PANEL88-9) were interviewed prior to the spill.

Tests for differences between the panels and the posttest respondents in 1992 are made between samples matched from the same villages in the four areas directly affected by the drifting oil. PANEL88-9 is tested against a 1992 posttest sample whose $N = 318$ (Tyonek panel respondents were excised because Tyonek was not included in the Social Effects sample). PANEL90-1 is tested against a 1992 posttest sample whose $N = 359$ (Tyonek respondents also were excised from this panel). For these tests, respondents from villages included in the 1992 Social Effects research wave but not in previous research waves (Nanwalek, Port Graham, Larsen Bay, Ouzinkie, Chenega) are excluded from the two posttest samples.

[45]Tyonek panel respondents were not reinterviewed in 1992, nor was a new sample drawn in Tyonek without replacement from previous samples during the 1992 research wave conducted by the Social Effects research team. Thus, Tyonek is not represented in these panels or in the 1992 posttest.

V.A. PANEL88-9 and the 1992 POSTTEST Sample

Differences between the compositions of PANEL88-9 and the 1992 POSTTEST require some comments. The ratio of males to females is 1:1 in the panel but 1.6:1 in the posttest and the ratio of Natives to non-Natives is 1:7 in the panel but 1:4 in the posttest. In addition, panel respondents are 46.1 years of age, on average, compared with 42.6 years for posttest respondents. These differences in personal attributes surely influence some of the tests of differences between PANEL88-9 and the 1992 POSTTEST, particularly those items that measure participation in commercial fishing, household income, voting in village and regional corporation elections, and attitudes about whether the search for oil will create jobs.

Let us first address PANEL88-9 (see Table 5-7). The longitudinal reliability for age, sex, and race is high (as it must be). Most PANEL88-9 respondent-household sizes, voting, and camping practices in 1992 were very similar to what they had been when initially interviewed in 1988/1989.[46]

Longitudinal correlations of .50 or greater are obtained for voting in the most recent city council election (D19), the number of public meetings attended in the past month (D16), the number of days in which friends or relatives were visited in the past week (D13), and annual household incomes (D2). More respondents voted in 1992 than during the year of the spill, and more respondents attended more public meetings during the year of the spill than in 1992. These two items appear to have been affected by the oil spill. The evidence does not rest on the differences in responses between the two waves. Among the panel members who were initially interviewed in 1988 prior to the spill, more voted in city council elections in 1988 than did their panel counterparts in 1989, who were initially interviewed soon after the spill. In addition, fewer respondents who were initially interviewed in 1988 attended public meetings in the month prior to being interviewed than was the case for their panel counterparts, who were initially interviewed in 1989. Thus, the

[46]If, in 1990 and 1991, household sizes (HSIZE), voting in statewide elections (D20), or establishing camps for the harvesting of wild resources (CACT4) fluctuated from their 1988/1989 levels among the PANEL88-9 respondents, they had returned to their about 1989 levels in 1992.

Table 5-7

LONGITUDINAL CORRELATIONS, *PANEL88-9* PRETEST (N = 112), [PRESPILL = KODIAK-OLD HARBOR 1988 (N = 23)] [POSTSPILL = SELDOVIA-KENAI-VALDEZ-CORDOVA-TATITLEK (N = 89)], AND TESTS OF SIGNIFICANCE OF DIFFERENCES WITH *1992 POSTTEST* SAMPLE RESPONDENTS FROM THOSE SAME VILLAGES [1992 (N = 318)], QUESTIONNAIRE INSTRUMENT, 1988/1989-1992[a]

	RELIABILITY 1988-1989 PRETEST *PANEL88-9*	DIFFERENCES *PANEL88-9* v. 1992 POSTTEST
NOMINAL VARIABLES (ϕ)	88/89*92 r_{12}	88/89 v. 92 POST 92*92
A28 Subsistence food yesterday	.25	NS
D3 Commercial fishing or own a business	.20	.01
D19 Vote in most recent city council election	.53	.02
D20 Vote in most recent statewide election	.72	.01
D22 Vote in most recent village corporation election	.22	NS
D23 Vote in most recent regional corporation election	.19	NS
D28 Race of respondent	.92	.06
E50 Will oil search create jobs	.22	.0006
RSEX Sex of respondent	.91	.04
CACT4 Camping to hunt/fish	.65	NS
ORDINAL VARIABLES (γ)		
A32 Eat with relatives in their houses	.33	NS
INTERVAL VARIABLES (r)		
D2 Annual household income	.51	.01
D13 Days visiting friends/relatives in past week	.50	NS
D16 Number of public meetings attended last month	.53	NS
D27 Visits to other communities in the past year	.27	NS
RAGE Respondent's age	.99	.02
HSIZE Household size	.73	NS

[a]Longitudinal correlations (reliability) for the PANEL88-9 measure two intervals (Wave 1: 1988W Kodiak villages are joined with 1989S Cook Inlet and Prince William Sound villages [summer following the spill], and Wave 2: the same villages are restudied in 1992 [winter 34 months following the spill). Longitudinal correlations (reliability) are expressed as r_{12} throughout the table. Reliability for nominal variables is derived from Pearson's Phi (ϕ). Controls for reliability of the nominal variables (differences between responses by posttest respondents in same communities as those in PANEL88-9) are tested with the significance of difference of proportions. Longitudinal correlations for ordinal variables are obtained with Goodman and Kruskal γs. Significance of differences between panel responses for each ordinal variable are obtained from the Kolmogorov-Smirnov test for two independent samples. Longitudinal correlations for interval variables are Pearson's rs. t-tests measure the significance of difference between two independent samples. NS = Not significant. Probability (P) values <10 in 100 are expressed.

factors that reduced the longitudinal correlations on Items D19 and D16 were not the same for the two subsets of the panel; but both are accounted for by the oil spill.

The PANEL88-9 respondents who were initially interviewed in 1988 made three or more visits outside their communities (D27) less frequently in 1988 than did the panel respondents in 1989, who were initially interviewed in 1989. We have noted this phenomenon in most of our measures of visiting. Many persons moved frequently during the spill year, much of it a function of spill-related employment--either in quest of work, because of work assignments, or because increased income made travel possible. All persons who traveled need not have been employed, particularly Natives among whom income sharing within a household and wider networks of kinspersons is a longstanding practice. In 1992 the respondents who were first interviewed in 1989 again visited persons in communities other than their own more frequently (at a rate 3.5 times greater for 3 or more visits) than did the respondents who were first interviewed in 1988. The difference between the 1988 and 1989 respondents' visiting practices outside the community in 1992 does not prompt a simple explanation.

In 1992 the average income of panel respondents was $6,000 higher than posttest respondents, suggesting--as have our previous tests--that panel stability is linked to income. If we look more closely at the incomes of the two subsets of the panel--those initially interviewed in 1988 and those in 1989, it is our impression that changes in income may help to account for the differences in the 1992 responses regarding visits outside the community between the two subsets in PANEL88-9. Forty-three percent of all respondents initially interviewed in 1989 earned more than $50,000 in 1992, as compared with 35 percent of all respondents initially interviewed in 1988. Indeed, the median income in 1992 for 1989 respondents was $50,000, whereas the median income in 1992 for 1988 respondents was $40,000. The discrepancy between incomes of the two subsets of the panel may account for the lesser number of visits by 1989 respondents.[47] We

[47]Eighty-three percent of the 1988 respondents and 82 percent of the 1989 respondents left the village at least once on visits in 1988 and 1989, respectively. In 1992, 65 percent of the 1988 respondents left the village at least once for a visit compared with 83 percent of 1989 respondents.

analyze the relations among employment, income, and visiting in Social Indicators Study VI (Jorgensen 1994).

The items with the lowest reliability have proved to yield low reliability in the measures we have made for all pre-postspill panels, and for all panels in which postspill responses in 1989 are correlated with responses in subsequent years. Responses to whether persons ate wild foods in any meal yesterday (A28), were commercial fishermen or self-employed (D3), and recently ate meals at relatives' homes (A32) were different in 1992 from either 1988 or 1989. In 1992 panel responses were no different from posttest responses on the items measuring wild foods in yesterday's meals (A28) and eating with relatives (A32). Use of wild resources and sharing of meals in relatives' homes do not discriminate between the panel and the posttest. Yet the proportions of persons engaged as commercial fishermen in the panel and the posttest do discriminate. The panel selects against persons who were once engaged in commercial fishing but either got out of the occupation after 1989 or relocated from the village in which they were interviewed in 1988 or 1989. The panel also selects for persons with stable employment in the public and private sectors (e.g., employees of oil-related industries; owners and employees of businesses that provide services, dry goods, food, and the like). Pretests and posttests capture commercial fishermen and self-employed persons in fishing-related businesses, such as canneries and boat services, whose residence in Alaska may be brief. More than one-third of posttest respondents were engaged as commercial fishermen or were self-employed, whereas less than one-fourth of panel respondents were so engaged in 1992.

In our PANEL88-9:1992 POSTTEST contrasts, a greater proportion of panel respondents are women, a lesser proportion are Natives, their average ages are older, their incomes are larger, they more frequently vote in state and city elections, and they are more apt to think that the search for oil will bring employment to local residents than are posttest respondents. Posttest respondents are much more frequently employed in commercial fishing-related enterprises. Panel stability is easily perceived from the differences between the personal characteristics of the respondents in PANEL88-9 and the 1992 POSTTEST sample, and their responses.

V.B. PANEL90-1 and the 1992 POSTTEST Sample

There are marked differences between PANEL88-9 and PANEL90-1, which can be inferred from the differences between PANEL90-1 and the 1992 POSTTEST sample, followed by some casual comparisons of the differences between PANEL88-9 and the 1992 POSTTEST. PANEL90-1 has a significantly smaller proportion of male respondents who are significantly younger than is the case for the 1992 posttest sample. Whereas sex proportions between the panels are about the same, the average age of respondents is not. In addition, PANEL90-1 respondents attended significantly fewer public meetings and visited persons outside their own villages significantly fewer times than did 1992 posttest respondents. The differences between PANEL88-9 and the 1992 POSTTEST respondents were not significant on these items. In all other contrasts, the 1992 POSTTEST sample and PANEL90-1 are similar. The differences between the 88-9 and 90-1 panels, presumably, are that younger men leave the village more frequently to visit, whereas older persons (in the posttest sample) attend more public meetings within the village.

Among the PANEL 90-1 respondents (see Table 5-8), there is high reliability between Wave 1 and Wave 2 responses on personal characteristics (race, sex, age) and also on voting in the most recent city council and statewide elections (D19, D20), voting in the most recent village and regional corporation elections (no variation on D22 and D23), camping for extracting wild resources (CACT4), and household size (HSIZE). Reliability is lower for incomes (D2, incomes dropped for several high earners between 1990-1991 and 1992) and visits to persons in other communities (D27). These results are similar to those obtained for PANEL88-9.

The variables measuring environmentally related items (subsistence food in meals yesterday [A28], eating in the homes of relatives [A32], commercial fishing [D3], and opinions about the search for oil and its effect on jobs for local residents [E50]) and communitarian activities (visiting friends [D13], attending public meetings [D16]) yield relatively low reliability (.17 to .36). There was an increase

Table 5-8

LONGITUDINAL CORRELATIONS, *PANEL90-1* POSTTEST (N = 91), [POSTSPILL = KODIAK-OLD HARBOR-KARLUK 1990 (N = 26)] AND CHIGNIK-SELDOVIA-KENAI-VALDEZ-CORDOVA 1991 (N = 65)], AND TESTS OF SIGNIFICANCE OF DIFFERENCES WITH *1992POSTTEST* SAMPLE RESPONDENTS FROM THOSE SAME VILLAGES [1992 (N = 359)], QUESTIONNAIRE INSTRUMENT, 1990/1991-1992[a]

	RELIABILITY 1990-1991 POSTTEST *PANEL90-1*	DIFFERENCES *PANEL90-1* v. 1992 POSTTEST
NOMINAL VARIABLES (ϕ)	90/91*92 r_{12}	90/91 *v.* 92 POST 92*92
A28 Subsistence food yesterday	.17	NS
D3 Commercial fishing or own a business	.38	NS
D19 Vote in most recent city council election	.59	NS
D20 Vote in most recent statewide election	.70	NS
D22 Vote in most recent village corporation election	X	NS
D23 Vote in most recent regional corporation election	X	NS
D28 Race of respondent	1.00	NS
E50 Will oil search create jobs	.26	NS
RSEX Sex of respondent	.96	.01
CACT4 Camping to hunt/fish	.92	NS
ORDINAL VARIABLES (γ)		
A32 Eat with relatives in their houses	.36	NS
INTERVAL VARIABLES (r)		
D2 Annual household income	.46	NS
D13 Days visiting friends/relatives in past week	.36	NS
D16 Number of public meetings attended last month	.36	.05
D27 Visits to other communities in the past year	.47	.004
RAGE Respondent's age	.99	NS (.10)
HSIZE Household size	.80	NS

[a]Longitudinal correlations (reliability) for PANEL90-1 measure two intervals (Wave 1: 1990W Kodiak villages are joined with 1991W Kodiak Island, Alaska Peninsula, Cook Inlet, and Prince William Sound villages; and Wave 2: the same villages are restudied in 1992 [winter 12-24 months following the initial interviews and 34 months following the spill]). Longitudinal correlations (reliability) are expressed as r_{12} throughout the table. Reliability for nominal variables is derived from Pearson's Phi (ϕ). Controls for reliability of the nominal variables (differences between responses by posttest respondents in same communities as those in PANEL90-1) are tested with the significance of difference of proportions. Longitudinal correlations for ordinal variables are obtained with Goodman and Kruskal γs. Significance of differences between panel responses for each ordinal variable are obtained from the Kolmogorov-Smirnov test for two independent samples. Longitudinal correlations for interval variables are Pearson's rs. t-tests measure the significance of difference between two independent samples. NS = Not significant. Probability (P) values <10 in 100 are expressed.

in wild foods in meals in 1992 and an increased optimism about the salutary effect of the search for oil on employment for locals. But respondents ate fewer meals with relatives, fewer respondents engaged in commercial fishing or self-employed businesses, and respondents both visited friends less and attended fewer public meetings than in 1990-1991. These items also are unexceptional and are consonant with our findings for the other panels.

CHAPTER 6
TESTING ARTIFACTS AS A THREAT TO VALIDITY

I. INTRODUCTION: REACTIVITY AS AN ARTIFACT OF TESTING

We seek to control for reactions among reinterview respondents that can bias reinterview results. If the initial interviews administered to respondents generate a reaction that creates bias, the assumptions of the statistics we have employed thus far, and those we wish to employ elsewhere in this analysis, have been violated. In the preceding sections we employed γ, ϕ, and r (and several measures derived from r), X^2 , the Kolmogorov-Smirnov test for two independent samples, and the t-test for two independent samples to measure intratopic reliability and item stability and change. Each of these statistics assumes independent responses from respondents selected at random. The stability tests for over-time correlations seek not only to account for change in a variable but do so while eliminating the threat to validity posed by "ecological fallacy" (or specification error as described in Chapter 4; also see Social Indicators Study II, Chapter 10 [Jorgensen 1993]).

To avoid specification error in our research design, we test for significance of differences between reinterviews and initial interviews administered during the same research wave. For example, if differences are not significant between panel reinterview responses in 1990 and posttest responses in 1990 (initial interviews administered during the same wave in which the panel reinterviews were administered), the indication is that panel responses are not reactive. Results of reinterviews of panel respondents are used to generalize about panels but also can be used to generalize about the larger initial interview samples from which they were drawn. A testing model such as this one conducted in steps, in which panels selected at random from a larger initial interview sample that also was selected at random, means that we can attribute the reinterview results to the original sample. We can do so only if the panel responses do not vary significantly from the initial interview sample--selected without replacement (of respondents from the sample from which the panel is drawn), which is interviewed at the same time the panel respondents are reinterviewed.

Figure 2-1, which demonstrates the relations between pretest and posttest samples and reinterview waves among AQI panels, is introduced here.

Year	Reinterview Panel: Kodiak-Old Harbor Pre- & Post-spill	Initial Interview Sample: Kodiak-Old Harbor Prespill	Initial Interview Samples: Prince William Sound/ Cook Inlet/Kodiak Island/ Alaska Peninsula Postspill Pretest Posttest	Reinterview Panel: Prince Wm. Sound/Cook Inlet/Kodiak Postspill	Reinterview Panel: Kodiak-Old Harbor-Karluk Postspill
			Posttest = 216*N*		
1991W	18N		159N	95N	27N
	↑ ↑		| |	↑ ↑	↑ ↑
1990W	18N		57N → → →	→ → ↑ →	→ → →
	↑ ↑ ↑		**Pretest = 350*N***	↑ ↑ ↑	
1989S	↑		300N → → →	→ → →	
Exxon Valdez Spill 3/89	↑		|		
1989W	↑ ↑ 18N		|		
1988W	↖ ↖	← 50N —	——— |		

FIGURE 2-1. SOCIAL INDICATORS PROJECT EXXON VALDEZ SPILL SOLOMON FOUR GROUP SAMPLING DESIGN, AOSIS QUESTIONNAIRE INSTRUMENT, 1988-1991

Legend: Double Underline = Two initial interview samples that comprise the pretest sample in the Four Group Design. At various points in the analysis the 1988 (prespill) and 1989 (postspill) subsamples are separated.

Outline = Two initial interview samples that comprise the posttest sample in the Four Group Design. At various points the 1990 and 1991 subsamples are separated for analysis.

→ ← ↗ ↖ = The initial interview samples (pretest and posttest) from which panels are drawn.

The K1C panel is a subsample of a larger panel drawn from the Schedule B pretest sample in 1988. The 1989 reinterviews among K1C respondents were tested against the Schedule A panel responses in 1989 and also against the Schedule A posttest sample in 1989, neither of which is entered in Figure 2-1. The 1990 K1C responses were tested against the Schedule B posttest in 1990. The relation of the K1C panel to Schedules A and B appears in Social Indicators Studies II (Jorgensen 1993) and III (Jorgensen 1994). All but the Kodiak Island respondents were dropped from the 1988 pretest and the Schedule B panel, which we employ here strictly as K1C comprising respondents from Kodiak and Old Harbor.

Because we initiated our research among Schedule A villages in 1987, we were able to test for "testing artifacts"--essentially reactivity--in the Schedule A and B research in 1988 (by contrasting Panel A reinterview respondents with Schedule B pretest respondents). Not one of the variables we retained for the Exxon Valdez spill study suffered from reactivity in the Schedule A and B study. The Kodiak Island villages of Kodiak City and Old Harbor were sampled in the Schedule B pretest of 1988. Those data appear in this study as the Kodiak Island prespill, pretest sample. The Kodiak Island panel (K1C) served to test for stationariness and change in the Schedule A and B study, for which Schedule A and B posttest samples served to test for testing effects in the Schedule B panel. So the Exxon Valdez spill sample, or Schedule C research, is of a piece with the Schedule A and B research. The first Kodiak Island panel (K1C) in particular allows us to avert the "ecological fallacy," for Kodiak Island at least, in attributing changes from the pretest sample (*N50*, 1988) to the Kodiak Island posttest sample (*N57*, 1990). Because our posttest samples are selected without replacement, they do not suffer from reactivity. Yet because the posttest was not drawn from the pretest, by comparing sample responses with panel responses we can infer whether differences are due to reactivity or other factors. And because inferences about stasis or change from the Kodiak Island pretest to posttest samples pose the problem of specification error as a threat to valid conclusions in the larger Schedule C research design, tests of similarities or differences with the panels allow us to infer whether those differences or similarities are epiphenomena or examples of stasis and change. We address that threat here for the Kodiak Island area as well as for the larger spill-affected area.[48]

We perform several tests to determine whether the effects of reinterviewing cause testing artifacts, and we also exercise controls to assist us in evaluating those tests. Table 6-1 is divided by rows into nominal, ordinal, and interval variables as are the previous tables. It is also divided by columns into "Tests for Testing Artifacts" and "Controls for Testing Artifacts." The research design connects the stability analysis with the analysis of testing artifacts. The logic of the tests, which analyze stability and reliability, is integral to the analysis of testing artifacts and vice versa. This is not to say that the tests are redundant. We introduce controls for testing artifacts to determine similarities and differences between the panels and posttests at a single point in time, with the pretest and posttest samples at two points in time. We want to see whether the differences between pretest and posttest samples at two points in time (two for each set of pretest and posttest samples) are different or similar from the panel/posttest contrasts at one point in time. If the pretest and posttest samples demonstrate significant differences on some variables, but the panel/posttest tests do not on those same variables, change rather than "testing effect" should account for the differences.

II. TESTS FOR TESTING ARTIFACTS

II.A. Kodiak Island Panel and Posttest

The first column of the "Tests for Testing Artifacts" of Table 6-1 tests the significance of differences between Kodiak Island respondents (K1C) and Kodiak Island posttest respondents. In Chapter 5 we presented evidence that panel respondents differ from respondents in pretest and posttest samples on several AQI variables that appear to be influenced by exogenous factors. In general, respondents who are reinterviewed one or more times reside for longer periods in the villages in which they are interviewed, reside in households whose compositions and sizes change less and in which income is more stable and/or employment is more stable,

[48]For a fuller rationale of tests for testing artifacts, see Social Indicators Study II (Chapter 10) (Jorgensen 1993).

Table 6-1

MEASURES FOR TESTING ARTIFACTS, PANELS FOR SCHEDULE C TESTED AGAINST THE SCHEDULE C POSTTEST SAMPLE. CONTROLS EXERCISED THROUGH TESTS WITH SCHEDULE C PRETEST SAMPLES, AOSIS QUESTIONNAIRE INSTRUMENT[a]

NOMINAL VARIABLES		TESTS FOR TESTING ARTIFACTS		CONTROLS FOR TESTING ARTIFACTS	
		1990 Panel v. Posttest	1991 Panel v. Posttest	1988-1990 Pretest v. Posttest	1989-1991 Pretest v. Posttest
C12	Work away from village last year	NS*	NS	NS	.06
D3	Commercial fisherman or own business	NS	NS	NS	.02
D19	Vote in last city council election	NS*	.00	NS	NS
D20	Vote in last statewide election	NS	.01	NS	NS
D28	Race of respondent	NS	NS	NS	NS
D29A	Race of spouse	NS	NS	NS	.04
E50	Will oil search create more jobs	NS	NS	.01	NS
RSEX	Sex of respondent	NS	NS	NS	NS
EMPLR	Employer	NS	NS	.00	NS
HTYPE	Household type	.00	NS	.00	.05
A28	Subsistence food yesterday	NS	NS	NS	NS
A30	Subsistence food day before yesterday	NS	NS	NS	.03
B9	Illness/injury prevent some activities	NS	NS	NS	NS
C6N	Employed last year	.09	NS	.05	NS
C15	If work was Exxon related, leave village	NS*	NS	NA'88	.00
D10	What happens to waste water	NS	NS	NS	NS
D11	Toilet facilities	NS	NS	NS	NS
D22	Vote in last village corporation election	NS	NS	NS	NS
D23	Vote in last regional corporation election	NS	NS	NS	NS
D29	Currently married	NS	NS	NS	NS
E58	Who is responsible for Exxon oil spill	NS	NS	NA'88	.00
PPEMP	Public-private employment	NS	NS	.06	NS

[a]In the first column a panel comprising Kodiak Island respondents (K1C) is merged with panel respondents from Chignik and Tyonek (*N* = 23). All of these persons were reinterviewed in 1990. This panel is tested against the 1990 posttest sample comprising initial respondents (*N* = 57) from Kodiak City, Old Harbor, and Karluk. In the second column 145 reinterview respondents in 1991 representing all villages in the spill area (K1C, K2C, Tyonek-Chignik, and EXXONC panels) are merged and tested against the 1991 posttest sample (*N* = 159) comprising respondents from all villages in the spill sample. The test for significance of difference between proportions is employed on the nominal data; Kolmogorov-Smirnov test for two independent samples is used for the ordinal data. The *t*-test is used to test the significance of difference between samples on interval scale data. NS = Not significant. Probability (*P*) values <10 in 100 are expressed. NV = No variance in one or both samples. NA'88 = Question not asked in 1988 (prespill).

Table 6-1 (continued)

ORDINAL VARIABLES		TESTS FOR TESTING ARTIFACTS		CONTROLS FOR TESTING ARTIFACTS	
		1990 Panel v. Posttest	**1991 Panel v. Posttest**	**1988-1990 Pretest v. Posttest**	**1989-1991 Pretest v. Posttest**
A26A	Game available last 5 years	NS	NS	.00	.10
A26B	Fish available last 5 years	.02	NS	.04	.00
A32	Meals with relatives from other households	NS	NS	NS	NS
A33	Percent meat/fish (Native food) in diet	NS	NS	NS	NS
C1	Years education	NS	NS	NS	NS
D6	Is household better off now	NS	NS	NS	NS
E10	Ability to speak Native language	NS	NS	NS	NS
E12	Social ties to other communities	NS	NS	NS	NS
E29	Feelings about current income	NS	NS	NS	.10
A25A	Game available since Exxon Valdez spill	NS	NS	NA'88	NS
A26A	Fish available since Exxon Valdez spill	NS	NS	NA'88	NS
A31	Either day was food harvested by another	NS	NS	NS	NS
A32B	Percent subsistence food since Exxon Valdez	NS	NS	NA'88	.10
A38	Speak Native language at home	NS	NS	NS	NS
B1	My health is...	NS	NS	NS	.00
C20	If financial loss, did Exxon compensate	.09	NS	NA'88	.03
C20A	Reimburse for loss from Exxon Valdez spill	NA	NS	NA'88	NA'89
D9	Ability to get good drinking water	NS	NS	NS	NS
D12	Difficulty in heating house	.02	NS	.08	NS
D24	Where were you born	NS	.06	NS	NS
D26	Where did you live before moving here	NS	NS	NS	NS
D3A	Amount invested in personal business	NA	NS	NA'88	.01
C9A	Class of job--unemployed to manager	NA	NS	NA'88	NA'89
C9B	Number of different jobs in past year	NA	NS	NA'88	NA'89
C10A	Private employ--unemployed to professional	NA	.00	NA'88	NA'89
C10B	No. different businesses last year	NA	NS	NA'88	NA'89
C11	Occupation desired--unemp/same/different	NA	NS	NA'88	NA'89
C12X	Occupation away--labor to manager/prof.	NA	NS	NA'88	NA'89
C12Y	Occupation away--pub-not spill to priv-spill	NA	NS	NA'88	NA'89
C20B	Net gain from Exxon Valdez spill	NA	NS	NA'88	NA'89
E52	Search for oil good idea/mixed/bad idea	NA	NS	.05	NS
E51	How will search for oil affect game/fish	NA	NS	NA'88	NS
INTERVAL VARIABLES					
RAGE	Age of respondent	.00	.03	.03	NS
C6M	Months worked (employed) last year	NS	NS	NS	NS
C12M	Time spent working outside village	NS	NS	NS	.00
C13	Employment due to Exxon Valdez	.06	NS	NA'88	NS
C16	Lose employment due to Exxon Valdez	NS	.03	NA'88	.02
C18	Relocate due to Exxon Valdez	NV	NS	NA'88	NS
C19	Lost property due to Exxon Valdez	NV	NS	NA'88	NS
D2	Annual household income	NS	NS	NS	.07
D13	Days visiting friends/relatives	NS	NS	NS	.04
D16	Attend public meetings last month	NS	NS	NS	NS
D25	Years resided in village	NS	.00	NS	NS
D27	Number of visits outside village last year	NS	NS	.07	.10
D8	Number of rooms in house	NS	.00	.06	.00
D4	Minimum income needed per year	NS	NS	NS	NS
HSIZE	Household size	NS	NS	.04	NS
C12C	No. of months worked away from village	.05	NS	NA'88	.00

and more frequently exercise their political franchise than do respondents in the pretest and posttest samples from which panel respondents are drawn (at random).

The prespill and postspill Kodiak Island data (first and third columns) support these generalizations. Among the nominal variables, there are two differences between the Kodiak panel and posttest for 1990 that can be attributed to chance less than 10 times in 100. The two significant differences are C6N (Were you employed last year?) and HTYPE (Type of household organization). Posttest respondents were employed at a rate of 10:1, panel respondents at 3:1. Persons residing alone accounted for 60 percent of posttest households, yet only 15 percent of panel respondents resided alone. Conjugal pairs, nuclear families, stem families, and composite households comprised a much larger proportion of households in the panel.

The contrasts of the nominal variables suggest that reactivity is not influencing responses among panel respondents. Rather, the differences in the 1990 panel and 1990 posttest households appear to be influenced by the mobility of single persons in quest of employment on one hand, and the better access to local sources of employment--and probably to local political power as well--among panel respondents on the other hand. This is not to argue that panel respondents are better off financially or enjoy greater access to employment, in general, than posttest respondents. It appears that posttest respondents pursue work wherever they can find it and are successful in landing employment at greater rates than panel respondents. It may well be that the opportunity costs for employment are higher for panel respondents than for posttest respondents, rendering panel respondents less willing to relocate (or because of age, sex, or obligations to a household, less able to relocate).

For examples, although the differences are not significant between panel and posttest respondents on items C12 (Did you work away from the community last year?) and C15 (If work during the past year was related to the Exxon Valdez spill, did you leave the village for that employment?), the differences are interesting. One in four panel respondents worked away from the community in the 10-month period following the spill compared with two of every of five in the posttest. In addition, every posttest respondent who claimed to be employed in a spill-related job between spring 1989 and winter 1990 left the village for employment. The rate of panel respondents who claimed to gain spill-related employment at some time during the 1989-1990 period was twice that of the posttest respondents, yet only one-third of those panel respondents left their villages to do so. These results are suggestive that panel respondents acquire jobs within the village, whereas others do not get work--or must move to do so--at higher rates than panel respondents.

Finally, Kodiak Island panel respondents differed from posttest respondents in 1990 by a greater proportion voting in the most recent city council elections (D19) and a greater proportion eating subsistence foods two days prior to the interview (A30). The differences are attributable to chance at about 10 percent.

There are three differences significant at less than 10 percent among the ordinal variables. Not one of these appears to be a consequence of reactivity among reinterview respondents. Cognitive attitudes of posttest respondents are negatively correlated with panel respondents with respect to the amount of fish available in 1990 and 1986 (A26B). A 60-percent majority of posttest respondents thought that there had been a decrease in the amount of fish available from 5 years earlier, while almost 50 percent of the panel respondents thought that there had been an increase in the amount of fish available in that period. More posttest than panel respondents claimed that they had sustained financial losses due to the spill, and a greater proportion of the posttest respondents reported that they were adequately compensated for the financial losses they sustained (C20). The proportions of panel and posttest respondents engaged in commercial fishing in 1990 are almost identical (about 35%). The differences between panel and posttest respondents with respect to the availability of fish in 1990 in comparison with 1985 (5 years earlier) is accounted for by persons who are not engaged in commercial fishing-related businesses: 31 percent of panel respondents and 79 percent of posttest respondents not engaged in commercial fishing thought that fewer fish were available in 1990 than in 1985. Neither length of residence in the village (D25) nor ethnicity (D28) exercised significant effects. The final difference is in the difficulty in heating one's house: three times as many posttest respondents as panel respondents reported difficulty in heating their homes (D12). This is likely due to the mobility of single persons who occupy houses on a temporary basis (see also the Kodiak Island pretest:posttest contrast, wherein a similar difference obtains for the same apparent reason).

Among interval variables there are three significant differences: (1) posttest respondents, on average, are *10 years* younger, (2) worked away from the village much longer during the past year (C12C), and (3) gained more employment as a consequence of the Exxon Valdez spill than panel respondents. As among the nominal and ordinal items, there are no indications of testing artifacts among the interval variables. The differences represent differences in the sample populations due, we aver, to mobility among predominantly non-Native, commercial fishing populations. Non-Natives, as individuals rather than in families, move to Alaska for employment. They leave when there are no jobs. Pretest and posttest samples capture youthful respondents; panels lose them.

These claims are partially confirmed by the 1988-1990 pretest-posttest contrasts for Kodiak Island. There are many more significant differences between pretest and posttest samples than between the 1990 panel and 1990 posttest. This is anticipated inasmuch as the prespill pretest sample (from which the panel was drawn) was interviewed in 1988--about 14 months before the spill. The posttest, drawn without replacement from the pretest, was interviewed about 10 months after the spill. Appropriate comparisons with the panel appear in footnotes.

Posttest respondents are 6 years younger (RAGE), reside in houses with fewer rooms (D8), and reside in smaller households (HSIZE) than pretest respondents.[49]

[49]The 6-year age difference contrasts with the 10-year difference between panel and posttest. Because all panel respondents were 2 years older in 1990 than during the pretest research wave, the real difference between posttest and panel is 8 years rather than 10. Nevertheless, the difference between pretest and posttest suggests that the Exxon Valdez spill selected for mobility among youth as well as an influx of youth in Kodiak City. The 1988 pretest sample from the Schedule B panel members drawn in 1989 suffered from attrition, and that same panel lost 10 percent of its respondents in 1990; i.e., 10 percent of the 1989 panel respondents could not be located in 1990. Persons under 35 relocated more frequently. The concluding hypothesis is that random samples of universes of persons not previously interviewed have high proportions of young persons. Reinterview panels lose young persons.

The differences in cognitive attitudes about the availability of fish and game in the present and 5 years earlier (A26A, A26B) are especially revealing, as are cognitive opinions about whether the search for oil is a good idea, a bad idea, or something in between (E51). Posttest respondents thought that both fish and game were less available in 1990 than in 1985, whereas pretest respondents thought that there were no differences in the availability of those resources in 1988 and 1983. In addition, the modal pretest response was that the search for oil was a mixture of good and bad ideas; but the next most common answer was that it was a good idea. In 1990 the "mixed" option remained the modal category, but "bad" replaced "good" as the second alternative.

Changes in the sources of employment also distinguish the pretest from the posttest samples on Kodiak Island. Higher proportions of posttest respondents were employed in the previous year (C6N), the proportion of employment in the public sector increased (EMPLR, PPEMP), respondents resided in smaller households (HTYPE), and significantly fewer posttest respondents than pretest respondents (79% v. 54%) thought that the search for oil would generate jobs locally (E50). This last response is of a piece with the responses about whether the search for oil is a good idea, a bad idea, or some of both. Even though many postspill posttest respondents had secured work in spill-related activities, the proportion of respondents who thought their local employment would increase as a consequence of oil was less than among persons interviewed in 1988 (pretest-prespill) who had not coped with a large spill and had not sustained losses from a spill. The answers to this question by posttest and 1990 panel respondents are similar, suggesting that 1990 panel and posttest respondents responded not to jobs available in cleanup alone but to lost opportunities for fishing and to the short-term nature of cleanup work.

The differences between Kodiak Island pretest and posttest samples, and the similarities between Kodiak Island panel and posttest on several topics, suggest that the spill had several consequences that are measured here, and that testing artifacts are not evident.

II.B. Exxon Valdez Spill-Area Panel and Posttest Sample

All villages represented in the Kodiak Island samples gain the majorities of their incomes from commercial fishing. Three of the four largest villages (Kenai, Valdez, and Seldovia) in the Exxon Valdez panel, pretest, and posttest samples gain much less than 20 percent of their total incomes from commercial fishing. The principal multiplier for the Kenai and Valdez economies is oil. Thus, we expect differences between the Exxon Valdez spill-area samples and the Kodiak Island samples. Although we do not test for those differences here, they will become obvious as we analyze these data for testing artifacts.

There are two significant differences between the 1991 panel and the 1991 posttest responses: (1) significantly higher proportions of panel respondents than posttest respondents voted in the most recent city council and statewide elections (D19, D20), and (2) these results are consonant with the more stable characteristics of panel populations that we have noted above and in Chapter 5.

Among ordinal variables, a greater proportion of posttest respondents was born outside the region and outside Alaska than was the case for panel respondents (D24), yet more panel respondents were engaged in higher ranked occupations (foreman, skilled labor, management, professional) than was the case for posttest respondents (C10A). These differences fit our expectations for postspill changes in which persons who have resided in sample villages for long periods and have reasonable job security can be located during reinterviews, whereas at any point in time the populations in Alaska's villages, in general, are in some state of flux in which younger persons enter seeking work and younger persons leave when work cannot be found or when employment terminates.

Among interval-level variables, posttest respondents are 4 years younger, on average, than panel respondents (RAGE). They also are twice as likely as panel respondents to have lost employment because of the Exxon Valdez oil spill (C16), and their residency in the village is for a significantly shorter duration than that of panel members (D25).

There is no evidence for testing artifacts in the Exxon Valdez spill-area panel. However, there is compelling evidence to suggest that this panel is stable in much the same way that the Kodiak Island panel is stable, and that persons who experienced the most deleterious consequences from the spill are captured only in the larger samples and are less often located for reinterviews.

The Exxon Valdez pretest:posttest contrasts reveal that posttest respondents worked away from the village at significantly higher rates than pretest respondents (C12), but there were significantly more persons engaged in commercial fishing or some other self-owned business in the pretest than in the posttest (D3). The number of non-Natives in the posttest was significantly lower than in the pretest (D28). Inasmuch as the Exxon Valdez spill area pretest sample was drawn and interviewed 5 months following the oil spill at a time near the peak of spill-cleanup activity, and because non-Natives poured into spill-area communities in search of employment, we anticipated that the proportion of non-Natives would be less in the posttest than in the pretest. But we also anticipated that non-Native households would be fewer in the posttest because whether non-Natives are short-term or long-term residents (<6 months or >10 years), non-Natives are much more likely to relocate during economic downturns than are Natives. Non-Natives, with very few exceptions, migrate to Alaska for employment and emigrate from Alaska when employment is terminated. When the owner-operator of a fishing vessel cannot fish and cannot maintain payments on his or her equipment, or when a small businessperson loses his clientele or cannot pay help to keep his business going, or when a person loses work, outmigration often follows.

The person who loses a business or employment leaves, as do that person's dependents. Thus outmigration in the year following the spill affected not only single persons who migrated to the spill area on a temporary basis but also families and conjugal pairs. Single persons (or persons living alone) comprise the bulk of the inmigrants and outmigrants in Alaskan villages. Natives, through means of kinship networks, traditional customs of sharing, and much more extensive uses of naturally occurring resources for subsistence, are less apt to migrate during economic downturns; but if Natives migrate, young men and women between the ages of 18 and 35 are the most likely candidates to do so (see Social Indicators Study III [Jorgensen 1994]).

Households were much more apt to be single-person and less apt to have eaten subsistence food 2 days earlier among posttest than pretest respondents (HTYPE, A30). A greater proportion of posttest than pretest respondents placed blame for the Exxon Valdez oil spill on the public sector, particularly State of Alaska agencies and departments and Federal agencies, including the U.S. Coast Guard (E58).

The comparisons of the similarities and differences in the responses to the ordinal variables between pretest and posttest respondents confirm many of our expectations: posttest respondents thought that game and fish were less available, their current incomes were insufficient, and their health was worse; increased their intake of subsistence food; and claimed that they were inadequately compensated for their losses due to the Exxon Valdez oil spill.

Our expectations are confirmed because the proportion of Natives in the posttest sample is greater than the pretest--accounting for the greater use of naturally occurring resources for subsistence; the proportion of older Natives is greater in the posttest, accounting for the large number of persons who report poor health (the non-Native population in coastal Alaskan villages is younger and healthier than the general Native population); and many commercial fishermen and small businessmen in some villages, notably Cordova, had complained since late 1989 that they had not been adequately compensated for the losses they incurred as consequences from the spill. Pretest respondents invested more in their commercial fishing and business enterprises. Much of this investment was a direct consequence of money made available to them from *their participation in the spill cleanup*. Many of those investments, we learned in 1991, were not wise for several reasons that are beyond our immediate concern here.

Among the interval variables, pretest respondents more often left their villages for work, much of which was directly related to the spill. Among posttest respondents, more lost employment due to the spill. Perhaps because of the unexpected amounts of cash that flowed through some households in which persons gained employment because of the spill, annual household income, visits with friends and relatives within the village, and visits to friends and relatives in communities other than the respondent's was higher in the pretest than in the posttest sample. One measure of the dislocation of families after the pretest is that pretest respondents' houses had more rooms than posttest respondents' houses; and they worked away from the village more often--almost always as commercial fishermen.

III. TESTS FOR TESTING ARTIFACTS IN 1992: 1992 POSTTEST V. ALL REINTERVIEW RESPONDENTS

The data collected by the ADF&G's Social Effects research team allow us to test for testing artifacts among 16 AQI items. We seek to be parsimonious by lumping all reinterviewees in 1992 and contrasting their responses with all initial interviewees in 1992. The reinterviewees form a single panel comprising 215 respondents from all study villages with the exception of Tyonek.[50] The panel members were initially interviewed either in 1988, or 1989, or 1990, or 1991. Some of these respondents had been selected for other panels (e.g., K1C, K2C, EXXONC), so some were reinterviewed one or more times before 1992. The 1992 posttest sample comprises 535 respondents not previously interviewed. In Table 6-2, reinterview respondents are designated by "RI" and initial interview respondents are designated by "I."

Although not demonstrated in Table 6-2, several significant differences obtain between the reinterview panel and the 1992 posttest. A greater proportion of posttest respondents than panel respondents is male (59% v. 47%), commercial fisherman (39% v. 29%), and Native (44% v. 16%). There are differences between the panel and posttest in voting behavior, incomes, opinions about the consequences of searches for oil, the number of meals eaten with relatives, the amount of visits made within and outside the village, and attendance at public meetings.

The many differences between the panel and the 1992 posttest samples require that we subclassify these data sets by three major contrasts in order to test for

[50]Tyonek respondents have been excluded from the panel because they were not reinterviewed in 1992.

Table 6-2

SIGNIFICANCE OF DIFFERENCES BY THEORETICAL CONTRASTS: REINTERVIEW RESPONDENTS (RI) (*N* = 215) V. INITIAL INTERVIEW RESPONDENTS (I) (*N* = 535), QUESTIONNAIRE INSTRUMENT, 1992[a]

	Differences I v. RI 1992 Race/Ethnicity		Differences I v. RI 1992 *Hub:Periphery*		Differences I v. RI 1992 *Comm Fish:Noncom*	
NOMINAL VARIABLES (ϕ)	**Non-Native**	**Native**	*Hub*	*Periphery*	*Comm Fish*	*Noncom*
A28 Subsistence food yesterday	NS	NS	NS	NS	NS	NS
D3 Commercial fishing or own a business	NS	NS	NS	NS	NS	.06#
D19 Vote in most recent city council election	.001	NS	.01	NS**	NS**	NS**
D20 Vote in most recent statewide election	.0001	NS	.001	NS	.02	.05
D22 Vote in most recent village corporation election	NS	NS	NS+	NS+	NS+	NS+
D23 Vote in most recent regional corporation election	NS	NS	NS+	NS+	NS+	NS+
E50 Will oil search create jobs	.0002	NS	.08#	NS	.06	.0002
RSEX Sex of respondent	.0004	NS	.0002	NS**	.006	NS**
CACT4 Camping to hunt/fish	NS	NS	NS	NS	NS	NS
ORDINAL VARIABLES (γ)						
A32 Eat with relatives in their houses	NS	NS	NS	NS	.01	NS
INTERVAL VARIABLES (*r*)						
D2 Annual household income	NS	NS	NS	NS	.003#	NS
D13 Days visiting friends/relatives in past week	NS	NS	NS	.03#	.000#	NS
D16 Number of public meetings attended last month	NS	NS	NS	NS	.01#	NS
D27 Visits to other communities in the past year	NS	NS	.02	NS	.09#	.02
RAGE Respondent's age	.003	NS	.06	NS	NS**	.03
HSIZE Household size	NS	NS	NS	NS	NS	NS

[a]Reinterview respondents were interviewed one or more times from 1988 through 1989, 1990, and 1991. Initial interview respondents were interviewed for the first time in 1992. Significance of differences between samples for responses on the nominal variables is tested with the significance of difference of proportions. Significance of differences between sample responses for the ordinal variables is obtained from the Kolmogorov-Smirnov test for two independent samples. *t*-tests measure the significance of difference between two independent samples for the interval level variables. NS = Not significant. Probability (*P*) values <10 in 100 are expressed. Symbols adjacent to *P* values represent changes when race/ethnicity is controlled (i.e., when Natives R's are excluded from the significance tests): # = not significant when Natives removed; ** = significant when Natives removed; + = no variation when Native R's are excluded. Samples sizes (*N*) **Non-Native** I = 300, RI = 179; **Native** I = 233, RI = 36; *Hub* I = 156, RI = 147; *Periphery* I = 379, RI = 68; *Comm Fish* I = 377, RI = 115; *Noncom Fish* I = 158, RI = 100.

testing artifacts: race/ethnicity (**Native** v. **Non-Native**), *Hub, Periphery, Comm Fish, Noncom Fish*. We do so to accommodate the differences in racial/ethnic proportions and also the differences in proportions of other contrasts (*Hub:Periphery, Comm Fish:Noncom*). Thus, **Non-Native** "I's" are tested against **Non-Native** "RI's," *Hub* "I's" are tested against *Hub* "RI's," and so forth. Because the 1992 posttest sample includes several *Native* villages, hence a larger proportion of **Native** respondents than any of the samples from which the reinterviewees are drawn, it also is necessary to control for race/ethnicity within *Hub, Periphery, Comm Fish*, and *Noncom Fish* contrasts to determine whether reactivity is a threat to validity.

There are no significant differences on any of the 16 AQI items between **Natives** interviewed for the first time in 1992 and **Natives** who were reinterviewed in 1992. It is apparent that two of the five significant differences that obtain between **Non-Native** initial and reinterview respondents are personal characteristics: the 1992 posttest sample has a significantly higher proportion of younger respondents and male respondents than does the panel. Not surprisingly, a significantly greater proportion of panel respondents than posttest respondents voted in the most recent city council and statewide elections. These results are similar to other contrasts between initial and reinterview responses of **Non-Natives** (posttest v. panel). And as we have found in other panel:posttest contrasts, non-Native panel respondents are more apt to think that the search for oil will generate employment for local residents than are non-Native posttest respondents.[51] The differences between **Non-Native** posttest and panel responses are attributable to the differences between the youthful, male-dominated posttest sample and the stability of place of panel members.

The final four columns of RI v. I contrasts in Table 6-2 require closer attention than the **Non-Native** and **Native** columns. Because of the large proportion of

[51]Panel and posttest non-Native respondents are optimistic that OCS development will create local jobs (panel respondents are positive at a ratio of 3.5:1; posttest respondents are positive at a ratio of 1.75:1). Panel and posttest Native respondents also are optimistic, although much less so than non-Natives (panel respondents are positive at a ratio of 2:1; posttest respondents are positive at a ratio of 1.35:1).

Native respondents in the posttest, it was necessary to control for Natives (i.e., hold them constant) in our tests of significance in order to determine the influence exercised by race/ethnicity on the differences between reinterview and initial interview responses. The following symbols are placed adjacent to the *P* values for the significance tests of some of the items: + (means that there is no variation among respondents when Natives are excluded), ** (means that the difference is significant when Natives are excluded), # (means that the difference is not significant when Natives are excluded).

There is no evidence of test artifacts when controlling for ethnicity, although there appears to be evidence of differences between respondents who have resided for long periods (>11 years) in the villages in which they were interviewed and those who have resided in those villages for shorter periods. The panel, of course, selects for stable residents, which select for long-term residents. Thus the differences between I and RI on items that are not accounted for by ethnicity appear to be influenced by length of residence in the village and/or stable source(s) of income, regular political participation, and the like (not to be confused with "stationariness" or "item stability").

Voting in village corporation (D22) and regional corporation (D23) elections yields no variation when Natives are excluded, and the differences are not significant when Natives are included (see the *Hub, Periphery, Comm Fish*, and *Noncom* columns for these items). Non-Natives, of course, cannot vote in village corporation or regional corporations; and the differences are not significant when **Native** I and RI responses are tested.

Voting in recent city council (D19) and statewide (D20) elections is a different matter. Here we see that four of eight tests yield significant differences. Among all four the differences are attributable to a greater proportion of panel respondents (Native and non-Native) than posttest respondents exercising their franchises. When Natives are excluded from tests of Item D19 within the *Periphery, Comm Fish*, and *Noncom* columns, the differences between RI and I are significant. The differences are a function of more non-Native panel respondents than non-Native posttest respondents exercising their franchises. Natives, whether initial or reinterview respondents, vote at about the same rates.

A set of items in the *Comm Fish* column (D2, D13, D16, D27) yield significant differences between I and RI respondents so long as Natives are included. The differences on these items are not significant when Natives are excluded. The item measuring annual income (D2) demonstrates that non-Natives have significantly higher incomes than Natives; but when Natives are excluded, non-Native panel members in *Comm Fish* villages do not have significantly larger incomes than non-Native posttest respondents in those villages.

Two items that frequently discriminate between Natives and non-Natives are D13 (days visiting friends/relatives in the past week) and D27 (visits to other communities in the past year). It is customary for Natives to visit friends and relatives within the village frequently and to do so outside the village when resources allow. The differences in *Comm Fish* villages disappear when Natives are excluded.

Differences in the number of public meetings attended last month (D16) also disappear among *Comm Fish* village I's and RI's when Natives are excluded. Natives attend public meetings much as they visit friends and relatives and eat at the homes of relatives. These are customary activities in which Natives engage, but these are not customary activities in which non-Natives engage.

The preceding assessment leaves unexplained two items for which differences are significant. Item E50 (will the search for oil create jobs for local residents) yields significant differences in the Non-Native, *Hub*, *Comm Fish*, and *Noncom* tests of I v. RI responses. It is interesting that non-Native panel (RI) respondents, in general, are more likely than non-Native posttest respondents, in general, to think that the search for oil will create local jobs. But the difference disappears between non-Native respondents in *Hub* villages (E50 is not significant when Natives are excluded). The economies of two of the three largest *Hub* villages in our sample, Kenai and Valdez, are based on oil-related enterprises. In commercial fishing villages the panel respondents at a ratio of 2:1 think that the search for oil will create jobs, whereas posttest respondents think so at a ratio of 1.3:1. In *Noncom* fishing villages (which include Kenai and Valdez), panel respondents at a ratio of 9:1 think that the search for oil will create local jobs compared with a ratio of 2:1 for posttest respondents. Although the majority of panel and posttest respondents in *Comm Fish* and *Noncom* villages think that the search for oil will create local jobs, the differences between them are consonant with our observations of stability among panel respondents. When Natives are excluded from the *Comm Fish* and *Noncom* tests, the ratios of positive to negative responses on E50 increase for panel and posttest, but not enough to render the differences not significant.

The differences between panel and posttest respondents in *Hub* and *Noncom* villages are attributable to the same thing: young males. The majority of *Hub* posttest respondents are the same persons that represent the majority of *Noncom* villages. The young males among them tend to be single persons living alone and tend to travel frequently outside the village in which they were interviewed. They also tend to have high per capita incomes.

The differences between reinterviewees and initial interviewees in Table 6-2 are accounted for by factors other than reactivity, but particularly ethnicity, age, sex, and the economic bases of two large villages--Kenai and Valdez.

IV. TESTING ARTIFACTS AND CHANGE

There is no evidence that reinterview responses of panel members are affected by reactivity. There is overwhelming evidence that reinterview responses are similar to initial interview responses collected at the same time as the reinterview responses, suggesting that the factors that affect panel responses also affect initial responses to members of the various pretest and posttest samples. There are clear differences between the Kodiak Island samples and the Exxon Valdez spill-sample responses for pretest- and posttest-research waves, but these differences are accounted for by the differences between the villages that are incorporated in each sample. All Kodiak Island villages rely on commercial fishing for the main portion of their incomes. Three large spill-area villages do not rely on fishing; the two largest rely on oil and the multiplier it represents.

PART THREE: KEY INFORMANT PROTOCOL

CHAPTER 7
RESEARCH DESIGN

The Solomon Four Group research design we have implemented comprises several methods and has generated several data sets (see Chapters 1 and 2) . The key informant protocol (KIP) is one of three instruments we administered in the course of our research. The methodology used to select protocol respondents, the instrument itself, and the methodology employed to administer the instrument vary from the methods used to select respondents for the AOSIS Questionnaire Instrument (AQI), the AQI itself, and the methodology used to administer that instrument. There are a few questions in the AQI that are comparable to a few questions in the KIP instrument, providing for interinstrument reliability tests. Because the KIP samples are selected following random selection procedures from the AQI samples, intrarespondent, interinstrument reliability tests are facilitated as well.

The KIP instrument elicits responses that are essentially open-ended. The interviewer, rather than the informant (respondent), classifies the informant's response to each of the protocol's topical questions. The manner in which variables are created that comprise mutually exclusive and mutually inclusive sets of attributes (possibility sets) is described in Social Indicators Study of Alaskan Coastal Villages II. Research Methodology: Design, Sampling, Reliability, and Validity (Jorgensen 1993). In brief, during the first wave of field research, the KIP investigators ask the informants all or most of the questions that are listed on the KIP instrument. It is not always necessary to ask each question because the investigator and the informant engage in a dialogue in which it is possible for the informant to ask questions of the investigator, and for the investigator to ask questions of the informant, questions not specifically appearing on the KIP instrument. In discussions such as these, the informant frequently answers questions for which the KIP investigator desires answers, but which have not yet been asked. The exchanges during the first wave of research facilitate the focussing of questions and the methods of asking questions in subsequent interviews and subsequent research waves.

The KIP investigators keep notes on each response to each question and formulate variables for each question. They also rate the response of each informant on each of the variables. By pooling information from 112 informants at the end of the first field research session (1987 for Schedule A), and from 216 following the first wave of field research in the summer of 1989 (the Exxon Valdez spill sample [Schedule C]), the research team created KIP variables comprising mutually exclusive and mutually inclusive attribute sets. Because of the endless dialectical nature of protocol research, debriefings of investigators and analyses of interviews followed each wave of KIP research. Some additions of new questions and some changes to old questions were made at each of these sessions. In the following sections, we will analyze the reliability and validity of the KIP instrument, jettisoning the unreliable and otherwise invalid variables.

So we do not lose the thread here, the responses on each KIP variable for each informant were rated by the KIP investigator. The weakness of this method is subjectivity, i.e., the interviewers may be subject to biases and those biases may influence the interviewer's ratings. The strength of the protocol is that its administration is an interview conducted as dialogue rather than as a series of questions whose answers are restricted to choosing one among a set of alternatives. Questions can be explored at greater length using a wider variety of situations and contexts to explain the intention of the question. The person being interviewed can respond to the interviewer with questions of his own, and can make clarifying comments which serve to better inform the interviewer. Protocol items seldom suffer from construct-validity problems and almost always provide greater depth of understanding about topics than do questionnaire items.

We refer to questionnaires as "forced-choice" instruments whose strengths are objectivity (Everyone is asked the same questions and everyone has the same set of alternatives from which to choose.) and whose weaknesses are either construct validity (The question does not measure what it purports to measure.) or triviality.

The strength of the questionnaire--its objectivity--helps account for the subjectivity of the protocol. The strength of the protocol--its depth of information--

provides remedies for some construct-validity problems inherent in questionnaires and also averts the trivializing of social subjects.

Upon encountering a large number of problems with the original AQI in the 1987 and 1988 waves of the Schedule A and B research which caused us to eliminate over 50 percent of the original questions and to modify many others, we sought to rectify those problems by adding topics to the KIP instrument. We reasoned that the nature of KIP interviews, coupled with the skills of the KIP investigators (all of whom possess years of research experience and hold graduate degrees in the social sciences, mostly PhD's in anthropology), would facilitate fuller and deeper responses to cognitive-attitude questions, questions about economic practices, questions about political activities, and questions pertaining to the social structure and dynamics of local communities.

In creating the KIP portion of the Exxon Valdez spill-area-research design, we added topics to specifically address the consequences of the oil spill, and we increased the proportion that the KIP samples represented of the AQI samples. We drew a 72 percent random sample (KIP = 216*N*) from the postspill pretest AQI sample (300*N*) for 1989, and a 63 percent random sample (KIP = 100*N*) from the postspill posttest AQI sample (157*N*) for 1991. We also created a panel comprising a 33 percent random sample (KIP Panel = 72*N*) of the postspill pretest KIP sample (KIP = 216*N*) which we reinterviewed in 1991. Thus, our KIP analysis is based on 388 interviews conducted 5 months after the spill (216*N*) and 22 months after the spill (172*N*). Table 7-1 lists the number of KIP households in our pretest (1989) and posttest (1991) samples by village, and the proportions of KIP households of the total AQI households in each village.

The KIP sample proportions of the AQI samples are so large as to render sample error inconsequential when generalizing for the larger AQI samples. The large panel, for which error of the estimate can be calculated from the covariance (COV [P,Q]), is a compelling property of our research design because sample *N*'s, hence costs, can be reduced dramatically (see Social Indicators Study of Alaskan

Table 7-1

KIP SAMPLING FRAME FOR EXXON VALDEZ SPILL RESEARCH: NUMBER AND PROPORTIONS OF AQI HOUSEHOLDS IN KIP PRETEST AND POSTTEST SAMPLES BY VILLAGES, 1989 AND 1991[a]

Village	KIP Proportion of AQI Households Interviewed	KIP Number of Pretest Households Interviewed	KIP Number of Posttest Households Interviewed
False Pass	50	6	
Ekwok	60	10	
Kodiak	100	11	25
Old Harbor	100	3	7
Karluk	100	7	3
Chignik	65	10	5
Kenai	61	57	20
Tyonek	65	10	5
Seldovia	61	10	7
Valdez	67	48	16
Cordova	66	35	12
Tatitlek	65	9	

[a]The KIP sample households are represented as a proportion of the AQI sample households (aggregate for the 1989 pretest and 1991 posttest) from which they were drawn. The panel (72*N*) is drawn from the 1989 pretest sample. The reinterview wave is not represented here. See Table 18 above for a listing of the proportion of total AQI households (1988 + 1989 pretest samples, 1990 + 1991 posttest samples) to total village households.

Coastal Villages II. Research Methodology: Design, Sampling, Reliability, and Validity [Jorgensen 1993]).

In 1992 the ADF&G's Social Effects research team included ten questions in their questionnaire that are similar to items in the KIP instrument. The ADF&G researchers posed the questions as forced choices rather than as protocol inquiry. These data will be analyzed at appropriate points in the following chapters.

Figure 7-1 is a temporal and spatial representation of the KIP sampling design within the Solomon Four Group research design. Comprehension of the way in which the KIP design is fitted with the AQI design, and the manner in which panels are nested in both, will be facilitated by comparison with the AQI design (Figures 1-2, 2-1). Figure 7-2 is a temporal and spatial representation of the way in which

	Reinterview Panel	Initial Interview Sample	Initial Interview Samples	Reinterview Panel
Year	**Kodiak-Old Harbor Prespill and Postspill Waves 2-4**	**Kodiak-Old Harbor Prespill**	**Prince William Sound/ Cook Inlet/ Kodiak Island/ Alaska Peninsula Postspill Pretest Posttest**	**a Prince William Sound/Cook Inlet/ Kodiak Island/ Alaska Peninsula Postspill Wave 2**
1991W	2N ↑ ↑		**Posttest = 100*N***	72N ↑ ↑
1990W	↑ ↑ ↑ ↑			↑ ↑ ↑ ↑
1989S	4N ↑ ↑		**Pretest = 216*N*** → → →	→ → → →
Exxon Valdez Spill 3/89	↑			
1989W	14N ↖ ↖			
1988W		← ← 16N		

FIGURE 7-1. SOCIAL INDICATOR PROJECT EXXON VALDEZ SPILL: SOLOMON FOUR GROUP SAMPLING DESIGN, KEY INFORMANT PROTOCOL (KIP) INSTRUMENT, 1988-1991

Legend: Double Underline = The initial prespill interview sample of 16 Kodiak City and Old Harbor respondents, winter 1988. This sample is part of the Schedule B Pretest Sample.

Bold = Two initial interview samples which comprise the postspill Pretest sample (Summer 1989) and Posttest sample (Winter 1991) in the 4-Group Design.

– – ↗ ↖ = The initial interview samples (pretest prespill, pretest postspill) from which panels are drawn.

Year	Kodiak-Old Harbor Prespill (I) and Postspill Panel (RI)	Prince William Sound/ Cook Inlet/Kodiak Island/ Alaska Peninsula Postspill Pretest-Posttest (I) and Panel (RI)	Prince William Sound/ Cook Inlet/Kodiak Island/ Alaska Peninsula/ Postspill Panel (RI) [From EXXONKI]
1992W	SE 143N RI	[SE Posttest 374N I]	SE 48N RI
			↑
		← Posttest 100N I	48N RI
1991W	↑	↑	↑
	↑	↑	↑
1990W			
	↑	↑	↑
		← Pretest 216N I → → → →	
1989S	↑		
Spill			
	↑		
1989W			
	↑		
1988W	16N		

FIGURE 7-2. SOCIAL INDICATOR PROJECT EXXON VALDEZ SPILL: SOLOMON FOUR GROUP SAMPLING DESIGN RELATION TO 1992 SOCIAL EFFECTS RESEARCH WAVE, KIP-LIKE QUESTIONS, 1992

the Social Effects research is fitted with the Exxon Valdez spill-research design for protocol informants.

The KIP respondents in the Social Indicators research design are selected from the Exxon Valdez spill pretest (1988W, 1989S) and posttest (1991W) samples only. Sixteen KIP respondents were selected in the villages of Kodiak City and Old Harbor in 1988W during the Schedule B pretest wave (prespill). Fourteen of these respondents were reinterviewed in the winter of 1989 prior to the spill. Four of these persons were located and interviewed during the summer of 1989 following the spill, but the other twelve persons originally interviewed in 1988, or ten reinterviewed in the winter of 1989 could not be located 5 months after the spill. Only two of the original 16 KIP respondents in the 1988 Schedule B pretest were selected for the panel, i.e., the respondents that were drawn at random from the KIP 1989 postspill pretest sample and reinterviewed in 1991 (the second research wave).

The Social Effects researchers reinterviewed 143 persons who had been administered KIP's in one or more of the following research waves (1988W, 1989W, 1989S, 1991W), and 535 persons who had not previously been administered either the KIP or AQI instruments. Because 161 of the 535 new informants resided in villages not included in the Social Indicators sample design, the responses of those 161 persons are not included here. Eliminating them allows us to better control for reactivity and to make less obfuscating tests for testing artifacts.

We proceed with an analysis of the reliability and validity of the KIP instrument as administered in the Exxon Valdez spill-area research.

CHAPTER 8
KIP NONRESPONSE

I. INTRODUCTION

The assessment of nonresponse to protocol items poses different problems from the assessment of nonresponse to questionnaire items: in the latter each respondent is asked a set of identical questions for which the response must be chosen from a mutually exclusive and mutually inclusive list of attributes. Hence, we refer to questionnaires as "forced choice" instruments. Responses to protocol questions are essentially open-ended. The interviewer, rather than the informant-respondent, classifies the response as one among a set of mutually inclusive and mutually exclusive attributes which were created by the research team after evaluating hundreds of responses to each question from hundreds of informants.

We encountered almost no response problems when conducting research among the Schedule A and B villages. With the exceptions of Kodiak City, Dillingham, and Dutch Harbor-Unalaska, the villages in those samples were predominantly composed of Natives. Non-Natives had often resided in those villages for more than 6 years, sufficient time to gain some knowledge of Native ways and also to engage in some resource harvests for subsistence.

Unlike the KIP research conducted in the A and B regions, the protocol research in the oil-spill area occasioned several response problems to select topics. These include high nonresponse rates for (1) knowledge about the availability of naturally occurring resources for the respondent's use; (2) statements about whether persons or some group of persons in the respondent's village exercises influence over the management of wildlife in the immediate area; (3) knowledge of whether elected or appointed government officials comprehend Native understandings of their environments; and (4) knowledge about economic conflicts within the local area.

We can account for most of the topics for which nonresponses are high. The Exxon Valdez oil spill drew a large number of persons in search of cleanup work to villages in the spill area. Many were ignorant of village life and did not care to provide information on many topics. This phenomenon increased the nonresponse rates for some questions. But a second threat to reliability also occurred in the

Exxon Valdez oil-spill research. It is evident that non-Native respondents in Kenai and Valdez either refused to answer some questions, or that the investigators responsible for conducting the KIP interviews in those villages did not explore topics that they presumed to be sensitive, not because the respondents only recently arrived in those villages in search of work, but because of the nature of their work--in oil-related businesses or in businesses that catered to employees of oil-related businesses. In Kenai and Valdez in particular, investigators were told that informants would not answer some questions pertaining to the spill, so the topics were not broached at all. Finally, some of the topics remained ambiguous to the investigators, even after attending training sessions that we devoted to clearing up ambiguities while addressing our intentions in pursuing information of one sort and another.

II. SPILL-AREA NONRESPONSE

The KIP investigators, all of whom had extensive field research experience and graduate degrees in social science (most hold PhD's in anthropology), began their KIP interviews with discussions of naturally occurring resources. They asked each KIP informant to tell them whether each of 77 items pertaining to naturally occurring resources in the general area in which they lived and gained their livelihoods was insufficient, sufficient, or more than sufficient for his needs. Some of those items represented a single species, such as red or sockeye salmon (*O. nerka*); some represented a variety of species from the same Linnaean class, such as "other mammals;" and some represented a variety of edible items, such as "greens, roots, leaves."[52] It was left to the respondent to use his or her understanding of what constituted edible leaves or edible greens in the local area.[53]

These same questions were asked of Schedule A and B informants during 1989 when we reinterviewed the KIP respondents. The contrasts between the responses of those informants and of the informants in the Exxon Valdez spill-area sample are

[52]Natives commonly refer to all plants of the land and plants of the sea which are harvested for subsistence consumption as "greens."

[53]We sought a "folk taxonomy" definition and response (Folk taxonomy is an ethnosemantic concept.).

remarkable. Slightly more than 95 percent of the Schedule A and B KIP respondents answered every one of the 77 questions about the sufficiency (amount available) of those resources in their environments. We did not ask respondents questions about species or varieties of resources that did not occur in the respondent's local environment, such as moose in the Aleutian Islands or red salmon in St. Lawrence Island rivers. Among respondents in the Exxon Valdez spill areas, not a single item measuring the sufficiency of resources in either the 1989 (pretest) or the 1991 (posttest) received a 95 percent response rate from the KIP informants. The nonresponse rates are extremely high, and these rates, alone, suggest the impression either that the vast majority of our informants did not harvest naturally occurring resources or that they harvested few resources and then on an occasional basis only.

We knew that all but one *Periphery* village gained more than 60 percent of their incomes from commercial fishing and that commercial fishing contributed very modest amounts to the aggregate incomes of two of the *Hub* villages. So we exercised the *Hub:Periphery* contrast (Table 8-1). We learned that resources such as halibut, cod, salmon, and crabs received the highest response rates among both types of villages, and that among *Hub* villages, a few species that are preferred by hunters and collectors, such as moose, ducks, and berries, also received relatively high-response rates. We were left with the distinct impression that the principal items about which residents of the spill area have knowledge, or perhaps concern, are resources which are extracted as commodities.

Response rates are higher for more species and varieties of naturally occurring resources among respondents in *Periphery* villages than among respondents in *Hub* villages. These results are not surprising inasmuch as two of the *Hub* villages, Kenai and Valdez, are dominated by oil-related businesses and tourism, not commercial fishing. The public sector, too, is highly important as a multiplier in all of the villages, but in the largest *Hub* and *Periphery* villages, public sector employees are not necessarily long-term residents and do not necessarily extract naturally occurring resources on a regular basis.

Table 8-1

RESPONSE RATES BY SPECIES: *HUB:PERIPHERY* CONTRAST, KIP INSTRUMENT, PRETEST AND POSTTEST SAMPLES COMBINED, 1989 AND 1991

HUB			*PERIPHERY*		
Rank	Species or Variety	Response Rate	Rank	Species or Variety	Response Rate
1.	Silver salmon	74%	1.	Silver salmon	92%
2.	Halibut	61%	3.	Chum salmon	85%
3.	Red salmon	59%	3.	Red salmon	85%
4.5.	Pink salmon	48%	3.	King salmon	85%
4.5.	*Berries*	*48%*	5.	Pink salmon	82%
6.	King salmon	44%	6.	Clams	80%
7.	*Moose*	*43%*	7.5.	Halibut	79%
8.5.	Cod	36%	7.5.	*Ducks*	*79%*
8.5.	*Other mammals*	*36%*	9.5.	Cod	69%
			9.5.	Tanner crabs	69%
			11.5.	Red King crabs	68%
			11.5.	Snow crabs	68%
			13.5.	*Ptarmigan*	*67%*
			13.5	*Brown bear*	*67%*
			16.	*Dolly Varden*	*64%*
			16.	Variant fox	64%
			16.	Otter	64%
			19.5.	*Moose*	*61%*
			19.5.	*Kelp*	*61%*

There are, nevertheless, considerable differences between *Hub* and *Periphery* villages, so we turn to this contrast in our analysis of nonresponse to the 77 natural resource items. Comparison of the *Hub* and *Periphery* subsamples of the 1991 posttest sample will suffice to make the point because they are nearly paralleled in the 1989 pretest sample.

Among *Hub* respondents, 90 percent did not answer 53 percent of the questions assessing cognitive information about the sufficiency of resources available for the respondent's use; 74 percent did not answer 80 percent of those questions. Only nine questions were answered by more than 35 percent of the respondents.

Six of the nine items are important commodities in every village. The resources not sold as commodities--moose, berries, "other mammals"-- appear in *italics*.

Among *Periphery* villages, response rates were considerably higher, in particular and in general, than the comparable responses for *Hub* villages. Questions about sea mammals, freshwater fishes, and land mammals of lesser local importance were responded to at about a 30 percent rate in *Periphery* villages. They responded to the less important marine invertebrates, sea birds, and plants at about 35 percent to 70 percent rates. It is likely that residents of *Periphery* villages, in general, are more knowledgeable about and are more frequent extractors of naturally occurring resources for their daily fare (subsistence). The commodity uses, too, are important in the rankings by response.

Because the response rates for the 77 resource categories are so low, they are not tallied in Table 8-2. Nevertheless, by providing a marked contrast with the responses about whether resources can be managed, who should manage them, and who manages them best, they prompt impressions about the willingness of persons, in these instances non-Natives, to offer opinions about resource management for resources they do not harvest or harvest seldomly and which, consequently, make little or no contribution to their own diets.

The nonresponse rates for the all other KIP variables appear in Table 8-2. We assess those items by sets, calling attention to problems and, when possible, resolving them by the rather simple procedure of exercising controls for the respondents. As for the AQI data, we established 10 percent as the nonresponse rate above which reliability is tenuous and poses a threat to validity. Throughout the text, the table items are highlighted if their nonresponse rates exceed 10 percent in two or more measures. Redlining is used to designate items whose nonresponse rates are high in one wave (pretest and first wave of the panel, or posttest and second wave of the panel), but not another. ~~Strikeout~~ is used for items whose nonresponse rates are above 10 percent for three or more measures. Items whose nonresponse rates are high on three or more measures will be discussed briefly, but are eliminated from incorporation into the data set for further indicators analysis.

Table 8-2

NONRESPONSE RATES FOR PROTOCOL ITEMS: EXXON VALDEZ SPILL-AREA SAMPLES: PANEL (TWO WAVES), PRETEST AND POSTTEST SAMPLES, 1989 AND 1991

VARIABLES		NONRESPONSE RATE (%)			
		1989 (N = 72) WAVE 1 PANEL	1991 (N = 72) WAVE 2 PANEL	1989 (N = 216) PRETEST	1991 (N = 100) POSTTEST
Q2A1	WALRUS, MANAGE?	19.4	6.9	22.7	8.0
Q2A2	WALRUS, WHO SHOULD MANAGE?	20.8	5.6	25.9	6.0
Q2B1	BOWHEAD, MANAGE?	19.4	5.6	23.1	9.0
Q2B2	BOWHEAD, WHO SHOULD MANAGE?	22.2	5.6	25.9	7.0
Q2C1	OTHER WHALES, MANAGE?	18.1	5.6	24.1	10.0
Q2C2	OTHER WHALES, WHO SHOULD MANAGE?	22.2	8.3	26.4	8.0
Q2D1	SALMON, MANAGE?	2.8	2.8	3.2	7.0
Q2D2	SALMON, WHO SHOULD MANAGE?	4.2	5.6	6.9	6.0
Q2E1	HERRING, MANAGE?	5.6	4.2	5.1	8.0
Q2E2	HERRING, WHO SHOULD MANAGE?	9.7	6.9	9.3	8.0
Q2F1	COD, MANAGE?	5.6	4.2	6.5	8.0
Q2F2	COD, WHO SHOULD MANAGE?	11.1	6.9	10.6	9.0
Q2G1	HALIBUT, MANAGE?	5.6	4.2	5.1	8.0
Q2G2	HALIBUT, WHO SHOULD MANAGE?	6.9	6.9	8.8	9.0
Q2H1	OTHER FISH, MANAGE?	5.6	4.2	6.5	9.0
Q2H2	OTHER FISH, WHO SHOULD MANAGE?	8.3	9.7	10.6	10.0
Q2I1	KING CRAB, MANAGE?	4.2	4.2	5.6	8.0
Q2I2	KING CRAB, WHO SHOULD MANAGE?	5.6	5.6	8.8	7.0
Q2J1	SNOW CRAB, MANAGE?	5.6	5.6	6.5	8.0
Q2J2	SNOW CRAB, WHO SHOULD MANAGE?	9.7	8.3	9.7	9.0
Q2K1	TANNER CRAB, MANAGE?	5.6	4.2	6.0	8.0
Q2K2	TANNER CRAB, WHO SHOULD MANAGE?	8.3	5.6	9.7	7.0
Q2L1	OTHER INVERT, MANAGE?	8.3	4.2	7.4	9.0
Q2L2	OTHER INVERT, WHO SHOULD MANAGE?	11.1	5.6	12.0	8.0
Q2M1	CARIBOU, MANAGE?	2.8	4.2	8.3	8.0
Q2M2	CARIBOU, WHO SHOULD MANAGE?	6.9	8.3	11.1	7.0
Q2N1	MOOSE, MANAGE?	2.8	4.2	7.9	8.0
Q2N2	MOOSE, WHO SHOULD MANAGE?	6.9	6.9	12.5	7.0
Q2O1	DALL SHEEP, MANAGE?	6.9	4.2	11.1	8.0
Q2O2	DALL SHEEP, WHO SHOULD MANAGE?	11.1	8.3	14.8	7.0
Q2P1	OTHER MAMMALS, MANAGE?	4.2	4.2	6.9	9.0
Q2P2	OTHER MAMMALS, WHO SHOULD MANAGE?	8.3	5.6	11.1	8.0
Q2Q1	GEESE, MANAGE?	2.8	4.2	4.2	8.0
Q2Q2	GEESE, WHO SHOULD MANAGE?	4.2	5.6	7.9	6.0
Q2R1	DUCKS, MANAGE?	2.8	4.2	3.2	8.0
Q2R2	DUCKS, WHO SHOULD MANAGE?	4.2	5.6	7.9	6.0
Q2S1	SWANS, MANAGE?	5.6	4.2	6.0	8.0
Q2S2	SWANS, WHO SHOULD MANAGE?	8.3	5.6	9.7	6.0
Q2T1	CRANES, MANAGE?	4.2	4.2	6.0	8.0
Q2T2	CRANES, WHO SHOULD MANAGE?	9.7	5.6	11.1	6.0
Q2U1	OTHER BIRDS, MANAGE?	2.8	4.2	6.0	9.0
Q2U2	OTHER BIRDS, WHO SHOULD MANAGE?	8.3	8.3	11.1	6.0
Q2V1	KELP ROE, MANAGE?	8.3	8.3	10.6	11.0
Q2V2	KELP ROE, WHO SHOULD MANAGE?	~~19.4~~	~~16.7~~	~~22.7~~	~~17.0~~
Q3A	MANAGEMENT OF WALRUS	22.2	4.2	24.1	5.0
Q3B	MANAGEMENT OF SEALS	16.7	4.2	18.5	6.0
Q3C	MANAGEMENT OF BOWHEAD	20.8	4.2	24.1	7.0
Q3D	MANAGEMENT OF POLAR BEAR	22.2	4.2	24.1	7.0
Q3E	MANAGEMENT OF CARIBOU	11.1	5.6	12.0	5.0
Q3F	MANAGEMENT OF MOOSE	8.3	4.2	10.6	5.0
Q3G	MANAGEMENT OF BEARS	5.6	5.6	6.9	5.0
Q3H	MANAGEMENT OF SALMON	4.2	4.2	6.5	5.0
Q3I	MANAGEMENT OF HERRING	8.3	5.6	8.3	5.0
Q3J	MANAGEMENT OF BOTTOMFISH	8.3	5.6	7.9	5.0
Q3K	MANAGEMENT OF CRABS	11.1	5.6	9.7	5.0
Q3L	MANAGEMENT OF OTHER RESOURCES	~~16.7~~	6.9	~~17.1~~	~~11.0~~

Table 8-2 (continued)

VARIABLES		NONRESPONSE RATE (%)			
		PANEL	PANEL	PRE	POST
Q4A	INFLUENCE OVER SALMON	6.9	8.3	8.8	8.0
Q4B	INFLUENCE OVER HERRING	~~19.4~~	~~13.9~~	~~15.3~~	~~12.0~~
Q4C	INFLUENCE OVER BOTTOMFISH	~~18.1~~	~~18.1~~	~~15.7~~	~~13.0~~
Q4D	INFLUENCE OVER INVERTEBRATES	~~15.3~~	~~16.7~~	~~15.7~~	~~13.0~~
Q4E	INFLUENCE OVER OTHER FISH	~~16.7~~	~~18.1~~	~~17.1~~	~~17.0~~
Q4F	INFLUENCE OVER GEESE	~~19.4~~	~~18.1~~	~~17.1~~	~~14.0~~
Q4G	INFLUENCE OVER DUCKS	~~16.7~~	~~18.1~~	~~16.2~~	~~14.0~~
Q4H	INFLUENCE OVER SWANS	~~20.8~~	~~19.4~~	~~19.4~~	~~17.0~~
Q4I	INFLUENCE OVER CRANES	~~20.8~~	~~19.4~~	~~19.4~~	~~17.0~~
Q4J	INFLUENCE OVER OTHER BIRDS	~~22.2~~	~~19.4~~	~~20.8~~	~~16.0~~
Q4K	INFLUENCE OVER CARIBOU	~~16.7~~	~~15.3~~	~~19.4~~	~~13.0~~
Q4L	INFLUENCE OVER MOOSE	~~13.9~~	~~11.1~~	~~17.6~~	~~12.0~~
Q4M	INFLUENCE OVER FURBEARERS	~~20.8~~	~~15.3~~	~~18.1~~	~~15.0~~
Q4N	INFLUENCE OVER OTHER MAMMALS	~~23.6~~	~~16.7~~	~~21.3~~	~~16.0~~
Q51A	KNOWLEDGE TO UNDERSTAND WATER	2.8	9.7	5.1	8.0
Q51B	KNOWLEDGE TO UNDERSTAND ICE	5.6	8.3	6.9	14.0
Q51C	KNOWLEDGE TO UNDERSTAND WIND	2.8	8.3	5.1	7.0
Q51D	KNOWLEDGE TO UNDERSTAND PLANTS	4.2	9.7	5.6	5.0
Q51E	KNOWLEDGE TO UNDERSTAND LAND MAMMALS	4.2	9.7	5.6	6.0
Q51F	KNOWLEDGE TO UNDERSTAND FISH	4.2	9.7	5.1	7.0
Q51G	KNOWLEDGE TO UNDERSTAND SEA MAMMALS	5.6	9.7	6.0	5.0
Q51H	KNOWLEDGE TO UNDERSTAND INVERTEBRATES	5.6	11.1	6.5	6.0
Q52A	UNDERSTAND WATER BY USE	4.2	19.4	3.7	12.0
Q52B	UNDERSTAND ICE BY USE	2.8	22.2	4.6	19.0
Q52C	UNDERSTAND WIND BY USE	9.7	25.0	6.5	16.0
Q52D	UNDERSTAND PLANTS BY USE	5.6	16.7	4.2	12.0
Q52E	UNDERSTAND LAND MAMMALS BY USE	4.2	15.3	3.2	10.0
Q52F	UNDERSTAND FISH BY USE	4.2	18.1	3.2	9.0
Q52G	UNDERSTAND SEA MAMMALS BY USE	6.9	16.7	4.6	9.0
Q52H	UNDERSTAND INVERTEBRATES BY USE	5.6	19.4	4.2	11.0
Q6	ACQUISITION OF KNOWLEDGE	9.7	23.6	7.4	5.0
Q7	ENVIRONMENTAL SYMBOLS	4.2	0.0	1.9	4.0
Q8A	DRILLING ATTITUDES	5.6	8.3	3.2	4.0
Q8B	PUMPING ATTITUDES	4.2	6.9	3.2	7.0
Q8C	TRANSPORT ATTITUDES	1.4	6.9	1.4	6.0
Q8D	PIPELINE ATTITUDES	5.6	8.3	3.7	6.0
Q8E	ENCLAVE ATTITUDES	5.6	8.3	3.2	6.0
Q8F	RECREATION ATTITUDES	2.8	8.3	2.3	6.0
Q9	MEMORIES OF SHARING	8.3	8.3	9.7	7.0
Q10	TREATMENT OF ELDERS	6.9	8.3	8.3	10.0
Q11A	UNDERSTANDING OF NON-NATIVE REPS	~~20.8~~	4.2	~~18.1~~	~~15.0~~
Q11B	UNDERSTANDING OF NATIVE REPS	~~22.2~~	5.6	~~19.4~~	~~11.0~~
Q11C	UNDERSTANDING OF NON-NATIVE APPOINTEES	~~22.2~~	5.6	~~20.4~~	~~16.0~~
Q11D	UNDERSTANDING OF NATIVE APPOINTEES	~~23.6~~	6.9	~~19.4~~	~~11.0~~
Q12A	FEDERAL <u>EXXON</u> <u>VALDEZ</u> RESPONSE	1.4	8.3	5.1	6.0
Q12B	STATE <u>EXXON</u> <u>VALDEZ</u> RESPONSE	2.8	6.9	5.1	6.0
Q12C	EXXON <u>EXXON</u> <u>VALDEZ</u> RESPONSE	2.8	9.7	2.3	4.0
Q13A	<u>EXXON</u> <u>VALDEZ</u> UNUSUAL?	5.6	5.6	2.8	4.0
Q13B	SIMILAR EVENTS OCCUR LATER?	4.2	5.6	3.7	7.0
Q14A	LATER RESPONSES	5.6	5.6	4.6	6.0
Q15	SPILL AFFECT INCOME?	2.8	1.4	4.6	5.0
Q16A	SPILL CAUSE FISHING DISPUTES?	5.6	2.8	7.9	10.0
Q16B	SPILL CAUSE DISPUTES, FISHING VS. OTHER?	5.6	5.6	8.8	17.0
Q17	NATIVE GROUPS HELP AFTER SPILL?	~~34.7~~	~~41.7~~	~~33.8~~	~~46.0~~

Table 8-2 (continued)

VARIABLES		NONRESPONSE RATE (%)			
		PANEL	PANEL	PRE	POST
K1	HARVEST EXPENSES	0.0	0.0	0.5	3.0
K2	VARIETY OF HARVESTED SPECIES	0.0	4.2	0.5	4.0
K3	HARVESTED PROTEIN IN DIET	0.0	2.8	0.5	4.0
K4	HOUSEHOLD INCOME	4.2	1.4	5.1	0.0
K5	HOUSEHOLD EARNED INCOME	0.0	0.0	0.9	1.0
K6	HOUSEHOLD UNEARNED INCOME	0.0	1.4	2.3	1.0
K7	GOVERNMENT SOURCES OF INCOME	1.4	0.0	4.6	1.0
K8	NON-GOVERNMENT SOURCE OF INCOME	0.0	0.0	1.4	0.0
K9	STABILITY OF EARNED INCOME	5.6	0.0	3.7	3.0
K10	STABILITY OF UNEARNED INCOME	0.0	5.6	0.5	4.0
K11A	INCOME GIVING IN VILLAGES	1.4	1.4	1.9	5.0
K11B	INCOME RECEIVING IN VILLAGES	2.8	25.0	8.3	15.0
K12A	INCOME GIVING BETWEEN VILLAGES	0.0	22.2	0.5	19.0
K12B	INCOME RECEIVING BETWEEN VILLAGES	1.4	27.8	4.6	19.0
K13A	LABOR GIVING IN VILLAGES	0.0	0.0	0.5	4.0
K13B	LABOR RECEIVING IN VILLAGES	1.4	8.3	1.9	5.0
K14A	LABOR GIVING BETWEEN VILLAGES	0.0	20.8	0.5	21.0
K14B	LABOR RECEIVING BETWEEN VILLAGES	2.8	26.4	4.2	25.0
K15A	RESOURCE GIVING IN VILLAGES	0.0	1.4	1.4	3.0
K15B	RESOURCE RECEIVING IN VILLAGES	2.8	8.3	2.3	5.0
K16A	RESOURCE GIVING BETWEEN VILLAGES	0.0	20.8	0.5	20.0
K16B	RESOURCE RECEIVING BETWEEN VILLAGES	2.8	19.4	4.2	23.0
K17	HOUSEHOLD SIZE	1.4	1.4	0.9	4.0
K18	AGE OF HOUSEHOLD HEAD	1.4	0.0	2.3	1.0
K19	HOUSEHOLD COMPOSITION AND DYNAMICS	0.0	6.9	0.9	3.0
K20	RULES FOR DYNAMICS	2.8	12.5	3.7	12.0
K21	HOUSEHOLD CONFLICT RESOLUTION	6.9	2.8	6.9	12.0
K22	DIVORCE OR SEPARATION	1.4	2.8	1.9	7.0
K23	SODALITY MEMBERSHIP	0.0	0.0	0.5	3.0
K24	POLITICAL PARTICIPATION	0.0	0.0	0.9	2.0
K25	IDENTIFICATION OF POLITICAL ISSUES	1.4	0.0	2.8	1.0
K26	RELIGIOUS PARTICIPATION	1.4	0.0	1.9	1.0
K27	EXTRACURRICULAR RELIGIOUS PARTICIPATION	1.4	2.8	1.4	1.0
K28	RESPONSIBILITY FOR ATTAINMENT	1.4	11.1	1.4	11.0
K29	ETHICS AND ENVIRONMENTAL SYMBOLS	1.4	25.0	2.3	20.0
K30	ETHICS OF COOPERATION	1.4	16.7	1.4	12.0
K31	ENCULTURATION AND GENDER DISTINCTIONS	2.8	6.9	2.3	18.8
K32	EXPECTATIONS FOR DEVELOPMENT	1.4	6.9	0.9	7.0
K33A	ECONOMIC CONFLICTS	4.2	1.4	4.2	10.0
K33B	PERSONAL ECONOMIC CONFLICTS	8.3	5.6	6.9	13.0
K33C	NATIVE ECONOMIC CONFLICTS	8.3	26.4	6.9	30.0
K33D	ANCSA CORPORATION ECONOMIC CONFLICTS	~~18.1~~	~~55.6~~	~~17.6~~	~~53.0~~
K33E	CITY AND ANCSA ECONOMIC CONFLICTS	8.3	37.5	9.3	49.0
K33F	NATIVE ORGANIZATION ECONOMIC CONFLICTS	~~15.3~~	~~48.6~~	~~14.3~~	~~52.0~~
K33G	OTHER CORPORATION ECONOMIC CONFLICTS	~~11.1~~	~~41.7~~	~~10.6~~	~~47.0~~
K33H	GOVERNMENT ECONOMIC CONFLICTS	~~11.1~~	~~34.7~~	9.3	~~36.0~~
K34	SCHOOLING AND SUCCESS	0.0	5.6	0.9	10.0
K35	PERCEIVED OBJECTIVES OF SERVICES	4.2	25.0	5.6	15.0
K36	PERCEIVED CONTROL OF SERVICES	~~16.7~~	~~18.1~~	~~14.4~~	~~17.0~~
K37	RESPONDENT RESIDENCE PATTERN	5.6	1.4	2.8	2.0
K37B	SPOUSE RESIDENCE PATTERN	~~30.6~~	~~31.9~~	~~28.7~~	~~41.0~~
K39	SERVICES USED BY RESPONDENT	5.6	2.8	6.0	6.0
K40	USE OF NATIVE HEALERS	5.6	2.8	4.2	2.0
K41	UTILITIES IN HOUSE	1.4	0.0	1.4	0.0

The first set of questions (Q2*1-Q2*n) asks about the management of the resources whose availability, according to the knowledge of each respondent, was sought in the first set of questions. We wanted to learn whether informants think that naturally occurring resources, such as birds and land mammals, *can* be managed. Here we refer to harvest laws, legal seasons for extraction, accurate assessments of available resources by agencies charged with managing the resources in question.[54] A related set of questions (Q2*2-Q2*n) asks respondents, even if they think God, alone, can manage wild resources, which mortal constituencies they think *should* manage the wild resources.[55]

Although bowhead whales do not frequent the waters of the spill area, and few Pacific walrus migrate south of the Alaska Peninsula, we retained these questions (1) because of the importance of bowheads and walrus to many Natives, whether or not those animals frequent the local waters; and (2), because they are important to many non-Natives as well. Federal acts and international agreements protect the whales and most sea mammals from all but Native hunters, while regulating the number of bowheads that Natives can strike (harpoon) annually. Some non-Natives are strenuously opposed to the hunting of any of these large sea mammals by Natives.

It is not a fortuity that among both the pretest and posttest samples and the second wave of the panel that very-low-response rates were obtained for almost every one of the 77 questions that focus on the sufficiency of resource availability. Many of the residents of the villages in the spill area are not engaged in resource harvests, and many restrict their harvests to commercial fish and a few varieties of game, such as moose and some waterfowl. In addition, many persons reside in commercial fishing villages, even the smallest ones such as Chignik, for only a few

[54]The variable composed from these data re cognitive attitudinal responses is rated according to the following attributes: (1) Only God can manage (a commonly held Native belief about naturally occurring phenomena); (2) No person can manage; (3) No institution can manage; (4) Persons (mortals) can manage; and (5) Institutions can manage.

[55]The variable we composed to measure this attitude has the following ordinal ranks (from formal, governmental institutions to local Natives): (1) Alaska Department of Fish and Game; (2) Various Federal Agencies; (3) Combination of Federal and State governmental agencies and Native organizations; (4) Native organizations alone (such as whale or walrus commissions); and (5) Local Natives.

months each year beginning before the onset of the commercial fishing season and ending soon after its termination. In our 1989 sample, we drew several persons who migrated between winter and summer residences. Finally, we learned in our Schedule A and B research among the commercial fishing villages of Bristol Bay, the Aleutian-Pribilof, and Kodiak Island regions that it is a common practice for wives and children to relocate from permanent residences in fishing villages, such as Kodiak City, to residences in the lower 48 states, when children attain school age, particularly middle school age. In these cases, the husband moves back and forth during each fishing season and has little time or reason to harvest resources for his personal use.

Turning our attention to questions of resource management (Q2*1 - Q3L), it will be noted that nonresponse rates greater than 10 percent are restricted to the pretest sample and first panel wave (1989), a period when transiency was at its peak. Upon controlling for race/ethnicity, we learned that *every* Native responded to these questions. Next we focused attention on non-Natives--the source of the nonresponses to the management questions. We were surprised to learn that the briefer the non-Native's residence in the village, the more likely it was that the respondent answered questions about (1) the availability of resources, (2) whether those resources can be managed, (3) who should manage those resources, and (4) who or what agency provides the most able management of those resources.[56] Nonresponse rates for persons who had resided in the villages for less than 1 year were 10 to 14 percent, for 2 to 5 years were 15 percent to 16 percent, and for over 6 years were 18 to 24 percent. If length of residence in an Alaskan village is an indicator of knowledge about locally occurring resources, these results suggest that the more knowledgeable the person, the less likely it is that he/she responded to

[56]Question Q3* asks respondents to compare State or Federal wildlife resource management against Native abilities to manage wildlife. Here we sought to learn how informants evaluate the way in which the State or Federal Government manages the resources over which they exercise regulatory authority. We ask them to compare the competence of the government regulators against what they think the competence of Native regulators would be if they exercised regulatory authority over the same resources. The KIP investigators rated the responses of their informants as (1) [Federal or State regulators perform] poorer than Natives could do; (2) .... as good as Native could do [equivalent to Natives]; and (3) ... better than Natives could do.

questions about resource availability and, for walrus and whales, questions about their management.

"Who should manage roe-on-kelp?" (Q2V2) and "Who would best manage other resources?" (Q3L) are the only questions about the management of wild resources for which nonresponse rates were high in two research waves. "Other resources" is ambiguous, so not worthy of extended discussion. It is important to remind readers that all of the nonresponses for these few items are attributed to non-Natives. It is surely significant that most of the persons who did not respond to these questions reside in Kenai or Valdez. Even though these persons did not respond to questions about walrus, whales, roe-on-kelp, and "other resources," they responded to all other management questions. This is a puzzlement, but not a severe one.

It is more plausible that the respondents who did not express an opinion about whether walruses, whales, and roe-on-kelp could be managed or who should manage them or who would manage them best, but responded to the other management questions, did not know who or what entity should manage the resources, perhaps because the resources in question were unimportant economically, rare, or irrelevant to them. Some were likely ignorant about the resources.[57]

It is evident that most respondents answered questions about whether resources can be managed and who should manage them. But for cod, Dall sheep, "other marine invertebrates," and roe-on-kelp, they are more sure that they can be managed than they are sure about who or what agency should manage them. "Other marine invertebrates" is so general a question as to provide no clear referent, and Dall sheep are located at such long distances from most villages in our spill sample, with the possible exceptions of Valdez, Tatitlek, and Cordova, that the inability to elicit knowledgeable responses is understandable.

Respondents answered questions about who possesses the greatest "knowledge" about naturally occurring resources (Q51*), but almost 20 percent of them did not

[57]During late winter, herring spawn on kelp beds. The kelp is often attached to outcroppings of rocks in the tidal areas. The roe-on-kelp is a preferred food of Natives as well as the Japanese and has high market value.

understand what information we sought to obtain about who possesses the greatest "understanding" of biological and abiological resources (Q52*).[58]

Every question in the protocol which sought information about whether respondents think they, or persons in their community, or institutions in their community, influence management decisions made by the ADF&G or various Federal agencies about the management of harvests of the resources in question (Q4A-Q4N) generated nonresponse rates greater than 10 percent in both pretest and posttest samples.[59] Because the ADF&G has citizens' advisory boards in every region, and because commercial fishermen, by tradition, express their opinions to the ADF&G's commercial fisheries regulators about the number and duration of commercial fishing openings scheduled for each season, we expected high-response rates to those questions. Even respondents who do not fish commercially or for subsistence or do not hunt or fish for pleasure, know persons who do. Nonresponse rates, however, are high.

Nonresponse rates are also high for a set of questions that ask whether respondents think non-Native or Native government officials--elected and appointed--comprehend how Natives understand the areas in which they reside (Q11A-Q11D).[60] Response rates increased by as much as 9 percent between the pretest and posttest research waves, but the questions remained fraught with problems of poor construct validity.

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[58]In Q51* the KIP investigators were asked to learn whether respondents thought Natives, through precept, training, and experience, or scientists through formal study and research controlled better (more) knowledge about the environment. Investigators rated responses as (1) Natives have better knowledge (make more accurate predictions) than scientists about the environment; (2) Natives and some scientists have about equal knowledge about the environment; and (3) scientists have better knowledge (than Natives) about the environment. In Q52* we sought to get respondents to tell us whose "understanding" of the environment, on the basis of familiarity through use, was greatest: Natives, oil companies, ADF&G, or the Federal Government (MMS, for example) . The question never worked. Respondents seldom conceptualized differences between practical knowledge of the environment gained from working in a regulatory agency, or for an oil company, or simply as an extractor, from formal knowledge gained from research.

[59]In these questions, we asked the informant how he/she thought the residents of the village influence management decisions made by the ADF&G regarding harvests of resources in their local areas, that is, the areas from which local residents extract resources. The responses were classified as (1) Not at all, (2) Rarely or seldom, (3) Frequently.

[60]In these questions, we wanted to learn how residents--Natives and non-Natives--thought that government officials comprehended or understood Native points-of-view about the spaces in which they gained their livelihoods, and the places in which they lived and which were assigned significant meanings. For examples, interviewers would refer to Native uses of the resources in an area; Native concepts of ownership and of stewardship; significant symbols attached by Natives to features of the environment or to its history, and so forth.

The first and second pages of Table 8-2 list protocol topics that were added in 1988 and 1989. It is evident that several of those questions have low reliability; hence, they pose threats to validity and must be jettisoned from our data set. There is little doubt that the considerable mobility and transiency among the villagers in the spill area, most of which are non-Natives, account for differences in the responses to KIP topics for the spill-area sample in comparison with the samples in the Schedule A and B inquiry. Natives in the spill-area sample tended to respond to most questions about naturally occurring resources and their uses, much as did their congeners in the Schedule A and B study.

The third page of Table 8-2 provides nonresponse rates for the original KIP variables (K1-K41). During the Schedule A and B research, these questions enjoyed nearly 100 percent responses by Natives and rates only somewhat lower by non-Natives. The same pattern holds for the spill-area samples, with two noteworthy exceptions. The first is a set of seven items from among twelve items which assesses sharing within villages and between persons in different villages (K11A-K11B to K16A-K16B).[61] During the posttest, not a single non-Native respondent in Valdez answered the questions which focused on the sharing (giving or receiving) of income, labor, or resources between persons in different villages, or the receiving of income from other persons within the village.

In our previous research we learned, and we have learned again here, that very few non-Natives in our samples were born or reared in Alaska, have lived in Alaska more than 11 years, or plan to retire in Alaska. In our previous research, we also learned that non-Natives engage in very little sharing of any kind--cash, labor, resources--within the village and very little sharing outside the village, with the

[61] In this set of questions, we want to learn (1) whether persons retain income for themselves, expend labor only for themselves, and procure and use goods (equipment, wild food, etc.) for themselves; whether, on a regular basis, household members pool and share income, and/or labor, and/or goods; whether household members, on an occasional basis, give income, and/or labor, and/or goods to persons in other households within the village; or whether household members, on a regular basis, give income, and/or labor, and/or goods to relatives and friends in other households in the village; (2) Next, we ask whether persons or households are recipients--occasional or regular--of income, labor, goods from persons in other households within the village; (3) and (4) pursue the topics covered in (1) and (2) between persons or households in distant villages. Each variable is rank-ordered from most narrow (the person) to most wide (households), and from no sharing to extensive sharing.

notable exception of giving cash to persons in distant villages. We interpreted that activity to constitute "cash remittances" to relatives.

Whereas we expected sharing between and among non-Natives in the spill-area sample to be modest, we expected response rates to the K11 through K16 questions to be high. The high nonresponse rates among posttest respondents in Valdez do not reflect their reluctance to answer our questions. Rather, they reflect decisions made by the KIP investigators. They chose not to ask their non-Native informants seven questions because the answers they received from the first several respondents were "No giving ..." and "No receiving ..." to the seven items. We will retain these variables for further analysis, while controlling for non-Natives in Valdez .

The KIP investigators in Valdez reported high nonresponse rates for another set of topics which distinguish the purported communitarian-sharing ethics and practices of Natives with the "Protestant ethic" (or "work ethic" and "individualistic-rational-legal ethics") and related practices of non-Natives (K20, K28-K30).[62] These questions yield high response rates in the pretest sample and high response rates among all but the non-Native respondents in Valdez. The large number of nonresponses for Valdez, then, is attributed to omissions by the researchers rather than to construct validity or a unique feature of Valdez residents. The sharing and the ethics questions contrast Native with non-Native practices. The differences are central to several of the hypotheses we seek to test in this research.

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[62]K20 classifies households on whether (1) There are no set rules or expectations for who can and cannot joint the household. (2) is a blend of (1) and (3). In (3) there are clear expectations for the observation of rules by household members, and set expectations for new members. K28 classifies the respondent's ideas about ethical responsibility and attainment: (1) A person should strive for individual success and individual rewards although saving and delaying gratification can benefit others in one's nuclear family. (2) A person should work hard to assist one's family now and in times of need and for the future as well. (3) A person should work hard to assist one's family, wider circle of kinspersons and affines, and the village. Giving and sharing take precedence over saving and assisting self or nuclear family to the exclusion of others, particularly elders. K29 classifies respondent views of the environment: (1) The environment, or features of it, are viewed as commodities--items whose values are established in the marketplace and are available for purchase or sale. (2) Combination of commodity and spiritual values. (3) The environment, or features of it, are viewed as things endowed with spirits, or which possess special relations to Natives and to which significant cultural symbols are attached (beauty, spirituality, helpfulness, traditions). The general environment is not conceptualized as a commodity. K30 probes the ethics of personal cooperation-competition: (1) A person should compete with others so as to do the best for one's self. (2) 1, 3, or 4, depending on circumstances. (3) A person should do the best one can in developing and employing skills: some should be used for one's family, wider network of kinspersons, and friends, and some should be used for personal gain. (4) A person should develop and employ skills, work in cooperation with others, and share in a communitarian fashion the products of those skills.

A final set of questions (K33C-K33H) was created for Native respondents in order to assess their perceptions of economic conflicts within their villages and regions, including conflicts whose repercussions were felt locally but not conducted locally. A simpler form of these questions was useful in the Schedule A and B research. But the complexity of the largest villages in the spill area lent itself to greater construct validity problems with these questions, no matter how often we tinkered with them and with ways to approach them through our protocol interviews. Natives, non-Natives, and KIP investigators were confused by the topics, so K33C through K33H will be dropped from further analysis, as will K36 because of high nonresponse rates in both research waves for samples and panels.

III. KIP ITEMS TO BE EXCISED BECAUSE OF HIGH NONRESPONSE RATES

The nonresponse analysis identified 26 variables whose nonresponse rates were greater than 10 percent in both the pretest and posttest research waves. The items pose threats to validity because they are not representative of the entire sample and because the nonresponses may represent systematic biases for which we can find no controls which eliminate those biases. Another 21 variables are selected for deletion because they are ambiguous, redundant, or both. For example, the univariate distributions for Q2C1 (Can other whales be managed?) and Q2C2 (Who should manage other whales?) are identical to the responses for bowhead whales (Q2B1, Q2B2). The responses are redundant, as are the questions about "other invertebrates," "other mammals," "other fish," and "other birds." Questions about the management of "other resources," influence over various regulatory bodies (the Q4* set), and the understanding of the environment (the Q52* set) are ambiguous, even though many of these items yielded high response rates during one or both research waves.

The list of KIP variables that failed to pass the nonresponse reliability test follows.

III.A KIP Items that Failed the Nonresponse Reliability Test and Will Be Dropped from Further Consideration

Q2C1	OTHER WHALES, MANAGE?
Q2C2	OTHER WHALES, WHO SHOULD MANAGE?
Q2H1	OTHER FISH, MANAGE?
Q2H2	OTHER FISH, WHO SHOULD MANAGE?
Q2L1	OTHER INVERT, MANAGE?
Q2L2	OTHER INVERT, WHO SHOULD MANAGE?
Q2O1	DALL SHEEP, MANAGE?
Q2O2	DALL SHEEP, WHO SHOULD MANAGE?
Q2P1	OTHER MAMMALS, MANAGE?
Q2P2	OTHER MAMMALS, WHO SHOULD MANAGE?
Q2U1	OTHER BIRDS, MANAGE?
Q2U2	OTHER BIRDS, WHO SHOULD MANAGE?
Q2V1	KELP ROE, MANAGE?
Q2V2	KELP ROE, WHO SHOULD MANAGE?
Q3L	MANAGEMENT OF OTHER RESOURCES
Q4B	INFLUENCE OVER HERRING
Q4C	INFLUENCE OVER BOTTOMFISH
Q4D	INFLUENCE OVER INVERTEBRATES
Q4E	INFLUENCE OVER OTHER FISH
Q4F	INFLUENCE OVER GEESE
Q4G	INFLUENCE OVER DUCKS
Q4H	INFLUENCE OVER SWANS
Q4I	INFLUENCE OVER CRANES
Q4J	INFLUENCE OVER OTHER BIRDS
Q4K	INFLUENCE OVER CARIBOU
Q4L	INFLUENCE OVER MOOSE
Q4M	INFLUENCE OVER FURBEARERS
Q4N	INFLUENCE OVER OTHER MAMMALS
Q52A	UNDERSTAND WATER BY USE
Q52B	UNDERSTAND ICE BY USE
Q52C	UNDERSTAND WIND BY USE
Q52D	UNDERSTAND PLANTS BY USE
Q52E	UNDERSTAND LAND MAMMALS BY USE
Q52F	UNDERSTAND FISH BY USE
Q52G	UNDERSTAND SEA MAMMALS BY USE
Q52H	UNDERSTAND INVERTEBRATES BY USE
Q11A	UNDERSTANDING OF NON-NATIVE REPS
Q11B	UNDERSTANDING OF NATIVE REPS
Q11C	UNDERSTANDING OF NON-NATIVE APPOINTEES
Q11D	UNDERSTANDING OF NATIVE APPOINTEE
K33C	NATIVE ECONOMIC CONFLICTS
K33D	ANCSA CORPORATION ECONOMIC CONFLICTS
K33E	CITY AND ANCSA ECONOMIC CONFLICTS
K33F	NATIVE ORGANIZATION ECONOMIC CONFLICTS
K33G	OTHER CORPORATION ECONOMIC CONFLICTS
K33H	GOVERNMENT ECONOMIC CONFLICTS
K34	PERCEIVED CONTROL OF SERVICES

III.B. KIP Items that Passed the Nonresponse Reliability Test. These Items Will Be Retained for the Analysis of Social Indicators

Q2A1	WALRUS, MANAGE?
Q2A2	WALRUS, WHO SHOULD MANAGE?
Q2B1	BOWHEAD, MANAGE?
Q2B2	BOWHEAD, WHO SHOULD MANAGE?
Q2D1	SALMON, MANAGE?
Q2D2	SALMON, WHO SHOULD MANAGE?
Q2E1	HERRING, MANAGE?
Q2E2	HERRING, WHO SHOULD MANAGE?
Q2F1	COD, MANAGE?
Q2F2	COD, WHO SHOULD MANAGE?
Q2G1	HALIBUT, MANAGE?
Q2G2	HALIBUT, WHO SHOULD MANAGE?
Q2I1	KING CRAB, MANAGE?
Q2I2	KING CRAB, WHO SHOULD MANAGE?
Q2J1	SNOW CRAB, MANAGE?
Q2J2	SNOW CRAB, WHO SHOULD MANAGE?
Q2K1	TANNER CRAB, MANAGE?
Q2K2	TANNER CRAB, WHO SHOULD MANAGE?
Q2M1	CARIBOU, MANAGE?
Q2M2	CARIBOU, WHO SHOULD MANAGE?
Q2N1	MOOSE, MANAGE?
Q2N2	MOOSE, WHO SHOULD MANAGE?
Q2Q1	GEESE, MANAGE?
Q2Q2	GEESE, WHO SHOULD MANAGE?
Q2R1	DUCKS, MANAGE?
Q2R2	DUCKS, WHO SHOULD MANAGE?
Q2S1	SWANS, MANAGE?
Q2S2	SWANS, WHO SHOULD MANAGE?
Q2T1	CRANES, MANAGE?
Q2T2	CRANES, WHO SHOULD MANAGE?
Q3A	MANAGEMENT OF WALRUS
Q3B	MANAGEMENT OF SEALS
Q3C	MANAGEMENT OF BOWHEAD
Q3D	MANAGEMENT OF POLAR BEAR
Q3E	MANAGEMENT OF CARIBOU
Q3F	MANAGEMENT OF MOOSE
Q3G	MANAGEMENT OF BEARS
Q3H	MANAGEMENT OF SALMON
Q3I	MANAGEMENT OF HERRING
Q3J	MANAGEMENT OF BOTTOMFISH
Q3K	MANAGEMENT OF CRABS
Q4A	INFLUENCE OVER SALMON
Q51A	KNOWLEDGE TO UNDERSTAND WATER
Q51B	KNOWLEDGE TO UNDERSTAND ICE
Q51C	KNOWLEDGE TO UNDERSTAND WIND
Q51D	KNOWLEDGE TO UNDERSTAND PLANTS
Q51E	KNOWLEDGE TO UNDERSTAND LAND MAMMALS
Q51F	KNOWLEDGE TO UNDERSTAND FISH
Q51G	KNOWLEDGE TO UNDERSTAND SEA MAMMALS
Q51H	KNOWLEDGE TO UNDERSTAND INVERTEBRATES
Q6	ACQUISITION OF KNOWLEDGE
Q7	ENVIRONMENTAL SYMBOLS
Q8A	DRILLING ATTITUDES
Q8B	PUMPING ATTITUDES
Q8C	TRANSPORT ATTITUDES
Q8D	PIPELINE ATTITUDES
Q8E	ENCLAVE ATTITUDES
Q8F	RECREATION ATTITUDES
Q9	MEMORIES OF SHARING
Q10	TREATMENT OF ELDERS
Q12A	FEDERAL <u>EXXON</u> <u>VALDEZ</u> RESPONSE
Q12B	STATE <u>EXXON</u> <u>VALDEZ</u> RESPONSE
Q12C	EXXON <u>EXXON</u> <u>VALDEZ</u> RESPONSE
Q13A	<u>EXXON</u> <u>VALDEZ</u> UNUSUAL?
Q13B	SIMILAR EVENTS OCCUR LATER?
Q14A	LATER RESPONSES
Q15	SPILL AFFECT INCOME?
Q16A	SPILL CAUSE FISHING DISPUTES?
Q16B	SPILL CAUSE DISPUTES, FISHING VS. OTHER?
Q17	NATIVE GROUPS HELP AFTER SPILL?
K1	HARVEST EXPENSES
K2	VARIETY OF HARVESTED SPECIES
K3	HARVESTED PROTEIN IN DIET
K4	HOUSEHOLD INCOME
K5	HOUSEHOLD EARNED INCOME
K6	HOUSEHOLD UNEARNED INCOME
K7	GOVERNMENT SOURCES OF INCOME
K8	NON-GOVERNMENT SOURCE OF INCOME
K9	STABILITY OF EARNED INCOME
K10	STABILITY OF UNEARNED INCOME
K11A	INCOME GIVING IN VILLAGES
K11B	INCOME RECEIVING IN VILLAGES
K12A	INCOME GIVING BETWEEN VILLAGES
K12B	INCOME RECEIVING BETWEEN VILLAGES
K13A	LABOR GIVING IN VILLAGES
K13B	LABOR RECEIVING IN VILLAGES
K14A	LABOR GIVING BETWEEN VILLAGES
K14B	LABOR RECEIVING BETWEEN VILLAGES
K15A	RESOURCE GIVING IN VILLAGES
K15B	RESOURCE RECEIVING IN VILLAGES
K16A	RESOURCE GIVING BETWEEN VILLAGES
K16B	RESOURCE RECEIVING BETWEEN VILLAGES
K17	HOUSEHOLD SIZE
K18	AGE OF HOUSEHOLD HEAD
K19	HOUSEHOLD COMPOSITION AND DYNAMICS
K20	RULES FOR DYNAMICS
K21	HOUSEHOLD CONFLICT RESOLUTION
K22	DIVORCE OR SEPARATION
K23	SODALITY MEMBERSHIP
K24	POLITICAL PARTICIPATION
K25	IDENTIFICATION OF POLITICAL ISSUES
K26	RELIGIOUS PARTICIPATION
K27	EXTRACURRICULAR RELIGIOUS PARTICIPATION
K28	RESPONSIBILITY FOR ATTAINMENT
K29	ETHICS AND ENVIRONMENTAL SYMBOLS
K30	ETHICS OF COOPERATION
K31	ENCULTURATION AND GENDER DISTINCTIONS
K32	EXPECTATIONS FOR DEVELOPMENT
K33A	ECONOMIC CONFLICTS
K33B	PERSONAL ECONOMIC CONFLICTS
K34	SCHOOLING AND SUCCESS
K35	PERCEIVED OBJECTIVES OF SERVICES
K37	RESPONDENT RESIDENCE PATTERN
K37B	SPOUSE RESIDENCE PATTERN
K39	SERVICES USED BY RESPONDENT
K40	USE OF NATIVE HEALERS
K41	UTILITIES IN HOUSE

CHAPTER 9
INTRATOPIC ITEM RELIABILITY WITH THEORETICAL CONTRASTS

I. INTRODUCTION

Our analysis of nonresponses to our protocol questions discovered a very large number of items for which nonresponses were greater than 10 percent. Only one of the 77 questions which sought information on the quantity of available wild resources in the environment, from walrus to fruits, was responded to by more than 90 percent of the respondents. Another 46 items which sought answers as to whether particular species can be managed, who should manage those species, whether any person other than a regulator exercises influence over regulations imposed on species harvests, who best "understands through experience" the natural environment, and whether there are specific economic conflicts within the village and region, also failed to gain more than 90 percent responses. More questions succumbed to high nonresponse rates (123) than survived because of high response rates (118).

At this point, we focus on the 118 KIP items that survived our tests for nonresponse, conducting an analysis similar to the intratopic reliability analysis of AQI data. KIP items are classified into five topical sections[63] comprising (1) 37 questions about the management of naturally occurring resources: Q2*1 (Can the resource be managed?), Q2*2 (Who should manage the resource?), and Q3* (Who manages or would manage the resource better?) [MGMT]; (2) 8 questions about knowledge of abiological and biological natural environments: Q51* (Who has more knowledge of the environment--scientistists or Natives?) [KNOW]; (3) 15 questions focussing on cognitive attitudes and empirical responses about oil- and oil-spill-related issues: Q8* (What do you think the effects of oil-related changes have been on the natural environment?), Q12* (Do you think the *** has done [none, few, many, all] things within its powers to clean the ocean, shores, animals and personal property affected by the oil spilled by the <u>Exxon</u> <u>Valdez</u> on March 24, 1989?), Q13* (Do you think that the <u>Exxon</u> <u>Valdez</u> spill is an isolated accident; Do you think

[63]The topics are designated MGMT, KNOW, OIL, ECON, TRAD.

similar or other types of oil spills will occur?), Q14-16* (cognitive attitudes and empirical responses to questions about oil company responses, consequences to household income, disputes or harmony between commercial fishermen and between commercial fishermen and other persons) [OIL]; (4) 27 questions pertaining to household economics, income, subsistence economics, and the sharing (distribution) of income, goods, and labor [ECON]; and (5) a group of 25 questions which focus on household organization, political activities, religious activities, and ethics, and which distinguish traditional Native customs and Western customs [TRAD].

The assumption in the following analysis is that each item within a topic, logically and empirically, should reduce high proportions of error when measured with a PRE coefficient with other items in the same topic. The rationale is that there is a similarity in the underlying theme on which all variables in the topic are based. We remind the reader that each item within a topic need not yield high positive PRE's with every other item in the topic. Among variables in the ECON set, for example, we expect to get high negative PRE scores between income and percentage of total income that is unearned. In addition, we do not think that each item in a topic must obtain high PRE coefficients--positive or negative--with every other item. The larger the *N* (number of variables in the set) and the more complex the topic (ECON, for example, embraces a wide variety of questions on several features of household and family life, from the sources and amount of income, to whether persons donate their labor to persons residing in villages other than their own.), the more we expect to obtain high proportions of PRE coefficients ≤ .50. The obverse is also true. The smaller the *N* and the more homogeneous the questions, the greater the proportion of PRE coefficients ≥ .50.

The reason we expect more low PRE's with the larger more heterogenous topics, and higher PRE's with the smaller and more homogeneous topics is due, in part, to the nature of our stratified sample. We stratified so as to assure the representation of villages whose populations were predominantly Natives and villages who populations were predominantly non-Natives; villages whose total income was dominated by receipts from commercial fishing-related enterprises and villages whose total income was not so dominated; and for villages with well-developed infrastructures which also served as transportation and service hubs, and for peripheral villages with modest infrastructures and a dependency on hub villages for transportation and many services. The differences among village populations caused us to anticipate that many variables on a topic, such as economics, which correlated highly in *Hub* villages, say, would yield PRE scores closer to zero in *Periphery* villages. Contrariwise, we anticipated that relations between economic variables which produce high PRE scores among *Periphery* villages would produce PRE scores closer to zero in *Hub* villages.

Table 9-1 provides the proportions of PRE coefficients ≥.50 for the five topical sets of KIP variables. The table is divided into pretest and posttest samples, and those samples are further divided into three sets of theoretical contrasts in which *Hub* proportions are contrasted with *Periphery*, *Comm Fish* with *Noncom Fish*, and **Natives with Non-Natives.** The last contrast separates Natives and non-Natives by race/ethnicity, rather than village. In the pretest wave, we were granted access to only five villages in the spill area in which the populations were more than 75 percent Native. In the posttest wave, that number was reduced to four, so the *Native:Mixed* village contrast is so top heavy with respondents in *Mixed* villages that we have not employed it here.

For the total pretest and posttest samples, the variables in four of the five topics yield very high proportions of relations in which PRE coefficients are equal to or greater than 50 percent. The TRAD topic in the pretest sample is the sole exception. We see that only 4 percent of the 300 coefficients[64] in the TRAD section of the pretest sample ≥.50. Were we to base our decision on the results for the total pretest sample alone, and forthwith jettison every variable in the TRAD section for which three or more PRE coefficients in the total sample were not .50 or greater, we would retain only 5 of the 25 variables in the set. Were we to do so, we would be giving no credence to the posttest (in which 8% of the 300 coefficients ≥.50), while losing some very important contrasts in the various subsamples.

[64]The 300 coefficients is derived thus: (N) (N-1)/2 or 25X24/2 = 300.

Table 9-1

INTRATOPIC RELIABILITY. PERCENTAGE OF PRE COEFFICIENTS ≥ .50 FOR RELATIONS BETWEEN ALL PAIRS OF VARIABLES WITHIN EACH KIP TOPICAL SECTION, PRETEST-POSTTEST TOTAL SAMPLES AND THEORETICAL CONTRASTS

Section	N		Total	*Hub*	*Periphery*	Non-Native	Native	*Comm Fish*	*Noncom*
Pretest			Pretest $N = 216$	Pretest $N = 116$	$N = 100$	Pretest $N = 145$	$N = 67$	Pretest $N = 93$	$N = 123$
MGMT	37								
		≥.50	49%	56%	61%	53%	62%	58%	59%
		≥.70	33%	41%	49%	44%	47%	52%	48%
		≥.90	21%	28%	25%	27%	23%	27%	27%
KNOW	8								
		≥.50	100%	100%	100%	100%	100%	100%	100%
		≥.70	100%	100%	93%	100%	89%	79%	100%
		≥.90	46%	46%	29%	46%	29%	25%	46%
OIL	15								
		≥.50	18%	18%	19%	19%	17%	18%	18%
		≥.70	15%	16%	15%	16%	14%	16%	15%
		≥.90	.95%	.95%	6%	4%	2%	3%	.95%
ECON	27								
		≥.50	12%	19%	15%	16%	12%	23%	13%
		≥.70	5%	8%	6%	5%	4%	7%	7%
		≥.90	1%	5%	1%	3%	.3%	2%	4%
TRAD	25								
		≥.50	4%	13%	7%	6%	5%	8%	5%
		≥.70	.66%	6%	1%	2%	.7%	2%	.66%
		≥.90	0%	5%	0%	.3%	0%	1%	0%
Posttest			Posttest $N = 100$	Posttest $N = 61$	$N = 39$	Posttest $N = 70$	$N = 30$	Posttest $N = 52$	$N = 48$
MGMT	37								
		≥.50	74%	60%	55%	76%	62%	68%	56%
		≥.70	47%	32%	53%	39%	41%	51%	37%
		≥.90	28%	25%	31%	30%	26%	25%	30%
KNOW	8								
		≥.50	100%	100%	100%	100%	100%	89%	100%
		≥.70	96%	75%	100%	79%	96%	50%	100%
		≥.90	14%	0%	46%	7%	36%	7%	75%
OIL	15								
		≥.50	24%	26%	30%	25%	25%	29%	24%
		≥.70	16%	17%	18%	18%	16%	21%	18%
		≥.90	13%	7%	14%	9%	14%	12%	13%
ECON	27								
		≥.50	27%	26%	45%	27%	43%	32%	29%
		≥.70	13%	12%	28%	12%	27%	21%	16%
		≥.90	2%	6%	14%	4%	43%	32%	29%
TRAD	25								
		≥.50	8%	22%	16%	10%	25%	19%	22%
		≥.70	2%	12%	8%	4%	12%	9%	8%
		≥.90	.33%	6%	2%	1%	6%	4%	2%

II. INTRATOPIC RELIABILITY

II.A. Intratopic Reliability by Theoretical Contrasts

We call special attention to the TRAD coefficients in the *Hub:Periphery* columns. We note that through the simple procedure of dividing the sample into two subsamples, one representing respondents who reside in large, complex villages with well-developed infrastructures, services, and transportation services, and one representing respondents who reside in small, simple villages with modestly developed infrastructures, services, and transportation, that the proportions of TRAD PRE coefficients ≥.50 about triple for large villages and about double for the small villages.[65] Each pair of contrasts in Table 9-1 demonstrate the importance of testing for different types of villages, or for differences in race/ethnicity.

Most of the TRAD variables are structured to distinguish customs or practices we classify as "Western," from those we classify as "traditional" (i.e., Alaska Native). Inasmuch as most of the variables are ordinal scale, we sought to order the ranks from 1 to n so that for each variable Native customs would occupy the first position (e.g., rank no. 1), and Western customs would occupy the *n*th position (e.g., rank no. 3). The middle rank(s) were reserved for practices that appeared to be blends of traditional and Western customs. The rationale for the ordering is the assumption shared by the majority of development economists, members of the U.S. Congress (as made irrefutable by the Alaska Native Claims Settlement Act), and three generations of social scientists in the U.S., that social change proceeds from relations based on kinship or tribe, to relations based on property and territory which are controlled by rational-legal systems. As economies develop, communitarian ethics are replaced by individual ethics, households become smaller, and resources are saved while gratifications are delayed.

Three variables which seek to measure features of household organization will illustrate the point: K19, K20, and K21. Item K19 seeks to measure whether households are fairly stable and rigid in their composition, or whether they are

[65]The comparisons are within the pretest sample and within the posttest sample. The proportional differences between the subsamples within each of the two samples are similar.

rather fluid. Native households are traditionally fluid in composition, allowing for the movement of persons in and out of the household as exigencies dictate, or simply because persons wish to spend time with favored relatives. Western households are traditionally stable with few changes of family members in the past 2 years. In the earlier segment of the Social Indicators research, we over-represented Natives in our sample so as not to swamp their responses with the responses of non-Natives in the largest villages (five sample villages in the Bristol Bay, Kodiak, and Aleutian-Pribilof Islands regions are not only among the largest villages in Alaska, but the huge majorities of the villages are non-Natives). Our efforts provided an accurate picture of the small and more stable villages, while also demonstrating that a large portion of non-Natives in the commercial fishing villages were part-time residents of those villages. Not any of the villages in the samples drawn from Schedules A and B had such complex economies with so little dependence on commercial fishing, or had so small a proportion of Native residents as Kenai and Valdez.

Acting upon the results of our KIP research among Schedule A and B villages in 1987 and 1988, we established the following ranks from "traditional" to "Western" for K19 (Household composition dynamics):

1. Households are open and fluid, experiencing frequent growth and decline through the movement of members in and out (excluding marriage, death, and relocation for school; three or more persons have joined or left the household in the past 2 years [Examples are adoptions, elders moving in, divorcees returning, collateral relatives staying for a brief time.]).
2. Household compositions change through infrequent addition or loss of members (perhaps one person every 2 years other than marriage, death, or relocation for school).
3. Household compositions are stable. No changes in personnel over the past 2 years.

K20 (Rules/expectations for household composition and dynamics) addresses the question as to whether there are rules about who can and who cannot move into a household. These ranks, too, are ordered from "traditional" to "Western."

1. No set rules or expectations for who cannot join the household. Flexible acceptance of members and the behavior of those persons.
2. Blend of 1 and 3.
3. Clear expectations for the observation of rules by household members. Set expectations for the behavior of new members.

With K21 we seek to know the manner in which and the places where (within the household or larger family, or through institutions) conflicts are addressed and resolved. The traditional practice is a passive response--either a discussion or withdrawal. The Western custom, we aver, depends on the situation. If conflict is frequent, drug induced, or abusive, we have learned that non-Natives, in particular, may begin with attempts at active internal solutions--rewards, punishments, even fights. If the conflicts are frequent and severe, formal external resolutions are often sought through police and various social services (counselling). When we established these variable classifications, we did not think that Natives, alone, appealed to passive solutions and that non-Natives appealed to active internal and formal external solutions.

What we have learned in the Schedule C research is that K21 behaves in ways we had not understood. It is not nearly so sensitive a variable as we once thought. Let us analyze K21 against our original assumptions. K21 allows us to rate each household's technique for resolving conflicts within the house. K21 (Household conflict resolution).

1. Passive internal (within household or larger family) resolution, such as dialogue or withdrawal.
2. Active internal resolution, such as rewards, punishments, or fights.
3. Informal external resolution, such as advice from relatives, assistance from friends, informal/nonformal resources.
4. Formal external resolution, such as police, helping services in the village or region.
5. Combination of three types.

If respondents are consistently rated as 1's, or 3's, or 2's (mixed) on the three variables, the PRE coefficients for K20 and K21 (γ_{12}) will be high and positive. The high, positive score informs us that there are few reversals of pairs in the data so that tradition correlates with tradition, mixed with mixed, and Western with Western. The TRAD data for the total pretest sample demonstrates that there are many reversals of pairs. The PRE for K19 by K20 in the total pretest sample is $\gamma =$. 32 (a 32% reduction of error). But when we subclassify for *Hub*, $\gamma K_{19}K_{20} = .54$ (a 54% reduction of error). We know from the γ score that there are reversals in the $K_{19}K_{20}$ *Hub* table, but if you know whether a household is fluid or static, you can reduce the error by 54 percent in predicting whether there are rules for joining households and whether there are set expectations of behavior for persons in those households.

Neither K19 or K20 obtains PRE coefficients ≥.50 with K21 in the total sample or in either of the *Hub:Periphery* contrasts. Nevertheless, the relations of K21 (household conflict resolution) with K19 and with K20 (household rules) are very different in the two halves of the contrast. For example, $\gamma K_{20}K_{21}$ = -.45 in the *Hub* subsample, suggesting that in nearly half of the cases, persons who have set rules for composition and behavior in their households tend toward passive and external conflict resolutions within those households, and persons who have no set rules or expectations, tend to use external agents, such as the police, or combinations of internal and external means to resolve conflicts. In the *Periphery* contrast, $\gamma K_{20}K_{21}$ = .02. Knowledge of either techniques of household resolution allows us to reduce our error in guessing the rules for household composition and behavior by 2 percent. It appears that households in *Hub* communities better fit the Western versus traditional model for household composition and household rules, yet the households that fit the Western type tend to resolve household conflicts internally, either passively or actively. It is more likely that the households that fit the traditional type use external agents more than do the households whose memberships are stable and in which there are generally recognized rules for membership and clear expectations for behavior.

On the basis of these contrasts, K21 will not survive the intratopic reliability tests, yet we appear to have learned several things of interest from the *Hub:Periphery* theoretical contrasts of K19, K20, and K21. One is that K21 is ill-conceived as a discriminator of *Western* behavior. According to the spill area samples, households whose stability and rules best fit the nuclear family-Protestant ethic model, also tend to resolve problems internally. It is likely that we were mistaken in thinking that because universalistic, legal means--police, social services, and the like--are coincident with economic and political development, that these means will correlate with stable households in which expectations for behavior and membership are explicit. Our discoveries in the earlier, Native-dominated samples of Schedules A and B, do not hold for the largest and most complex villages of the oil-spill area, Kenai and Valdez in particular.

It is the case that external agents to resolve household conflicts are more often called upon in the less stable households which harbor few expectations for membership and for the behavior of members. This discovery makes sense in accounting for households that are more apt to be in flux than to be stable.

It also may be the case that K21 suffers from poor construct validity. That is, "household conflict" may be interpreted differently within households that are stable and in which behavioral expectations are firm from households whose memberships are fluid and for which few rules are explicit. In the former households, the behavior of an errant adolescent caught using drugs or stealing from a grandparent's wallet may be interpreted as a household conflict which is dealt with by the parents actively and within the home. Similar behavior of an adolescent in a more fluid household with few or no explicit rules for behavior, may not be reported as a "household conflict." It may well be the case, as some of our observations suggest, that household conflicts in these households are recognized and reported as conflicts only if external agents are required to resolve these disputes--disputes which will not resolve themselves. Examples might be a divorced male who has returned to his natal home because his former wife has banished him. While in his parents' home, he becomes inebriated, wields a rifle, and threatens to take his own life, or those of his former wife and children. In short, some "traditional" households may view household conflicts as situations that require external agents, perhaps in conjunction with household members, to resolve.

The PRE coefficients are low for K21 with the items we most expect it to yield high scores. Although K21 yields several coefficients $\geq .50$ in the *Hub* contrast for the posttest sample, there is not sufficient reason to retain K21 in the sample.

The foregoing is a rather long-winded example used to demonstrate that intratopic coefficients increase their predictive value in certain theoretical contrasts. We retain all variables which obtain high positive or negative coefficients with three or more variables in any contrast. It is not necessary for each variable to obtain high PRE's in every contrast, or in the total sample.

We focus on the TRAD items because the variables in this matrix yielded the lowest proportion of PRE coefficients ≥ .50 among the five topical matrices. The TRAD matrix embraces many diverse items. We expect high positive PRE relations among some, high negative PRE relations among others. We expect many of the strongest relations to emerge only in the context of our theoretical contrasts.

The most powerful contrast for the TRAD variables in both samples is *Hub:Periphery*. The initial response to these results was not complete surprise because all of the villages with large proportions of Native residents are *Periphery*. The largest *Periphery* villages with the largest representations in the samples--Cordova and Seldovia--however, have very small proportions of Native residents. Cordova is a commercial fishing village. Seldovia has some commercial fishing-related enterprise, but essentially it is a retreat for Anchorage residents--a place of second homes and vacation homes situated on beautiful Kachemak Bay, Kenai Peninsula. The *Hub:Periphery* differences likely are attributable to two factors in addition to the larger proportion of Natives in *Periphery* villages than in *Hub* villages: (1) the length of residence of non-Native respondents, and the (2) amount of extraction for subsistence in which non-Natives engage. We learned in Schedule A and B research that the longer non-Natives resided in Alaskan villages (full time), the more actively they engaged in the extraction of naturally occurring resources and the greater the similarities with Native practices. We will test this as an hypothesis later. Here, let us focus on *Hub:Periphery* contrasts.

The *Hub* village contrasts in the two samples produce a similar structure. Household size (K17), stable household compositions (K19), rules for membership and expectations for behavior in the household (K20), the absence of divorces (K22), religious participation (K26), extracurricular religious activities (K27), political participation (K24), and the correct identification of political issues yield high positive PRE coefficients. High negative PRE coefficients obtain among several members of the previous set, and the cognitive attitudes that: (1) it takes a lifetime or the accumulated knowledge of several lifetimes to acquire knowledge about the environment (Q6); (2) important symbols are attached to features of the environment (Q7); (3) the environment has spiritual significance (K29); (4) a person should work hard to achieve success not only for himself or herself, but for a wider-network of kinspersons and friends in the village (K28); (5) a person should employ his or her skills in cooperation with others and share the products of those skills in a communitarian fashion (K30); and (6) traditional (non-Western) enculturation practices and gender distinctions should be maintained (K31). Most respondents in *Hub* villages were born and reared outside Alaska or outside the region (K37), as were their spouses (K37B). They frequently wrongly identify the functions of social service agencies in their communities (K35); use few if any social services (K39); and do not use Native healers, even if they are available (K40). Although the nonresponse rate is high, they also do not think that Natives and Native organizations participated in the oil-spill-cleanup operation (Q17).

The structure of *Hub* relations fits the Western hypothesis. The structure of *Periphery* relations approximates the *Hub* structure in several ways, but those relations also differ from the *Hub* structure, approximating the relations we have called "traditional" in the Schedule A and B research (Social Indicators Study III [Jorgensen 1994]). Also, among *Periphery* villages there are greater differences between the structures of the pretest and the posttest samples than is the case for *Hub* villages. The larger proportion of γs $\geq .50$ in the posttest is an indicator of the differences.[66]

Among *Periphery* villages, there seems to be reflected two populations. The first group is composed of respondents and spouses who were born and reared outside the region if not outside Alaska (K37, K37B) and who have stable households (K19) with rules for membership and behavior (K20). They maintain Western enculturation practices and gender distinctions (K31). These elements are similar to the *Hub* structure. Yet unlike *Hub* respondents, *Periphery* respondents in

[66]The multidimensional similarity structures (3-dimensional configurations, SSA-I) of the TRAD data for the pretest and posttest samples are highly similar, even though the posttest relations are stronger.

this set (1) think that Natives participated in the oil-spill-cleanup (Q17), correctly identify the functions of social service institutions in their village and region (K35), and belong to one or more sodalities (K23). The structure of this set suggests that these respondents--most likely predominantly non-Natives--are in-migrants but long-term residents of small villages. They participate in clubs and auxiliaries of various kinds, know the functions of social services, even if they do not use them, and are informed about the activities of Natives and Native organizations, even if they are not Natives.

The second population subset in *Periphery* villages appears to capture Natives, however weakly. In this set respondents and their spouses were born and reared in or near the village (K37, K37B), are members of several local sodalities, and are active attendants at religious ceremonies and extracurricular participants in religious activities (K26, K27). These items correlate positively and strongly with the cognitive attitudes that Natives participated in the spill cleanup (Q17), there is less sharing of all kinds between households and among friends now than 10 years ago (Q9), and elders receive less care than they should receive (Q10). This set also includes strong positive relations among ethics and practices we have defined as Native: a person should work hard to develop skills to assist a wide circle of friends and relatives within the village (K28), and should then use those skills to assist a wide circle of friends and relatives within the village (K30). Traditional gender distinctions are maintained and enculturation practiced (K31), and the environment is considered to be imbued with spirit(s) and to have significant symbols attached to many of its places, its fauna and flora, and its abiological forces (K29).

These two sets suggest a merging of some Western and traditional features among residents of *Periphery* villages, and some separation as well, that is not so obvious in *Hub* villages. The theoretical contrast has proved important in the intratopic reliability analysis. Most of the variables are reliable.

II.B. Intratopic Reliability by Racial/Ethnic Contrasts

The **Native:Non-Native** contrasts are important because they allow us to distinguish differences between **Natives**, when analyzed separate from non-Natives, and the total *Periphery* matrices (Natives and non-Natives are not separated in the *Periphery* subsamples). This issue is more appropriate for the multivariate analysis volume. Suffice it to say here that Native differences from *Periphery* are considerable on the relations among almost all variables which distinguish Western from traditional practices, ethics, and beliefs.

Three items should be dropped from the corpus of KIP variables, even though two of them generate more than sufficient PRE scores >.50 in most of the matrices. These are K21 (household conflict resolution), Q17 (Did Native groups help the general cleanup effort after the spill?), and K40 (Have you used a Native healer in the past year?). K21 needs no further discussion.

Q17 should be dropped, even though it provides prima facie evidence that non-Natives in large towns are ignorant of Natives and Native groups. The problem appears to be that so few non-Natives in the largest villages know anything about Natives, that they did not respond to the question. Those non-Natives who responded in *Hub* villages overwhelmingly reported that Native groups did not help. In the *Periphery* villages, they reported that Natives did help. Almost all Natives reported that Native groups helped. This variable survived beyond the nonresponse analysis because of the researcher's curiosity about the way it would behave in the theoretical contrasts.

K40 should be dropped because so few respondents have access to Native healers that the most frequent response was "no healers available in the community." Where they are available, Natives use them, non-Natives almost never use them.

III. REDUNDANCY

The problem we most frequently encounter in the intertopic analysis of these data is redundancy. The MGMT and the KNOW matrices are especially packed with very high PRE scores. In both the pretest and posttest samples, the PRE scores in the MGMT and KNOW matrices are so high, and the univariate distributions are so similar, that it is obvious we are measuring the same responses again and again. In the MGMT matrix, the extremely high scores are most obvious for the relations among items pertaining to the species that are perceived by respondents to be similar in some ways, such as saltwater fish harvested commercially (herring, cod, halibut) or large land mammals of the same family (caribou, moose). For example, in the total pretest and total posttest samples the following relations obtain for cognitive attitudes about herring, cod, and halibut: Q2*1 (Can the resource be managed?); Q2*2 (Who should manage the resource?); and Q3* (Who could manage the resource better?).

PRETEST | POSTTEST

Can the Resource be Managed?

PRETEST	He	C	Ha	POSTTEST	He	C	Ha
Herring	X	.93	.99	Herring	X	1.00	1.00
Cod	X	.95		Cod	X	1.00	
Halibut			X	Halibut			X

Who Should Manage the Resource?

PRETEST	He	C	Ha	POSTTEST	He	C	Ha
Herring	X	.95	.97	Herring	X	1.00	1.00
Cod	X	.96		Cod	X	1.00	
Halibut			X	Halibut			X

Who Could Manage the Resource Better?

PRETEST	He	BF	POSTTEST	He	BF
Herring	X	.93	Herring	X	1.00
Bottomfish		X	Bottomfish		X

PRE scores similar to or higher than these for Q2*1 and Q2*2, obtain for the relations among (1) walrus and bowhead; (2) king crab, snow crab, and tanner crab; (3) caribou and moose; and (4) geese, ducks, swans, and cranes. Among Q3* items, PRE scores from .95 to 1.0 obtain for the management of (1) walrus, seals, and bowhead; and (2) polar bear, caribou, moose, and bears. The univariate distributions reflect the variation in the PRE coefficients. There is, for example, almost no variation in the univariate responses for each of the following: can geese, ducks, swans, and cranes be managed? The univariate distribution for each of these groups of waterfowl is almost identical within each of the samples, although there are slight, but not significant, differences between the distributions in the two samples. Below we provide a single table for each sample because the distributions for each of the four waterfowl are so similar within samples. More pretest than posttest respondents think only "God" can manage the resource (7.2 to 3.3), and more posttest than pretest respondents think the resource cannot be managed at all (6.5 to 1.5).

Can the Resource be Managed?

PRETEST: Can waterfowl be managed?		POSTTEST: Can waterfowl be managed?	
Only God can manage	7.2%	Only God can manage	3.3%
No person can manage	1.0%	No person can manage	6.5%
No institution can manage	.5%	No institution can manage	0.0%
Persons can manage	9.7%	Persons can manage	9.8%
Institutions can manage	81.6%	Institutions can manage	80.4%

Responses for Q2*2 questions pertaining to waterfowl (and to the sets comprising large land mammals, marine invertebrates, saltwater fishes) and Q3* questions pertaining to sea mammals (and to the sets comprising large land mammals, marine invertebrates, and salt water fishes) reveal only minute variations similar to the example above.

The high redundancy among the measures of cognitive attitudes about the management of similar or most closely related species allows us to drop several items from each set of related species, being assured that the responses for any of the items in the set are valid for the other items in the set. The items selected below to represent each set were chosen, in part, on the basis of the response rates to the items which measure the availability of various species according to respondents in the *Hub* and *Periphery* contrasts (see Table 19). It will be recalled that only one species (silver or coho salmon) among 77 was responded to by more than 90 percent of the respondents in either of those contrasts. We wanted the best possible representative for each set of related species to represent all other items in the set. We decided to compare the items which received the highest response rates in each of the two halves of the contrast for the pretest and posttest samples. We then chose the item in each set of related species with the highest rank to represent the other items in the set.

Following this procedure, we have selected the items in **bold** to represent the other items in the set to which it belongs:

Q2A1	**WALRUS, MANAGE?**	**Q2A2**	**WALRUS, WHO SHOULD MANAGE?**
Q2B1	**BOWHEAD, MANAGE?**	**Q2B2**	**BOWHEAD, WHO SHOULD MANAGE?**
Q2D1	**SALMON, MANAGE?**	**Q2D2**	**SALMON, WHO SHOULD MANAGE?**
Q2G1	**HALIBUT, MANAGE?**	**Q2G2**	**HALIBUT, WHO SHOULD MANAGE?**
Q2E1	HERRING, MANAGE?	Q2E2	HERRING, WHO SHOULD MANAGE?
Q2F1	COD, MANAGE?	Q2F2	COD, WHO SHOULD MANAGE?
Q2K1	**TANNER CRAB, MANAGE?**	**Q2K2**	**TANNER CRAB, WHO SHOULD MANAGE?**
Q2I1	KING CRAB, MANAGE?	Q2I2	KING CRAB, WHO SHOULD MANAGE?
Q2J1	SNOW CRAB, MANAGE?	Q2J2	SNOW CRAB, WHO SHOULD MANAGE?
Q2N1	**MOOSE, MANAGE?**	**Q2N2**	**MOOSE, WHO SHOULD MANAGE?**
Q2M1	CARIBOU, MANAGE?	Q2M2	CARIBOU, WHO SHOULD MANAGE?
Q2R1	**DUCKS, MANAGE?**	**Q2R2**	**DUCKS, WHO SHOULD MANAGE?**
Q2Q1	GEESE, MANAGE?	Q2Q2	GEESE, WHO SHOULD MANAGE?
Q2S1	SWANS, MANAGE?	Q2S2	SWANS, WHO SHOULD MANAGE?
Q2T1	CRANES, MANAGE?	Q2T2	CRANES, WHO SHOULD MANAGE?

Q3A	**MANAGEMENT OF WALRUS**
Q3B	MANAGEMENT OF SEALS
Q3C	**MANAGEMENT OF BOWHEAD**
Q3D	**MANAGEMENT OF POLAR BEAR**
Q3F	**MANAGEMENT OF MOOSE**
Q3E	MANAGEMENT OF CARIBOU
Q3G	MANAGEMENT OF BEARS
Q3H	**MANAGEMENT OF SALMON**
Q3J	**MANAGEMENT OF BOTTOMFISH**
Q3I	MANAGEMENT OF HERRING
Q3K	**MANAGEMENT OF CRABS**

The items pertaining to who possesses better or more knowledge of the environment--scientists, Natives, or both scientists and Natives--are equal, and also yield high PRE scores and very similar univariate distributions. The PRE coefficients for knowledge of the abiological features of the environment (water, ice, wind) average .98 for the total pretest and .91 for the total posttest samples. In the two samples, the PRE scores between, and the univariate distributions for, knowledge of plants and knowledge of marine invertebrates commend that these items be treated as one. The similarities between these groups of resources, however, are not obvious.[67] Plants are relatively unimportant to non-Natives but important to Natives in our samples. Marine invertebrates are a major commodity, but only to a few commercial fisherpersons in our samples.

Q51A KNOWLEDGE OF ABIOLOGICAL PHENOMENA
- Q51A KNOWLEDGE TO UNDERSTAND WATER
- Q51B KNOWLEDGE TO UNDERSTAND ICE
- Q51C KNOWLEDGE TO UNDERSTAND WIND

Q51H KNOWLEDGE TO UNDERSTAND INVERTEBRATES
- Q51D KNOWLEDGE TO UNDERSTAND PLANTS

Q51E KNOWLEDGE TO UNDERSTAND LAND MAMMALS

Q51F KNOWLEDGE TO UNDERSTAND FISH

Q51G KNOWLEDGE TO UNDERSTAND SEA MAMMALS

During the course of the analysis, then, the data pertaining to walrus will represent all sea mammals other than the bowhead whale; halibut (Q2*1, Q2*2) and bottomfish (Q3*) will represent all salt water fish harvested as commodities; tanner crabs will represent all crabs; moose will represent all large land mammals; and ducks will represent all waterfowl. Because of the special importance of salmon to commercial fishing as well as to subsistence use, and because of the special importance in international and Federal law of polar bears and bowhead whales, these items will not be merged with related species. Wind, water, and ice will be subsumed under "abiological environment," and plants and invertebrates will be joined as the "Russell Set" (apologies to Bertrand Russell).

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[67]David Moyer (pers. comm. 1993) reports "In the traditional economies of the Inuit or Eskimo, both these items [plants and marine invertebrates] are collected or gathered. They usually are a known resource that can be collected from fixed sites. Most of the collecting is done by women. It is interesting that the data picked up what is probably a very old association that may no longer be relevant."

IV. EXCLUSION AND RETENTION OF KIP ITEMS

IV.A. KIP Items that Are Redundant or Otherwise Failed the Intratopic Reliability Tests and Will Not Be Retained for the Social Indicators Analysis

Q2E1	HERRING, MANAGE?	Q2E2	HERRING, WHO SHOULD MANAGE?
Q2F1	COD, MANAGE?	Q2F2	COD, WHO SHOULD MANAGE?
Q2I1	KING CRAB, MANAGE?	Q2I2	KING CRAB, WHO SHOULD MANAGE?
Q2J1	SNOW CRAB, MANAGE?	Q2J2	SNOW CRAB, WHO SHOULD MANAGE?
Q2M1	CARIBOU, MANAGE?	Q2M2	CARIBOU, WHO SHOULD MANAGE?
Q2Q1	GEESE, MANAGE?	Q2Q2	GEESE, WHO SHOULD MANAGE?
Q2S1	SWANS, MANAGE?	Q2S2	SWANS, WHO SHOULD/ MANAGE?
Q2T1	CRANES, MANAGE?	Q2T2	CRANES, WHO SHOULD MANAGE?
Q3A	MANAGEMENT OF SEALS	Q3E	MANAGEMENT OF CARIBOU
Q51B	KNOWLEDGE TO UNDERSTAND ICE	Q3G	MANAGEMENT OF BEARS
Q3I	MANAGEMENT OF HERRING	Q51C	KNOWLEDGE TO UNDERSTAND WIND
Q51D	KNOWLEDGE TO UNDERSTAND PLANTS	Q17	NATIVE GROUPS HELP AFTER SPILL?
K21	HOUSEHOLD CONFLICT RESOLUTION	K40	USE OF NATIVE HEALERS

IV.B. KIP Items that Passed the Intratopic Reliability Tests and Will Be Retained for the Analysis of Social Indicators

Q2A1	WALRUS, MANAGE?
Q2A2	WALRUS, WHO SHOULD MANAGE?
Q2B1	BOWHEAD, MANAGE?
Q2B2	BOWHEAD, WHO SHOULD MANAGE?
Q2D1	SALMON, MANAGE?
Q2D2	SALMON, WHO SHOULD MANAGE?
Q2G1	HALIBUT, MANAGE?
Q2G2	HALIBUT, WHO SHOULD MANAGE?
Q2K1	TANNER CRAB, MANAGE?
Q2K2	TANNER CRAB, WHO SHOULD MANAGE?
Q2N1	MOOSE, MANAGE?
Q2N2	MOOSE, WHO SHOULD MANAGE?
Q2R1	DUCKS, MANAGE?
Q2R2	DUCKS, WHO SHOULD MANAGE?
Q3A	MANAGEMENT OF WALRUS
Q3C	MANAGEMENT OF BOWHEAD
Q3D	MANAGEMENT OF POLAR BEAR
Q3F	MANAGEMENT OF MOOSE
Q3H	MANAGEMENT OF SALMON
Q3J	MANAGEMENT OF BOTTOMFISH
Q3K	MANAGEMENT OF CRABS
Q4A	INFLUENCE OVER SALMON
Q51A	KNOWLEDGE TO UNDERSTAND WATER
Q51E	KNOWLEDGE TO UNDERSTAND LAND MAMMALS
Q51F	KNOWLEDGE TO UNDERSTAND FISH
Q51G	KNOWLEDGE TO UNDERSTAND SEA MAMMALS
Q51H	KNOWLEDGE TO UNDERSTAND INVERTEBRATES
Q6	ACQUISITION OF KNOWLEDGE
Q7	ENVIRONMENTAL SYMBOLS
Q8A	DRILLING ATTITUDES
Q8B	PUMPING ATTITUDES
Q8C	TRANSPORT ATTITUDES
Q8D	PIPELINE ATTITUDES
Q8E	ENCLAVE ATTITUDES
Q8F	RECREATION ATTITUDES
Q9	MEMORIES OF SHARING
Q10	TREATMENT OF ELDERS
Q12A	FEDERAL EXXON VALDEZ RESPONSE
Q12B	STATE EXXON VALDEZ RESPONSE
Q12C	EXXON EXXON VALDEZ RESPONSE
Q13A	EXXON VALDEZ UNUSUAL?
Q13B	SIMILAR EVENTS OCCUR LATER?
Q14A	LATER RESPONSES
Q15	SPILL AFFECT INCOME?
Q16A	SPILL CAUSE FISHING DISPUTES?
Q16B	SPILL CAUSE DISPUTES, FISHING VS. OTHER?
K1	HARVEST EXPENSES
K2	VARIETY OF HARVESTED SPECIES
K3	HARVESTED PROTEIN IN DIET
K4	HOUSEHOLD INCOME
K5	HOUSEHOLD EARNED INCOME
K6	HOUSEHOLD UNEARNED INCOME
K7	GOVERNMENT SOURCES OF INCOME
K8	NON-GOVERNMENT SOURCE OF INCOME
K9	STABILITY OF EARNED INCOME
K10	STABILITY OF UNEARNED INCOME
K11A	INCOME GIVING IN VILLAGES
K11B	INCOME RECEIVING IN VILLAGES
K12A	INCOME GIVING BETWEEN VILLAGES
K12B	INCOME RECEIVING BETWEEN VILLAGES
K13A	LABOR GIVING IN VILLAGES
K13B	LABOR RECEIVING IN VILLAGES
K14A	LABOR GIVING BETWEEN VILLAGES
K14B	LABOR RECEIVING BETWEEN VILLAGES
K15A	RESOURCE GIVING IN VILLAGES
K15B	RESOURCE RECEIVING IN VILLAGES
K16A	RESOURCE GIVING BETWEEN VILLAGES
K16B	RESOURCE RECEIVING BETWEEN VILLAGES
K17	HOUSEHOLD SIZE
K18	AGE OF HOUSEHOLD HEAD
K19	HOUSEHOLD COMPOSITION AND DYNAMICS
K20	RULES FOR DYNAMICS
K22	DIVORCE OR SEPARATION
K23	SODALITY MEMBERSHIP
K24	POLITICAL PARTICIPATION
K25	IDENTIFICATION OF POLITICAL ISSUES
K26	RELIGIOUS PARTICIPATION
K27	EXTRACURRICULAR RELIGIOUS PARTICIPATION
K28	RESPONSIBILITY FOR ATTAINMENT
K29	ETHICS AND ENVIRONMENTAL SYMBOLS
K30	ETHICS OF COOPERATION
K31	ENCULTURATION AND GENDER DISTINCTIONS
K32	EXPECTATIONS FOR DEVELOPMENT
K33A	ECONOMIC CONFLICTS
K33B	PERSONAL ECONOMIC CONFLICTS
K34	SCHOOLING AND SUCCESS
K35	PERCEIVED OBJECTIVES OF SERVICES
K37	RESPONDENT RESIDENCE PATTERN
K37B	SPOUSE RESIDENCE PATTERN
K39	SERVICES USED BY RESPONDENT
K41	UTILITIES IN HOUSE

CHAPTER 10
RELIABILITY AND STABILITY OVER-TIME

I. INTRODUCTION: THE PRESPILL KODIAK ISLAND KIP PANEL, 1988-1989

I.A. Overview

The protracted nature of the Social Indicators research project, which began early in the winter of 1986-1987, commenced among the Kodiak Island villages of Kodiak City and Old Harbor in January of 1988. As has been pointed out in several places above, we had concluded a second wave of research among Kodiak Island residents just prior to the infamous foundering of the Exxon Valdez. Our research design called for protocol reinterviews in the winter of 1989 among all members of the KIP panel initially interviewed in 1988. We were able to locate and reinterview 14 of the original 16 KIP panel members in the winter of 1989. The 14 reinterviewees comprise the Kodiak City-Old Harbor panel (KOKIPAN) for which we compute longitudinal PRE coefficients for each of the KIP items.

The protocol instrument, by its nature and size, requires more time to administer than does the questionnaire, so when the research team began research on the consequences of the spill to residents in the area directly affected and returned to Kodiak City and Old Harbor, 5 months had elapsed since the Exxon Valdez had foundered and 6 months had elapsed since we had completed the most recent set of protocol reinterviews. In August of 1989, we learned that some of our Kodiak City and Old Harbor panel informants were working in the spill cleanup, some were fishing, and some were reluctant to be reinterviewed so soon after the last reinterview. We were able to locate and reinterview only four members of the panel. As a consequence, the third wave responses are too few to allow us to calculate over-time coefficients for three waves.

Nevertheless, the prespill responses are important to our inquiry, and new questions which were added to the protocol before we entered the field in the winter of 1989 are part of the reason for our special interest in responses prior to the spill. It is important to our inquiry to be able to make two kinds of comparisons with the protocol data. One is the comparison between prespill responses and postspill responses. The other is the comparison between the respondents in the spill-area sample (Schedule C) and the respondents in the Schedule A and B sample. The overlap of Kodiak Island villages with Schedule A and B villages assists both comparisons. As we assess KOKIPAN responses to protocol questions, we will have occasion to contrast these responses with the responses to the protocol by the total A and B panel. These comparisons will allow us to differentiate the Kodiak Island responses and contrast them with the more typical responses of Natives and non-Natives in the areas north of the Alaska Peninsula. The Kodiak Island panel is characteristic of non-Native respondents who (1) observe Western ethics and customs, (2) are engaged in commercial fishing-related occupations, (3) earn high incomes, (4) are engaged in only a few local volunteer, political, or religious activities, and (5) were born and reared outside Alaska. These attributes are widespread among spill-area respondents, as our data will demonstrate.

I.B. KIP Reliability in the Kodiak Island Panel (KOKIPAN): Prespill With Some Postspill Examples

The most informative way to assess the reliability of the responses to the KIP instrument is to begin with a table of univariate distributions for the KOKIPAN for 1988 (16*N*), 1989W (14*N*), 1989S (4*N*), and 1991 (2*N*). The normal procedure is to provide a table of longitudinal correlations for each of the items in which the responses of the panel at, say, t_1, are correlated with the responses of the same panel at t_2. In this chapter we will analyze longitudinal reliability within the prespill KOKIPAN and the postspill panel for the entire spill area (EXXONKI.PAN) after we assess the univariate distributions for those panels.

Table 10-1 lists the proportions of responses to each attribute for each KIP item for the two waves of prespill research (l988W and 1989W), and the raw scores for the small sample of KOKIPAN respondents in postspill research waves (1989S and 1991W).[68] During analysis of 1987 and 1988 responses to the AQI it became clear that many types of cognitive questions and questions about cultural beliefs and practices which had been posed in the questionnaire format were subject

[68]The discussion in Chapter 7 explains how and why the number of KOKIPAN respondents dwindled from 16 to 2.

Table 10-1

FREQUENCY DISTRIBUTIONS, KEY INFORMANT PROTOCOL VARIABLES, KODIAK ISLAND PANEL, PRESPILL (1988W, 1989W), POSTSPILL (1989S, 1991W)*

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	**Prespill 1988 *16N***	**Prespill 1989 *14N***	**Postspill 1989 *4N***	**Postspill 1991 *2N***
Q2A1 WALRUS, MANAGE?	These			
ONLY GOD CAN MANAGE		0.0%		(1)
NO PERSON CAN MANAGE	Questions	0.0%		
NO INSTITUTION CAN MANAGE		0.0%		
PERSONS CAN MANAGE	Not	0.0%	(2)	
INSTITUTIONS CAN MANAGE		100.0%	(1)	(1)
	Asked			
Q2A2 WALRUS, WHO SHOULD MANAGE?				
ALASKA DEPARTMENT OF FISH & GAME	In	0.0%	(2)	(1)
VARIOUS FEDERAL AGENCIES		42.9%		
COMBINATION OF GOVERNMENT & NATIVES	1988	57.1%	(1)	
NATIVE ORGANIZATIONS		0.0%		(1)
LOCAL NATIVES		0.0%	(1)	
Q2B1 BOWHEAD, MANAGE?				
ONLY GOD CAN MANAGE		0.0%		(1)
NO PERSON CAN MANAGE		0.0%		
NO INSTITUTION CAN MANAGE		0.0%		
PERSONS CAN MANAGE		0.0%	(2)	
INSTITUTIONS CAN MANAGE		100.0%	(1)	(1)
Q2B2 BOWHEAD, WHO SHOULD MANAGE?				
ALASKA DEPARTMENT OF FISH & GAME		0.0%	(2)	(1)
VARIOUS FEDERAL AGENCIES		42.9%		
COMBINATION OF GOVERNMENT & NATIVES		57.1%	(1)	
NATIVE ORGANIZATIONS		0.0%		(1)
LOCAL NATIVES		0.0%	(1)	
Q2D1 SALMON, MANAGE?				
ONLY GOD CAN MANAGE		0.0%		(1)
NO PERSON CAN MANAGE		0.0%		
NO INSTITUTION CAN MANAGE		0.0%		
PERSONS CAN MANAGE		0.0%	(2)	(1)
INSTITUTIONS CAN MANAGE		100.0%	(1)	
Q2D2 SALMON, WHO SHOULD MANAGE?				
ALASKA DEPARTMENT OF FISH & GAME		0.0%	(3)	(1)
VARIOUS FEDERAL AGENCIES		42.9%		
COMBINATION OF GOVERNMENT & NATIVES		57.1%	(1)	
NATIVE ORGANIZATIONS		0.0%		
LOCAL NATIVES		0.0%		(1)

*The Kodiak Island Panel from the Schedule B pretest sample comprised 16 respondents in the winter of 1988. Upon reinterviewing during the winter of 1989, immediately prior to the spill, 14 of the original 16 were located and reinterviewed. Five and one-half months later, when reinterviewing after the Exxon Valdez oil spill, we were able to locate only 4 of the original 16. When we created a panel from the 1989 postspill sample, 2 of the 4 we reinterviewed in the summer of 1989, were reinterviewed in the winter of 1991. Because the numbers are so small, we dispense with percentages in this table. We use small sample statistics to test for significance of differences between the two prespill waves of the sample. The Kolmogorov-Smirnov test for two independent samples is employed for the ordinal variables. Significance of difference of proportions via X^2 is employed for nominal dichotomous data. ** Designates differences in which $P \leq .10$

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
Q2G1 HALIBUT, MANAGE?	These			
ONLY GOD CAN MANAGE		0.0%		(1)
NO PERSON CAN MANAGE	Questions	0.0%		
NO INSTITUTION CAN MANAGE		0.0%		
PERSONS CAN MANAGE	Not	0.0%	(2)	
INSTITUTIONS CAN MANAGE		100.0%	(1)	(1)
	Asked			
Q2G2 HALIBUT, WHO SHOULD MANAGE?				
ALASKA DEPARTMENT OF FISH & GAME	In	0.0%	(3)	(1)
VARIOUS FEDERAL AGENCIES		42.9%		
COMBINATION OF GOVERNMENT & NATIVES	1988	57.1%	(1)	
NATIVE ORGANIZATIONS		0.0%		(1)
LOCAL NATIVES		0.0%		
Q2K1 TANNER CRABS, MANAGE?				
ONLY GOD CAN MANAGE				(1)
NO PERSON CAN MANAGE		NA		
NO INSTITUTION CAN MANAGE				
PERSONS CAN MANAGE			(2)	
INSTITUTIONS CAN MANAGE			(1)	(1)
Q2K2 TANNER CRABS, WHO SHOULD MANAGE?				
ALASKA DEPARTMENT OF FISH & GAME		NA	(3)	(1)
VARIOUS FEDERAL AGENCIES				
COMBINATION OF GOVERNMENT & NATIVES			(1)	
NATIVE ORGANIZATIONS				(1)
LOCAL NATIVES				
Q2N1 MOOSE, MANAGE?				
ONLY GOD CAN MANAGE		0.0%		(1)
NO PERSON CAN MANAGE		0.0%		
NO INSTITUTION CAN MANAGE		0.0%		
PERSONS CAN MANAGE		0.0%	(2)	(1)
INSTITUTIONS CAN MANAGE		100.0%	(1)	
Q2N2 MOOSE, SHOULD MANAGE?				
ALASKA DEPARTMENT OF FISH & GAME		0.0%	(2)	(1)
VARIOUS FEDERAL AGENCIES		42.9%		
COMBINATION OF GOVERNMENT & NATIVES		57.1%	(1)	
NATIVE ORGANIZATIONS		0.0%		
LOCAL NATIVES		0.0%		(1)
Q2R1 DUCKS, MANAGE?				
ONLY GOD CAN MANAGE		0.0%		(1)
NO PERSON CAN MANAGE		0.0%		
NO INSTITUTION CAN MANAGE		0.0%		
PERSONS CAN MANAGE		0.0%	(2)	
INSTITUTIONS CAN MANAGE		100.0%	(1)	(1)
Q2R2 DUCKS, WHO SHOULD MANAGE?				
ALASKA DEPARTMENT OF FISH & GAME		0.0%	(3)	(1)
VARIOUS FEDERAL AGENCIES		42.9%		
COMBINATION OF GOVERNMENT & NATIVES		57.1%	(1)	
NATIVE ORGANIZATIONS		0.0%		(1)
LOCAL NATIVES		0.0%		

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
Q3A MANAGEMENT OF WALRUS	These			
POORER THAN NATIVES		0.0%		(1)
EQUIVALENT TO NATIVES	Questions	28.6%	(1)	
BETTER THAN NATIVES		71.4%	(3)	(1)
	Not			
Q3C MANAGEMENT OF BOWHEAD				
POORER THAN NATIVES	Asked	0.0%	(1)	(1)
EQUIVALENT TO NATIVES		28.6%	(1)	
BETTER THAN NATIVES	In	71.4%	(2)	(1)
Q3D MANAGEMENT OF POLAR BEAR	1988			
POORER THAN NATIVES		0.0%		(1)
EQUIVALENT TO NATIVES		28.6%	(1)	
BETTER THAN NATIVES		71.4%	(3)	(1)
Q3F MANAGEMENT OF MOOSE				
POORER THAN NATIVES		0.0%		(1)
EQUIVALENT TO NATIVES		28.6%	(1)	
BETTER THAN NATIVES		71.4%	(3)	(1)
Q3H MANAGEMENT OF SALMON				
POORER THAN NATIVES		0.0%		(1)
EQUIVALENT TO NATIVES		28.6%	(1)	
BETTER THAN NATIVES		71.4%	(3)	(1)
Q3J MANAGEMENT OF BOTTOM FISH				
POORER THAN NATIVES		0.0%		(1)
EQUIVALENT TO NATIVES		28.6%	(1)	
BETTER THAN NATIVES		71.4%	(3)	(1)
Q3K MANAGEMENT OF CRABS				
POORER THAN NATIVES		0.0%		(1)
EQUIVALENT TO NATIVES		28.6%	(1)	
BETTER THAN NATIVES		71.4%	(3)	(1)
Q4A INFLUENCE OVER SALMON				
NOT AT ALL		0.0%	(1)	(1)
RARELY OR SELDOM		30.8%	(1)	(1)
FREQUENTLY		69.2%	(2)	
Q51A KNOWLEDGE OF WATER/WIND/ICE				
NATIVES CONTROL MOST KNOWLEDGE		7.1%		(2)
NATIVES AND SOME SCIENTISTS CONTROL		57.1%	(4)	
SCIENTISTS CONTROL MOST KNOWLEDGE		35.7%		
Q51E KNOWLEDGE OF LAND MAMMALS				
NATIVES CONTROL MOST KNOWLEDGE		7.1%	(2)	(2)
NATIVES AND SOME SCIENTISTS CONTROL		57.1%	(2)	
SCIENTISTS CONTROL MOST KNOWLEDGE		35.7%		
Q51F KNOWLEDGE OF FISH				
NATIVES CONTROL MOST KNOWLEDGE		7.1%	(1)	(2)
NATIVES AND SOME SCIENTISTS CONTROL		57.1%	(2)	
SCIENTISTS CONTROL MOST KNOWLEDGE		35.7%	(1)	

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
Q51G KNOWLEDGE OF SEA MAMMALS	These			
NATIVES CONTROL MOST KNOWLEDGE		7.1%	(1)	(2)
NATIVES AND SOME SCIENTISTS CONTROL	Questions	57.1%	(2)	
SCIENTISTS CONTROL MOST KNOWLEDGE		35.7%	(1)	
	Not			
Q51H KNOWLEDGE OF INVERTEBRATES				
NATIVES CONTROL MOST KNOWLEDGE	Asked	7.1%	(1)	(2)
NATIVES AND SOME SCIENTISTS CONTROL		57.1%	(3)	
SCIENTISTS CONTROL MOST KNOWLEDGE	In	35.7%		
Q6 TIME FOR ACQUISITION OF KNOWLEDGE	1988			
ABOUT 1 YEAR		21.4%		
1 TO 5 YEARS		42.9%	(3)	(1)
6-20 YEARS		7.1%		
A LIFETIME		7.1%		
ACCUMULATED EXPERIENCES/SEVERAL GENS		21.4%	(1)	(1)
Q7 SIGNIFICANT ENVIRONMENTAL SYMBOLS				
NONE		7.1%		
A FEW		42.9%	(3)	(1)
MANY		35.7%	(1)	
MANY OVER GENERATIONS		14.3%		(1)
Q8A DRILLING ATTITUDES				
DELETERIOUS		0.0%	(2)	(1)
NO CHANGE		57.1%		
MIXED		42.9%	(1)	(1)
BENEFICIAL		0.0%		
Q8B PUMPING ATTITUDES				
DELETERIOUS		0.0%	(2)	(1)
NO CHANGE		57.1%		
MIXED		42.9%	(1)	(1)
BENEFICIAL		0.0%		
Q8C TRANSPORTING ATTITUDES				
DELETERIOUS		0.0%	(3)	(1)
NO CHANGE		57.1%		
MIXED		42.9%	(1)	(1)
BENEFICIAL		0.0%		
Q8D PIPELINE ATTITUDES				
DELETERIOUS		0.0%	(1)	(1)
NO CHANGE		57.1%		
MIXED		42.9%	(1)	(1)
BENEFICIAL		0.0%		
Q8E ENCLAVE ATTITUDES				
DELETERIOUS		0.0%	(2)	(1)
NO CHANGE		57.1%		
MIXED		42.9%		(1)
BENEFICIAL		0.0%	(2)	

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
Q8F RECREATION ATTITUDES	These			
DELETERIOUS		0.0%	(3)	(1)
NO CHANGE	Questions	57.1%		
MIXED		42.9%		(1)
BENEFICIAL	Not	0.0%	(1)	
Q9 MEMORIES OF SHARING	Asked			
LESS THAN PRESENT		28.6%	(2)	
NO CHANGE	In	28.6%		(1)
MORE THAN PRESENT		42.9%	(2)	(1)
	1988			
Q10 TREATMENT OF ELDERS				
LESS CARE THAN NECESSARY		7.1%	(2)	
APPROPRIATE CARE		92.9%	(2)	(1)
MORE CARE THAN NECESSARY		0.0%		
Q12A ADEQUACY OF THE RESPONSE OF THE FEDERAL GOVERNMENT TO THE EXXON VALDEZ OIL SPILL				
DID NOTHING OF CONSEQUENCE		NA	(3)	(1)
DID FEW THINGS WITHIN ITS POWERS				(1)
DID MANY THINGS WITHIN ITS POWERS				
EXERCISED ALL OF ITS POWERS				
Q12B ADEQUACY OF THE ALASKA STATE RESPONSE TO THE EXXON VALDEZ SPILL				
DID NOTHING OF CONSEQUENCE		NA	(2)	(1)
DID FEW THINGS WITHIN ITS POWERS			(2)	(1)
DID MANY THINGS WITHIN ITS POWERS				
EXERCISED ALL OF ITS POWERS				
Q12C ADEQUACY OF THE EXXON COMPANY RESPONSE TO THE EXXON VALDEZ SPILL				
DID NOTHING OF CONSEQUENCE		NA	(4)	(2)
DID FEW THINGS WITHIN ITS POWERS				
DID MANY THINGS WITHIN ITS POWERS				
EXERCISED ALL OF ITS POWERS				
Q13A IS EXXON VALDEZ SPILL UNUSUAL EVENT?		NA		
NO			(4)	(1)
YES				(1)
Q13B WILL EVENTS SIMILAR TO THE EXXON VALDEZ SPILL OCCUR IN THE FUTURE?				
NO		NA	(3)	(1)
RARELY			(1)	(1)
FREQUENTLY				
Q14A HOW WILL FUTURE RESPONSES TO SPILLS COMPARE WITH THE RESPONSE TO EXXON?				
WORSE		NA		
SAME AS				
BETTER THAN			(3)	(2)

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
Q15 HOW DID SPILL AFFECT YOUR INCOME?	These			
DECREASED		NA	(1)	
STAYED THE SAME	Questions		(3)	(2)
INCREASED				
	Not			
Q16A DID SPILL CAUSE DISPUTES AMONG				
OR BETWEEN FISHERMEN?	Asked	NA		
NONE				
VERY FEW	In			(1)
MANY			(2)	(1)
	1988			
Q16B DID SPILL CAUSE DISPUTES BETWEEN				
FISHERMEN AND NONFISHERMEN?		NA		
NONE			(1)	(1)
VERY FEW			(2)	(1)
MANY				
K1 HARVEST EXPENSES AS PROPORTION OF INCOME				
VERY LOW, 0-9%	31.3%	71.4%	(2)	(1)
LOW, 10-19%	43.8%	7.1%	(1)	(1)
MEDIUM, 20-29%	25.0%	21.4%	(1)	
HIGH, 30% OR MORE	0.0%	0.0%		
K2 VARIETY OF HARVESTED SPECIES				
NONE	0.0%	7.1%		
FEW, NONE IN SOME CATEGORIES	56.3%	78.6%	(3)	(1)
AT LEAST 1 SPECIES PER CATEGORY	43.8%	0.0%		
2-3 SPECIES PER CATEGORY	0.0%	7.1%		
MORE THAN 3 SPECIES PER CATEGORY	0.0%	7.1%	(1)	(1)
K3 HARVESTED PROTEIN IN DIET				
LESS THAN 25%	25.0%	35.7%		
25-49%	25.0%	21.4%	(2)	(1)
50-75%	37.5%	35.7%		
76-100%	12.5%	7.1%	(2)	
				(1)
K4 HOUSEHOLD ANNUAL INCOME				
$0-10,000	0.0%	0.0%	(1)	
$10,001-20,000	18.8%	14.3%		(1)
$20,001-30,000	6.3%	7.1%		
$30,001-40,000	6.3%	28.6%		
$40,001-60,000	43.8%	35.7%	(1)	
$60,001-100,000	25.0%	14.3%	(2)	(1)
K5 PERCENTAGE OF TOTAL HOUSEHOLD INCOME THAT IS EARNED				
0-24%	12.5%	21.4%	(1)	
25-49%	6.3%	7.1%		
50-74%	12.5%	7.1%		
75-100%	68.8%	64.3%	(3)	(2)

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	**Prespill 1988 *16N***	**Prespill 1989 *14N***	**Postspill 1989 *4N***	**Postspill 1991 *2N***
K6 PERCENTAGE OF TOTAL HOUSEHOLD INCOME THAT IS UNEARNED				
0-24%	68.8%	64.3%	(3)	(2)
24-49%	18.8%	14.3%		
50-74%	0.0%	7.1%		
75-100%	12.5%	17.3%	(1)	
K7 GOVERNMENT SOURCE OF TOTAL HOUSEHOLD INCOME BY PERCENT				
0-24%	43.8%	NA	(2)	(1)
24-49%	37.5%			
50-74%	6.3%		(1)	
75-100%	12.5%		(1)	(1)
K8 NONGOVERNMENTAL SOURCE OF TOTAL HOUSEHOLD INCOME BY PERCENT				
0-24%	12.5%	NA	(1)	(1)
24-49%	6.3%		(1)	
50-74%	37.5%			
75-100%	43.8%		(2)	(1)
K9 STABILITY HOUSEHOLD EARNED INCOME				
IRREGULAR	6.3%	**0.0%		
ERRATIC	81.3%	0.0%		(1)
SEASONAL	6.3%	15.4%		(1)
MONTHLY	6.3%	84.6%	(3)	
K10 STABILITY OF HOUSEHOLD UNEARNED INCOME				
(1) IRREGULAR	50.0%	**0.0%		
(2) MONTHLY WELFARE OR TRANSFER PAYMENTS	0.0%	7.1%		(1)
(3) REGULAR RECEIPTS a/o ROYALTIES a/o LEASE w/(1) or (2)	31.3%	85.7%	(4)	(1)
(4) 1, 2, AND 3	18.8%	7.1%		
K11A INCOME GIVING WITHIN THE VILLAGE				
PERSONAL USE ONLY, NOT SHARED	18.8%	14.3%	(2)	
POOLED WITHIN THE HOUSEHOLD	43.8%	64.3%	(1)	(1)
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	12.5%	21.4%	(1)	(1)
REGULAR SHARING WITH OTHER HOUSEHOLDS	25.0%	0.0%		
K11B INCOME RECEIVING IN THE VILLAGE				
NO SHARING	12.5%	21.4%	(2)	
POOLED WITHIN THE HOUSEHOLD	43.8%	64.3%	(1)	(1)
OCCASIONAL SHARING	12.5%	14.3%	(1)	(1)
REGULAR SHARING	31.3%	0.0%		
K12A INCOME GIVING BETWEEN VILLAGES				
PERSONAL USE ONLY, NOT SHARED	18.8%	NA	(3)	
POOLED WITHIN THE HOUSEHOLD	37.5%		(1)	(1)
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	43.8%			(1)
REGULAR SHARING WITH OTHER HOUSEHOLDS	0.0%			

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
K12B INCOME RECEIVING BETWEEN VILLAGES				
NO SHARING	12.5%	NA	(3)	(1)
OCCASIONAL SHARING	37.5%		(1)	(1)
REGULAR SHARING	50.0%			
K13A LABOR GIVING WITHIN THE VILLAGE				
PERSONAL USE ONLY, NOT SHARED	18.8%	7.1%	(1)	
POOLED WITHIN THE HOUSEHOLD	75.0%	14.3%	(1)	
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	6.3%	57.1%	(2)	(1)
REGULAR SHARING WITH OTHER HOUSEHOLDS	0.0%	21.4%		(1)
K13B LABOR RECEIVING IN THE VILLAGE				
NO SHARING	0.0%	0.0%		
POOLED WITHIN THE HOUSEHOLD	18.8%	14.3%	(2)	
OCCASIONAL SHARING	68.8%	64.3%	(2)	(1)
REGULAR SHARING	12.5%	21.4%		(1)
K14A LABOR GIVING BETWEEN VILLAGES				
PERSONAL USE ONLY, NOT SHARED	50.0%	57.1%	(3)	(1)
POOLED WITHIN THE HOUSEHOLD	43.8%	42.9%	(1)	(1)
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	0.0%	0.0%		
REGULAR SHARING WITH OTHER HOUSEHOLDS	6.3%	0.0%		
K14B LABOR RECEIVING BETWEEN VILLAGES				
NO SHARING	50.0%	64.3%	(2)	(1)
OCCASIONAL SHARING	50.0%	35.7%	(1)	(1)
REGULAR SHARING	0.0%	0.0%	(1)	
K15A RESOURCE GIVING WITHIN THE VILLAGE				
PERSONAL USE ONLY, NOT SHARED	0.0%	**0.0%		(1)
POOLED WITHIN THE HOUSEHOLD	50.0%	0.0%		
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	43.8%	35.7%		
REGULAR SHARING WITH OTHER HOUSEHOLDS	6.3%	64.3%	(4)	(1)
K15B RESOURCE RECEIVING IN THE VILLAGE				
NO SHARING	0.0%	**0.0%		
POOLED WITHIN THE HOUSEHOLD	43.8%	0.0%	(1)	
OCCASIONAL SHARING	50.0%	50.0%	(3)	(1)
REGULAR SHARING	6.3%	50.0%		(1)
K16A RESOURCE GIVING BETWEEN VILLAGES				
PERSONAL USE ONLY, NOT SHARED	25.0%	35.7%	(3)	
POOLED WITHIN THE HOUSEHOLD	62.5%	57.1%	(1)	(2)
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	12.5%	7.1%		
REGULAR SHARING WITH OTHER HOUSEHOLDS	0.0%	0.0%		
K16B RESOURCE RECEIVING BETWEEN VILLAGES				
NO SHARING	25.0%	42.9%	(3)	(1)
OCCASIONAL SHARING	68.8%	50.0%	(1)	(1)
REGULAR SHARING	6.3%	7.1%		

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	**Prespill 1988** ***16N***	**Prespill 1989** ***14N***	**Postspill 1989** ***4N***	**Postspill 1991** ***2N***
K17 HOUSEHOLD SIZE				
1-3	62.5%	78.6%	(3)	(2)
4-6	25.0%	21.4%	(1)	
7-9	12.5%	0.0%		
10-OVER	0.0%	0.0%		
K18 AGE OF HOUSEHOLD HEAD				
UNDER 25	0.0%	0.0%		
25-40	18.8%	21.4%		
41-55	37.5%	28.6%	(1)	
56-OVER	43.8%	50.0%	(3)	(2)
K19 HOUSEHOLD COMPOSITION AND DYNAMICS				
OPEN AND FLUID (TRADITIONAL)	6.3%	14.3%	(1)	(1)
INFREQUENT CHANGE	25.0%	28.6%	(1)	(1)
STABLE (WESTERN)	68.8%	57.1%	(2)	
K20 RULES FOR HOUSEHOLD DYNAMICS				
(1) NO STANDARD RULES (TRADITIONAL)	11.1%	NA	(1)	(1)
(2) BLEND OF 1 AND 3	37.5%			
(3) CLEAR EXPECTATIONS (WESTERN)	56.3%		(3)	
K22 DIVORCE OR SEPARATION				
ONE OR MORE BROKEN UNIONS	37.6%	21.4%		
NO BROKEN UNIONS	62.5%	78.6%	(4)	(2)
K23 SODALITY MEMBERSHIP				
NO MEMBERSHIPS IN HOUSEHOLD	37.5%	NA	(2)	(1)
ONE MEMBERSHIP IN HOUSEHOLD	37.5%		(1)	
TWO OR MORE MEMBERSHIPS IN HOUSEHOLD	25.0%		(1)	(1)
K24 POLITICAL PARTICIPATION IN HOUSEHOLD AT PRESENT				
NO OFFICIAL CAPACITIES	87.5%	92.9%	(4)	(2)
ONE OFFICIAL CAPACITY	12.5%	0.0%		
TWO OR MORE OFFICIAL CAPACITIES	0.0%	7.1%		
K25 IDENTIFICATION OF POLITICAL ISSUES				
NO ISSUES CORRECTLY IDENTIFIED	18.8%	0.0%		
ONE ISSUE CORRECTLY IDENTIFIED	43.8%	42.9%	(1)	
TWO ISSUES CORRECTLY IDENTIFIED	18.8%	21.4%	(1)	(1)
THREE OR MORE ISSUES IDENTIFIED	18.8%	35.7%	(2)	(1)
K26 RELIGIOUS PARTICIPATION IN HOUSEHOLD				
DO NOT PROFESS RELIGION OR PARTICIPATE	31.3%	28.6%	(1)	
ATTEND CEREMONIES OCCASIONALLY	25.0%	14.3%		(2)
ATTEND CEREMONIES REGULARLY	43.8%	57.1%	(3)	
K27 EXTRACURRICULAR RELIGIOUS PARTICIPATION				
NO EXTRACURRICULAR ACTIVITIES	56.3%	42.9%	(2)	
ONE/TWO ON OCCASIONAL BASIS	18.8%	14.3%		(1)
ONE/TWO ON REGULAR BASIS	6.3%	14.3%	(1)	(1)
MORE THAN TWO REGULARLY	18.8%	28.6%	(1)	

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
K28 ETHICAL RESPONSIBILITY FOR ATTAINMENT				
SEEK SUCCESS FOR SELF (PERSONAL)	31.3%	50.0%	(2)	(1)
SEEK SUCCESS FOR SELF & FAMILY	43.8%	28.6%	(1)	
SEEK SUCCESS FOR FAMILY, NETWORK OF KINSPERSONS, ELDERS, FRIENDS, VILLAGE	25.0%	21.4%	(1)	(1)
K29 ETHICS AND SIGNIFICANT ENVIRONMENTAL SYMBOLS				
(1) RESOURCES ARE COMMODITIES	50.0%	64.3%		(1)
(2) BLEND OF 1 AND 3	50.0%	35.7%	(3)	
(3) RESOURCES AND ENVIRONMENT HAVE SPIRITUAL a/o CULTURAL SIGNIFICANCE	0.0%	0.0%	(1)	(1)
K30 ETHICS OF PERSONAL COOPERATION				
(1) PERSONAL COMPETITION FOR SELF GAIN	12.5%	7.1%		
(2) 1, 3 OR 4, DEPENDING ON SITUATION	50.0%	42.9%	(1)	(1)
(3) COOPERATION AND COMPETITION	12.5%	21.4%		
(4) MAINLY COOPERATION-COMMUNITARIAN	25.0%	28.6%	(3)	(1)
K31 ENCULTURATION AND GENDER DISTINCTIONS				
WESTERN ENCULTURATION & GENDER	66.7%	57.1%	(2)	(1)
WESTERN AND TRADITIONAL ARE MIXED	26.7%	35.7%	(2)	
TRADITIONAL ENCULTURATION & GENDER	6.7%	7.1%		(1)
K32 EXPECTATIONS FOR DEVELOPMENT				
MAINLY LOCAL BENEFITS AND CONTROL	26.7%	NA		
LOCAL AND NONLOCAL COMPANIES WILL	20.0%			
SHARE BENEFITS AND CONTROL	40.0%		(3)	(1)
LOCAL JOBS, BUT EXTERNAL CONTROL				
EXTERNAL BENEFITS + EXTERNAL CONTROL	13.3%		(1)	(1)
K33A ECONOMIC CONFLICTS?				
NO	28.6%	21.4%	(1)	(1)
YES	71.4%	78.6%	(3)	
K33B PERSONAL ECONOMIC CONFLICTS?				
NO	NA	33.3%	(1)	(2)
YES	NA	66.7%	(2)	
K34 SCHOOLING AND SUCCESS				
STRONG ASSOCIATION BETWEEN THE TWO	68.8%	85.7%	(4)	(2)
OCCASIONAL ASSOCIATION BETWEEN THEM	31.3%	14.3%		
NO ASSOCIATION BETWEEN THE TWO	0.0%	0.0%		
K35 PERCEIVED OBJECTIVES OF SERVICES				
CORRECT IDENTIFICATION OF OBJECTIVES	56.3%	**100.0%	(4)	(1)
INCORRECT IDENTIFICATION OF OBJECTIVES	43.7%	0.0%		
K37 PLACE RESPONDENT BORN AND REARED				
OUTSIDE THE CURRENT REGION	75.0%	71.4%	(2)	(1)
IN THE REGION BUT NOT SUBREGION	0.0%	14.3%	(1)	
IN THE SUBREGION BUT NOT THE VILLAGE	12.5%	7.1%		
IN THE VILLAGE OF CURRENT RESIDENCE	12.5%	7.1%	(1)	(1)

Table 10-1 (continued)

Kodiak City and Old Harbor Panel Key Informant Protocol Variables	Prespill 1988 *16N*	Prespill 1989 *14N*	Postspill 1989 *4N*	Postspill 1991 *2N*
K37B RESPONDENT'S SPOUSE WAS BORN AND REARED				
OUTSIDE THE REGION	71.4%	70.0%	(2)	(1)
IN THE REGION BUT NOT SUBREGION	14.3%	15.0%	(1)	
IN THE SUBREGION BUT NOT THE VILLAGE	14.3%	15.0%		
IN THE VILLAGE OF CURRENT RESIDENCE	0.0%	0.0%		(1)
K38 SIZE OF VILLAGE				
VERY SMALL, UNDER 150	0.0%	0.0%		
SMALL, 151-300	0.0%	0.0%		
MEDIUM, 301-500	18.8%	14.3%	(1)	
LARGE, 501-800	0.0%	0.0%		
VERY LARGE, 801-OVER	81.3%	81.3%	(3)	(1)
K39 SOCIAL SERVICES USED BY RESPONDENT				
(1) AVOID ALL SERVICES	43.8%	14.3%	(1)	
(2) HEALTH SERVICES	31.3%	50.0%	(2)	
(3) FINANCIAL SERVICES	0.0%	7.1%		
(4) FAMILY AND SOCIAL SERVICES	6.3%	14.3%		
(5) HEALTH (2) AND FINANCIAL (3)	18.8%	7.1%		(2)
(6) FAMILY-SOCIAL (4) AND TWO OR MORE	0.0%	7.1%		
K41 UTILITIES IN HOUSE				
NO UTILITY PRESENT OR WORKING	0.0%	0.0%		
ONE UTILITY PRESENT AND WORKING	6.3%	0.0%		
TWO OR MORE WORKING, BUT NOT ALL	0.0%	14.3%		
ALL PRESENT, WORKING	93.8%	85.7%	(4)	(2)

to a wide variety of problems which rendered them unreliable and invalid. We considered the questions which failed these several tests to be important to the Social Indicators project, so we sought a medium through which we could ask similar questions that avert threats to validity where the questionnaire failed. We created topics for the protocol to gather information on many of the questions for which the questionnaire was unsuccessful and entered them in the KIP in the winter of 1989 prior to the spill.

As a consequence, we have only one, rather than two, prespill measures on several cognitive and instrumental attitude questions about whether naturally occurring resources can be managed (Q2*1); who or what agencies should manage them if they were manageable (Q2*2); whether the appropriate Federal or State agency manages the resource in question better or poorer than Native or Native organizations would manage them (were the Natives given the authority to do so)

(Q3*); whether local residents exercise any influence over the decisions made by regulatory bodies (Q4*); who controls more (better predictive or more accurate) knowledge of biological and abiological phenomena pertaining to the local environment (Q51*); the length of time required to gain knowledge about the local environment (Q6); customs pertaining to places within the local environment, sharing practices and the treatment of elders (Q7, 9-10); and cognitive attitudes about the consequences of oil-related activities for the local village and its environment (Q8*).

Many other questions which focused specifically on the Exxon Valdez oil spill were added during the summer of 1989. The postspill measures of these items are presented as raw frequencies. We call attention to the racial composition of the Kodiak-Old Harbor panel. About 85 percent of Kodiak City residents, the largest village in our sample (6,650), are **non-Natives**. About 93 percent of Old Harbor residents, one of the smallest villages in the spill area sample (320), are **Natives**. We under-sampled Kodiak City and over-sampled Old Harbor during the AQI pretest wave in 1988 because we did not want to swamp Native responses with non-Native responses.[69] We drew the Kodiak-Old Harbor panel at random from the AQI pretest sample of 1988. KOKIPAN is represented by 10 non-Natives and 4 Natives. Thus, because we over-sampled Old Harbor, Natives are represented at about a 50 percent greater rate in the KOKIPAN than would be expected by chance. To avoid partialling and subclassification techniques at this point in the analysis, the proportions of Native and non-Native respondents will not be distinguished when assessing the responses about natural resources. Suffice it to say that race/ethnicity distinctions are important and that Native respondents comprise 29 percent of the panel, non-Natives 71 percent

Looking briefly at the questions pertaining to the management of the natural environment, respondents prior to the spill in 1989, without exception, thought that institutions could manage the naturally occurring species in the local environments

[69]The sampling design and its rationale for over-sampling Natives and under-sampling non-Natives are discussed fully in Social Indicators Study of Alaskan Coastal Villages II. Research Methodology: Design, Sampling, Reliability, and Validity (Jorgensen 1993): Chapter 2, and briefly in Chapters 1 and 2, above.

(Q2*1). As for who should manage those species, response proportions were identical throughout the range of questions: 43 percent thought various Federal agencies should be vested with management responsibilities, and 57 percent thought some combination of State, Federal, and Native governmental organizations should jointly manage the species (Q2*2). The proportion of responses also did not vary among the questions which asked respondents to compare government regulatory agencies with Native organizations if each had the power to regulate species (Q3*J). More than two-thirds (71%) of the respondents thought the agencies that currently regulate the resources in question would do a better job than would Natives, and less than one-third (29%) thought that Natives would do equally as good a job as the agencies. No one thought the agencies would do a poorer job than the Natives. In addition, more than two-thirds of the respondents thought that persons in their communities influenced the regulation of salmon (the ADF&G regulates the number and duration of the periods ["openings"] in which salmon can be caught by commercial fishermen throughout each fishing season).

The prespill panel members on Kodiak Island, then, understood that resources could be managed and that, for the most part, the appropriate agencies possessed the regulatory authority over those species. A sizeable proportion of respondents thought that Natives could regulate resources about as well as the current regulators if they were given joint authority with those regulators. Part of the willingness to recognize that Natives would discharge their responsibilities as well as the current regulators if they were given joint authority over the resources may be inferred from the responses to the questions about the possession of knowledge about the environment. A majority of respondents (64%) thought Natives controlled as much (57%) or more knowledge (7%) than scientists. Thus, several non-Natives attributed as much knowledge to Natives as to scientists about wind, water, ice, and the behavior and abundance of sea mammals, land mammals, birds, fishes, and invertebrates. This is an interesting recognition that Natives control large amounts of knowledge, most of it gained through experience rather than through scientific research methodologies and empirical inquiry.

Nevertheless, not one respondent wanted to turn over sole regulatory responsibility to Natives, regardless of the knowledge they possessed. The reason for the reluctance to delegate regulatory responsibility to Natives is not transparent, but it is undoubtedly related to the commodity value of the resources in question (see Social Indicators Study III [Jorgensen 1994] for an analysis of the effect of commodities on opinions expressed by Natives, non-Natives, commercial fishermen, and noncommercial fishermen about their management). The importance of fish and shellfish as commodities for Kodiak residents almost surely influenced respondents to reject Natives as the sole managers of resources, and also to deny that the current regulators would carry out their charges more poorly than Natives. State and Federal governments, presumably, were regarded as less partial than Natives might be should Natives be granted sole regulatory power of naturally occurring resources.

During the spill-cleanup period in the summer of 1989, it is evident that three panel members had rather consistently changed their positions on whether resources could be managed, and who should manage them. Half of the respondents thought that persons were able to manage resources, whereas all had thought only institutions could do so 5 months earlier. And a majority of respondents thought the ADF&G should manage resources, including all sea mammals (sea mammals are regulated by the Federal Government and denied to all but Native hunters).

Sea mammals are a special case. Their commodity value is not high in the spill area, although they remain an important subsistence resource for Natives. It is not sea mammals, in general, that capture our attention here. Rather, it is the bowhead whale, which has great ritual and spiritual significance to Eskimos, and walrus, whose by-products, especially ivory carvings, have great commodity value to Eskimos. Neither the bowhead whale nor the Pacific walrus range south of the Alaska Peninsula. Nevertheless, persons residing below the Alaska Peninsula have offered strong opinions about the species. In our open-ended interviewing, we learned that many non-Natives eschew the Native practices of harvesting either species, yet we also learned that Natives and some non-Natives recognize the importance of these animals to Natives north of the Peninsula and also recognize their need to harvest these species.

It is very likely that the oil spill prompted persons to express different opinions about the management of sea mammals and other species. Respondents express less confidence in the Federal Government, while expressing more confidence in the knowledge of, and the abilities of Natives to manage. The sample is so small as to provide no more than concluding hypotheses, but changes in opinions about who should manage and who would be the better manager of bowheads and all other sea mammals are striking. Two persons would transfer sea mammal control to the ADF&G; one would make the transfer to local Natives.

The variables beginning with K1 (Harvest expenses as a proportion of income) and ending with K41 (Utilities available and working in the house) proved to be highly reliable in the Schedule A and B research. The KIP instrument was not administered a third time to the A and B Panel, so we have no measures of over-time reliability and stationariness for these items. A careful perusal of the univariate distributions for the two prespill research waves among the KOKIPAN, however, suggests two generalizations: (1) as in all other panels we have analyzed in the A and B and C (Exxon Valdez spill area) research designs, respondents are older and have resided in the villages in which they were interviewed for longer periods than respondents in the pretest and posttest samples, including the panel respondents who could not be located for second (third, or fourth) reinterviews. We have referred to this phenomenon as panel stability, meaning only that panel respondents are rather stable over time because they remain in the same place and can be located for reinterviews.

In a somewhat complex way, the "stability" of panel members is related to stability of income, observable through the bifurcation in income and source of income among panel respondents. Panels select for persons with high, stable, earned incomes, and low, stable, unearned incomes. The high, stable earners comprise the majority of the respondents, while those persons whose incomes are low, stable, and unearned comprise small proportions of panels. In Alaskan villages, then, persons who stay in place either have skills and employment and do not have to move, or they are elderly, or single parents who lack skills, and who have either kinship support networks or who receive public support of various kinds, or both, such that relocation would be difficult if not disadvantageous.

Returning to Table 10-1, the variables K4, K5, K6, K9, and K10 reflect the panel "stability." Across the three reinterview research waves (1989W, 1989S, 1991W), the highest and lowest incomes are selected for (K4), as are the highest and lowest percentages of earned income (K5), the lowest and highest percentages of unearned income (K6), the most stable household earned incomes (K9), and the most stable household unearned incomes (K10).

The relations among K1, K2, and K3 proved to be highly interrelated among respondents in the A and B Schedules. The greater the proportion of income invested in resource harvests, the greater the variety of species harvested and the greater the amount of protein in the diet. There are qualifications for this simple linear generalization: it held for Natives, but for only a subset of non-Natives. There was variation among the Natives: the highest earners allocated smaller proportions of their incomes to harvest-related expenses than did the lower earners, but the amount the highest earners spent on harvests was greater than the amount spent by the lower earners. Among the non-Natives, long-term residents in the private sector, such as fishing-related businesses, allocated less of their incomes to subsistence resource harvests, harvested fewer species, and had a smaller proportion of wild foods in their diets than did non-Natives who had lived in Native villages for more than 6 years and who were employed in the public sector.

The evidence from the observations and open-ended discussions with non-Natives employed in the public sector of the A and B villages (employees of city governments, regional corporations, and village corporations; some State and borough employees; infrequently teachers) suggests that many of these persons are self-selected for life in the Alaska bush, engaging in more subsistence pursuits and acquiring more knowledge of Native customs, and more frequently marrying Natives than do non-Native commercial fisherman and owners of small businesses. The latter reside year-round or seasonally in the Bristol Bay, Aleutian-Pribilof, and Kodiak areas. Non-Natives employed in the public sector reside throughout all of the regions and most of the villages, but with a half-dozen exceptions, they are always in the minority in villages north of the Alaska Peninsula.

Among all samples of A and B respondents, the variables that focus on intra- and intervillage distribution of cash, labor, and resources (goods, by-products, equipment) are highly and positively correlated, so much so that the relations appear to represent an involution of sharing practices. If a person engages in giving resources to persons within his/her household, it is likely he/she will give resources to relatives in other households in the village and also to friends in other households in the village. The greater the distributions of resources, say, within the village, the more likely that resources will be given to persons in villages other than the village in which the respondent resides. And if persons give resources (such as dried fish, or allow a person to use a skiff, a wrench, a rifle, or shell-loading equipment), they are likely to offer their labor and to give cash.

The relation between donor and recipient is interesting. Most persons report giving more widely than they receive. Yet when controlling for income, persons with the lowest incomes are more apt to give labor and resources than cash, whereas persons with the highest incomes are apt to give cash and labor and resources, but to receive only labor and resources. And persons with the lowest incomes, particularly elderly persons, receive cash, resources, and labor.

The KOKIPAN responses to these variables reflect the high proportion of non-Natives (71%) in the sample. Income is seldom shared as donor or recipient beyond the household (Native households are the exceptions). Labor and resources are more frequently shared beyond the household and within the village than is cash. The extension of these practices beyond the village is rare for non-Natives and limited for Natives. The pattern of responses to the distribution questions are markedly different from the responses in the A and B Schedules, but similar to the responses we obtained when subclassifying by **Native:Non-Native** contrasts in the villages whose economies are based on commercial fishing. Natives have wider networks of kinspersons and friends within and beyond the villages in which they reside than do non-Natives, and they share more through these networks than do non-Natives. Nevertheless, Native residents of commercial fishing villages do not share as much or as widely as do Native residents of noncommercial fishing villages.

Most households have three members or fewer (K17), are headed by persons over 41 years of age (K18), experience infrequent changes of members (K19), have clear expectations for the behavior of its members (K20), and observe Western enculturation practices and gender distinctions (K31). These customs reflect Western ideology and household sizes consonant with an industrialized, non-Native population. Divorce rates are relatively low (K22), as are sodality memberships (K23) and political participation (K24) in the household. So, whereas the panel is rather stable, and divorce rates low, panel members and persons in their households are not "joiners" nor are they engaged in local politics in elected or appointed capacities. Kodiak City has several clubs, auxiliaries, and volunteer groups which residents can join, but few in the panel have done so.

In most A and B villages, including all of the villages with less than 800 residents, participation in sodalities and politics correlate with a host of variables that reflect "stable, long-term, Native" residents. Those variables include households larger than 3 persons, frequent fluctuation in household membership, no clear rules for membership or behavioral expectation within the household, and the observation of traditional enculturation practices and gender distinctions, or some mixture of traditional with Western practices.

Other features which distinguish "stable, long-term, Native" residents are high rates of religious participation at ceremonials and in extracurricular activities (K26, K27); the espousal of ethical ideals that a person acquires and uses skills for persons in addition to self and household (K28, K30); and the attribution of considerable cultural significance (usually spiritual significance) to the environment (K29). The bulk of KOKIPAN respondents cluster at the opposite ends of each of these variables, reflecting Western practices and ideals.

Non-Natives and Natives alike think there is a strong association between schooling and success (K34), but when education is controlled, the more the years of education completed beyond high school, the more likely that Natives think that there is no association between the two.

Items K37 and K37B demonstrate that the great majority of panel members and their spouses are born and reared outside the region (and outside Alaska) in which they currently reside. Only the Native respondents in Old Harbor were not born and reared within the current village, subregion, or Kodiak region. These variables, alone, help account for the dominance of Western ethics, family and household customs, the modest participation in community and religious affairs, and the cognitive attitudes about who should manage resources.

II. KIP LONGITUDINAL RELIABILITY: EXXONKI POSTSPILL PANEL AND CONTRASTS BETWEEN NON-NATIVE AND NATIVE SUBSETS OF THE PANEL

We began the previous section on the Kodiak Island panel (KOKIPAN) with a table of univariate distributions for the four research waves in which panel members were interviewed and reinterviewed. To avoid redundancy, the univariate distributions of KIP items for the panel (named EXXONKI.PAN), which were drawn from the summer 1989 spill-area-pretest sample, appear in Table 11-1 (Chap. 11) in conjunction with the KIP item distributions for the (postspill) pretest and posttest samples. Here we begin with an assessment of the longitudinal correlations for all KIP items which have passed the previous tests for response reliability and intratopic reliability.

The EXXONKI panel comprises 72 respondents selected at random from the 216 KIP respondents in the summer 1989 postspill, pretest sample. The **non-Native** subsample (*N*52) of the EXXONKI panel is a little over 2½ times larger than the **Native** subsample (*N*20). It is evident that longitudinal reliability increases for many of the variables when controls for race/ethnicity are exercised. **Non-Native** vs. **Native** differences have yielded more significant differences and more PRE coefficients ≥.50 than the total panel without contrasts, or for any of the contrasts by village type, such as *Hub:Periphery*, which provides the next most powerful set of distinctions.[70]

Table 10-2 has three columns of longitudinal reliability coefficients. In the first column the coefficient for every KIP item is obtained by correlating the postspill responses of panel members in 1989 with their responses on the same item in 1991. The next two columns contain the longitudinal reliability coefficients obtained for the **non-Native** and **Native** subsamples of the panel. The significance of race/ethnicity is considerable, as a few simple comparisons reveal. There are 90 KIP variables: in the total panel 46 (51%) of the PRE coefficients ≥.50; 39 (43%) PRE coefficients in the **non-Native** subsample ≥.50; and 47 (52%) of the PRE coefficients in the **Native** subsample ≥.50. The differences in percentages of PRE coefficients ≥.50 among the samples are modest, but the percentages do not reflect the real differences that obtain. Six items in the **non-Native** subsample and twelve items in the **Native** subsample produce PRE coefficients ≥.50 that do not do so in the total sample. Aggregating the scores, 65 KIP items obtain PRE scores equal to or greater than .50 in at least one of the three samples. In the contrasts solely between **non-Native** and **Native** subsamples, 16 items yield PRE scores ≥.50 among **non-Native** respondents which do not do so among **Native** respondents, and 25 items yield PRE scores ≥.50 among **Native** respondents which do not do so among **non-Native** respondents.

All but one of the 90 PRE coefficients for the total panel are positive. Among the 44 items for which changes were sufficient to push PRE scores below +.50, fourteen are between .35 and .49, and thirteen are between .20 and .34. If we accept .50 as the lowest longitudinal coefficient we will accept as reliable, almost half of the KIP items are not reliable in the total panel. The differences in sizes of coefficients between **non-Native** and **Native** subsamples render strict adherence to the +.50 value obtained for the total panel unwise. It is evident that changes in cognitive responses as well as many other responses have reduced the sizes of PRE

[70] Chapter 11, which focuses on testing artifacts and change, provides tests for significance of differences between the 1991 KIP posttest responses and the 1991 EXXONKI panel responses, and also the significance of differences between postspill pretest and posttest samples while controlling for Native:Non-Native and *Hub:Periphery* contrasts.

Table 10-2

LONGITUDINAL CORRELATIONS, EXXONKI PANEL (*N72*), AND NON-NATIVE (*N52*) V. NATIVE (*N20*) SUBSAMPLES, POSTSPILL PRETEST AND POSTTEST RESEARCH WAVES, 1989S AND 1991W[a]

NOMINAL VARIABLES (ϕ)	Reliability EXXONKI 89S*91W	Reliability Non-Native 89S*91W	Reliability Native 89S*91W
Q13A EXXON VALDEZ UNUSUAL?	.02	.19	#.37
K33A ECONOMIC CONFLICTS	.01	.08	*0.00
K33B PERSONAL ECONOMIC CONFLICTS	.16	.17	#.45
K35 PERCEIVED OBJECTIVES OF SERVICES	.17	.03	.39
ORDINAL VARIABLES (γ)			
Q2A1 WALRUS, MANAGE?	.55	.47	.64
Q2A2 WALRUS, WHO SHOULD MANAGE?	.34	.31	#.44
Q2B1 BOWHEAD, MANAGE?	.69	.68	.85
Q2B2 BOWHEAD, WHO SHOULD MANAGE?	.34	.35	#.48
Q2D1 SALMON, MANAGE?	.51	.28	.85
Q2D2 SALMON, WHO SHOULD MANAGE?	.35	.41	#.25
Q2G1 HALIBUT, MANAGE?	.57	.32	.85
Q2G2 HALIBUT, WHO SHOULD MANAGE?	.34	.43	#.22
Q2K1 TANNER CRAB, MANAGE?	.18	-1.00	.59
Q2K2 TANNER CRAB, WHO SHOULD MANAGE?	.51	.66	#.45
Q2N1 MOOSE, MANAGE?	.41	.23	.59
Q2N2 MOOSE, WHO SHOULD MANAGE?	.60	.59	#.65
Q2R1 DUCKS, MANAGE?	.47	.42	.53
Q2R2 DUCKS, WHO SHOULD MANAGE?	.42	.53	#.28
Q3A MANAGEMENT OF WALRUS	.53	.37	#.66
Q3C MANAGEMENT OF BOWHEAD	.53	.24	#.93
Q3D MANAGEMENT OF POLAR BEAR	.55	.41	#.86
Q3F MANAGEMENT OF MOOSE	.60	.42	#.45
Q3H MANAGEMENT OF SALMON	.53	-.24	#.54
Q3J MANAGEMENT OF BOTTOMFISH	.52	.31	#.40
Q3K MANAGEMENT OF CRABS	.48	.00	#.58
Q4A INFLUENCE OVER SALMON	.66	.59	.61
Q51A KNOWLEDGE TO UNDERSTAND WATER	.18	-.14	#.58
Q51E KNOWLEDGE TO UNDERSTAND LAND MAMM	.43	.30	#.52
Q51F KNOWLEDGE TO UNDERSTAND FISH	.51	.31	*#.64
Q51G KNOWLEDGE TO UNDERSTAND SEA MAMMLS	.35	.21	#.39
Q51H KNOWLEDGE TO UNDERSTAND INVERTEBRT	.66	.49	*#.75
Q6 ACQUISITION OF KNOWLEDGE	.13	.12	.06
Q7 ENVIRONMENTAL SYMBOLS	.28	.34	#.20
Q8A DRILLING ATTITUDES	.55	.45	.76
Q8B PUMPING ATTITUDES	.47	.33	.93
Q8C TRANSPORT ATTITUDES	.46	.59	.13
Q8D PIPELINE ATTITUDES	.49	.45	.71

[a]Longitudinal correlations (reliability) for the EXXONKI panel and the **Non-Native** and **Native** subsamples of the EXXONKI panel measure two intervals following the Exxon Valdez oil spill of March 24, 1989. Longitudinal correlations for dichotomous nominal variables are obtained with phi (ϕ). Longitudinal correlations for the ordinal variables are obtained with Goodman and Kruskal's gamma (γ). Significance of differences between the **Native** and **Non-Native** subsamples are obtained from the univariate distributions for each subsample for each variable, 1989 and 1991. X^2 for the significance of difference of proportions is used for the nominal variables and the Kolmogorov-Smirnov two independent sample test is used to test differences for the ordinal variables. * Designates $P \leq .09$ for 1989, # for 1991.

Table 10-2 (continued)

ORDINAL VARIABLES (γ)	Reliability EXXONKI 89S*91W	Reliability Non-Native 89S*91W	Reliability Native 89S*91W
Q8E ENCLAVE ATTITUDES	.27	.14	.68
Q8F RECREATION ATTITUDES	.10	-.13	.79
Q9 MEMORIES OF SHARING	.60	.68	.40
Q10 TREATMENT OF ELDERS	.34	.39	.08
Q12A FEDERAL EXXON VALDEZ RESPONSE	.21	.25	.07
Q12B STATE EXXON VALDEZ RESPONSE	.41	.49	.13
Q12C EXXON EXXON VALDEZ RESPONSE	.27	.28	.06
Q13B SIMILAR EVENTS OCCUR LATER?	.58	.65	.31
Q14A LATER RESPONSES	-.10	-.39	.69
Q15 SPILL AFFECT INCOME?	.69	.58	.86
Q16A SPILL CAUSE FISHING DISPUTES?	.63	.71	.50
Q16B SPILL CAUSE DISPUTES, FISHING VS. OTHER?	.39	.51	#-.07
K1 HARVEST EXPENSES	.66	.84	-1.00
K2 VARIETY OF HARVESTED SPECIES	.43	.58	#.38
K3 HARVESTED PROTEIN IN DIET	.67	.61	.84
K4 HOUSEHOLD INCOME	.65	.62	*#.63
K5 HOUSEHOLD EARNED INCOME	.81	.81	*.56
K6 HOUSEHOLD UNEARNED INCOME	.85	.92	*.62
K7 GOVERNMENT SOURCES OF INCOME	.74	.82	#.45
K8 NON-GOVERNMENT SOURCE OF INCOME	.57	.72	#.06
K9 STABILITY OF EARNED INCOME	.78	.91	.31
K10 STABILITY OF UNEARNED INCOME	.51	.73	*#-.20
K11A INCOME GIVING IN VILLAGES	.24	.41	#.09
K11B INCOME RECEIVING IN VILLAGES	.31	.41	#-.24
K12A INCOME GIVING BETWEEN VILLAGES	.93	1.00	.88
K12B INCOME RECEIVING BETWEEN VILLAGES	.19	NV	-.05
K13A LABOR GIVING IN VILLAGES	.12	.30	#-.48
K13B LABOR RECEIVING IN VILLAGES	.14	.26	#-.48
K14A LABOR GIVING BETWEEN VILLAGES	.07	.23	#-.39
K14B LABOR RECEIVING BETWEEN VILLAGES	.32	-1.00	*#.01
K15A RESOURCE GIVING IN VILLAGES	.52	.35	#.75
K15B RESOURCE RECEIVING IN VILLAGES	.23	.10	#.44
K16A RESOURCE GIVING BETWEEN VILLAGES	.69	.70	*#.22
K16B RESOURCE RECEIVING BETWEEN VILLAGES	.73	.81	#.34
K17 HOUSEHOLD SIZE	.85	.84	.84
K18 AGE OF HOUSEHOLD HEAD	.92	.93	.90
K19 HOUSEHOLD COMPOSITION AND DYNAMICS	.54	.46	.67
K20 RULES FOR DYNAMICS	.19	.34	#-.11
K22 DIVORCE OR SEPARATION	.97	.98	.94
K23 SODALITY MEMBERSHIP	.68	.78	#.33
K24 POLITICAL PARTICIPATION	.86	.80	.92
K25 IDENTIFICATION OF POLITICAL ISSUES	.72	.87	.25
K26 RELIGIOUS PARTICIPATION	.77	.85	.60
K27 EXTRACURRICULAR RELIGIOUS PARTICIPATN	.84	.88	.80
K28 RESPONSIBILITY FOR ATTAINMENT	.26	.09	#.44
K29 ETHICS AND ENVIRONMENTAL SYMBOLS	.12	.13	#.06
K30 ETHICS OF COOPERATION	.09	-.08	*#-.05
K31 ENCULTURATION AND GENDER DISTINCTIONS	.77	.27	*#.55
K32 EXPECTATIONS FOR DEVELOPMENT	?	.25	.94
K34 SCHOOLING AND SUCCESS	.48	.95	.58
K37 RESPONDENT RESIDENCE PATTERN	.91	1.00	*#1.00
K37B SPOUSE RESIDENCE PATTERN	.99	.97	1.00
K39 SERVICES USED BY RESPONDENT	.07	.10	.01
K41 UTILITIES IN HOUSE	.88	.92	.78

coefficients toward zero, but complete reversals (negative coefficients) are rare (2 among 270 coefficients). So let us assess the coefficients to determine whether regression (changes of opinions from the extremes in the initial wave toward the center in the second wave), ambiguity (a threat to construct validity), or some exogenous factor or factors (change) account for the coefficients.

II.A. Q2*1 (Can Resource * Be Managed?)

The PRE coefficients for items measuring whether wild resources can be managed (Q2*1) are very misleading for the **non-Native** subsample. Only one coefficient is greater than +.50. These low scores are a function of the very small amount of variation in each bivariate table. Almost all responses fall in a single cell of the bivariate table. On average, 78.5 percent of non-Native respondents answer the Q2*1 questions in identical fashions in 1989 and 1991 (the range is 76.6 to 79.2): they think that institutions can manage resources. Question Q2K1 (Can Tanner Crabs Be Managed?) yields γ -1.00, yet in both years the same 77 percent of all respondents answer that institutions can manage tanner crabs. It is evident that a better measure of reliability for these questions than Goodman and Kruskal's γ, Kendall's τ_c, or Pearson's r is a simple percentage (same responses both years/total responses both years) which places the reliability of every item between 77 percent and 80 percent.

The variation (20-23%) is attributable to systematic changes of positions between 1989 and 1991 by a few respondents (variously between 6 and 8) who vacillate between the choices: (1) "Only God Can Manage," and (2) "No Person Can Manage" and respondents who vacillate between choices (4) "Persons Can Manage," and (5) "Institutions Can Manage." For persons who believe in God, attributes (1) and (2) are not contradictory: it is possible that a person who thinks only a supernatural being can manage a wild resource also thinks no person can manage the same resource. Contrariwise, for persons who do not believe in God, yet who think that the population dynamics of wild resources can be influenced, although not managed, by actions of man (some intended and some unintended), also believe these resources (1) cannot be managed by God and (2) are contradictory.

Vacillation in regards to attributes (4) and (5) suggests a different problem. Institutions are legal fictions operated by persons, and as such attributes (4) and (5) are not contradictory, namely: persons as representatives of institutions can manage; and institutions represented by persons can manage. We had not anticipated vacillation between choices (4) and (5) when we initially rated responses to these questions in 1989. For choice (4), we wondered whether some respondents might think knowledgeable persons, such as natural resource biologists, can manage resources, but institutions replete with scientists and nonscientists cannot. So we perceived real cognitive differences among the choices, and specifically sought different information for (1) and (2), and for (4) and (5). It appears that the questions are not completely successful, even in a protocol format where it is possible to ask for sufficient information to distinguish, say, "Only God Can Manage," from "No Person Can Manage."

In the discussion of nonresponse as a threat to validity (Chap. 8) we pointed out that respondents in general, and non-Native respondents in particular, had high nonresponse rates on the questions that pertain to the availability of wild resources. Large proportions of respondents answered very few of the questions most likely for any of several reasons: (1) they did not harvest the resources, or (2) did not know much about their abundance, or (3) were disinterested. We note that the spill area is not within the range of either species. We also note that walrus and bowhead are very important in Native life. Whereas 29 percent of non-Native panel members did not respond to questions as to whether these specific sea mammals can be managed, only 10 percent of Natives did not answer these questions. It is doubtful that the differences between Native and non-Native subsamples are fortuities.

Responses in the Native subsample to the entire range of Q2*1 questions were identical in 77 percent of the cases in 1989 and 1991. The variation is similar in kind and amount to the variation observed in the non-Native subsample between attributes (4) and (5). The Native subsample being very small (*N*20) is highly influenced by a few cases. Throughout the Q2*1 questions, one person who answered that (5) "Institutions Can Manage" in 1989, answered (1) "Only God Can

Manage" in 1991, and one person who opted for God in 1989, answered (4) "Persons Can Manage" in 1991. The variation is small and the reliability coefficients are sufficiently high and positive to retain these items. Neither non-Native nor Native opinions changed much about whether resources can be managed, although the PRE coefficients belie the constancy in the non-Native responses.

II.B. Q2*2 (Who Should Manage Resource *?)

The questions about who should manage resources (Q2*2) represent more marked differences between the **non-Native** and **Native** subsamples. Although the two subsamples are significantly different on every item, neither the **non-Native** nor the **Native** responses yield PRE coefficients ≥.50. A first guess to account for the low PRE scores might be that regression is operating in these questions such that persons whose responses favor government agencies (ADF&G or Federal agencies) in 1989 favored balanced combinations of government and Native organizations in 1991, while persons who favored Natives (Native organizations or local Natives) also opted for balanced combinations in 1991. In fact, changes in the responses of the members of the **non-Native** subsample were in the exactly opposite direction from the changes in the responses of members of the **Native** subsample. The consistent losers among the non-Natives in 1991 are "Federal Agencies" and "Balanced Combinations of Government and Native Organizations." The consistent gainer is the "ADF&G." Contrariwise, the consistent loser among the **Native** responses in 1991 is the "ADF&G," whereas the consistent gainer is "Local Natives." We will return to the **Native:Non-Native** differences.

On average, 80 percent of non-Natives thought government agencies should manage the wild resources in 1989, and 83 percent thought government agencies should do so in 1991. At this level, then, where distinctions are not made between State and Federal agencies, changes between 1989 and 1991 appear modest. The 3-percent increase is from persons who switched from the choice "Balanced Combination of Government and Native Organizations" in 1989 to government agencies in 1991. The more marked change occurs in the specification of different governmental agencies in 1991 from the answers in 1989. The switch from specifying "Federal Agencies" in 1989 to specifying "ADF&G" in 1991 represents a consistent, strong change of positions. The selection of ADF&G increases an average of 8.5 percentage points (from 66.2% to 74.7%) for the seven measures of wild resources.

Although these changes are consistent, between 1989 and 1991, the large majority of non-Native respondents (average 77%) did not change their answers about who should manage salmon, crabs, halibut, and moose, and a majority of respondents (average 58%) did not change their selections on walrus, bowhead whales, and ducks. The importance of the three resources that have great commodity value--salmon, halibut, crabs--and the resource which is highly preferred by sport hunters--moose--who wish to bag them for their larders.are worthy of some special attention.

Cognitive choices among non-Natives about who should manage salmon, halibut, crabs, and moose changed very little. On average and with little variation, State or Federal Government is chosen to manage these resources 85 percent to 15 percent in 1989 and by the same percentage in 1991. The greatest changes are to cognitive choices for walrus and bowhead whales: from 69 percent for government and 31 percent balanced or Native in 1989, to 79 percent government and 21 percent balanced or Native in 1991. Neither whales nor walrus are commodity items for non-Natives. As a matter of law, non-Natives are forbidden from hunting them. Yet the non-Native opinion favoring "Balanced Combination" was sharply changed to "ADF&G" control. The questions is, why, possibly, did non-Natives no longer think that Natives should share management duties with State or Federal Agencies? It may well be that as the economy of the spill area worsens, the willingness of non-Natives to consider the legitimacy of Natives participating in, or controlling the management of any wild resource is diminished, perhaps in fear that management of one resource would lead to management of other resources, hence threatening the livelihoods of many non-Natives.

It is likely, too, that the controversy over bills introduced in the Alaska legislature to redefine subsistence extraction rights for Natives and non-Natives, have animated non-Natives in our panel as they have animated non-Natives throughout the State. Debates and exchanges were acrimonious, new policies were not enacted, and the Federal Government stepped in to exercise control over resources previously assigned to the regulatory authority of the State of Alaska. The threat of Federal intervention into State affairs, and into the control of resources on which some respondents gain their incomes and which many extract for pleasure and to contribute to their own subsistence, may account for the shift from "Federal Agencies" to "ADF&G," and from "Balanced Combination" to "ADF&G" control.[71]

The **Native** subsample demonstrates a marked change of responses about who should manage wild resources between 1989 and 1991. In 1989, by a ratio of about 7:3 Natives thought the "ADF&G" should manage commodity resources, and by a ratio of about 1:1 they thought the "ADF&G" should manage bowheads and walrus. In 1989, about 20 percent of Natives thought "Local Natives" should manage bowheads and walrus. In 1991, Natives, by a ratio of 7:3 thought "Local Natives" and "Native Organizations" should manage bowheads and walrus, and by a ratio of about 1:1 thought "Local Natives" and "Native Organizations" should manage all other resources, including resources which are harvested as commodities. When "Balanced Combination of Government and Natives" are aggregated with "Local Natives" and "Native Organizations," the ratios are about 6.5 to 3.5 for commodity resources.

The PRE coefficients for the Q2*2 items are positive, although less than +.50, and significantly different from non-Native responses. There is considerable evidence that the differences in responses to the Q2*2 questions by Natives and

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[71] A UPI (United Press International) story that appeared in many U.S. newspapers in early July 1990 summarized the "subsistence" dispute within Alaska, and between the State and the Federal Government (*Herald Journal*, Logan, Utah, July 2, 1990: 3-4). On Sunday, July 1, 1990, the U. S. Fish and Wildlife Service, implementing provisions of ANILCA (the Alaska National Interest Lands Conservation Act), directed the takeover of wildlife management on public lands from the state of Alaska. ANILCA grants hunting priority to rural Alaskans, not Native Alaskans to the exclusion of non-Native Alaskans. The takeover was the outgrowth of several years of contentions and disputes between rural Native subsistence hunters and urban sport hunters. A spate of legislation was proposed in the 1980's to assure the harvest of wild resources by rural and urban residents. One state preference law which had provided rural residents with priority to game in establishing hunting seasons and limits was struck down by the state Supreme Court in early 1990. Undaunted, Native groups sought a constitutional amendment that would give special hunting rights to rural Alaskans. The oil industry lobbied for the change because of the federal-state issues that could affect interests of the oil companies. Republicans in the state Senate and House, lobbied by the National Rifle Association, opposed the amendment. When no agreement could be reached, the federal government stepped in.

non-Natives between 1989 and 1991 reflect change, not regression. And the change is along ethnic/racial dimensions: cognitive answers of Natives and non-Natives change in opposite directions in 1991 from the choices made in 1989.

We do not know what factors most likely account for the changes in responses by Natives any more than we do for the factors which most likely account for changes in the non-Native subsample. These issues will be analyzed in a subsequent volume. It is plausible that relations between Natives and the ADF&G deteriorated following the spill, triggered by statements issued by the ADF&G throughout the summer and fall of 1989 about the toxicity levels in fish, sea mammals, and birds with which Natives did not agree. Suspicions about ADF&G competence in resource management, knowledge of toxicity problems, coupled with disagreements about regulations may have exercised a general effect on Native responses that influenced them to change their positions and suggest that Natives should manage or be part of the management team.

In 1989 Natives, by proportions in the range from 63 percent to 88 percent thought the ADF&G, or the ADF&G and various Federal agencies, should manage most resources. The ADF&G, alone, was chosen to manage resources which are also commodities: salmon (68%), halibut (77%), and crabs (83%). "Balanced Combination" and "Local Natives" split the remainders equally (17% to 32%) in each case. In 1991, "Native Organizations" and "Local Natives" were chosen by 47 percent for the management of salmon and halibut, and by 44 percent for the management of crabs. When "Balanced Combination" is added, 73 percent of Natives opted for management of salmon by Natives or the balanced combination of Natives and government agencies, 71 percent for halibut, and 61 percent for crabs. The move away from government to Natives is just as marked for walrus, bowheads, moose, and ducks, with about 25 percent shifts from ADF&G to Native organizations and local Natives.

II.C. Q3* (Who Would Manage Resource * Better?)

The PRE coefficients for the questions assessing who would manage better, the ADF&G or Natives (Q3*) are high and positive for the total sample. The contrasts between Natives and non-Natives demonstrate that coefficients for the **Native** subsample reduce more error than do the coefficients for the **non-Native** subsample. In addition, the distribution of every Q3* item is significantly different between the two subsamples. As for the Q2*2 questions, there is no suggestion that the PRE scores are functions of regression. Looking first at wild resources with significant commodity values (salmon, bottom fish, crabs) in 1989, on average 83 percent of non-Native respondents thought the ADF&G would be better managers than Natives, 13 percent thought ADF&G or Native management would be equivalent, and 4 percent thought Natives would be better managers than the ADF&G. In 1991 those same respondents shifted away from the center (equivalence of Native and ADF&G management): 84 percent thought ADF&G management would be better, 11 percent thought ADF&G or Native management would be equivalent, and 5 percent thought Native management would be better.

The PRE coefficients for the Q3* items in the **non-Native** subsample suggest marked changes of cognitive responses about who would best manage the wild resources with commodity values (salmon -.24, bottom fish .31, and crabs .00). This suggestion is dispelled by inspection of the bivariate tables. On average, 75 percent of the respondents did not change their cognitive responses on commodity items or on moose in 1989 and 1991. Among this 75 percent, 97 percent thought the ADF&G would be the best managers. The negative correlation for salmon and the zero correlation for crabs are functions of no persons thinking in 1989 *and* 1991 that the ADF&G would be poorer managers than Natives. So, as with the Q2*2 items, a simple percentage (same response in 1989 and 1991/total responses in 1989 and 1991) better reflects reliability than do the PRE measures (γ, τ_c).

The wild resources that are preferred by Natives (walrus, bowhead whales, polar bear), yet which do not have commodity value,[72] demonstrate two definite directions of change in the **non-Native** subsample. Respondents moved away from

[72]Although it is repetitious, ivory carvings, a walrus by-product, have significant commodity value among many Inupiat Eskimos in the Bering Strait area, and Siberian Yupik Eskimos of St. Lawrence Island. Non-Natives prefer polar bears as trophies. In addition, there is a market for polar bear rugs, heads, and hair, the last mentioned to be used in flies tied for fly fishermen. It is, however, a violation of the Marine Mammals Act to sell polar bear by-products or to carry them across national boundaries.

the middle (equivalence of ADF&G and Natives) to either the ADF&G or to Natives as "the better managers." By a ratio of 2 to 1, more persons who changed their positions selected ADF&G as the better manager over Natives as the better manager. In 1989, about 75 percent of non-Natives thought the ADF&G would manage these resources better than Natives, 21 percent thought ADF&G or Native management would be equivalent, and 4 percent thought Native management would be better than the ADF&G. In 1991, about 81 percent thought the ADF&G would be the better managers, 11 percent thought management by ADF&G or Natives would be equivalent, and 8 percent thought Natives would be better.

The direction of the greatest change to the Q3* questions in the **non-Native** subsample is consistent with the responses to Q2*2 by those respondents: if non-Natives changed their positions, the change was most frequently to ADF&G.

Responses in the **Native** subsample to Q3* items are consonant with the changes noted for Q2*2 items: in 1989 about 60 percent of Natives thought the ADF&G would better manage wild resources, 30 percent thought ADF&G and Native management would be equivalent, and 10 percent thought Natives would be better managers. In 1991 the changes were away from the selection of the ADF&G as the better managers, and from the equivalence of ADF&G and Natives. The change is greatest for the management of walrus, bowhead, and polar bear. In 1989, an average of 9 percent of Natives thought Natives would manage better in comparison with 59 percent who thought the ADF&G would manage these resources better. In 1991, 50 percent thought Natives would be the better managers and 27 percent thought the ADF&G would be the better managers. The ADF&G fared somewhat better for moose and the resources with commodity value, yet even among these items, the sole resource ADF&G was thought to be the better manager of was crabs (by 47% to 40% for Natives). The ADF&G received a draw on bottom fish (44% to 44%), and lost on moose (35% to 41%) and salmon (37% to 42%).[73]

It is evident that changes in Native responses on Q3* and Q2*2 items are consistent as are non-Native responses, although in opposite directions. The former are away from ADF&G toward Natives. The latter are toward the ADF&G and away from Federal Agencies, balanced combinations of government and Natives, and equivalence of Natives and ADF&G. These responses are not fortuities and do not reflect regression. These changes of positions, although modest among non-Natives, almost surely reflect exogenous factors.

II.D. Q4A (Do Persons or Groups in the Community Influence ADF&G Policies?)

The question measuring whether respondents think that persons in their communities exercise influence over the ADF&G in the management of salmon (Q4A) yields relatively high and positive PRE coefficients for the total sample and for the two subsamples. The changes are consistent and in the same direction in both subsamples: among **Natives**, many panel respondents who thought they or persons in their communities seldom or rarely influenced the ADF&G policies toward salmon in 1989, thought they did not influence the ADF&G at all in 1991. Many **non-Natives** who thought they or members of their communities *frequently* influenced ADF&G policies toward salmon in 1989, thought that they seldom influenced ADF&G policies in 1991.

The differences are instructive and, perhaps, of a piece with the responses to Q2*2 and Q3* items. The proportion of non-Natives that thought they frequently exercised influence over ADF&G policies toward salmon dropped from 65 to 45 between 1989 and 1991, but a very large majority of non-Native respondents thought they exercised some influence in both 1989 (95%) and 1991 (85%). The scale responses for Natives are lower than for non-Natives, and in 1991, the

[73]The percentages in the following table are rough averages drawn from the responses to seven Q3* questions about who would best manage groups of species (salmon, crabs, etc.):

	Non-Natives			Natives		
	ADF&G	Equivalent	Natives	ADF&G	Equivalent	Natives
1989	75	21	4	60	30	10
1991	81	11	8	35	20	45

proportions of Natives and non-Natives who think that members of their community exercise (1) frequent influence or (2) no influence at all, are mirror opposites:

1991	No influence at all	Frequent influence
Non-Natives	15	45
Natives	45	15

In 1989, 45 percent and in 1991, 15 percent of Natives thought they frequently influenced ADF&G decisions about the management of salmon. In 1989, 10 percent and in 1991, 45 percent thought they did not influence ADF&G policies at all. The reversal from "frequent influence" to "no influence at all" is dramatic, even though 50 percent of Native respondents did not alter their positions between 1989 and 1991. It is plausible that ADF&G policies following the Exxon Valdez oil spill related to commercial harvests and others related to pronouncements about the toxicity levels of fish affected Native responses to Q4A. The KIP investigators consistently reported that Natives thought salmon and other species were tainted by oil from the spill, an idea contradicted by ADF&G (see Fall 1990).

It is apparent that Natives think they exercise much less influence on ADF&G than do non-Natives, and that the amount of influence Natives think they exercise decreased between 1989 and 1991.

II.E. Q51* (Who Possesses Greater Biological and Abiological Knowledge?)

In 1989, a little over 50 percent of non-Natives thought scientists possessed more knowledge than Natives about biological resources (land mammals, fish, sea mammals, marine invertebrates), 37 percent thought scientists and Natives possessed about equal knowledge, and 13 percent thought that Natives possessed more knowledge than scientists about these phenomena. The large percentage of non-Native panel respondents who recognized Native knowledge on a par with the knowledge possessed by natural resource scientists was not expected. Further, what was not expected in 1989 were the cognitive responses of non-Natives to the question "Who controlled the greatest amount of knowledge about abiological phenomena?" A plurality (48%) thought Native and scientists were about equal in their knowledge of wind, water, and ice, 37 percent thought scientists controlled the greatest amount, and 15 percent thought Natives controlled the greatest amount of knowledge about these phenomena.

Abiological phenomena, water and wind in particular, are vexing to meteorologists and oceanographers, so the attribution of equal knowledge to Natives and scientists by 48 percent of non-Native respondents, and to Natives alone by another 15 percent of non-Native respondents might mean only that no one--scientists included--possesses much knowledge of wind, water, and ice.

In 1991, 66 percent of non-Natives changed their cognitive responses about who knows most about abiological phenomena. The changes were away from the center (Natives and scientists possess about equal knowledge, 37%) to scientists possess the most (41%) and Natives possess the most (22%). This pattern does not hold for the biological phenomena. For those questions the move was away from "scientists know most" (40%) to the "Natives and scientists" (45%) and "Natives alone" (15%). It is evident that non-Natives are quite consistent in thinking that scientists, or scientists and some Natives, possess the greatest amount of knowledge about the environment.[74]

Among Natives there is less changing of positions on these questions between 1989 and 1991 than occurs among non-Natives. About 65 percent of Natives do not change their responses, but among those that do, the most notable change is away from "scientists possess most knowledge." In 1989, pluralities of Natives thought Natives controlled the greatest knowledge about water, land mammals, and sea mammals, and about 50 percent thought Natives controlled the most knowledge about fish and marine invertebrates. In 1991, a majority of Natives thought Natives controlled the greatest knowledge about all abiological and biological phenomena. Scientists, alone, were accorded very little knowledge of fish (6%) and sea mammals (6%)--the biological phenomena most affected by the Exxon Valdez oil spill and the

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[74]Rough averages in percents from responses by non-Natives in 1989 and 1991 to the questions about knowledge of abiological phenomena and biological resources are organized in the following table:

	Biological Resources			Abiological Phenomena		
	Scientists	Scientists & Natives	Natives	Scientists	Scientists & Natives	Natives
1989	50	37	13	37	48	15
1991	40	45	15	41	37	22

most important in the diets and household economies of Natives. They were accorded greater knowledge of land mammals (12%), marine invertebrates (13%), and water (17%).

The Q51* series is of a piece with the previous questions. The difference between Native and non-Native responses is significant on every item, and Native responses show little evidence of regression.

II.F. Q6 Q7 (Acquire Knowledge and Assign Symbols)

Item Q6 asks how long it takes to acquire knowledge of the local environment. The choices are from about 1 year to several lifetimes of accumulated and shared experiences. The gamma scores for Q6 are low. Sixty-three percent of non-Native panel members changed their positions between 1989 and 1991 about how long it would take to acquire knowledge of the environment. (Of those who changed positions, 41% thought it would take less time, and 59% thought it would take more time than they previously claimed.) Responses among Native panel members on Q6 are from shorter periods in 1989 (32% said it took more than 6 years to accumulate much knowledge about the environment) to longer periods in 1991 (47% said that accumulation took more than 6 years). There is no simple explanation for the changes of position. The question appears to suffer from poor construct validity.

Item Q7 asks whether respondents, their ancestors, or their current families know of several features in the environment which have special significance for them, including named places in which memories are recounted, spirits reside, important events occurred, and so forth. The attributes are from "none" to "many assigned over several generations." This item, too, generates low positive gamma coefficients in both subsamples. Responses among Natives to Q7 increased from 50 percent for "many" and "many over several generations," to 75 percent for those two categories between 1989 and 1991. We did not anticipate that a majority of respondents in the non-Native subsample would claim that they held many places and memories of the environment as significant. Yet 51 percent did in 1989 and 53 percent did in 1991. The changes in the estimates made by non-Natives between 1989 and 1991, however, pose a problem. Forty-seven percent changed their estimates, and most of those persons revised their estimates downward of places and memories of significance in the environment.

It would be premature to drop Q7 from the corpus of social indicator questions. It distinguishes Natives from non-Natives (the difference is significant), and the change in responses fits with the general trend toward the selection of Natives by Natives for management or joint management (Q2*2), better management (Q3*), no influence over ADF&G (Q4A), and knowledge of abiological and biological phenomena (Q51*). Only the power of natural resources with commodity values appear to mitigate the trend to selecting Natives over non-Native interlopers of all kinds.

Item Q6 does not appear to work well and may be ambiguous.

II.G. Q8* (Cognitive Attitudes About Consequences of Oil-Related Activities)

The series of questions about the consequences of oil-related activities generates marked differences between the **non-Native** and **Native** subsamples. The range of Native responses on all but one item--attitudes about transporting oil--is very small as are changes in attitudes. Respondents expressed the same cognitive opinions in 1991 that they expressed in 1989 on drilling (71%), pumping (72%), pipelines (59%), enclaves (59%), and recreation (63%). These opinions with two exceptions were that each of these activities, if undertaken anew in the local area, would be "deleterious" or would cause "no significant change" from current conditions. Two persons who thought that pipeline construction would have mixed consequences, some beneficial and some deleterious, in 1989, thought so in 1991 as well. Otherwise, all persons in 1989 who thought the consequences from oil-related activities would be either "mixed" or "beneficial," thought those same activities would be "deleterious" or occasion "no change from the current conditions" in 1991. Indeed, in 1991 rather consistent proportions of 60 percent thought oil-related activities would be deleterious, and 40 percent thought those activities would occasion no changes. One person thought that a new pipeline project would be beneficial.

These responses were not anticipated. Some Natives thought oil transport and pipeline construction would provide mixed or beneficial consequences in 1989 a few months after the spill. That they did not think so in 1991, 2 years after the spill, is interesting. It may be that these persons were employed in spill-cleanup work (to be tested in the analysis volume), or that they were employed in oil-related occupations in Valdez in 1989, or that family members were employed in one or another of these jobs. Whatever the case may be, a very large majority of Natives thought that consequences from oil-related activities would be deleterious or would occasion few changes for them in 1989, and an even larger majority of these same panel members thought the consequences would be deleterious or occasion no change in 1991.

The responses in the non-Native subsample are very different from the Native responses, even though the differences are not significant. The main differences are that in 1989 non-Natives, much more so than Natives, thought that oil-related activities would be beneficial (about 3%) or that they would occasion no changes to the environment or the local community (about 35%) and much less so than Natives, they thought that the activities would be deleterious (about 46%). In 1991, non-Natives were similar to Natives in thinking that oil-related activities would have deleterious consequences (from 53% for pipelines to 63% for transport). The change in cognitive response is dramatic for oil transport (from 41% deleterious in 1989 to 63% in 1991) and also for drilling, pipelines, and enclaves (about a 15% increase in the choice of "deleterious"). The changes are away from the opinions that oil-related activities would effect no change (about 24%). The tiny percentage who thought oil-related activities would be beneficial in 1989 remained the same in 1991.

Thus, a few non-Natives persisted in the thought that the consequences would be beneficial. We will test to determine whether employment or profession influences this response, as well as the responses that think oil-related activities will occasion changes that mix benefits with undesirable consequences. The responses fit our expectations for non-Natives although we also anticipate that optimism will replace skepticism about negative consequences of development (for assessments of the topic see Champion and Ford 1980; Gold 1978; Jorgensen 1981; Little 1978, 1980; Lovejoy 1977).

II.H. Q9 Q10 (Memories of Sharing and Treatment of Elders)

A smaller proportion of respondents in the non-Native subsample than in the Native subsample changed their opinions about whether there is more sharing in the present than in the past (Item Q9). But in each subsample, equally as many persons changed their positions downward (responding that there was more sharing in the past than in the present) as changed their positions upward (responding that more sharing occurs in the present than in the past). The directions of the changes suggest that this item is not reliable, even though the PRE coefficients for this item in the non-Native (γ = .68) and the Native (γ = .40) subsamples are relatively high.

Item Q10 asks whether respondents think elders are getting less, appropriate, or more care than is necessary. Most respondents in both subsamples thought that elders received adequate care in 1989, and most think so as well in 1991. The PRE scores are low, however, because so many persons changed their opinions. The pattern of changes in the responses suggest that Q10 is unreliable and should be dropped from the corpus of indicators variables.

II.I. Q12-Q16B (Consequences from the Oil Spill)

II.I.1. Q12* (Public-Private Responses to the Oil Spill)

Five months after the Exxon Valdez oil spill, we asked respondents whether they thought the Federal Government (Q12A), State Government (Q12B), and Exxon Corporation (Q12C) had used "none, few, many, or all" of the economic and technical resources and political authority within their power to mitigate the spill and its consequences. We anticipated negative responses from Natives and non-Natives in 1989 because the spill-cleanup operation was underway in and around the villages in which we were conducting our interviews. Upon entering the same villages, less than 1½ years later (February 1991), we anticipated that non-Natives would express more positive responses than they had expressed in 1989, while Native responses would remain negative. By positive we mean that respondents would think that the organizations had done many or all things in their powers. By negative we mean that respondents would think that organizations had done few or no things within their powers.

The non-Native subsample behaves much as we anticipated. The PRE scores are low, but positive, and about half of the respondents gave the same cognitive responses in 1991 that they gave in 1989 (Q12A re Federal Government [γ .25], no change among 55% of non-Native respondents; Q12B re State Government [γ .49], no change among 50%; Q12C re Exxon Corporation [γ .28], no change among 45%). Table 10-3 provides percentages of responses to Q12* items.

Table 10-3

COGNITIVE OPINIONS ABOUT RESOURCES EMPLOYED BY FEDERAL GOVERNMENT, STATE GOVERNMENT, AND EXXON CORPORATION IN MITIGATING THE OIL SPILL, 1989-1991

	Non-Native						Native					
	FEDERAL		STATE		EXXON		FEDERAL		STATE		EXXON	
	N/F	M/A	N/F	M/A	N/F	M/A	N/F	M/A	N/F	M/A	N/F	M/A
1989	68	32	38	62	68	32	61	39	39	61	79	21
1991	60	40	36	64	43	57	61	39	22	78	73	27

N/F = the Federal or State Government or Exxon Corporation used None or Few of its resources or powers to mitigate the oil spill. M/A = the Federal or State Government or Exxon Corporation used Many or All of its resources or powers to mitigate the oil spill.

In regard to the behavior of the Federal Government, in 1991, 45 percent of the respondents changed their positions: 62 percent (of those who changed positions) thought that Federal agencies had done more ("many," "all") within their powers than they thought in 1989, whereas 38 percent thought those agencies had done less. Regardless of the positive changes in cognitive responses, the majority of respondents in 1989 (68%) and 1991 (60%), thought the Federal Government had exercised "none" or "few" of its powers. These responses are consonant with the shift away from the Federal Government toward the State of Alaska as the governmental body in whom management authority over naturally occurring resources should be placed (Q2*2). The Federal Government is consistently given low evaluations by panel respondents.

Cognitive responses about the manner in which Exxon used economic and technical resources, and exercised political power, change in the same direction as those for the Federal Government. Furthermore, more persons (55% of all respondents) changed their opinions about Exxon than did so about the Federal Government. Of the 55 percent who changed their positions, 63 percent thought Exxon had done more ("many," "all") within their powers than they thought in 1989, and 37 percent thought it had done less. Whereas the majority of respondents thought Exxon had exercised "none" or "few" of its powers in 1989 (68%), in 1991 a majority thought Exxon had exercised "many" or "all" of its powers in 1991 (57%). The contrast with the Federal Government is marked, even though favorable, or improved evaluations dominate changes in responses to powers exercised both by the Federal Government and by Exxon Corporation.

The responses to the efforts by the State of Alaska are most interesting. Although there is a paradox we will seek to explain, the responses are consonant with the evaluations that non-Natives gave to State agencies (the ADF&G) in Q2*2 and Q3*. Fifty percent of the respondents did not change their cognitive responses to Q12B in 1991. Furthermore, in 1989 (62%) and 1991 (64%) majorities thought the State had exercised "many" or "all" powers it possessed in responding to the spill. The positive assessment fits with the move away from the Federal Government and toward ADF&G in the Q2*2 questions.

Nevertheless, among the 50 percent of the respondents who changed their opinions between 1989 and 1991, 54 percent lowered their evaluation of the State's performance. The paradox is that of the two public sector and one private sector organizations, the organization that was considered to have exercised the greatest amount of resources, technical skills, and power within its domain in both research waves--improving in the second wave--also had the largest proportion of respondents who lowered their evaluation from 1989 to 1991. The important points, we aver, are (1) that the evaluation of the response made by the State was the highest among all three in 1989 and 1991, and that the percentage of respondents increased between 1989 and 1991 who thought the State had exercised "many" or "all" means of which it was capable.

Representatives of State agencies of several kinds, from law enforcement to social services, are present in most villages in the spill area. As a rule of thumb, the larger the village, the greater the number of representatives and agencies represented. Whether the representatives are stationed in the village or appear in the village on a regular basis, or are contacted at *Hub* communities, residents have many contacts with State personnel. Indeed, State personnel comprise large portions of the public sector in Alaska, and the public sector constitutes a large proportion of total employment in Alaska villages. It is to be expected that residents would know the postspill activities of State agencies, especially those dealing with emergencies, social services, natural resources, harbors, inshore waters, and law enforcement. So, knowledge might be an important factor in accounting for the majority responses in 1989 and 1991 that the State used many or all resources and powers within its authority to address the spill. Half of the respondents who changed their cognitive responses downward between 1989 and 1991 did so from "all" to "many." We do not have an independent measure of "first hand knowledge" of Federal, State, and Exxon activities, but we do have an analogous measure in the AQI which we will test in Social Indicators Study VI, Analysis (Jorgensen 1994).

Although evaluations of the Federal Government's uses of the resources and technologies within its power (including forcing compliance from Exxon in rectifying problems) are higher in 1991 than 1989, the majority of respondents in 1991 continued to think that the Federal Government exercised "few" (51%) or "none" (9%) of its powers. It may be that knowledge of Federal actions influenced the evaluations upward in 1991. It may also be the case that we are measuring "optimism" in non-Native respondents. We have learned from analyses of several short-lived boom-bust cycles of energy developments in the western United States that the negative consequences[75] experienced by non-Natives in rural communities (with the exception of ranchers) are discounted, regardless of whether they have been experienced several times in the past, or not at all. Rather, positive benefits of past experiences and of future possibilities are emphasized (see Champion and Ford 1980; Gold 1978; Jorgensen 1981; Little 1978, 1980; Lovejoy 1977). Analogously, non-Natives in the spill area may well be expressing optimism for their future and for the future of their economic lot in Alaska, for the use of their labor as a commodity, and for the use of the environment as a commodity.

The optimism, coupled with the recognition that Exxon, through VECO, funded a large cleanup operation, provided employment, and paid many claims, can account for the change in cognitive responses by non-Natives about Exxon's uses of its resources and power. Although the proportion of respondents who changed their evaluations upward in 1991 of the Federal Government's response was large, a minority thought the Federal Government had used "many" of its resources or powers in addressing the consequences of the spill. It may be optimism alone that accounts for the positive change in cognitive responses about the behavior of the Federal Government after the spill. In other words, the Federal Government's evaluation may have benefitted from the optimistic "mind-set" of non-Natives, as well as from the evaluations of Exxon's and the State of Alaska's responses to the spill.

The Native subsample demonstrates considerable ambivalence about the Federal Government's response to the oil spill. In both 1989 and 1991, 61 percent thought the Government had exercised few of its powers and used few of its resources to mitigate the spill. But because a majority of respondents (62%) changed their evaluations of the Federal performance between 1989 and 1991 (half deciding the

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[75]Some of the negative consequences that occurred in a large number of communities from south-central Montana (Coalstrip) to northern Arizona in the 1970's included a rapid influx of persons seeking work from distant areas, strains on public facilities and services, inflation, altercations between newcomers and long-term residents, dislocation, fatigue, and resignation among elected officials and among social service workers, increasing tax and bond obligations for local residents, high incidence of failures among previously viable small businesses, increasing use of mental health services, outflow of dollars earned in the community, and rapid out-migration as the project ends. There are more negative consequences, but this list should convey an impression of what is meant by "negative."

Government had done less and half deciding it had done more in 1991 than 1989), the PRE coefficient is very low for Q12A.

Between 1989 and 1991, half of all Native respondents evaluated upward the performance of the State in mitigating the spill. This in spite of the negative evaluations Natives gave the ADF&G with regard to the management of wild resources. It is evident that Natives thought that the State of Alaska used more of its resources and more of its power than did the Federal Government and more than Exxon, as well.

Natives thought Exxon used very few of its resources and technical skills in mitigating the spill in 1989, and a large majority held to that position in 1991. Fifty-three percent did not change their position between 1989 and 1991. Fifteen percent re-evaluated Exxon downward and 32 percent re-evaluated Exxon upward in 1991.

The large majority of Native panel members in 1989 and again in 1991 thought the Federal Government and Exxon Corporation used "none" or "few" of the resources, technical skills, and powers they controlled to mitigate the spill. Among respondents who changed their evaluations between 1989 and 1991, more thought the State and Exxon had used more of their resources in 1991 than had thought so in 1989. The unmistakable conclusion, however, is that Native panel members thought little was done that could have been done given the resources and controls available to the Federal Government and to Exxon Corporation. Native responses are very different from non-Native responses, particularly in regard to the corporation whose employees and equipment were the proximate cause of the oil spill.

II.I.2. Q13-16 (Future Oil Spills, Future Responses to Spills, Oil Spill and Income, Oil Spill and Disputes)

Respondents were asked whether they thought events similar to the Exxon Valdez oil spill would occur again (Q13B). With a single exception among non-Natives, all non-Native and Native respondents in 1989 thought they would recur. In 1991, this time with a single exception in each subsample, all respondents thought large oil spills would recur. In both subsamples, large majorities did not change their evaluations between 1989 and 1991, and among those who re-evaluated the likelihood of future spills, majorities thought they would occur more frequently than they thought when originally asked. For example, non-Natives who thought spills comparable to the Exxon Valdez spill would be frequent increased from 38 percent to 45 percent and among Natives from 26 percent to 32 percent. Natives, then, are more conservative in their predictions than are non-Natives.

Item Q14A asks how future responses will compare to the responses to the Exxon Valdez oil spill. As in the previous question, Native respondents are more conservative than non-Natives. Most Natives in both research waves think that the responses will be better in the future (74% in 1989, 68% in 1991). Majorities of non-Natives, too, in 1989 (56%) and 1991 (58%) think the responses will be better, but more non-Natives (55%) changed their evaluations than did Natives (25%).

The contradiction is that non-Natives, who appear to accentuate positive benefits and repress negative consequences of the spill, also think spills will be more frequent than do Natives and are less apt to think that responses to the spills will be better than do Natives. These variables will likely be useful in more complex hypothesis testing.

The PRE coefficients on item Q15 (How did the spill affect your income?) for the Native and the non-Native subsamples are high and positive. Non-Natives reported fewer decreases and fewer increases to incomes than did Natives in 1989. Spill-cleanup income would have a greater effect on Native than non-Native income in that Natives earn much less than non-Natives, so high hourly wages paid over a short period will increase Native incomes beyond their prespill incomes. In 1989, 37 percent of Native respondents reported an increase over their prespill income, whereas 28 percent of non-Natives reported an increase. A greater proportion of Natives than non-Natives reported losses (32% to 18%). It is likely the case that Native commercial fishermen, either because they are undercapitalized or because they were inexpert at filing claims for losses, or some combination of factors including the aforementioned, suffered more decreases than non-Natives.[76] In 1991 about one-fourth of each subsample reported increases, one-fourth reported decreases, and half reported no change. These rough comparisons aside, there are differences between the subsamples.[77]

About one-third of each sample changed their evaluations in 1991. It is plausible that some of the evaluations made 5 months after the spill would change for many persons 22 months following the spill. Among non-Natives, several persons who reported that their incomes had either increased or stayed the same 5 months after the spill, reported that their incomes had decreased 22 months later. A couple of persons who reported decreases in 1989 reported that they were back to normal (prespill income levels) in 1991. The effects on non-Native income, as measured by this variable, show a greater decrease in income in 1991 than immediately following the spill, probably because more cleanup work was available to them in 1989 than in 1990-1991. Economic conditions after the spill, by our measures, have not returned to prespill levels for several reasons: the price of oil remains low as does Alaskan oil production; the price of fish, particularly salmon, has remained low since the spill; and the public sector economy in Alaska suffers as an effect of the struggling oil and commercial fishing sectors.

In both 1989 and 1991, non-Natives thought there were many more disputes between fishermen as a consequence of the Exxon Valdez oil spill than did Natives (Q16A). In 1989, a greater proportion of non-Natives than Natives thought that there were no disputes between fisherman, but most non-Natives abandoned that

[76]Capitalization is important because it is related to the type of entry permit the fisherman holds, the type of equipment he operates, and the areas in which he fishes (it was beneficial in 1989 to fish outside the spill area). Equipment is important because the largest, fastest equipment in the best state of repair had an advantage in being contracted by VECO for cleanup work. Our KI Investigators heard reports of favoritism in the contracting engaged in by VECO's agents, favoritism which selected against Native boat operators. Finally, the filing of successful claims required adequate records of previous catches and previous expenses, and it required some political acumen and tenacity to see a claim through the evaluation process (see the reports in Social Indicators Study IV, Parts 1 and 2 [HRAF 1993] for assessment of the claims process as reported by informants in 1991).

[77]The following table compares self-reports by Natives and non-Natives on their prespill/postspill income.

	Non-Native			Native		
	Decrease	Same	Increase	Decrease	Same	Increase
1989	18	54	28	32	32	37
1991	26	50	24	26	47	26

position in 1991. The differences between Native and non-Native assessments of disputes between fishermen is likely a function of knowledge, i.e., the question is probably measuring what it is supposed to measure. The large commercial fishing towns, particularly those in which disputes occurred between fishermen following the spill, are predominantly non-Native. The places where fishermen meet, from bars to docks, and the contexts in which the meetings take place are seldom frequented by Natives.

Because we sampled households at random, the representation of Natives in commercial fishing villages is fitted closely to their proportions in the populations of those towns. Because of the modest representation of Natives in the large fishing villages (Kodiak City, Cordova), and villages that are not fishing villages, but in which fishermen reside and in which commercial fishing is engaged (Valdez, Kenai), Natives had a less advantageous position than non-Natives to learn about disputes between commercial fishermen which, according to our KI Interviewers were sparked by many issues. A principal one in the summer of 1989 was that some fishermen leased their boats to VECO and others did not. Among the latter, some sought to hire their boats for the cleanup operation but were not contracted by VECO, and others refused to hire out to VECO. The differences are not subtle. Some refused to cooperate; some were not allowed to cooperate with VECO-Exxon.

Item Q16B yields a PRE coefficient of .51 for the non-Native subsample, but the equivalent coefficient for the Native subsample is negative. About 70 percent of the respondents changed their evaluations of disputes ("none," "very few," "many") between commercial fishermen and others (not fishermen) caused by the oil spill. The pattern of changes in the Native subsample is so dispersed (several changes from "many" to "none," several from "none" to "many," and everything in between) as to render the variable useless. This information can adequately be derived only from the institutional protocols and the deeper, open-ended interviews.

Item Q16A should be retained, but Q16B should be dropped.

II.J. K1-K41 (Traditional and Western Practices and Ideas: Subsistence, Economics, Residence and Kinship, Ethics, Politics, and Religion)

Items K1-K41 proved reliable in the Schedule A and B research (Social Indicators Study II [Jorgensen 1993]; Social Indicators Study III [Jorgensen 1994]). Many of the variables also suggested sensitivity to exogenous factors, hence valid measures of change. The Exxon Valdez spill sample (Schedule C) is different from the Schedule A and B sample in ethnic composition, population density, the ratio of large villages (populations larger than 800) to small villages, general infrastructural and business development, resource availability, severity of winters, and proximity to markets. We anticipated differences between non-Native and Native respondents in the Schedule C sample to be similar in kind, if not specific amounts, to differences between non-Natives and Natives in the Schedule A and B sample. Because of the differences between Schedule A and B and Schedule C universes, we also expected some general differences between Schedules A and B and C on many of the K1-K41 items.

Inspection of Table 10-2 reveals that the K1-K41 items are sensitive to differences between Natives and non-Natives: the distributions of 24 of the 42 items are significantly different between the **non-Native** and the **Native** subsamples. We also note that only 62 percent (26) of the items for the total panel obtain PRE coefficients $\geq .50$. Another four items obtain PRE scores $\geq .50$ in one or the other of the subsamples (71% of K1-K41 items obtain $\gamma \geq .50$). The distributions are significantly different between the **Native** and **non-Native** subsamples in one or both research waves (1989, 1991) for ten of the twelve items for which neither the total sample or either of the subsamples obtain PRE scores $\geq .50$. These results suggest that many of the variables are not stationary,[78] but they also suggest that change is being measured. We anticipate, to be sure, that the Exxon Valdez oil spill occasioned many changes.

[78]The items whose PRE coefficients are less than +.50 have low reliability (less than 50% of prediction error is reduced), yet "stationariness" can only be surmised [above "suggested"' is the term used] from a longitudinal correlation. We must have measures at three points in time to measure stationariness, or "stability."

These protocol items were created following the charge from MMS to distinguish differences, if they existed, between Native and non-Native residents, between villages that possessed well-developed infrastructures and superstructures and those that did not, and between OCS oil-related activities and other activities that may affect village organizations and life within villages. As we have made amply clear, all villages in the spill area sample were affected by the Exxon Valdez oil spill, so the distinction between *Test* and *Control* village in relation to oil-related activities was obviated, or nearly so. Because of the dominance of oil-related businesses in the villages of Kenai and Valdez, villages which prior to about 1955 and 1971, respectively, were much smaller communities dominated by commercial fishing, these *Test* communities are different in some respects from other villages with well-developed infrastructures and superstructures whose private sector economies were not dependent on oil-related business. All public sector economies in Alaska are dependent on transfers of oil revenues.

A little less than half of the 42 items yield longitudinal PRE scores of 50 percent or higher in the Native subsample. The impression obtained from analysis of the bivariate tables, is that conditions in 1989 were much different from the conditions in 1991, and that the differences in the responses on many items, including several whose PRE coefficients reduce error less than 50 percent reflect change. Our research has demonstrated that Natives harvested fewer resources and retained fewer of the resources that they harvested in 1989 than in prior years.[79] Our research has also demonstrated that Native residents of the spill area obtained work in spill-related jobs and that those jobs conflicted with resource harvests. These are but small indicators of changes from prespill conditions. The pattern of responses to the K1-K41 variables can best be understood in a multivariate context. Indeed, multivariate concluding hypotheses must be advanced to account for change and to account for some low, even negative, PRE scores. The large number of

[79] See Social Indicators Study IV, Parts 1 and 2 (HRAF 1993) for assessments of the consequences of spill employment for subsistence harvests, and also see Fall (1990) for a comprehensive report on subsistence harvests in all villages within the spill area.

significant differences between the Native and non-Native subsamples commend separate treatments for each subsample on the K1-K41 variables.

II.J.1. The Native Subsample (K1-K41)

Beginning with the Native subsample, we commence with the Items K1 through K3. In the A and B Schedule, controlling for income, we obtained high, positive PRE coefficients among these three items. Here the PRE scores for K1 = -1.00, K2 = .38, and K3 = .84. Bivariate Table 10-4 must be examined in order to explain the negative unity obtained for K1, and the 38 percent reduction of error obtained for K2. Table 10-4 expresses frequencies in percents of the total Native *N*.

Table 10-4

SUBSISTENCE HARVESTS BY EXPENSE, VARIETY, AND AMOUNT IN DIETS, 1989-1991

K1 Subsistence Harvest Expenses as Proportion of Total Native Household Income [γ = -1.00]

1991 Responses ⇒ 1989 Responses ⇓	Very Low, 0 - 9% of Income	Low, 10 - 19% of Income	High, 30% or More of Income
Very Low, 0 - 9% of Income	70	15	10
Low, 10 - 19% of Income	5		

K2 Variety of Species Harvested by Natives [γ = .38]

1991 Responses ⇒ 1989 Responses ⇓	None	Few, None in Some Categories	At Least 1 Species Per Category	2 to 3 Species Per Category	3+ Species Per Category
None	10.5	5.3			
Few, None in Some At		26.3		5.3	26.3
Least 1 Per Categ		5.3			5.3
2 to 3 Per Category		5.3		5.3	
3+ Per Category			5.3		

K3 Amount of Wild Proteins in Annual Diets of Natives [γ = .84]

1991 Responses ⇒ 1989 Responses ⇓	Less Than 25%	25 - 49%	50 - 75%	76 - 100%
Less than 25%	30			
25 - 49%	10	10	5	
50 - 75%	10	15	5	
76 - 100%			5	10

Item K1 asks what proportion of total household income was allocated to harvest expenses. Item K2 asks how wide was the variety of species harvested by respondents or other members of their households in each of four categories (land mammals, sea mammals, birds, fish). Item K3 asks the proportion of wild (naturally occurring) proteins in the respondent's annual diet. Although K1 yields a negative PRE coefficient of unity, 70 percent of respondents allocated about the same amount to harvest expenses in 1991 that they allocated in 1989. The negative coefficient is created by the increase in percentage of income allocated by 25 percent of respondents in 1991. Less was allocated in 1989 because residents of the spill area harvested less. They harvested less because beaches were fouled, the ocean waters were fouled, and because many feared that species were tainted (also see Fall 1990). In addition, it is a common practice of small-scale commercial fishermen to allocate parts of their catches to household use (subsistence). Seasonal and temporary closures of fishing waters mandated by the ADF&G in some areas affected the allocation of funds to subsistence.

The increased proportion of income 2 years after the spill by 25 percent of the households is consonant with our expectations for subsistence harvesters in the spill area. In general, Native residents of spill-area villages are younger and are more often employed than Native residents of the A and B Schedule villages. For Natives, as income increases, the absolute amount allocated to subsistence increases, but the proportion of total income so allocated seldom exceeds 19 percent. In 1991, we note that a few respondent households allocated more than 30 percent of their incomes in 1991, but most continued to allocate less than 9 percent. In 1991, resource harvests had not returned to their pre-1988 levels.

Responses to K1, then, demonstrate that 25 percent allocated a greater proportion of their incomes in 1991 than 1989. Item K2 demonstrates that 42 percent harvested a greater variety of species in the 1990-1991 year than in the year of the spill (43% harvested the same, and 16% harvested fewer). The increase in allocation of income to harvests is consonant with the increase in species harvested. Many were travelling greater distances to acquire species free of contamination. But K3, which measures the self-reports of wild proteins in annual diets, increases for 5 percent while decreasing for 40 percent of the respondents. Persons worked harder and spent more in subsistence harvests to gain less for their diets than they had during the spill year.

The oil spill, by affecting employment, income, ocean, sounds, inlets, beaches, birds, sea mammals, fish and, according to Natives, land mammals,[80] negatively affected the amount of resources harvested and consumed. The longitudinal PRE coefficients appear to reflect change. The variation among joint frequencies for each bivariate table suggest that these items are reflecting exogenous factors, not regression or flawed construct validity.

There was a slight increase in Native incomes (K4), earned incomes (K5), and earned incomes from public sector employment (K7), but a decrease in incomes earned from the private sector (K8) between 1989 and 1991. Inasmuch as spill-cleanup employment increased private sector employment throughout the spill area, the cause of the decrease in private sector employment after 1989 is transparent. Nevertheless, the loss of cleanup-related jobs alone is not sufficient to account for the decrease in earned income from the private sector. Some of that decrease is also a consequence of the dwindling prices paid for fish in 1990, and smaller commercial catches in 1990 than in 1989 by a few set-net fishermen in Cook Inlet. The increase of public sector employment in 1991 is a consequence of State and Federal programs that were implemented to assist villages recovering from the spill.

Between 1989 and 1991, there is a measurable change from seasonal employment (cleanup or commercial fishing), which decreases, to monthly employment, which increases (K9). Some persons who enjoyed some temporary employment and perhaps some irregular welfare transfers in 1989, were dependent on regular receipts from shareholder corporations, various State and Federal transfers, and welfare. That is, the increase in the stability of unearned income is considerable and fills a gap that some persons experienced at the conclusion of the spill cleanup (K10).

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[80]According to Fall (1990: 19, 24), Natives in Prince William Sound villages feared that land mammals, too, were contaminated by oil, having seen dead bears on beaches and having seen deer eating kelp.

The Native subsample demonstrates a dramatic increase between 1989 and 1991 in the giving and the receiving of cash, labor, and resources beyond the respondent's household but within the village, and increases of giving and receiving between different villages as well (K11A-K16B). Table 10-5 shows the frequencies in percentages for Native respondents in 1989 and 1991 on the "sharing" variables (cash, labor, resources) by donors and recipients within the village.

Table 10-5

SHARING OF CASH, LABOR, AND RESOURCES BY NATIVES, 1989-1991

Within the Village	Cash 1989	Cash 1991	Labor 1989	Labor 1991	Resources 1989	Resources 1991
Donor						
1. None	26%	11%	5%	0%	0%	5%
2. In Household	47%	21%	10%	15%	5%	0 %
3 .Kin-Affines[a] beyond HH	26%	58%	60%	20%	60%	35%
4. 2+3 Friends & Elders[b]	0%	11%	25%	65%	35%	60%
Recipient						
1. None	24%	18%	5%	0%	0%	0%
2. In Household	47%	12%	11%	5%	15%	0%
3. Kin-Affines beyond HH	29%	71%	68%	32%	50%	40%
4. 2+3 & Others	0%	0%	16%	63%	35%	60%

[a] Represents an increase in sharing over "2. In household" category.
[b] Represents an increase in sharing over "2. In household" and over "3. Kin-affines" category.

It has been a characteristic of every sample and every wave of every panel that respondents report that they give more than they receive. Natives enjoy giving. Most gifts from donor to recipient are small--enough food for a meal--but frequent, particularly from younger persons to their elders. During some periods of the year, particularly during winter seasons, elders may receive more than they give. But during summers when most extractive activities occur, elders often receive so much fresh food that they pass much of it on to other persons in their kinship or friendship networks--whole salmon, half salmon, greens, and the like.

Persons who earn the largest incomes have the least time to engage in extractive pursuits, so they frequently give less labor and food and fewer by-products. Yet they give cash, and they also share resources other than wild food, particularly equipment in which they have invested, such as skiffs, outboard motors, all-terrain vehicles, trucks, snowmachines, and camping supplies.

Resources, comprising food (fish, fowl, marine invertebrates, eggs, meat, berries, greens), tools, articles of clothing, blankets, vehicles, boats, and other items, are shared most often and most widely, followed by labor, then cash. Cash is in shortest supply. It is shared, especially between persons who are gainfully employed (donors) and persons who are elderly, infirm, or in need of financial assistance (recipients). By and large, equipment purchases are a better use of cash if the intention is to share. The household which possesses good equipment can lend equipment to relatives and friends for subsistence purposes. The recipient who receives cash from a donor to assist in underwriting his harvesting activities is generous with the items that he or she harvests while using the equipment. There is, however, no quid pro quo in which a recipient must share with a donor. Sharing is the Native custom.

Sharing of cash, labor, and resources was a wider practice within the village in 1991 than in 1989. The percentage of respondents who shared nothing, or shared within the household only, decreased in 1991. The percentage who shared with kinspersons and affines beyond the respondent's household, or with kinspersons, affines, friends, and elders beyond the household increased in 1991. The "sharing" variables appear to be sensitive to exogenous factors. As overall employment and private sector employment decreased in 1990, sharing increased. It is plausible that sharing among some Natives was actually curtailed during the summer of 1989 as persons in many households gained cleanup employment and were unable to extract resources. Sharing increased thereafter because larders were modest in many households affected either by the oil which covered key resource sites, or by employment which deflected people from extraction during 1989, or both. The reports for Tatitlek, Eyak (a Native community within Valdez), and Karluk provide evidence for this concluding hypothesis.

With few exceptions, items K17 through K41 yield high PRE scores. The few that do not obtain high PRE scores among Native panel respondents reflect change and, in most instances, significant differences from non-Native responses. The differences from the non-Native panel, as well as the changes, are expected by our hypotheses about the differences between Western and Native economic organization, social organization, and ideational structure, including ethics.

Item K17 measures a 15 percent increase in the size of households, K19 measures a 25 percent change in household composition, and K20 measures a change in the rules expressed for household dynamics (rules about who can join a household and how persons must behave within the household) between 1989 and 1991. In 1989, our KI Investigators thought that 59 percent of Native households observed rigid rules about who could join the household and how household members must behave. In 1991, our KI Investigators thought that only 24 percent of the households had "clear expectations" about who could join and how members must behave. We think these items are responsive to economic conditions and that Native households, much like an accordion, expand in size and incorporate collaterals, lineals, or affines as exigencies require. These households contract during periods of widespread employment and increased earnings. The increased dependence on stable unearned income and the decrease of private sector employment are the likely causes of changes to K17, K19, and K20.

Item K18 merely demonstrates, as it should, that household heads were about 18 months older in the winter of 1991 than in the summer of 1989. Item K22 reflects 10 percent broken unions (divorces, separations) between 1989 and 1991.

Throughout the A and B villages (Social Indicators Study III [Jorgensen 1994]), Natives belong to more sodalities than do non-Natives, and the difference in their respective memberships is significant. In the spill sample, Natives and non-Natives participated about equally in sodalities in 1989, but in 1991 many fewer Natives were active in many fewer sodalities than was the case in 1989. Non-Natives, on the other hand, participated in more sodalities than was the case in 1991 (K23). Whether for Natives, particularly in the *Periphery* villages, this is a function of the dissolution of some clubs and organizations, or a lack of funds to maintain membership, or some other factors is not known. It is possible that several short-lived organizations emerged during the summer of 1989 in response to the spill, only to wither or fold by the winter of 1991. Contrary examples are various spill-response organizations which were formed in Cordova, Kenai, and Kodiak City and which survived into 1991, but the populations of these communities are overwhelmingly non-Native. At least one of these organizations became engaged in litigation, making its survival more likely to the conclusion of its lawsuits (as plaintiff and as respondent).

We had anticipated that Natives and non-Natives would become more knowledgeable of the specific political issues generated by the Exxon Valdez oil spill. We further anticipated that, as an effect, political awareness of other issues would be heightened. Items K24 and K25, which measure changes in political participation and knowledge of political issues, suggest our presumptions are correct. Participation in official capacities in political activities by respondents or members of their households increased 10 percent between 1989 and 1991. Increases in official political capacities are restricted by the number of political offices available in any village or region. The smallest villages have few offices whereas the largest villages are (1) dominated by non-Native populations and (2) official political positions (e.g., city council, mayor) do not increase proportionally to population size. Thus, there are more persons available for proportionally fewer political positions in big villages than in small villages.

Knowledge of political issues (K25) increased dramatically. Native respondents able to identify 1 or less political issues correctly decreased from 42 percent in 1989 to 26 percent in 1991, whereas persons able to identify 2 or more correctly increased from 58 percent to 74 percent. Natives and non-Natives alike, especially long-term residents (and the panel selects for stable, long-term residents), demonstrate a marked increase in the knowledge of current political issues.

Regular attendance at religious rituals (church attendance, attendance at ceremonies) also increased between 1989 and 1991 (K26, from 65% to 80%).

These statistics confirm the well-established generalization that Natives are active church members. Whether the spill in 1989 kept some respondents away from church because of increased job demands (spill-cleanup-related work) or increased familial or kinship network demands (child care, assistance to elders) or whether postspill conditions stimulated church attendance in 1990 and early 1991 is not known.

We do know that participation in extracurricular activities sponsored by churches or religious auxiliaries did not trail off as did participation in sodalities. Engagement in extracurricular activities sponsored or promoted by religious groups was about the same in 1989 and 1991 (15% participated in more activities and 15% participated in fewer activities than in 1989) (K27).

Above we have referred to a complex of ethical practices and ideas that are characteristic of traditional Native societies, and a complex of ethical practices and ideas that are characteristic of non-Native society (K28-K31). The Native and non-Native subsamples are significantly different on two of these items in 1989, and all of these items in 1991. The PRE coefficients on three of the four items in the Native subsample are less than .50, suggesting low reliability. A close inspection of the bivariate distributions, however, suggests that about 20 percent of the Native informants reflected on the village, the environment, and the way in which they rear their children (or think their children should be reared) after 1989 and gave answers in 1991 that are consonant with traditional practices. In 1989, our KI Investigators interpreted the responses of these persons to be either those we identify as Western, or as mixtures of Western and traditional positions.[81] The demonstrable differences between 1989 and 1991 responses do not appear to be functions of regression. Native differences from non-Native suggest that traditional ethical practices and

[81]The attributes for K29 are provided above, but as a refresher in the "Western" model, the environment is viewed as a challenge and as a bundle of commodities. Even when given a biblical interpretation, the "Western" environmental ethic takes form something like the following: "The earth was put here to be conquered by man for man's benefit, or 'things' were put on this earth for use by man." A "mixed Western and traditional" ethics and environmental symbols model means that some aspects of the environment are regarded as possessing significant commodity value, whereas the general environment--the air, the land, the sea, the rivers--have spiritual value or noncommodity cultural significance, and many specific features of the environment are attributed significant symbols by a respondent, his/her family, or village associates.

ideas gained adherents following the spill. The spill and its aftermath may well have triggered the resurgence of these traditional ideas and practices.

Item K28, which measures whether persons think that they seek skills and expertise solely as (1) a personal benefit (individual), or (2) to benefit one's family, or (3) to benefit persons in wider kinship networks, or (4) to benefit self, family, wider networks of kinspersons, and villagers, in general (communitarian), demonstrated a decrease in responses which stressed personal benefits from 26 percent to 21 percent and an increase in responses which stressed communitarian benefits from 37 percent to 42 percent. Cognition of the environment as a commodity decreased from 31 percent to 18 percent, whereas cognition of the environment as space, places, and phenomena rich with spiritual and cultural significance increased from 25 percent to 44 percent (K29). Traditional enculturation and gender practices increased from 15 percent to 25 percent, whereas espousal of Western enculturation and gender practices decreased from 30 percent to 20 percent (K31). Among K28, K29, and K31, "mixed" Western and traditional practices constitute a modality of responses only in K31 (the measure of enculturation and gender). It may well be that high educational attainment, in conjunction with residence in large villages and gainful employment, will account for the persistence of "mixed" practices. If so, part of the Western development model will receive some support from these data, i.e., traditional practices accommodate to Western practices as part of the successful "development" process.

Item K30, which is intended to measure the ethics of personal cooperation, appears to be unreliable among Native respondents. The topic may have been confusing to Natives, or it may be the case that KI Interviewers had difficulty interpreting the responses they received. Whether for informant or interviewer, K30 may pose a threat to construct validity. Whatever the case may be, responses from Natives in 1991 do not form a pattern that suggests any systematic change from their 1989 responses. Changes occur in all directions.

Native respondents think there is a strong association between the amount of schooling a person receives and economic success as an adult (K31). In the

Schedule A and B sample, this correlation is pushed to zero; indeed, it becomes negative, when controlling for education. That is, the greater the education completed by the respondent beyond high school, the greater the likelihood that there will be a negative correlation with the belief that success increases with schooling completed. The reliable response to this question may be another indicator of differences between Natives in the spill-area sample and Natives residing north of the Aleutians. The spill area, dominated by oil-related businesses and commercial fishing, and heavily influenced by tourism, is more densely populated and enjoys better transportation services and infrastructure than do most villages north of the Aleutians.

Items K37 and K37B demonstrate that most Native respondents were born and reared either in the village in which they were interviewed, or in a village nearby in the same region. About half of their spouses were born and reared in the village in which the respondent was interviewed, and about half were born outside the region. These results are consonant with results for Natives elsewhere in coastal Alaska.

Item K41 demonstrates that the number and condition of utilities and appliances in Native respondent's houses changed very little between 1989 and 1991. There is no indication that utilities were cut off between 1989 and 1991. A couple of informants reported that appliances that were working in 1989 were not working in 1991, and another informant reported that appliances had been added since 1989. There is no indication that persons were not able to repair their appliances because of financial embarrassment.

One item that suggests an increase in health and financial problems for some respondent households between 1989 and 1991 is K39, which measures the helping services provided by Federal, State, or city governments, or by Native regional or village corporations. Between 1989 and 1991, there was an increase in the use of health and financial services from 70 percent of respondents to 90 percent and a concomitant decrease in respondents who claimed not to use any helping services from 20 percent in 1989 to 10 percent in 1991. The increase in the use of services is noted a year after the spill, not during the cleanup period. It is also interesting that Natives claimed to use health and financial services exclusively, but not family counseling or other forms of social services.

The Nominal Variables: There are significant differences between the **Native** and **Non-Native** subsamples on three nominal questions pertaining to the Exxon Valdez oil spill. Natives are ambivalent about whether the spill was an unusual event (Q13A). Between 1989 and 1990, 70 percent of respondents changed their positions, half from "it is an unusual event" to "it is not an unusual event," and half the reverse. This question cannot be measuring what it was intended to measure, at least for Natives.

The question (K33A) which asks whether economic conflicts, in general, emerged following the spill obtains a $\phi = 0.00$. Regardless of the zero coefficient, it is likely that K33A is measuring change. The interviews in 1989 were conducted in the summer while cleanup activities were underway. In 1989, 50 percent of Natives respondents thought that economic conflicts had erupted after the spill. In the winter of 1991, 88 percent thought economic conflicts had emerged following the spill. Economic conflicts, particularly between fishermen, but not restricted to fishermen, erupted in the winter following the spill, so we do not expect a stable, reliable response on this question given the time when the postspill pretest interviews were conducted.

But when asked about personal economic conflicts (K33B conflicts between specific persons), only half of the panel members responded and most of them changed their positions from "yes, there were personal economic conflicts" in 1989 to "no personal economic conflicts arose" in 1991. The specific conflict item appears to be sensitive for Native respondents, hence to threaten construct validity. It may have to be jettisoned.

Although K35 produces a $\phi = .39$, 75 percent of the respondents did not change their answers between 1989 and 1991, suggesting very high reliability. The variable may also be measuring change, because 83 percent correctly identified the objectives of helping services in 1991 as opposed to 72 percent in 1989. The increase in correct answers fits with the increase in the use of helping services by Natives between 1989 and 1991.

II.J.2. The Non-Native Subsample (K1-K41)

Non-Native respondents in the spill area do not invest large proportions of their incomes, harvest a wide variety of wild resources, nor consume large quantities of wild resources in their daily fare. All of these generalizations hold for Native respondents in the spill area as well, although Natives invest more, harvest more, and eat more wild resources than do non-Natives. Non-Natives invested less and harvested fewer varieties in 1991. Whether this is a function of fewer resources available, or comes from despair and subsequent lack of interest in subsistence pursuits in familiar areas as a consequence of the spill (oil residues, for example) is not known.

Table 10-6 expresses frequencies in percents of the total non-Native sample for their responses to the subsistence items K1, K2, and K3.

Item K1 for the non-Native sample demonstrates that there is little change between 1989 and 1991 in the proportions of incomes invested in the harvests of naturally occurring species. In 1991, 87 percent of non-Native respondents, as opposed to 75 percent of Native respondents (see Table 10-4) invested less than 9 percent of their household incomes in subsistence pursuits. In 1991, 88 percent of non-Native respondents, in contrast with 53 percent of Natives, harvested no wild resources at all, or harvested very few resources. And whereas 36 percent of non-Natives harvested a lesser variety and 8 percent a greater variety of resources in 1991, nearly the reverse was true for Natives, 16 percent of whom harvested a lesser variety and 42 percent a greater variety. As for wild proteins in the diet, 54 percent of non-Natives and 50 percent of Natives had less than 25 percent. This represents a 10-percent increase of non-Natives and a 20-percent increase in Natives who acquired less than 25 percent of their proteins from wild resources in 1989. Non-Natives, then, invested less, harvested fewer varieties, and ate fewer wild resources in 1989 than 1991. As for the Native subsample, K1-K3 are almost surely measuring change among non-Natives between 1989 and 1991.

Table 10-6

SUBSISTENCE HARVESTS BY EXPENSE, VARIETY, AND AMOUNT IN DIETS, 1989-1991

K1 Subsistence Harvest Expenses as Proportion of Total Non-Native Household Income [$\gamma = .84$]

1991 Responses ⇒ 1989 Responses ⬇	Very Low, 0 - 9% of Income	Low, 10 - 19% of Income	High, 30% or More of Income
Very Low, 0 - 9% of Income	76	4	
Low, 10 - 19% of Income	6	4	2
High, 30% + of Income	4	4	

K2 Variety of Species Harvested by Non-Natives [$\gamma = .58$]

1991 Responses ⇒ 1989 Responses ⬇	None	Few, None in Some Categories	At Least 1 Species Per Category	2 to 3 Species Per Category	3+ Species Per Category
None	8	2			
Few, None in Some At	4	44			
Least 1 Per Categ		6	2	2	4
2 to 3 Per Category		6			
3+ Per Category	2	16		2	

K3 Amount of Wild Proteins in Annual Diets of Non-Natives [$\gamma = .61$]

1991 Responses ⇒ 1989 Responses ⬇	Less Than 25%	25 - 49%	50 - 75%	76 - 100%
Less than 25%	36	6		2
25 - 49%	10	8	10	
50 - 75%	8	10	4	2
76 - 100%			2	2

The income variables, K4-K10, demonstrate fluctuation between 1989 and 1991 consonant with the spill, the spill cleanup, and the aftermath. Item K4, which measures total household income, demonstrates considerable fluctuation: 38 percent of the respondents lost and 21 percent gained income. Decreases between 1989 and 1991, perhaps, can be attributed to high spill-cleanup earnings and claims settlements in 1989. But the losses in 1991 may be exacerbated by several factors, including low fish prices. Whether the oil spill affected the Prince William Sound and Cook Inlet fish markets is to be explored.

Whatever the case may be in regard to income fluctuation, most non-Natives (94%) earn more than 75 percent of their total incomes (70% of Natives earn more than 75%) (K5), and most non-Natives (94%) acquire less than 24 percent of their income from unearned sources (68% for Natives) (K6). There is, however, an increase of 6 percent of non-Natives for whom unearned income contributed a greater percentage of total income in 1989 than 1991. The sources of income clearly distinguish between Natives and non-Natives as well. Government, or the public sector, is the source of more than 25 percent of total household income for less than 75 percent of non-Natives, but is the source of more than 25 percent of total household income for 60 percent of Natives. Income earned in the private sector accounts for more than 75 percent of total income for twice as many non-Natives (73%) as Natives (35%).

The evidence is obvious: Native earnings are overwhelmingly dependent on public sector employment whereas non-Natives dominate the private sector. This is not to suggest that non-Natives do not dominate the public sector as well. They do dominate in the key and highest paying Federal, State, borough, and city positions, and also hold key positions in regional nonprofit corporations in the spill area.

The measures of income stability demonstrate that many fewer changes occurred to non-Native earned income (12%) between 1989 and 1991 than to Native earned income (41%). Since wage employment and piecework were initiated in Alaska, Natives have enjoyed less stable employment than non-Natives (K9). The relatively high instability of Native employment between 1989 and 1991 is undoubtedly influenced by the oil spill, but fits the pattern of Native employment. More revealing of the spill's consequences, perhaps, are changes in the stability of unearned income to non-Native respondents: 20 percent of non-Natives registered changes between 1989 and 1991 in the stability of the unearned income that they received--irregular receipts. In this same period, Native unearned income became more stable (60% changed toward regular receipts).

The economic distribution variables, K11A-K16B, reveal very large differences between Natives and non-Natives in whether income, labor, and resources are shared at all, and whether they are shared regularly and widely among kinspersons, friends, and elders within a community. Very few Natives do not share at all, or restrict their sharing to persons within their households. Non-Natives are more apt not to share, or to share within the household only. Yet, between 1989 and 1991 there is a noticeable and systematic increase in the number of persons with whom non-Natives share, if not a major increase in the regularity with which sharing beyond the household occurs.

Table 10-7 shows the frequencies in percentages for 1989 and 1991 on the "sharing" variables (cash, labor, resources) by non-Native donors and recipients within the village.

Table 10-7

SHARING OF CASH, LABOR, AND RESOURCES WITHIN THE VILLAGE BY NON-NATIVES, 1989-1991

Within the Village	Cash		Labor		Resources	
	1989	1991	1989	1991	1989	1991
Donor						
1. None	14%	8%	3%	4%	4%	10%
2. In Household	61%	55%	25%	10%	18%	8%
3. Kin-Affines[a] beyond HH	20%	26%	58%	64%	59%	61%
4. 2+3 Friends & Elders[b]	6%	12%	14%	23%	20%	22%
Recipient						
1. None	34%	46%	9%	6%	0%	9%
2. In Household	51%	29%	21%	9%	15%	4%
3. Kin-Affines beyond HH	14%	23%	55%	68%	61%	65%
4. 2+3 & Others	0%	3%	15%	17%	24%	22%

[a] Represents an increase in sharing over "2. In household" category.
[b] Represents an increase in sharing over "2. In household" and over "3. Kin-affines" category.

Non-Natives, whether because of economic exigencies or for other reasons, increased the amount of labor they donated and received from persons beyond their own households. The increases in the sharing of cash and resources are negligible. It will be recalled that Natives dramatically increased the frequency and the recipients of their labor, resources, and, less so, cash. Natives, almost all of whom were born and reared near the villages in which they were interviewed, have a greater number of kinship and friendship obligations, are more actively engage in subsistence pursuits, and have less cash than non-Natives. The differences are important and serve to separate Natives from non-Natives.

The several measures of household size, composition and dynamics, rules for membership, and ages of household heads behave for non-Natives much as the same measures do for Natives (K17-K20). There were considerable changes in household sizes (K17) and compositions (K19) between 1989 and 1991. Ten percent of the households gained and 14 percent lost members. Compositions of 26 percent of the households were less stable. It is likely that the spill affected household dynamics, causing losses and gains of members. Compositions were affected because the gains in household members often were collateral kinspersons, more distant lineal kinspersons (grandparents or grandchildren), or nonkinspersons. It is interesting that changes in household composition mirror changes in claims about whether households observed explicit rules for membership and explicit expectations for behavior within the household: about 16 percent of persons who maintained that they observed explicit rules for membership and explicit expectations for behavior consonant with the Western model in 1989, espoused more fluid households with few explicit behavioral expectations in 1991 (K20). In this regard, respondents claiming to reside in households which blend Western and Native (open, fluid households) customs increased from 11 percent to 21 percent of the households. The fluctuation in household sizes, compositions, and even the integration of rules with current practices, are likely indicators of economic changes occasioned by the Exxon Valdez oil spill.

Item K18 measures changes in the ages of household heads, who are 1½ years older in 1991 than in 1989. Item K22 measures the stability of marriages: 8 percent of non-Native marriages dissolved between the 1989 and 1991 research waves (10% of the marriages among Native respondents dissolved in this period).

Non-Natives increased their participation in sodalities after the spill by about 10 percent. There was an increase of 15 percent in persons participating in two or more sodalities in 1991 (33% in 1989 to 48% in 1991). So, non-Native participation in sodalities increased, whereas Native participation decreased (from

30% who were active in two or more sodalities in 1989 to 5% in 1991). The reason for the drop in Native participation is not obvious, but the reason for the increase in non-Native participation may well be a consequence of participation in organizations of a wide variety that formed following the oil spill in the larger villages (see the ethnographic reports for Kenai, Cordova, and Kodiak in Social Indicators Study IV, Part 2 [HRAF 1993] for discussions of organizations created in response to the spill, problems which occurred following the spill and which were consequences of the spill, and the activities of members within those organizations).

Sodality participation may not be separable from participation in grass-roots political organizations, pressure groups that sought economic justice or fair compensation from Exxon following the spill, fishing organizations that sought environmental protection to avert serious consequences from future spills, or environmental groups which formed for reasons similar to, but not the same as, the reasons which prompted commercial fishermen to organize.

Actual political participation as measured by persons holding official political capacities (elected or appointed to government positions) within respondent households is small. Only 15 percent of the households have a member who holds a political position (K24). Between 1989 and 1991, about 10 percent of the households lost positions and 10 percent gained. The turnover--in city, borough, State, IRA, village corporation, or regional corporation officers and boards--is modest and coincident with elections.[82] Political participation in large villages provides few opportunities for office because there are few offices relative to the size of the population. We interpret K24, then, as reflecting modest change, wholly anticipated.

Knowledge of political issues is a hallmark of non-Native respondents (K25): 75 percent identified 2 or more political issues correctly in 1989 and 1991. Non-Natives, then, were much better informed than were Natives in 1989, but the two

[82]The IRA's (often village nonprofit corporations), village corporations, and regional corporations (profit and nonprofit) are not political organizations although members recognize them as such. The IRA's are the trickiest. In some villages, such as Karluk which has no city charter and is not incorporated as a city, the IRA serves as the local government. In some other villages, such as Unalakleet in the A and B Schedule, the IRA serves as the nonprofit corporation, but its decisions are followed almost uniformly by the city council in that government's deliberations and decision making.

populations were equally well informed on the political issues we posed to them in 1991. Our measures suggest that Natives became knowledgeable about political issues relevant to their lives and livelihoods in 1991 as a consequence of heightened political activities, especially in their relations with representatives of State and Federal agencies. We note that Natives thought Natives knew more than government officials or scientists about many environmental phenomena, and also favored Native control or State control over many of those phenomena. The rejection of government may well be an organic response to learning more about government, and confronting obstacles in dealing with government. Non-Natives, who know more about how government works and expect less from government because of this knowledge, remain willing to work with and to pressure, as best they can, government agencies.

Non-Natives much less often report that they profess a religion, or attend church on an occasional basis, or attend on a regular basis than do Natives. Indeed, non-Natives who do not profess a religion increased from 33 percent to 47 percent and persons who attended church services occasionally decreased from 39 percent to 24 percent. Frequent attenders remained the same in 1991 as in 1989. The drop-off in participation in extracurricular activities sponsored by church groups and auxiliaries is similar to the drop-off in religious participation. In 1989, 50 percent and in 1991, 72 percent of non-Natives participated in no extracurricular activities; and persons who participated in one or two activities either on an occasional or a regular basis dropped to 16 percent in 1991 from 42 percent in 1989. Native participation remained about the same.

It is plausible that Native practices are traditional and were unaffected by the spill. This interpretation fits the structure of religious participation by Natives in the A and B villages. The tailing off of non-Native attendance at religious services and participation in extracurricular activities may signal an increase in 1989 following the spill and a decrease thereafter. We do not possess data that will allow us to test this proposition.

The set of variables that measures ethical ideas and practices (K28-K31) yields significant differences between non-Natives and Natives. Native responses, it will be recalled, are weighted on the traditional-communitarian end of the ranks for each variable. Non-Natives are weighted toward the personal and family end of the ranks for each variable. The non-Native responses fit our expectations for non-Natives: for the most part they reflect Western ethics (Protestant and/or work ethic of democratic capitalism, development ethics in regard to the environment, and Western ethics in regard to the rearing of children and gender distinctions). There is, nevertheless, a modest change away from solely personal reasons and personal benefits for attaining and using skills (K28), and from a comprehension of the environment as commodity (K29), and from the sole practice of Western enculturation and gender customs (K31). Whether the change is chance variation or whether it is a consequence of reflection about the consequences of the oil spill for the environment and for family life in Alaska following a period in which assistance among neighbors was more widespread than in the prespill period is not known. The changes, however, fit a larger pattern of changes consequent to the spill which appear to be responsive to the spill. Table 10-8 juxtaposes Native and non-Native responses (percents) in 1989 and 1991 on three items measuring ethical ideas and practices.

Although 62 percent of non-Native respondents did not change their evaluation of the relation between schooling and success (K34) between 1989 and 1991 (54% thought the relation strong, 8% thought education occasionally correlated with success), 28 percent re-evaluated and changed their positions from "strong" association to "occasional" (18%) or to "no association" (10%). The changes which devalue the association, hence the value of educational achievement, are much different from the Native response. These responses, too, may reflect the consequences of the spill, especially personal and household losses of, perhaps, a wide variety of things, from jobs and equipment to income. Responses of non-Natives to this question in 1991 appear to be similar to the responses of well-educated Natives in A and B villages without regard to the spill. The response

Table 10-8

ETHICAL CODES FOR PERSONAL RESPONSIBILITY, ENVIRONMENT, ENCULTURATION, AND GENDER DISTINCTIONS, NATIVES AND NON-NATIVES, 1989-1991

K28 Ethical Responsibility for Attainment of Skills, Education, Profession

1991 ⇒ / 1989 ⇓	Native			Non-Native		
	Personal	Family	Fam&Village	Personal	Family	Fam&Village
Personal Succ.	5.5	16.5	5.5	16	18	7
Family Success	11.0	16.5	11.0	18	22	4
Village-Family Success	5.5	5.5	27.5	2	9	2

K29 Ethics and Significant Environmental Symbols

1991 ⇒ / 1989 ⇓	Native			Non-Native		
	Commodity	Blend	Spirit-Symbol	Commodity	Blend	Spirit-Symbol
Commodity	6.3	12.6	12.6	8.0	16.0	2.7
Blend	6.3	19.0	19.0	14.0	48.0	6.0
Spirit-Symbolic	6.3	6.3	12.6	2.7		2.7

K31 Enculturation and Gender Distinctions

1991 ⇒ / 1989 ⇓	Native			Non-Native		
	Western	Blend	Traditional	Western	Blend	Traditional
Western	10	20		73	18	2
Blend	10	25	20	4	2	
Traditional		10	5			

suggests either a more cynical or a more realistic assessment of the relation between achievement and success. The variable must be tested in multivariate hypotheses with other items that seem to reflect responses to the spill including the ethics variables.

Item K30, on the ethics of cooperation, is unreliable among non-Natives, much as it is unreliable among Natives.

Reliability is high in respondent (K37) and respondent's spouse's residence pattern (K37B). About 88 percent of the respondents and their spouses were born outside the region if not outside the State.

Non-Natives use a wider variety of helping services than do Natives, and the uses of those services increased between 1989 and 1991 (22% used no services in

1989, the percent dropping to 17 in 1991). A minor difference is that 20 percent of non-Natives reported using family and social services in 1991 as opposed to 17 percent in 1989. A major difference is that no Natives reported using family and social services (they restricted usage to health and financial services). The increased use of family and social services, as well as the increased use of helping services in general in 1991, suggests that the spill may have contributed to non-Natives' social service needs following the cleanup period.

Four percent of households who did not have trouble with appliances or utilities in 1989, reported that some of their appliances were not working in 1991. This, too, may be an indicator of problems, most likely economic, indirectly related to the spill.

The Nominal Variables: Responses to Q13A demonstrate that the majority of non-Natives who thought the Exxon Valdez oil spill was not unusual (i.e., more commonplace than exceptional) increased from 57 percent to 75 percent between 1989 and 1991. This may well be a function of knowledge of oil-transport practices, the readiness of spill-response teams and the equipment available to them, and the observation of State, Federal, and corporation behavior in the past spill. The changes in opinion are considerable.

Huge majorities of non-Natives in 1989 and 1991 thought that economic conflicts occurred following the spill (K33A) and that personal economic conflicts occurred following the spill (K33B). The percentage increased from 80 percent to 90 percent on personal economic conflicts. Because variation is so small and because so many frequents fall in a single cell, ϕ grossly underestimates the reliability of K33A and K33B. The reliability for K33A is 85 percent and for K33B is 70 percent.

In 1989 and 1991, most non-Natives correctly (71%) or incorrectly (3%) identified the objectives of the helping services with perfect reliability (K35). Eleven percent who made errors in 1989 correctly identified the services in 1991. This variable, too, should be integrated in multivariate hypotheses dealing with indicators of responses to the spill or other exogenous factors.

III. KIP LONGITUDINAL RELIABILITY: COMPARISON OF KODIAK-OLD HARBOR PRESPILL PANEL (KOKIPAN) AND EXXONKI POSTSPILL PANEL (EXXONKI.PAN)

The Kodiak Island prespill panel of KIP respondents was first interviewed in the winter of 1988 and reinterviewed in the winter of 1989. The Exxon Valdez postspill panel was first interviewed in the summer of 1989 and reinterviewed in the winter of 1991. As we have made clear, KOKIPAN respondents reside in the villages of Kodiak City and Old Harbor,[83] whereas EXXONKI.PAN respondents reside in Cordova, Valdez, Seldovia, Kenai, Tyonek, Chignik, Kodiak City, and Old Harbor.

In the previous section we demonstrated the marked differences between Native and non-Native responses to KIP items in the two postspill waves of the panel. In neither of the following columns in Table 10-9 are the panels subclassified into Native and non-Native. The longitudinal correlations, then, obscure the differences between Natives and non-Natives within the panels and between the panels. The reasons are heuristic for comparing the prespill and postspill longitudinal responses, regardless of differences in sample compositions. We ask whether the KIP items (K1-K41) that have been demonstrated to be most reliable and suffer the fewest threats to validity among all KIP samples, are equally reliable in the Kodiak prespill and the Exxon postspill sample. We anticipated less reliability in the postspill than the prespill sample as a consequence of the oil spill in 1989.

Respondents in the Kodiak Island panel were asked 37 of the 46 KIP questions which were posed to the respondents in the Exxon Valdez spill-area panel. Among those 37 items, the PRE scores for 18 are greater than .50 for both panels,[84] and for 2 items the PRE scores are less than .50 for both, but the differences between them are modest.[85] There are 17 items in which the differences between the PRE coefficients for the two samples are .20 or greater, and in which the PRE score for at

[83] I.A. KIP Reliability in the Kodiak Island Panel (KOKIPAN): Prespill with some Postspill Examples above assesses the Kodiak Island prespill panel. Only two respondents among the 16 interviewed in 1988 are members of the EXXONKI.PAN postspill panel.

[84] PRE coefficients ≥.50 for both panels: K3 K4 K5 K6 K9 K10 K15A K17 K18 K19 (.48 & .54) K22 K24 K26 K27 K31 K37 K37B K41.

[85] PRE coefficients for K2 K11A are ≤.50, but about equal in the proportional reduction of error for each panel.

Table 10-9

LONGITUDINAL CORRELATIONS, KODIAK PRESPILL PANEL, (KODIAK-OLD HARBOR [$N = 14$]), AND EXXONKI PANEL (KODIAK ISLAND-COOK INLET-PRINCE WILLIAM SOUND-ALASKA PENINSULA [$N = 72$]), PROTOCOL INSTRUMENT, 1989S-1991W[a]

	RELIABILITY KOKIPAN PRESPILL	RELIABILITY EXXONKI.PAN POSTSPILL
NOMINAL VARIABLES (ϕ)	88W*89W ϕ_{12}	89S*91W ϕ_{12}
Q13A EXXON VALDEZ UNUSUAL?	NA	.02
K33A ECONOMIC CONFLICTS	.26	.01
K33B PERSONAL ECONOMIC CONFLICTS	NA	.16
K35 PERCEIVED OBJECTIVES OF SERVICES	1.00	.17
ORDINAL VARIABLES (γ)	γ_{12}	γ_{12}
K1 HARVEST EXPENSES	.35	.66
K2 VARIETY OF HARVESTED SPECIES	.37	.43
K3 HARVESTED PROTEIN IN DIET	.85	.67
K4 HOUSEHOLD INCOME	.65	.65
K5 HOUSEHOLD EARNED INCOME	.77	.81
K6 HOUSEHOLD UNEARNED INCOME	.85	.85
K7 GOVERNMENT SOURCES OF INCOME	NA'89	.74
K8 NON-GOVERNMENT SOURCE OF INCOME	NA'89	.57
K9 STABILITY OF EARNED INCOME	1.00	.78
K10 STABILITY OF UNEARNED INCOME	1.00	.51
K11A INCOME GIVING IN VILLAGES	.37	.24
K11B INCOME RECEIVING IN VILLAGES	.79	:31
K12A INCOME GIVING BETWEEN VILLAGES	NA'89	.93
K12B INCOME RECEIVING BETWEEN VILLAGES	NA'89	.19
K13A LABOR GIVING IN VILLAGES	.31	.12
K13B LABOR RECEIVING IN VILLAGES	.38	.14
K14A LABOR GIVING BETWEEN VILLAGES	.89	.07
K14B LABOR RECEIVING BETWEEN VILLAGES	1.00	.32
K15A RESOURCE GIVING IN VILLAGES	.68	.52
K15B RESOURCE RECEIVING IN VILLAGES	-.36	.23
K16A RESOURCE GIVING BETWEEN VILLAGES	.47	.69
K16B RESOURCE RECEIVING BETWEEN VILLAGES	.33	.73
K17 HOUSEHOLD SIZE	1.00	.85
K18 AGE OF HOUSEHOLD HEAD	1.00	.92
K19 HOUSEHOLD COMPOSITION AND DYNAMICS	.48	.54
K20 RULES FOR DYNAMICS	NA'89	.19
K22 DIVORCE OR SEPARATION	1.00	.97
K23 SODALITY MEMBERSHIP	NA'89	.68
K24 POLITICAL PARTICIPATION	1.00	.86

[a]Longitudinal correlations (reliability) for the Kodiak panel (KOKIPAN) measure two intervals prior to the Exxon Valdez oil spill (two waves:1988W, 1989W). Longitudinal correlations for the Exxon Valdez spill-area sample (EXXONKI.PAN) measure two intervals following the Exxon Valdez oil spill (two waves: 1989S, 1991W). Longitudinal correlations (reliability) are expressed as γ_{12} for ordinal variables. Reliability for nominal variables is derived from Pearson's Phi (ϕ_{12}).

Table 10-9 (continued)

ORDINAL VARIABLES (γ)		RELIABILITY KOKIPAN PRESPILL 88W*89W γ_{12}	RELIABILITY EXXONKI.PAN POSTSPILL 89S*91W γ_{12}
K25	IDENTIFICATION OF POLITICAL ISSUES	.33	.72
K26	RELIGIOUS PARTICIPATION	.77	.77
K27	EXTRACURRICULAR RELIGIOUS PARTICIPATION	.93	.84
K28	RESPONSIBILITY FOR ATTAINMENT	.47	.26
K29	ETHICS AND ENVIRONMENTAL SYMBOLS	.78	.12
K30	ETHICS OF COOPERATION	.72	.09
K31	ENCULTURATION AND GENDER DISTINCTIONS	1.00	.77
K32	EXPECTATIONS FOR DEVELOPMENT	NA'89	?
K34	SCHOOLING AND SUCCESS	1.00	.48
K37	RESPONDENT RESIDENCE PATTERN	.95	.91
K37B	SPOUSE RESIDENCE PATTERN	.56	.99
K39	SERVICES USED BY RESPONDENT	.32	.07
K41	UTILITIES IN HOUSE	1.00	.88

least one of the panels is less than .50. The largest discrepancies among these 17 are items which we anticipated would reflect changes wrought by the oil spill.

Inasmuch as the Exxon panel was assessed at some length in the preceding section, we will not repeat the complete analysis of the each item (see also Table 10-1 above). Item K33A, the measure of economic conflicts, yields a PRE score near zero for the Exxon panel. We attribute the low PRE score to increased conflicts and changed assessments of the conflicts during and following the winter of 1989-90. Item K35, the measure of perceived objectives of services changed not at all between 1988W and 1989W, but changed dramatically between 1989S and 1991W almost surely because of the increased use of financial and family services by non-Native respondents, or perhaps by an increased knowledge of those services because of the increased demand for their use by friends, relatives, and associates after the summer of 1989.

Item K1 (the measure of total household income invested in harvest expenses) varied considerably between 1988W and 1989W, less so between 1989S and 1991W. The greatest variation in the 1991W sample was registered among

Natives, 25 percent of whom invested greater proportions of their incomes into subsistence resources (while gaining less wild proteins in so doing). Item K11B (income giving between villages) showed little variation between 1988W and 1989W, but marked variation between 1989S and 1991W. Natives received more from persons beyond their own kinship-affinal networks and so did non-Natives, but the proportion of non-Natives who received no cash at all from any relative or friend also increased. The measure of receipt of cash within the village very firmly suggests wider and more extensive patterns of sharing.

Items K13A-K14B (assessing the giving and receiving of labor within and from outside the village) likewise reflect considerable changes between 1989S and 1991W postspill responses. Non-Natives shared labor somewhat more widely beyond their households in 1991 than was the case in 1989, and Natives shared labor much more widely beyond their households in 1991W than 1989S. Resource sharing within and between villages for non-Natives remained about the same in 1998W as it had in 1989W, but for Natives giving resources, particularly within the village, sharing was greatly expanded in 1991W over 1989S. The contrasts with the Kodiak Island panel are marked, principally because the Kodiak Island panel is dominated by non-Natives, many of whom shared little or nothing in 1988W and 1989W, whereas the Natives in the sample were frequent sharers.

Identification of political issues are normally high for non-Natives. In 1988W and 1989S, this was the case. Change, as reflected in the 1988W-1989W PRE coefficient and the 1989S-1991W PRE coefficient, is caused by increased correct identifications by Natives. The spill almost surely accounts for the higher rates of correct identification of political issues by Natives in 1989S and 1991W.

We noted marked changes between 1989S and 1991W among the responses to the ethical ideas and practices questions among Exxon panel respondents (K28-K30). Responses to K30 in the Exxon panel contain so many reversals as to represent a threat to validity, so we will excise it from our inquiry, even though the item behaved well in the A and B Schedule. Items K28 and K29, which yield sufficiently high PRE scores in 1988W-1989W, yield low positive scores in the

Exxon panel. We attribute the change in both variables principally to a shift by Natives away from personal and family responsibilities and obligations, toward responsibilities throughout the village, and to a shift toward symbolic-spiritual assessment of the environment. Non-Natives, too, demonstrate a very modest shift in these directions between 1989 and 1991.

The services used by respondents, especially the variety of services, increased for non-Natives between 1989 and 1991 and account for differences with the 1988W-1989W responses. The spill surely affected the increased and wider use of family social services by non-Natives.

IV. OVER-TIME RELIABILITY AND STABILITY IN THE SOCIAL EFFECTS OPPORTUNITY SAMPLE OF THE EXXONKI PANEL, 1992

The ADF&G's Social Effects data for 1992 included reinterviews of 48 respondents in the EXXONKI panel (72*N*). Ten questions similar to KIP questions were asked, allowing us here to measure the over-time reliability and stability of those ten questions on a subsample of the EXXONKI sample. Table 10-10 demonstrates the longitudinal correlations, reliability, and stability coefficients for the ten KIP items, and also for the sex, race, and age of the respondents.

This version of the EXXONKI panel has a larger proportion of non-Natives (85% to 72%), and has a larger proportion of males (57% to 51%) than the larger EXXONKI panel studied in 1989S and 1991W. These differences, alone, influence the 1992 measures and render comparisons with the larger panel incommensurable. Thus, the responses of the 48 panel members are correlated for the 1989, 1991, and 1992 research waves so as not to confuse readers. But because the sample is so small, **Native** vs. **non-Native** contrasts are not introduced in Table 10-10. Comparisons between Natives and non-Natives will be introduced as is necessary to generate concluding hypotheses or to account for differences from the results from the larger EXXONKI panel.

Although the panel is a small opportunity sample of the original EXXONKI sample, the coefficients have heuristic value. Item Q12C measures whether respondents think the Exxon Corporation did "nothing," "few," "many," or "all" things within its power to mitigate the consequences of the oil spill. Between 1989 and

Table 10-10

STABILITY, RELIABILITY, AND LONGITUDINAL CORRELATIONS, SUBSET OF EXXONKI PANEL (*N48*), THREE RESEARCH WAVES: 1989S, 1991W, 1992W[a]

		Reliability EXXONKI 89S*91W	Reliability EXXONKI 91W*92W	Reliability EXXONKI 89S*92W	REL R_{13}	STA S_{13}
NOMINAL VARIABLES (ϕ)						
Sex		1.00	1.00	1.00	1.00	1.00
Race/Ethnicity		1.00	1.00	1.00	1.00	1.00
ORDINAL VARIABLES (γ)						
Q12C	Exxon Valdez Response	.35	.72	.38	.11	1.23
Q16B	Spill disputes fishing v. others?	.45	.83	1.00	.36	1.71
K4	Household incomeaa	.74	.58	.54	.82	.66
K11A	Income giving in villages	.38	.32	.13	.37	.35
K13A	Labor giving in villages	.37	.09	.25	.23	.87
K15A	Resource giving in villages	.35	.04	.29	.12	2.49
K17	Household size	.90	.92	.93	.99	.84
K24	Political participation	.91	.85	.83	.67	.69
K26	Religious participation	.78	.70	.79	.57	1.13
AGE	Respondent age category	1.00	1.00	1.00	1.00	1.00

[a]The EXXONKI panel (*N48*) here is a 62 percent opportunity sample of the EXXONKI panel (*N72*) analyzed above. The longitudinal correlations, reliability (R_{13}), and stability (S_{13}) coefficients measure three intervals following the Exxon Valdez oil spill of March 24, 1989. Longitudinal correlations for dichotomous nominal variables are obtained with phi (ϕ). Longitudinal correlations for the ordinal variables are obtained with Goodman and Kruskal's gamma (γ). Reliability and stability coefficients are obtained from Pearsonian r correlations (not shown).

1991 respondents raised their estimations of Exxon's efforts to mitigate the spill's consequences, but in 1992 respondents lowered their estimations of Exxon's efforts: 62 percent in 1989, 40 percent in 1991, and 69 percent in 1992 thought Exxon had exercised few or none of the resources within its power to mitigate the spill. The longitudinal correlations, although positive, are relatively low, and the over-time reliability and stability suggest change in assessments. Whether the changes are conditioned by unmeasured factors, such as protracted damage litigation or slow environmental recovery, both of which topics receive media attention in Alaska, is not known.

Whereas the majority of Native respondents in 1992 maintained their 1989 and 1991 assessments of Exxon's performance (75% thought Exxon had exercised few or none of its resources to mitigate the spill), non-Natives vacillated from their 1991 assessments (57% thought that Exxon had deployed many or all of the resources within its powers to mitigate the consequences of the spill) and returned to their 1989 assessments (about 65% thought that Exxon had used few or none of the resources within its powers to mitigate the spill's consequences).

Cognitive assessments about whether the oil spill caused altercations between commercial fishermen and noncommercial fishermen (Q16B) generated very high longitudinal PRE coefficients for 1991-1992 and 1989-1992, but only marginal over-time reliability and stability coefficients. Only 9 of the 48 respondents answered this question in 1992. The high, positive PRE scores for the two measures of 1992 (1989-1992, 1991-1992) merely demonstrate that those nine persons did not change their assessments between 1989 and 1992, and between 1991 and 1992 on this question. Five of the 9 thought that a few disputes occurred, 1 thought many had occurred, and 3 denied that disputes had occurred in each of the three measures (1989-1992).

As is expected of panels, household sizes (K17), incomes (K4), political participation (K24), and religious participation (K26) are rather stable. The first two are closely related. Income is of more interest here than are the other measures.

Average household incomes (K4) near $35,000 were rather stable over the 1989S-1992W period. They dropped between 1989S and 1991W by $1,300, reflecting the general depression of the prices of fish and the general turndown of Alaska's economy. Panel respondent incomes increased between 1991W and 1992W on average by $2,400, yet 23 percent of respondents reported incomes of less than $20,000 during 1991-1992. The proportion of persons whose incomes were less than $20,000 and those whose incomes were more than $60,000 increased significantly between 1991 and 1992. The respondents who maintained high incomes throughout the three waves were predominantly employed in the public sector. Persons whose incomes were low throughout the three waves were predominantly Natives (unemployed elders and women), or single men. Persons whose incomes increased in 1992 were predominantly non-Natives and predominantly engaged in commercial fishing, although some self-employed persons' (entrepreneurs) incomes also increased.

Political participation (K24) and religious participation (K26) are also very stable: most respondents had no official political capacity in 1989, 1991, or 1992; and most non-Natives either did not profess religious membership or attended religious ceremonies only occasionally, whereas most Natives regularly attended religious ceremonies.

The Social Effects researchers collected information on some of the variables that are intended to measure the extent and amount of sharing within and between households. Information was collected on "giving" but not "receiving" income (cash) (K11A), labor (K13A), and resources (K15A). Longitudinal coefficients for each of the three variables are low, as are the over-time reliability and stability measures. Natives continued to engage in large amounts of sharing of labor and resources beyond the household but the amount of giving to persons in other villages decreased between 1991 and 1992. Non-Natives reported a decrease in giving cash, labor, and resources beyond the household. The increase in giving (K11A, K13A, and K15A) reported by non-Natives in 1991 (over 1989) correlates with increases in income and single males. The low reliability and low stability measures for these variables are expected for non-Natives: giving appears to have been influenced by economic exigencies.

V. EXCLUSION AND RETENTION OF KIP ITEMS ON THE BASIS OF LONGITUDINAL RELIABILITY AND STABILITY TESTS

V.A. KIP Items To Be Dropped from Further Consideration

Four KIP items failed our test for longitudinal reliability, and two KIP items performed well among non-Native respondents, but not among Native respondents. We will retain the items that performed in a satisfactory fashion among non-Native respondents for further testing with data collected by ADF&G researchers in 1992.

V.A.1. KIP Items That Failed Part of the Longitudinal Reliability Tests and Will Be Retained for More Testing

The following KIP items will be retained for more testing:

Q13A	Exxon Valdez unusual?
K33B	Personal Economic Conflicts

V.A.2. KIP Items That Failed the Longitudinal Reliability Tests and Will Not Be Retained for the Social Indicators Analysis

The following KIP items will not be retained for the Social Indicators Analysis:

Q6	Acquisition of Knowledge	Q10	Treatment of Elders
Q16B	Spill Cause Disputes, Fishing vs. Other?	K30	Ethics of Cooperation

V.B. KIP Items That Passed the Longitudinal Reliability Tests and Will Be Retained for the Analysis of Social Indicators[86]

Q2A1	WALRUS, MANAGE?
Q2A2	WALRUS, WHO SHOULD MANAGE?
Q2B1	BOWHEAD, MANAGE?
Q2B2	BOWHEAD, WHO SHOULD MANAGE?
Q2D1	SALMON, MANAGE?
Q2D2	SALMON, WHO SHOULD MANAGE?
Q2G1	HALIBUT, MANAGE?
Q2G2	HALIBUT, WHO SHOULD MANAGE?
Q2K1	TANNER CRAB, MANAGE?
Q2K2	TANNER CRAB, WHO SHOULD MANAGE?
Q2N1	MOOSE, MANAGE?
Q2N2	MOOSE, WHO SHOULD MANAGE?
Q2R1	DUCKS, MANAGE?
Q2R2	DUCKS, WHO SHOULD MANAGE?
Q3A	MANAGEMENT OF WALRUS
Q3C	MANAGEMENT OF BOWHEAD
Q3D	MANAGEMENT OF POLAR BEAR
Q3F	MANAGEMENT OF MOOSE
Q3H	MANAGEMENT OF SALMON
Q3J	MANAGEMENT OF BOTTOMFISH
Q3K	MANAGEMENT OF CRABS
Q4A	INFLUENCE OVER SALMON
Q51A	KNOWLEDGE TO UNDERSTAND WATER
Q51E	KNOWLEDGE TO UNDERSTAND LAND MAMMALS
Q51F	KNOWLEDGE TO UNDERSTAND FISH
Q51G	KNOWLEDGE TO UNDERSTAND SEA MAMMALS
Q51H	KNOWLEDGE TO UNDERSTAND INVERTEBRATES
Q7	ENVIRONMENTAL SYMBOLS
Q8A	DRILLING ATTITUDES
Q8B	PUMPING ATTITUDES
Q8C	TRANSPORT ATTITUDES
Q8D	PIPELINE ATTITUDES
Q8E	ENCLAVE ATTITUDES
Q8F	RECREATION ATTITUDES
Q9	MEMORIES OF SHARING
Q12A	FEDERAL EXXON VALDEZ RESPONSE
Q12B	STATE EXXON VALDEZ RESPONSE
Q12C	EXXON EXXON VALDEZ RESPONSE
???Q13A	EXXON VALDEZ UNUSUAL?
Q13B	SIMILAR EVENTS OCCUR LATER?
Q14A	LATER RESPONSES
Q15	SPILL AFFECT INCOME?
Q16A	SPILL CAUSE FISHING DISPUTES?
K1	HARVEST EXPENSES
K2	VARIETY OF HARVESTED SPECIES
K3	HARVESTED PROTEIN IN DIET
K4	HOUSEHOLD INCOME
K5	HOUSEHOLD EARNED INCOME
K6	HOUSEHOLD UNEARNED INCOME
K7	GOVERNMENT SOURCES OF INCOME
K8	NON-GOVERNMENT SOURCE OF INCOME
K9	STABILITY OF EARNED INCOME
K10	STABILITY OF UNEARNED INCOME
K11A	INCOME GIVING IN VILLAGES
K11B	INCOME RECEIVING IN VILLAGES
K12A	INCOME GIVING BETWEEN VILLAGES
K12B	INCOME RECEIVING BETWEEN VILLAGES
K13A	LABOR GIVING IN VILLAGES
K13B	LABOR RECEIVING IN VILLAGES
K14A	LABOR GIVING BETWEEN VILLAGES
K14B	LABOR RECEIVING BETWEEN VILLAGES
K15A	RESOURCE GIVING IN VILLAGES
K15B	RESOURCE RECEIVING IN VILLAGES
K16A	RESOURCE GIVING BETWEEN VILLAGES
K16B	RESOURCE RECEIVING BETWEEN VILLAGES
K17	HOUSEHOLD SIZE
K18	AGE OF HOUSEHOLD HEAD
K19	HOUSEHOLD COMPOSITION AND DYNAMICS
K20	RULES FOR DYNAMICS
K22	DIVORCE OR SEPARATION
K23	SODALITY MEMBERSHIP
K24	POLITICAL PARTICIPATION
K25	IDENTIFICATION OF POLITICAL ISSUES
K26	RELIGIOUS PARTICIPATION
K27	EXTRACURRICULAR RELIGIOUS PARTICIPATION
K28	RESPONSIBILITY FOR ATTAINMENT
K29	ETHICS AND ENVIRONMENTAL SYMBOLS
K31	ENCULTURATION AND GENDER DISTINCTIONS
K32	EXPECTATIONS FOR DEVELOPMENT
K33A	ECONOMIC CONFLICTS
???K33B	PERSONAL ECONOMIC CONFLICTS
K34	SCHOOLING AND SUCCESS
K35	PERCEIVED OBJECTIVES OF SERVICES
K37	RESPONDENT RESIDENCE PATTERN
K37B	SPOUSE RESIDENCE PATTERN
K39	SERVICES USED BY RESPONDENT
K41	UTILITIES IN HOUSE

[86]Items Q13A and K33B must be tested further (see text).

CHAPTER 11
KIP TESTING ARTIFACTS AS A THREAT TO VALIDITY AND AS A MEASURE OF CHANGE

I. INTRODUCTION

In Chapters 2, 4, and 6, we present the rationale for embedding panels in our pretest-posttest research design. Panels can avert threats to validity in pretest-posttest designs posed by the "ecological fallacy" ("specification error"). Yet reinterview responses from panel respondents also pose threats to validity, the principal one being "reactivity." That is, persons are conditioned to respond to retests on the basis of their responses to previous tests on the same items. If a pretest generates a reaction that creates bias, the assumptions of the statistics that we employ to measure change have been violated (see Social Indicators Study II, Methodology, Chap. 10 [Jorgensen 1993] for an extensive treatment of testing artifacts as a threat to validity in the Social Indicators research design).

To avoid specification error in the KIP portion of our Exxon Valdez spill area research, the EXXONKI panel comprising 72 respondents was selected at random from the postspill pretest sample (216*N*). The EXXONKI panel comprises 30 percent of the pretest sample. The rationale is that upon reinterviewing, the responses of panel members can be attributed to the larger universe from which the panel was selected. Thus, if changes are measured between the initial interview and the first reinterview, or between the first reinterview and the second reinterview (or between the initial interview and the second reinterview, and so forth), it is assumed that the changes that appear in the panel reflect changes in the universe. If no changes occur, we infer that no changes have occurred in the universe.

The problem with inferences such as these, is that we have no measure of whether the responses are simple functions of regression toward a mean for each item (persons unwittingly changing responses--some higher and some lower than their initial responses), or whether the responses have been conditioned by the pretest so that they reflect bias (for example, exceptional stability in responses), or whether the responses are measuring what the question is intended to measure.

The posttest sample is important here. Similar to the pretest sample, the posttest sample comprises persons who previously have not been interviewed. On one hand, posttest responses are not subject to reactivity bias. On the other, one cannot interpret differences in responses between pretest and posttest samples as representing changes nor interpret similarities in responses of the two samples as absent of change. To attribute to the pretest change or similarity over time from posttest responses when respondents in each sample have been interviewed once and only once (the posttest sample must be drawn without replacement from the pretest sample) is to commit "specification error," that is, to erroneously specify that the results from group B are attributable to group A.

A way around this conundrum is to reinterview panel respondents and to interview posttest respondents on the same items at the same point in time, then to test for the similarity or difference in their respective responses to each question. If the difference between the pretest and the posttest response on the same item is significant, but the difference between the posttest and second wave of the panel is not significant, we infer that the difference between pretest and posttest represents change and is not a fortuity, not a random occurrence, and not a function of regression. We also infer that reactivity is not operating in the panel, and that panel results can be attributed to pretest respondents. Thus, testing for "test artifacts" allows us to test for reactivity (and regression and fortuitous results) and to avert threats to validity posed by specification error.

One caveat: every panel in our project appears to be more stable than the pretests from which they were drawn and the posttests with which they are compared. So we expect some differences between sample respondents and panel respondents in stability of employment, stability of earned income, stability of unearned income, age of respondents, and participation in various social, political, and religious affairs. Any differences should demonstrate that panel respondents are somewhat more stable than their counterparts in the pretest and posttest samples.

Table 11-1 provides the univariate distributions for KIP items for the pretest sample (1989S, 216*N*), posttest sample (1991W, 100*N*), and the second wave of

Table 11-1

FREQUENCY DISTRIBUTIONS AND SIGNIFICANCE OF DIFFERENCES, 118 KEY INFORMANT PROTOCOL VARIABLES, PRETEST (1989), POSTTEST (1991), AND PANEL (SECOND RESEARCH WAVE, 1991)[a]

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q2A1 WALRUS, MANAGE?			
ONLY GOD CAN MANAGE	4.2%	3.3%	6.0%
NO PERSON CAN MANAGE	1.2%	6.5%	6.0%
NO INSTITUTION CAN MANAGE	1.2%	0.0%	0.0%
PERSONS CAN MANAGE	6.6%	8.7%	9.0%
INSTITUTIONS CAN MANAGE	86.8%	81.5%	79.1%
Q2A2 WALRUS, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	41.9%	42.6%	47.1%
VARIOUS FEDERAL AGENCIES	15.6%	3.2%	5.9%
COMBINATION OF GOVERNMENT & NATIVES	28.8%	34.0%	22.1%
NATIVE ORGANIZATIONS	5.0%	9.6%	10.3%
LOCAL NATIVES	8.8%	10.6%	14.7%
Q2B1 BOWHEAD, MANAGE?			
ONLY GOD CAN MANAGE	3.6%	3.3%	5.9%
NO PERSON CAN MANAGE	1.8%	6.6%	7.4%
NO INSTITUTION CAN MANAGE	1.2%	9.9%	0.0%
PERSONS CAN MANAGE	6.6%	80.2%	8.8%
INSTITUTIONS CAN MANAGE	86.7%		77.9%
Q2B2 BOWHEAD, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	38.1%	41.9%	45.6%
VARIOUS FEDERAL AGENCIES	20.6%	4.3%	8.8%
COMBINATION OF GOVERNMENT & NATIVES	28.8%	34.4%	22.1%
NATIVE ORGANIZATIONS	4.4%	8.6%	8.8%
LOCAL NATIVES	8.1%	10.8%	14.7%
Q2D1 SALMON, MANAGE?			
ONLY GOD CAN MANAGE	6.2%	3.2%	5.7%
NO PERSON CAN MANAGE	1.4%	6.5%	7.1%
NO INSTITUTION CAN MANAGE	1.0%	0.0%	0.0%
PERSONS CAN MANAGE	9.6%	8.6%	8.6%
INSTITUTIONS CAN MANAGE	81.8%	81.7%	78.6%
Q2D2 SALMON, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	69.7%	59.6%	66.2%
VARIOUS FEDERAL AGENCIES	2.0%	0.0%	1.5%
COMBINATION OF GOVERNMENT & NATIVES	18.9%	24.5%	16.2%
NATIVE ORGANIZATIONS	3.0%	5.3%	2.9%
LOCAL NATIVES	6.5%	10.6%	13.2%

[a]Significance of differences ≤.10 are designated by * for Pretest v. Posttest, and + for Posttest v. Panel. The Kolmogorov-Smirnov test for two independent samples is used for ordinal variables. The differences of proportions test (X^2) is used for dichotomous nominal variables.

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q2E1 HERRING, MANAGE?			
ONLY GOD CAN MANAGE	6.3%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	1.5%	0.0%	0.0%
PERSONS CAN MANAGE	10.2%	8.7%	8.7%
INSTITUTIONS CAN MANAGE	81.0%	81.5%	78.3%
Q2E2 HERRING, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	71.9%	62.0%	67.2%
VARIOUS FEDERAL AGENCIES	1.5%	0.0%	1.5%
COMBINATION OF GOVERNMENT & NATIVES	18.4%	23.9%	14.9%
NATIVE ORGANIZATIONS	2.6%	4.3%	3.0%
LOCAL NATIVES	5.6%	9.8%	13.4%
Q2F1 COD, MANAGE?			
ONLY GOD CAN MANAGE	7.4%	3.3%	7.2%
NO PERSON CAN MANAGE	1.5%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	1.0%	0.0%	0.0%
PERSONS CAN MANAGE	9.4%	8.7%	8.7%
INSTITUTIONS CAN MANAGE	80.7%	81.5%	78.3%
Q2F2 COD, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	70.5%	60.4%	64.2%
VARIOUS FEDERAL AGENCIES	2.1%	1.1%	4.5%
COMBINATION OF GOVERNMENT & NATIVES	19.2%	24.2%	14.9%
NATIVE ORGANIZATIONS	1.6%	4.4%	3.0%
LOCAL NATIVES	6.7%	9.9%	13.4%
Q2G1 HALIBUT, MANAGE?			
ONLY GOD CAN MANAGE	6.3%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	1.0%	0.0%	0.0%
PERSONS CAN MANAGE	9.8%	8.7%	8.7%
INSTITUTIONS CAN MANAGE	82.0%	81.5%	78.3%
Q2G2 HALIBUT, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	70.6%	60.4%	59.7%
VARIOUS FEDERAL AGENCIES	3.0%	1.1%	10.4%
COMBINATION OF GOVERNMENT & NATIVES	18.3%	24.2%	13.4%
NATIVE ORGANIZATIONS	2.0%	4.4%	3.0%
LOCAL NATIVES	6.1%	9.9%	13.4%
Q2I1 KING CRABS, MANAGE?			
ONLY GOD CAN MANAGE	5.4%	3.3%	7.2%
NO PERSON CAN MANAGE	.5%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	.5%	0.0%	1.4%
PERSONS CAN MANAGE	10.3%	8.7%	8.7%
INSTITUTIONS CAN MANAGE	83.3%	81.5%	76.8%
Q2I2 KING CRABS, SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	74.6%	59.3%	67.6%
VARIOUS FEDERAL AGENCIES	3.0%	2.2%	1.5%
COMBINATION OF GOVERNMENT & NATIVES	15.7%	24.2%	16.2%
NATIVE ORGANIZATIONS	2.0%	4.4%	2.9%
LOCAL NATIVES	4.6%	9.9%	11.8%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q2J1 SNOW CRABS, MANAGE?			
ONLY GOD CAN MANAGE	5.4%	2.2%	7.4%
NO PERSON CAN MANAGE	.5%	6.0%	5.9%
NO INSTITUTION CAN MANAGE	.5%	0.0%	1.5%
PERSONS CAN MANAGE	9.9%	8.7%	8.8%
INSTITUTIONS CAN MANAGE	83.7%	82.6%	76.5%
Q2J2 SNOW CRABS, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	74.4%	57.1%	68.2%
VARIOUS FEDERAL AGENCIES	3.1%	0.0%	1.5%
COMBINATION OF GOVERNMENT & NATIVES	15.9%	27.5%	15.2%
NATIVE ORGANIZATIONS	2.1%	4.4%	3.0%
LOCAL NATIVES	4.6%	11.0%	12.1%
Q2K1 TANNER CRABS, MANAGE?			
ONLY GOD CAN MANAGE	5.4%	2.2%	7.2%
NO PERSON CAN MANAGE	.5%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	.5%	0.0%	1.4%
PERSONS CAN MANAGE	9.9%	8.7%	8.7%
INSTITUTIONS CAN MANAGE	83.7%	82.6%	76.8%
Q2K2 TANNER CRABS, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	*74.4%	58.1%	67.6%
VARIOUS FEDERAL AGENCIES	3.1%	0.0%	1.5%
COMBINATION OF GOVERNMENT & NATIVES	15.9%	26.9%	16.2%
NATIVE ORGANIZATIONS	2.1%	4.3%	2.9%
LOCAL NATIVES	4.6%	10.8%	11.8%
Q2M1 CARIBOU, MANAGE?			
ONLY GOD CAN MANAGE	5.1%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	4.3%
NO INSTITUTION CAN MANAGE	1.0%	0.0%	0.0%
PERSONS CAN MANAGE	6.6%	9.8%	8.7%
INSTITUTIONS CAN MANAGE	86.4%	80.4%	79.7%
Q2M2 CARIBOU, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	*72.4%	54.8%	63.6%
VARIOUS FEDERAL AGENCIES	1.0%	0.0%	1.5%
COMBINATION OF GOVERNMENT & NATIVES	20.3%	28.0%	18.2%
NATIVE ORGANIZATIONS	2.1%	4.3%	3.0%
LOCAL NATIVES	4.2%	12.9%	13.6%
Q2N1 MOOSE, MANAGE?			
ONLY GOD CAN MANAGE	5.0%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	4.3%
NO INSTITUTION CAN MANAGE	.5%	0.0%	0.0%
PERSONS CAN MANAGE	8.5%	9.8%	8.7%
INSTITUTIONS CAN MANAGE	84.9%	80.4%	79.7%
Q2N2 MOOSE, SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	*71.4%	55.9%	64.2%
VARIOUS FEDERAL AGENCIES	1.1%	0.0%	1.5%
COMBINATION OF GOVERNMENT & NATIVES	21.2%	26.9%	17.9%
NATIVE ORGANIZATIONS	2.1%	4.3%	3.0%
LOCAL NATIVES	4.2%	12.9%	13.4%

Table 11-1 (continued)

Key Informant Protocol Variables	*Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q2Q1 GEESE, MANAGE?			
ONLY GOD CAN MANAGE	7.2%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	.5%	0.0%	0.0%
PERSONS CAN MANAGE	9.7%	9.8%	10.1%
INSTITUTIONS CAN MANAGE	81.6%	80.4%	76.8%
Q2Q2 GEESE, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	*49.2%	50.0%	58.8%
VARIOUS FEDERAL AGENCIES	24.6%	7.4%	8.8%
COMBINATION OF GOVERNMENT & NATIVES	18.6%	28.7%	17.6%
NATIVE ORGANIZATIONS	2.5%	4.3%	2.9%
LOCAL NATIVES	5.0%	9.6%	11.8%
Q2R1 DUCKS, MANAGE?			
ONLY GOD CAN MANAGE	7.2%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	1.0%	0.0%	0.0%
PERSONS CAN MANAGE	9.6%	9.8%	10.1%
INSTITUTIONS CAN MANAGE	81.3%	80.4%	76.8%
Q2R2 DUCKS, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	48.7%	50.0%	58.8%
VARIOUS FEDERAL AGENCIES	23.6%	7.4%	8.8%
COMBINATION OF GOVERNMENT & NATIVES	19.6%	28.7%	17.6%
NATIVE ORGANIZATIONS	2.5%	4.3%	2.9%
LOCAL NATIVES	5.5%	9.6%	11.8%
Q2S1 SWANS, MANAGE?			
ONLY GOD CAN MANAGE	7.4%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	.5%	0.0%	0.0%
PERSONS CAN MANAGE	8.9%	9.8%	10.1%
INSTITUTIONS CAN MANAGE	82.3%	80.4%	76.8%
Q2S2 SWANS, WHO SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	48.7%	50.0%	57.4%
VARIOUS FEDERAL AGENCIES	25.1%	7.4%	10.3%
COMBINATION OF GOVERNMENT & NATIVES	19.0%	28.7%	17.6%
NATIVE ORGANIZATIONS	2.6%	4.3%	2.9%
LOCAL NATIVES	4.6%	9.6%	11.8%
Q2T1 CRANES, MANAGE?			
ONLY GOD CAN MANAGE	7.9%	3.3%	7.2%
NO PERSON CAN MANAGE	1.0%	6.5%	5.8%
NO INSTITUTION CAN MANAGE	.5%	0.0%	0.0%
PERSONS CAN MANAGE	8.4%	9.8%	10.1%
INSTITUTIONS CAN MANAGE	82.3%	80.4%	76.8%
Q2T2 CRANES, SHOULD MANAGE?			
ALASKA DEPARTMENT OF FISH & GAME	48.4%	50.0%	58.8%
VARIOUS FEDERAL AGENCIES	25.0%	7.4%	8.8%
COMBINATION OF GOVERNMENT & NATIVES	19.3%	28.7%	17.6%
NATIVE ORGANIZATIONS	2.6%	4.3%	2.9%
LOCAL NATIVES	4.7%	9.6%	11.8%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q3A MANAGEMENT OF WALRUS			
POORER THAN NATIVES	12.2%	24.2%	20.3%
EQUIVALENT TO NATIVES	25.6%	20.2%	15.9%
BETTER THAN NATIVES	62.2%	54.7%	63.8%
Q3B MANAGEMENT OF SEALS			
POORER THAN NATIVES	11.9%	23.4%	21.7%
EQUIVALENT TO NATIVES	27.3%	20.2%	14.5%
BETTER THAN NATIVES	60.8%	56.4%	63.8%
Q3C MANAGEMENT OF BOWHEAD			
POORER THAN NATIVES	11.0%	23.7%	20.3%
EQUIVALENT TO NATIVES	26.2%	20.4%	15.9%
BETTER THAN NATIVES	62.8%	55.9%	63.8%
Q3D MANAGEMENT OF POLAR BEAR			
POORER THAN NATIVES	7.9%	23.7%	21.7%
EQUIVALENT TO NATIVES	26.2%	20.4%	14.5%
BETTER THAN NATIVES	65.9%	55.9%	63.8%
Q3E MANAGEMENT OF CARIBOU			
POORER THAN NATIVES	8.4%	21.2%	19.1%
EQUIVALENT TO NATIVES	28.4%	22.1%	16.2%
BETTER THAN NATIVES	63.2%	56.8%	64.7%
Q3F MANAGEMENT OF MOOSE			
POORER THAN NATIVES	8.3%	21.1%	18.8%
EQUIVALENT TO NATIVES	28.0%	18.9%	13.0%
BETTER THAN NATIVES	63.7%	60.0%	68.1%
Q3G MANAGEMENT OF BEARS			
POORER THAN NATIVES	8.5%	21.1%	19.1%
EQUIVALENT TO NATIVES	25.4%	18.9%	16.2%
BETTER THAN NATIVES	66.2%	60.0%	64.7%
Q3H MANAGEMENT OF SALMON			
POORER THAN NATIVES	10.4%	18.9%	14.5%
EQUIVALENT TO NATIVES	24.8%	18.9%	14.5%
BETTER THAN NATIVES	64.9%	62.1%	71.0%
Q3I MANAGEMENT OF HERRING			
POORER THAN NATIVES	9.6%	16.8%	16.2%
EQUIVALENT TO NATIVES	23.2%	20.0%	13.2%
BETTER THAN NATIVES	67.2%	62.1%	70.6%
Q3J MANAGEMENT OF BOTTOM FISH			
POORER THAN NATIVES	10.1%	16.8%	16.2%
EQUIVALENT TO NATIVES	24.1%	21.1%	11.8%
BETTER THAN NATIVES	65.8%	62.1%	72.1%
Q3K MANAGEMENT OF CRABS			
POORER THAN NATIVES	8.2%	16.8%	14.7%
EQUIVALENT TO NATIVES	25.1%	21.1%	11.8%
BETTER THAN NATIVES	66.7%	62.1%	73.5%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q4A INFLUENCE OVER SALMON			
NOT AT ALL	11.7%	18.5%	23.1%
RARELY OR SELDOM	39.6%	42.4%	40.0%
FREQUENTLY	48.7%	39.1%	36.9%
Q51A KNOWLEDGE OF WATER			
NATIVES CONTROL MOST KNOWLEDGE	24.4%	29.3%	30.8%
NATIVES AND SOME SCIENTISTS CONTROL	45.4%	32.6%	33.8%
SCIENTISTS CONTROL MOST KNOWLEDGE	30.2%	38.0%	35.4%
Q51B KNOWLEDGE OF ICE			
NATIVES CONTROL MOST KNOWLEDGE	24.9%	29.1%	30.3%
NATIVES AND SOME SCIENTISTS CONTROL	41.8%	30.2%	34.8%
SCIENTISTS CONTROL MOST KNOWLEDGE	33.3%	40.7%	34.8%
Q51C KNOWLEDGE OF WIND			
NATIVES CONTROL MOST KNOWLEDGE	25.4%	25.8%	25.8%
NATIVES AND SOME SCIENTISTS CONTROL	42.0%	26.9%	36.4%
SCIENTISTS CONTROL MOST KNOWLEDGE	32.7%	47.3%	37.9%
Q51D KNOWLEDGE OF PLANTS			
NATIVES CONTROL MOST KNOWLEDGE	24.0%	31.6%	29.2%
NATIVES AND SOME SCIENTISTS CONTROL	41.2%	30.5%	41.5%
SCIENTISTS CONTROL MOST KNOWLEDGE	34.8%	37.9%	29.2%
Q51E KNOWLEDGE OF LAND MAMMALS			
NATIVES CONTROL MOST KNOWLEDGE	22.1%	29.8%	26.2%
NATIVES AND SOME SCIENTISTS CONTROL	43.1%	29.8%	40.0%
SCIENTISTS CONTROL MOST KNOWLEDGE	34.8%	40.4%	33.8%
Q51F KNOWLEDGE OF FISH			
NATIVES CONTROL MOST KNOWLEDGE	23.9%	29.0%	26.2%
NATIVES AND SOME SCIENTISTS CONTROL	42.0%	33.3%	43.1%
SCIENTISTS CONTROL MOST KNOWLEDGE	34.1%	37.6%	30.8%
Q51G KNOWLEDGE OF SEA MAMMALS			
NATIVES CONTROL MOST KNOWLEDGE	22.2%	28.4%	30.8%
NATIVES AND SOME SCIENTISTS CONTROL	41.9%	31.6%	38.5%
SCIENTISTS CONTROL MOST KNOWLEDGE	36.0%	40.0%	30.8%
Q51H KNOWLEDGE OF INVERTEBRATES			
NATIVES CONTROL MOST KNOWLEDGE	20.3%	24.5%	26.6%
NATIVES AND SOME SCIENTISTS CONTROL	41.6%	31.9%	32.8%
SCIENTISTS CONTROL MOST KNOWLEDGE	38.1%	43.6%	40.6%
Q6 TIME FOR ACQUISITION OF KNOWLEDGE			
ABOUT 1 YEAR	11.5%	9.5%	6.9%
1-5 YEARS	34.0%	36.8%	37.5%
6-20 YEARS	24.0%	24.2%	27.8%
A LIFETIME	10.5%	4.2%	4.2%
ACCUMULATED EXPERIENCES/SEVERAL GENS	20.0%	25.3%	23.6%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q7 SIGNIFICANT ENVIRONMENTAL SYMBOLS			
NONE	6.1%	7.3%	5.6%
A FEW	34.0%	39.6%	33.3%
MANY	43.9%	38.5%	45.8%
MANY OVER GENERATIONS	16.0%	14.6%	15.3%
Q8A DRILLING ATTITUDES			
DELETERIOUS	52.2%	61.5%	62.1%
NO CHANGE	20.6%	20.8%	21.2%
MIXED	24.9%	15.6%	15.2%
BENEFICIAL	2.4%	2.1%	1.5%
Q8B PUMPING ATTITUDES			
DELETERIOUS	54.5%	59.1%	56.7%
NO CHANGE	25.8%	24.7%	25.4%
MIXED	17.7%	12.9%	14.9%
BENEFICIAL	1.9%	3.2%	3.0%
Q8C TRANSPORTING ATTITUDES			
DELETERIOUS	47.4%	58.5%	62.7%
NO CHANGE	35.2%	27.7%	26.9%
MIXED	16.4%	11.7%	9.0%
BENEFICIAL	.9%	2.1%	1.5%
Q8D PIPE LINE ATTITUDES			
DELETERIOUS	43.8%	58.5%	56.1%
NO CHANGE	35.6%	25.5%	28.8%
MIXED	17.3%	12.8%	10.6%
BENEFICIAL	3.4%	3.2%	4.5%
Q8E ENCLAVE ATTITUDES			
DELETERIOUS	55.5%	61.7%	62.1%
NO CHANGE	26.8%	23.4%	27.3%
MIXED	16.3%	11.7%	10.6%
BENEFICIAL	2.4%	3.2%	0.0%
Q8F RECREATION ATTITUDES			
DELETERIOUS	55.9%	56.4%	57.6%
NO CHANGE	29.4%	26.6%	28.8%
MIXED	13.3%	12.8%	13.6%
BENEFICIAL	1.4%	4.3%	0.0%
Q9 MEMORIES OF SHARING			
LESS THAN PRESENT	12.8%	25.8%	19.7%
NO CHANGE	43.6%	26.9%	39.4%
MORE THAN PRESENT	43.6%	47.3%	40.9%
Q10 TREATMENT OF ELDERS			
LESS CARE THAN NECESSARY	26.3%	20.0%	15.2%
APPROPRIATE CARE	69.7%	66.7%	71.2%
MORE CARE THAN NECESSARY	4.0%	13.3%	13.6%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q12A ADEQUACY OF THE RESPONSE OF THE FEDERAL GOVERNMENT TO THE EXXON VALDEZ OIL SPILL			
DID NOTHING OF CONSEQUENCE	13.2%	5.3%	6.1%
DID FEW THINGS WITHIN ITS POWERS	56.6%	51.1%	53.0%
DID MANY THINGS WITHIN ITS POWERS	21.5%	30.9%	25.8%
EXERCISED ALL OF ITS POWERS	7.8%	12.8%	15.2%
Q12B ADEQUACY OF THE ALASKA STATE RESPONSE TO THE EXXON VALDEZ SPILL			
DID NOTHING OF CONSEQUENCE	5.9%	2.1%	4.5%
DID FEW THINGS WITHIN ITS POWERS	40.0%	38.3%	29.9%
DID MANY THINGS WITHIN ITS POWERS	39.5%	40.4%	44.8%
EXERCISED ALL OF ITS POWERS	14.6%	19.1%	20.9%
Q12C ADEQUACY OF THE EXXON COMPANY RESPONSE TO THE EXXON VALDEZ SPILL			
DID NOTHING OF CONSEQUENCE	4.3%	3.1%	4.6%
DID FEW THINGS WITHIN ITS POWERS	55.5%	53.3%	44.6%
DID MANY THINGS WITHIN ITS POWERS	31.8%	33.3%	35.4%
EXERCISED ALL OF ITS POWERS	8.5%	10.4%	15.4%
Q13A IS EXXON VALDEZ SPILL UNUSUAL EVENT?			
NO	52.9%	51.0%	+66.7%
YES	47.1%	49.0%	31.9%
Q13B WILL EVENTS SIMILAR TO THE EXXON VALDEZ SPILL OCCUR IN THE FUTURE?			
NO	* 1.0%	3.2%	2.9%
RARELY	67.8%	47.3%	57.4%
FREQUENTLY	31.3%	49.5%	39.7%
Q14A HOW WILL FUTURE RESPONSES TO SPILLS COMPARE WITH THE RESPONSE TO EXXON?			
WORSE	3.9%	2.1%	7.4%
SAME AS	34.5%	28.7%	32.4%
BETTER THAN	61.7%	69.1%	60.3%
Q15 HOW DID SPILL AFFECT YOUR INCOME?			
DECREASED			
STAYED THE SAME	26.2%	21.1%	25.4%
INCREASED	45.6%	52.6%	50.7%
	28.2%	26.3%	23.9%
Q16A DID SPILL CAUSE DISPUTES AMONG OR BETWEEN FISHERMEN?			
NONE	19.6%	11.1%	11.4%
VERY FEW	24.1%	27.8%	35.7%
MANY	55.3%	61.1%	52.9%
Q16B DID SPILL CAUSE DISPUTES BETWEEN FISHERMEN AND NONFISHERMEN?			
NONE	34.5%	28.9%	25.0%
VERY FEW	22.3%	26.5%	33.8%
MANY	43.1%	44.6%	41.2%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
Q17 DID NATIVE GROUPS HELP AFTER THE SPILL?			
NO	*62.9%	18.5%	+42.9%
YES	37.1%	81.5%	57.1%
K1 HARVEST EXPENSES AS PROPORTION OF INCOME			
VERY LOW, 0-9%	81.4%	87.6%	83.3%
LOW, 10-19%	8.8%	9.3%	12.5%
MEDIUM, 20-29%	6.5%	2.1%	0.0%
HIGH, 30% OR MORE	3.3%	1.0%	4.2%
K2 VARIETY OF HARVESTED SPECIES			
NONE	*10.2%	22.9%	13.0%
FEW, NONE IN SOME CATEGORIES	48.4%	60.4%	65.2%
AT LEAST ONE SPECIES PER CATEGORY	13.5%	7.3%	4.3%
TWO-THREE SPECIES PER CATEGORY	11.2%	3.1%	5.8%
MORE THAN THREE SPECIES PER CATEGORY	16.7%	6.3%	11.6%
K3 HARVESTED PROTEIN IN DIET			
LESS THAN 25%	43.3%	55.2%	52.9%
25-49%	25.1%	17.7%	24.3%
50-75%	22.3%	16.7%	15.7%
76-100%	9.3%	10.4%	7.1%
K4 HOUSEHOLD ANNUAL INCOME			
$0-10,000	8.3%	8.0%	7.0%
$10,001-20,000	14.1%	16.0%	12.7%
$20,001-30,000	12.2%	10.0%	15.5%
$30,001-40,000	16.6%	17.0%	12.7%
$40,001-60,000	20.0%	27.0%	19.7%
$60,001-100,000	26.8%	22.0%	32.4%
$100,000 - OVER	2.0%	0.0%	0.0%
K5 PERCENTAGE OF TOTAL HOUSEHOLD INCOME THAT IS EARNED			
0-24%	8.4%	9.1%	2.8%
25-49%	5.1%	2.0%	2.8%
50-74%	6.5%	7.1%	6.9%
75-100%	79.9%	81.8%	87.5%
K6 PERCENTAGE OF TOTAL HOUSEHOLD INCOME THAT IS UNEARNED			
0-24%	83.4%	80.8%	87.3%
24-49%	5.2%	6.1%	7.0%
50-74%	3.8%	2.0%	2.8%
75-100%	7.6%	11.1%	2.8%
K7 GOVERNMENT SOURCE OF TOTAL HOUSEHOLD INCOME BY PERCENT			
0-24%	66.5%	62.6%	65.3%
24-49%	5.3%	5.1%	8.3%
50-74%	11.2%	4.0%	6.9%
75-100%	17.0%	28.3%	19.4%

Table 11-1 (continued)

Key Informant Protocol Variables	*Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
K8 NONGOVERNMENTAL SOURCE OF TOTAL HOUSEHOLD INCOME BY PERCENT			
0-24%	21.6%	31.0%	23.6%
24-49%	9.4%	3.0%	6.9%
50-74%	7.5%	8.0%	6.9%
75-100%	61.5%	58.0%	62.5%
K9 STABILITY HOUSEHOLD EARNED INCOME			
IRREGULAR	2.4%	4.1%	5.6%
ERRATIC	3.4%	10.3%	4.2%
SEASONAL	27.4%	23.7%	25.0%
MONTHLY	66.8%	61.9%	65.3%
K10 STABILITY OF HOUSEHOLD UNEARNED INCOME			
(1) IRREGULAR	*65.1%	49.0%	64.7%
(2) MONTHLY WELFARE OR TRANSFER PAYMENTS	6.5%	10.4%	5.9%
(3) REGULAR RECEIPTS a/o ROYALTIES a/o LEASE w/(1) or (2)	25.1%	38.5%	27.9%
(4) 1, 2 AND 3	3.3%	2.1%	1.5%
K11A INCOME GIVING WITHIN THE VILLAGE			
PERSONAL USE ONLY, NOT SHARED	*22.2%	25.3%	8.5%
POOLED WITHIN THE HOUSEHOLD	55.2%	25.3%	45.1%
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	17.5%	32.6%	35.2%
REGULAR SHARING WITH OTHER HOUSEHOLDS	5.2%	16.8%	11.3%
K11B INCOME RECEIVING IN THE VILLAGE			
NO SHARING	*30.8%	44.7%	35.8%
POOLED WITHIN THE HOUSEHOLD	55.1%	20.0%	22.6%
OCCASIONAL SHARING	12.1%	27.1%	39.6%
REGULAR SHARING	2.0%	8.2%	1.9%
K12A INCOME GIVING BETWEEN VILLAGES			
PERSONAL USE ONLY, NOT SHARED	*80.5%	51.9%	41.1%
POOLED WITHIN THE HOUSEHOLD	9.3%	33.3%	42.95
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	10.2%	14.8%	16.1%
REGULAR SHARING WITH OTHER HOUSEHOLDS	0.0%	0.0%	0.0%
K12B INCOME RECEIVING BETWEEN VILLAGES			
NO SHARING	88.8%	77.8%	61.5%
OCCASIONAL SHARING	6.3%	18.5%	32.7%
REGULAR SHARING	4.9%	3.7%	5.8%
K13A LABOR GIVING WITHIN THE VILLAGE			
PERSONAL USE ONLY, NOT SHARED	* 5.6%	10.4%	2.8%
POOLED WITHIN THE HOUSEHOLD	19.5%	10.4%	11.1%
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	52.6%	39.6%	51.4%
REGULAR SHARING WITH OTHER HOUSEHOLDS	22.3%	39.6%	34.7%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
K13B LABOR RECEIVING IN THE VILLAGE			
NO SHARING	7.1%	10.5%	4.5%
POOLED WITHIN THE HOUSEHOLD	21.7%	10.5%	7.6%
OCCASIONAL SHARING	50.9%	46.3%	57.6%
REGULAR SHARING	20.3%	32.6%	30.3%
K14A LABOR GIVING BETWEEN VILLAGES			
PERSONAL USE ONLY, NOT SHARED	77.2%	63.3%	59.6%
POOLED WITHIN THE HOUSEHOLD	17.2%	22.8%	28.1%
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	5.6%	13.9%	12.3%
REGULAR SHARING WITH OTHER HOUSEHOLDS	0.0%	0.0%	0.0%
K14B LABOR RECEIVING BETWEEN VILLAGES			
NO SHARING	79.2%	65.3%	60.4%
OCCASIONAL SHARING	15.5%	22.7%	28.3%
REGULAR SHARING	4.8%	12.0%	11.3%
	.5%	0.0%	0.0%
K15A RESOURCE GIVING WITHIN THE VILLAGE			
PERSONAL USE ONLY, NOT SHARED	3.8%	18.6%	8.5%
POOLED WITHIN THE HOUSEHOLD	11.7%	7.2%	5.6%
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	57.7%	40.2%	53.5%
REGULAR SHARING WITH OTHER HOUSEHOLDS	26.8%	34.0%	32.4%
K15B RESOURCE RECEIVING IN THE VILLAGE			
NO SHARING	4.7%	13.7%	6.1%
POOLED WITHIN THE HOUSEHOLD	14.7%	6.3%	3.0%
OCCASIONAL SHARING	53.1%	47.4%	57.6%
REGULAR SHARING	27.5%	32.6%	33.3%
K16A RESOURCE GIVING BETWEEN VILLAGES			
PERSONAL USE ONLY, NOT SHARED	*69.8%	47.5%	54.4%
POOLED WITHIN THE HOUSEHOLD	23.7%	31.3%	26.3%
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	6.5%	21.3%	19.3%
REGULAR SHARING WITH OTHER HOUSEHOLDS	0.0%	0.0%	0.0%
K16B RESOURCE RECEIVING BETWEEN VILLAGES			
NO SHARING	*73.9%	53.9%	62.7%
OCCASIONAL SHARING	19.3%	28.9%	15.7%
REGULAR SHARING	6.8%	17.1%	21.6%
K17 HOUSEHOLD SIZE			
1-3	56.5%	63.5%	56.3%
4-6	38.8%	28.1%	38.0%
7-9	3.3%	6.3%	5.6%
10-OVER	1.4%	2.1%	0.0%
K18 AGE OF HOUSEHOLD HEAD			
UNDER 25	3.3%	6.1%	2.8%
25-40	39.8%	43.4%	40.3%
41-55	30.8%	33.3%	29.2%
56-OVER	26.1%	17.2%	27.8%

Table 11-1 (continued)

Key Informant Protocol Variables	*Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
K19 HOUSEHOLD COMPOSITION AND DYNAMICS			
OPEN AND FLUID (TRADITIONAL)	*13.6%	12.4%	11.9%
INFREQUENT CHANGE	13.1%	32.0%	26.9%
STABLE (WESTERN)	73.4%	55.7%	61.2%
K20 RULES FOR HOUSEHOLD DYNAMICS			
(1) NO STANDARD RULES (TRADITIONAL)	*18.3%	29.5%	20.6%
(2) BLEND OF 1 AND 3	14.9%	19.3%	20.6%
(3) CLEAR EXPECTATIONS (WESTERN)	66.8%	51.1%	58.7%
K21 HOUSEHOLD CONFLICT RESOLUTION			
PASSIVE INTERNAL	55.2%	59.1%	57.1%
ACTIVE INTERNAL	14.4%	22.7%	17.1%
INFORMAL EXTERNAL	7.5%	4.5%	5.7%
FORMAL EXTERNAL	22.9%	13.6%	2.9%
COMBINATION	0.0%	0.0%	17.1%
K22 DIVORCE OR SEPARATION			
ONE OR MORE BROKEN UNIONS	41.0%	44.1%	40.0%
NO BROKEN UNIONS	59.0%	55.9%	60.0%
K23 SODALITY MEMBERSHIP			
NO MEMBERSHIPS IN HOUSEHOLD	46.0%	39.2%	48.6%
ONE MEMBERSHIP IN HOUSEHOLD	19.5%	22.7%	15.3%
TWO OR MORE MEMBERSHIPS IN HOUSEHOLD	34.4%	38.1%	36.1%
K24 POLITICAL PARTICIPATION IN HOUSEHOLD AT PRESENT			
NO OFFICIAL CAPACITIES	86.0%	86.7%	83.1%
ONE OFFICIAL CAPACITY	7.9%	10.2%	11.1%
TWO OR MORE OFFICIAL CAPACITIES	6.1%	3.1%	5.6%
K25 IDENTIFICATION OF POLITICAL ISSUES			
NO ISSUES CORRECTLY IDENTIFIED	* 8.6%	6.1%	9.7%
ONE ISSUE CORRECTLY IDENTIFIED	20.0%	12.1%	15.3%
TWO ISSUES CORRECTLY IDENTIFIED	33.3%	25.3%	27.8%
THREE OR MORE ISSUES IDENTIFIED	38.1%	56.6%	47.2%
K26 RELIGIOUS PARTICIPATION IN HOUSEHOLD			
DO NOT PROFESS RELIGION OR PARTICIPATE	34.4%	41.4%	40.3%
ATTEND CEREMONIES OCCASIONALLY	31.1%	24.2%	31.9%
ATTEND CEREMONIES REGULARLY	34.4%	34.3%	27.8%
K27 EXTRACURRICULAR RELIGIOUS PARTICIPATION			
NO EXTRACURRICULAR ACTIVITIES	51.6%	61.6%	70.0%
ONE/TWO ON OCCASIONAL BASIS	24.9%	12.1%	15.7%
ONE/TWO ON REGULAR BASIS	12.7%	9.1%	1.4%
MORE THAN TWO REGULARLY	10.8%	17.2%	12.9%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
K28 ETHICAL RESPONSIBILITY FOR ATTAINMENT			
SEEK SUCCESS FOR SELF (PERSONAL)	31.5%	38.2%	31.3%
SEEK SUCCESS FOR SELF & FAMILY	44.1%	30.3%	46.9%
SEEK SUCCESS FOR FAMILY, NETWORK OF KINSPERSONS, ELDERS, FRIENDS, VILLAGE	24.4%	31.5%	21.9%
K29 ETHICS AND SIGNIFICANT ENVIRONMENTAL SYMBOLS			
(1) RESOURCES ARE COMMODITIES	35.5%	21.3%	22.2%
(2) BLEND OF 1 AND 3	52.6%	58.8%	57.4%
(3) RESOURCES AND ENVIRONMENT HAVE SPIRITUAL a/o CULTURAL SIGNIFICANCE	11.8%	20.0%	20.4%
K30 ETHICS OF PERSONAL COOPERATION			
(1) PERSONAL COMPETITION FOR SELF -GAIN	17.4%	18.2%	20.0%
(2) 1, 3 OR 4, DEPENDING ON SITUATION	48.8%	34.1%	38.3%
(3) COOPERATION AND COMPETITION	15.5%	26.1%	23.3%
(4) MAINLY COOPERATION-COMMUNITARIAN	18.3%	21.6%	18.3%
K31 ENCULTURATION AND GENDER DISTINCTIONS			
WESTERN ENCULTURATION & GENDER	68.2%	52.4%	58.2%
WESTERN AND TRADITIONAL ARE MIXED	21.8%	35.4%	32.8%
TRADITIONAL ENCULTURATION & GENDER	10.0%	12.2%	9.05
K32 EXPECTATIONS FOR DEVELOPMENT			
MAINLY LOCAL BENEFITS AND CONTROL	* 6.1%	6.5%	3.0%
LOCAL AND NONLOCAL COMPANIES WILL SHARE BENEFITS AND CONTROL	13.6%	10.8%	7.5%
LOCAL JOBS, BUT EXTERNAL CONTROL	37.9%	19.4%	28.4%
EXTERNAL BENEFITS + EXTERNAL CONTROL	42.5%	63.4%	61.2%
K33A ECONOMIC CONFLICTS?			
NO	*19.8%	12.2%	9.9%
YES	75.4%	87.8%	90.1%
UNKNOWN	4.8%	0.0%	0.0%
K33B PERSONAL ECONOMIC CONFLICTS?			
NO	*23.4%	25.3%	20.6%
YES	63.7%	74.7%	79.4%
UNKNOWN	12.9%	0.0%	0.0%
K34 SCHOOLING AND SUCCESS			
STRONG ASSOCIATION BETWEEN THE TWO	75.7%	61.1%	69.1%
OCCASIONAL ASSOCIATION BETWEEN THEM	19.6%	34.4%	22.1%
NO ASSOCIATION BETWEEN THE TWO	4.7%	4.4%	8.8%
K35 PERCEIVED OBJECTIVES OF SERVICES			
CORRECT IDENTIFICATION OF OBJECTIVES	81.9%	81.2%	83.3%
INCORRECT IDENTIFICATION OF OBJECTIVES	18.1%	18.8%	16.7%

Table 11-1 (continued)

Key Informant Protocol Variables	Total Postspill Pretest Sample 1989 *216N*	Total Postspill Posttest Sample 1991 *100N*	KI Panel Second Wave 1991 *72N*
K37 PLACE RESPONDENT BORN AND REARED			
OUTSIDE THE CURRENT REGION	68.1%	78.6%	70.4%
IN THE REGION BUT NOT SUBREGION	4.3%	5.1%	2.8%
IN THE SUBREGION BUT NOT THE VILLAGE	8.6%	2.0%	2.8%
IN THE VILLAGE OF CURRENT RESIDENCE	19.0%	14.3%	23.9%
K37B RESPONDENT'S SPOUSE WAS BORN AND REARED			
OUTSIDE THE CURRENT REGION	71.4%	74.6%	83.7%
IN THE REGION BUT NOT SUBREGION	7.1%	8.5%	0.0%
IN THE SUBREGION BUT NOT THE VILLAGE	4.5%	0.0%	2.0%
IN THE VILLAGE OF CURRENT RESIDENCE	16.9%	16.9%	14.3%
K38 SIZE OF VILLAGE			
VERY SMALL, UNDER 15	19.4%	10.0%	13.0%
SMALL, 151-300	4.6%	6.7%	7.2%
MEDIUM, 301-500	6.0%	0.0%	10.1%
LARGE, 501-800	0.0%	8.9%	1.4%
VERY LARGE, 801-OVER	69.9%	74.4%	68.1%
K39 SOCIAL SERVICES USED BY RESPONDENT			
(1) AVOID ALL SERVICES	23.2%	12.8%	14.3%
(2) HEALTH SERVICES	38.4%	40.4%	40.0%
(3) FINANCIAL SERVICES	2.5%	1.1%	2.9%
(4) FAMILY AND SOCIAL SERVICES	8.9%	4.3%	5.7%
(5) HEALTH (2) AND FINANCIAL (3)	15.3%	22.3%	28.6%
(6) FAMILY-SOCIAL (4) AND TWO OR MORE	11.8%	19.1%	8.6%
K40 USE OF NATIVE HEALERS			
NATIVE HEALERS USED	7.7%	16.3%	4.3%
NATIVE HEALERS NOT USED	32.4%	19.4%	24.3%
NO HEALERS IN THE VILLAGE	59.9%	64.3%	71.4%
K41 UTILITIES IN HOUSE			
NO UTILITY PRESENT OR WORKING	.5%	0.0%	0.0%
ONE UTILITY PRESENT AND WORKING	.5%	1.0%	0.0%
TWO OR MORE WORKING, BUT NOT ALL	7.0%	5.0%	8.3%
ALL PRESENT, WORKING	92.0%	94.0%	91.7%

the KIP panel (1991W, 72*N*). The univariate distributions allow us to inspect the nature of variation for each variable by each sample. By simple inspection, we observe differences between samples. We test for the significance of difference between the pretest and posttest samples in the distribution of each KIP item. Differences that are expected to occur less than ten times in 100 by chance (almost all noted here occur less than five times in 100 by chance) are marked with an asterisk (*). We also test for the significance of difference between the posttest and the second wave of the EXXONKI panel, using the same rejection level and designating differences we deem significant with a plus (+). In Chapters 9 and 10, we demonstrated the importance of theoretical contrasts between **Natives:Non-Natives**, *Hub:Periphery*, and *Comm Fish:Noncom Fish*. We refer to pretest:posttest contrasts below (see Table 11-5 at the end of this chapter).

II. REACTIVITY AS AN EFFECT OF TESTING

Let us address the issue of reactivity as the cause of "testing artifacts." Among the 118 KIP variables in Table 11-1, distributions are significantly different between posttest and panel respondents on only two. Discussing them by the order in which they appear in the table, Q13A asks whether respondents think the Exxon Valdez spill was an unusual event, i.e., it was an event which is not likely to be duplicated; or whether they think it was not an unusual event and that similar events are likely to occur. Panel respondents are significantly more likely to think that events similar to the Exxon Valdez oil spill will recur than are posttest respondents. Sixty-seven percent (in contrast to 51% of posttest respondents) think that severe oil spills are in Alaska's future.

In the preceding chapter on longitudinal reliability, we pointed out that 70 percent of the subset of panel respondents who are Natives changed their positions on whether a major oil spill is a unique event, or an event likely to recur. The reversals between 1989 and 1991 among Native respondents were about equally split, half saying spills will recur and half saying they will not recur. Most non-Native respondents maintained the positions they held in 1989, but about 20 percent thought recurrences were more likely than they had thought in 1989. More Natives than non-Natives had taken the extreme position about recurrences ("Not unusual") in 1989. This variable may have a construct validity problem. It does not appear to suffer from reactivity.

The second item, Q17, asks whether respondents think that Native groups assisted in the spill cleanup. Item Q17 yields significant differences between posttest and panel responses. But significant differences aside, we demonstrate in Chapter 9 in the analysis of intratopic reliability that a large proportion of non-

Natives did not respond to the question and that large majorities of non-Natives in *Hub* villages who did respond thought that Natives had not participated in the spill cleanup. The large proportion of nonresponse by non-Natives in *Hub* villages to the question suggests ignorance (lack of awareness) of Natives and Native organizations in those large, complex towns, some of which were hosts to many cleanup workers. Responses by non-Natives in the posttest sample, too, suggests ignorance on the part of non-Natives in *Hub* villages to Native activities in regards to spill-cleanup operations.

Natives responded to the question in both samples and in the panel, as did non-Native respondents in the panel and also non-Native respondents in *Periphery* villages in both samples. It is evident that non-Native residents in *Periphery* villages know more about Natives than do their congeners in *Hub* villages.

Panel respondents are 20 percent more likely than the respondents in the pretest sample from which they were drawn to think that Native groups participated in the spill cleanup, but the panel, similar to the pretest, remains heavily represented by residents of *Hub* villages. So, although there are significant differences between the panel and the posttest on this item, the item is most useful in demonstrating the ignorance of non-Natives about Native activities in spill cleanup. Panel responses in 1991 are about half way between pretest and posttest responses. Item Q17 generated interesting differences, but it is unreliable.

Neither Q13A nor Q17 are reliable measures for either subsample: Q13A appears to be reliable for Natives only, and Q17 appears to be reliable for non-Native respondents who reside in *Periphery* villages and for Natives in general. Both variables are instructive, perhaps helpful in understanding Native/non-Native differences and some aspects of *Hub:Periphery* differences. These two partial exceptions, Q13A and Q17, are not sufficient to demonstrate that reactivity is operating to cause testing artifacts in panel responses to KIP items.

III. TESTING ARTIFACTS AND CHANGE

In the absence of evidence for test artifacts, significant differences between pretest and posttest responses (and between pretest and second wave panel responses) are indications that change has occurred. But as we contend in the discussion of the research design, the measurement of item change requires data from three points in time for two or more samples drawn without replacement (pretest-posttest), and for one or more panels embedded in the pretest-posttest sample design. Because we have only two complete measures of the KIP items, one from 1989 and the other from 1991 (the tiny 1992 sample of KIP items aside), we cannot measure over-time reliability and over-time stationariness, thereby testing for statistical conclusion validity about the factor or factors--external or internal--which account for change.

The analysis of change, then, proceeds in stages. We can determine whether there are significant differences between pretest and posttest responses to the same items (those samples being measured at different points in time, t_1 and t_2), and whether there are significant differences between posttest and panel responses to the same items (those samples being measured at the same point in time, t_2). A third wave is required to demonstrate whether items changed and whether those changes can be accounted for by internal or external factors (or interventions), or whether they are fluctuations attributable to chance factors. If relations remain stationary, the assumption is that they have not been affected by external interventions or internal factors. Controls must be exercised in multivariate models through the introduction of every variable the researcher can think of that could affect the item in question to account for fluctuation in the item over-time.

From the foregoing, it is evident that tests for stationariness and reliability, over-time, are closely related to the analysis of testing effects. Because the EXXONKI panel and the KIP pretest and posttest samples are measured at only two points in time, we cannot control sufficient factors to determine the likely causes of changes. There is, nevertheless, a definite "family" structure to the differences between the responses of pretest and posttest (and between and first and second wave of the EXXONKI panel).

The differences are significant between the pretest and posttest samples (and the first and second waves of the panel) for 20 of the 118 items (17%) in Table 26.[87] It is reasonable to expect that about 7 significant differences between the samples and the panel waves will occur by chance. The structure of the differences obtained here, in conjunction with the differences that do not prove significant but that fit a pattern similar to those that are significant, suggest that the following changes have occurred: pretest and posttest, and first and second wave panel respondents differ on their opinions about what agencies or persons should manage the wild resources in their areas. About three quarters of pretest respondents think the ADF&G or various Federal agencies should manage crabs, caribou, moose, and geese and about 7 percent think that Native organizations and local Natives should manage those resources. In 1991, about 57 percent of posttest respondents and 65 percent of second wave panel respondents think that the ADF&G or various Federal agencies should manage crabs, caribou, moose, and geese, and about 17 percent think Native organizations and local Natives should manage those resources.

In comparison with responses in 1989, the large drop in the proportion of respondents who think the ADF&G should manage the resources, the near complete absence of persons who think that various Federal agencies should manage these resources, and the dramatic increase in the proportion that thinks Natives should manage the resources represents an unmistakable shift in cognitive attitudes away from Federal (0%) and State (circa 55%) controls toward balanced combination and Native controls (circa 45%).

The differences are not significant for the remaining 11 items which measure "who should manage?" wild resources. Nevertheless, 9 of those items reflect cognitive responses in the pretest and posttest (and second wave panel) samples that are similar in proportions to the four above (Who should manage salmon, herring, cod, halibut, king crabs, snow crabs, ducks, swans, and cranes?). Controls for

[87]Table 11-5 at the end of this chapter provides univariate distributions for the *Hub:Periphery* and Native:Non-Native contrasts in the KIP pretest (1989) and posttest (1991) samples. The number of items which are significantly different within each contrast is remarkable (in the *Hub:Periphery* contrast alone, the distributions of 47 items in 1989 and 51 items in 1991 are significantly different).

ethnicity and for *Hub:Periphery* villages demonstrate near identical patterns of changes *within* contrasts, and very different patterns *between* contrasts.[88] Natives and respondents in *Periphery* villages in 1991 select Natives, or some combination of Natives and government to control resources. Except for sea mammals, a majority of Native and *Periphery* respondents did not select Natives in any combination to control resources in 1989. Non-Natives and *Hub* respondents switched support away from Federal agencies in 1989 to ADF&G in 1991, with a modest exception for sea mammals.

The questions pertaining to sea mammals (walrus and bowhead), resources which non-Natives are prohibited from hunting, provide responses most different among the 15 items. Between 1989 and 1991, responses shifted away from Federal agencies[89] and toward the Native organizations and local Natives.[90] Non-Natives in 1989 and 1991 more frequently think that Natives should participate in the management of sea mammals than think that they should participate in the management of other wild resources.[91] By law, non-Natives cannot extract these animals. In addition, neither of these animals have commodity value for non-Natives, except as by-products (the carved ivory tusks of walrus have commodity value for Natives and, on resale, to non-Natives). These are likely reasons for non-Natives to think that Natives should participate in the management: such management will not conflict with non-Native interests.

The panel is more conservative than the posttest sample in choosing the ADF&G and the balanced combinations of government agencies and Natives to manage wild resources. This is especially true for the non-Native respondents (the majority of all panel respondents). Yet on closer inspection, the ADF&G and

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[88] See Table 11-5 at the end of this chapter for the complete table of KIP item contrasts (*Hub:Periphery*, Native:Non-Native) for the pretest and posttest samples.

[89] Federal agencies are charged with protecting sea mammals. These agencies received about 21 percent of the pretest responses in 1989 , but only 4 percent of the posttest and 9 percent of the panel responses in 1991.

[90] Natives and Native organizations received about 13 percent of the responses in 1989 and 19 percent (posttest) and 24 percent (panel) in 1991. When the combination of government and Natives is joined with the selection of Native and Native organizations, the change is from 41 percent in 1989 to 54 percent (posttest) and 46 percent (panel) in 1991.

[91] See Table 11-5 at the end of this chapter for *Hub:Periphery* and Native:Non-Native contrasts for the KIP items.

balanced combinations of government agencies and Natives are less apt to be selected by panel respondents who are Natives than by those who are non-Natives in the second wave. Moreover, Federal agencies and local Natives are more apt to be selected in the second wave by panel respondents (in general) than they are by non-Native panel respondents and by posttest respondents. Non-Native and Native responses are almost surely affected by differences in the way in which they were affected by government restrictions and differences in the habitats in which resources were extracted between 1989 and 1991. Natives are more apt to think that Natives should manage resources in 1991 than thought so in 1989.

Two factors appear to account for the most obvious changes between responses in 1989 and 1991 about who or what agencies should manage wild resources: whether access to the locus of decision-making power is local or distant, and whether respondents are Native or non-Native. Empirical factors, of course, must account for each of these factors. The local vs. distant distinction for Natives is that "local Natives" are selected over "Native organizations."[92] For non-Natives, the choice is for local government agencies, specifically the ADF&G over distant agencies, the latter comprising the range of Federal agencies which exercise some regulatory authority over resources in Alaska. Residents serve on advisory boards to the ADF&G; non-Natives whether or not they personally serve on those boards frequently think[93] that they, personally, or members of their community influence some ADF&G decisions. Proximity in space to ADF&G operatives, knowledge of those persons, often on a first name basis, as well as access to the locus of power, that is, access to those same persons as decision makers, are important factors for non-Natives in choosing ADF&G over Federal agencies.

Ethnicity is also important. The majority of ADF&G appointees are non-Natives as well as residents of Alaska, if not the village of the respondent. Non-

[92]Native organizations are almost surely identified as regional corporations (profit and/or nonprofit) or as special offices created by these units. Regional corporations offices are located in the largest *Hub* villages (some in Anchorage) and are not directly accessible to most Natives in our sample. The choice is for "local Natives" over "Native organizations."

[93]See the analysis of AQI items. Non-Natives are much more likely than are Natives to think that some members of their community influence ADF&G policies.

Natives frequently know the local ADF&G employees, possess ways to influence those persons' decisions, and share some common opinions about resources and their uses, especially resources extracted for their commodity value. Natives, too, know ADF&G, but Natives, in contrast to non-Natives, seldom claim to influence ADF&G decisions (Q4A). In 1991, a large proportion of Natives shifted their choices of agencies or persons to manage resources from ADF&G to local Natives (most frequent choice) and Native organizations (next most frequent choice). The exception is sea mammals for which the choice of combined government and Native control outstrips local Natives and Native organizations, which are split evenly. The shift to Natives, particularly local Natives, represents a clear movement toward persons known to operate successfully in the local environment--persons not engaged in the State bureaucracy and not enforcing rules and directives considered not to be in the Natives' or perhaps the resource's interests.

There are no significant differences between the total pretest and posttest samples or between the first and second research waves among panel respondents for the Q3* variables which measure whether respondents think that the current government managers would manage better, the same as, or poorer than Natives if Natives were given regulatory authority over wild resources in Alaska. Yet every one of these items is significantly different in the pretest and posttest *Hub:Periphery* and **Native:Non-Native** contrasts. The differences between the total samples and the panel waves are masked by the unstratified samples.

The absence of stratification notwithstanding, inspection of Table 11-1 demonstrates a very large set of differences between pretest responses and the responses of posttest and panel respondents to the Q3* items. The proportions who think that the ADF&G would do poorer than Natives increase by 10 to 15 percent in 1991, and the proportion who think that the ADF&G would do better than Natives decrease by 5 to 10 percent among the posttest sample. Changes in 1991 responses among panel members, non-Natives as well as Natives, conform to the posttest response pattern. In the posttest, fewer non-Natives than Natives thought the ADF&G would manage more poorly than Natives, and more non-

Natives than Natives thought the ADF&G would manage better than Natives. But in these subsets, too, the opinion that Natives would manage better than the ADF&G received much greater support by both pairs of the contrast than was the case in 1989.

Although the unstratified panel respondents provide answers similar to those of the unstratified pretest and posttest respondents (switching support from ADF&G to Natives and Native organizations), in their second wave responses, panel members also veer from the choices made by posttest respondents in one interesting dimension: there is much less compromise among panel respondents in 1991 than in 1989, and much less than in comparison with posttest responses. Panel respondents pull support away from the choice that ADF&G management would be "equivalent to Natives" in 1991, the majority claiming that the ADF&G would manage better than Natives. The next largest proportion of panel respondents think that the ADF&G would manage poorer than Natives. In 1989, the second largest group of panel respondents thought that management of wild resources by Natives or by government agencies would be equivalent, but in 1991 a small minority held this opinion. The changes to the extremes ("better than Natives" and "poorer than Natives") are made at the expense of the middle. Significantly, the dominant change in the cognitive attitudes of panel respondents is from "equivalent" to "poorer than Natives," that is, Natives would do better if given the power to manage resources.

Responses in 1989 and 1991 to the 41 items which ask whether wild resources can be managed, who should manage them, and who would manage them best yield a definite pattern of differences, even though only six yield significant differences between pretest and posttest. In the KIP posttest sample (1991), the proportion choosing government control of resources and the proportion that thinks that governments manage better than Natives could manage decreases. Among those who select governments to manage and governments as the best managers, local government (ADF&G) is selected over distant government (Federal); and for those who think Natives should exercise some power, most think a combination of Native organizations and State government should exercise control and also think that

Natives would be equivalent to government managers of wild resources. A much higher proportion of Natives than non-Natives in the posttest sample and in the panel think Natives alone should manage and would manage the resources better..

The panel is distinguished from the posttest by the modest amount of compromise in the responses about who would manage better. This may be another indicator that the panel comprises a stable population: the more stable the income, the longer the person has resided in the community, the more active the person is in community political affairs and religious activities and, perhaps, the less compromising the position on who would manage better.

There are no significant differences between the KIP pretest and posttest samples or the first and second waves of the panel on the items that measure who knows most about abiological and biological phenomena, Natives or scientists (Q51*). In the KIP pretest, "Natives and some scientists" are the plurality choice for knowing the most about wild resources and abiological phenomena. In the KIP posttest, "scientists" are the plurality choice for knowing the most about wild resources and the abiological environment. Pluralities of panel respondents think scientists control the most knowledge about water, ice, wind, and marine invertebrates, but think Natives and scientists equally control knowledge about plants, land mammals, fish, and sea mammals.

Native:Non-Native contrasts are much different from the unstratified pretest and posttest samples on these items. In 1989, a plurality of Native respondents thought Natives either knew the most (42 to 45% on abiological phenomena, land mammals, fish), or possessed knowledge that was equivalent to the knowledge of scientists on all of these items (40% to 43% on sea mammals and invertebrates). A large plurality of non-Natives thought scientists possessed the most knowledge on all items (39% to 46% depending on the item). In 1991, a *majority* of Natives thought Natives controlled the most information on all items (57% to 64%, depending on the item). A plurality of non-Natives, including a majority for invertebrates, again thought scientists knew the most (48% to 52% depending on the item), but a larger proportion of these respondents than their 1989 counterparts thought that Natives possessed the most knowledge (16% to 22% depending on the item). Native knowledge is more widely regarded as being equivalent to, or better than the knowledge possessed by scientists in 1991 than 1989, regardless of the ethnicity of the respondent or whether that person is a panel member or a member of the posttest sample.

The six items that assess cognitive attitudes about the consequences of oil-related activities, from drilling to recreation, produced no significant differences of distributions between pretest and posttest, or between the first and second waves of the panel. Upon stratifying the samples and the panels into non-Natives and Natives, significant differences between posttest and pretest responses proved to be marked. Whereas majorities of non-Native pretest respondents (from 61% to 52%, depending on the item) thought that oil-related activities would occasion no change, or would mix benefits with some disbenefits, or would be beneficial, majorities of non-Native posttest respondents (from 61% to 67%, depending on the item) thought oil-related activities would be deleterious for all items). In 1989, Natives at rates of from 54 percent to 69 percent thought these activities were deleterious, and in 1991 they thought so at rates of from 68 percent to 76 percent. It is likely that the longer residents lived with the consequences of the spill, the more they knew about those consequences and the more negative their cognitive attitudes became.

Ten items seek to assess consequences of the Exxon Valdez spill (Q12A-Q17). Whereas only two yield significant differences between the pretest and posttest research waves, all appear to reflect increased knowledge between 1989 and 1991.

The Q12A-C items measure whether respondents think that the Federal Government, the State of Alaska, and the Exxon Corporation did "no things," "a few things," "many things," "all things" within its powers to mitigate the consequences of the spill. The majority of respondents in the KIP pretest and posttest samples, and in the two waves of the panel thought that the Federal Government and Exxon exercised few (or none) of their powers. Majorities of respondents in the three samples also agreed that the State of Alaska exercised most or all of its powers in mitigating the spill. Table 11-2 dichotomizes KIP items Q12A-C into "None or Few

Things within the Institution's Powers" and "Many or All Things within the Institution's Powers." The samples are unstratified. Only the second wave panel responses are listed.

Table 11-2

COGNITIVE ATTITUDES ABOUT THE RESPONSES OF THE FEDERAL GOVERNMENT, STATE GOVERNMENT, AND THE EXXON CORPORATION IN MITIGATING THE OIL SPILL, 1989-1991

POWERS EXERCISED	Q12A FEDERAL AGENCIES Percent	Q12B STATE OF ALASKA Percent	Q12C EXXON CORP. Percent
KIP PRETEST 1989			
None/Few	70	46	60
Many/All	30	54	40
KIP POSTTEST 1991			
None/Few	56	40	56
Many/All	44	60	44
EXXON PANEL 1991			
None/Few	59	34	49
Many/All	41	66	51

There is, nevertheless, a marked difference between responses in 1989 and 1991. The proportions of respondents in 1991 who thought the Federal Government, State government, and Exxon corporation employed all or most of their powers to mitigate the spill are considerably larger than in 1989. The EXXONKI panel respondents in 1991 were more conservative in their assessments of Federal mitigation efforts and more liberal in their estimates of the State of Alaska's and the Exxon Corporation's efforts to mitigate the spill than their KIP posttest counterparts.

The major difference is that in 1991 respondents were much less apt to think that these institutions had done "nothing" of consequence and much more apt to think that they had done "many" things to mitigate the spill than was the case in 1989. The research wave in 1989, it will be recalled, occurred only 5 months after the spill. Exxon, the State of Alaska, and agencies of the Federal Government continued to address spill-related problems through 1990. The difference between 1989 and 1991 responses is likely attributable to knowledge.

It is of interest that Native respondents, and respondents in *Periphery* villages were more critical of the Federal Government and of the Exxon Corporation in the posttest research wave than were non-Native respondents and respondents in *Hub* villages. It is plausible that the differences are attributable to the relations of Natives and of residents of *Periphery* villages to power. Cleanup planning was done in Anchorage, provisioning was done in Anchorage and the largest *Hub* villages, hires of temporary labor and boats for cleanup operations were done in Anchorage and the largest *Hub* villages, and Natives, particularly residents of *Periphery* villages, were most apt to have been unable to harvest some wild resources normally used for subsistence and been least apt to have received cash settlements for the resources they were unable to harvest. These relations will be analyzed in Social Indicators Study VI (Jorgensen 1994).

Non-Natives, in particular, held very critical views of the performance of the Federal Government in 1989, but the non-Native posttest respondents held dramatically different opinions, the majority thinking that Federal agencies had exercised many if not all of the powers in their possession to mitigate consequences from the spill. As for Exxon, however, non-Native responses in 1989 and 1991 were nearly identical--majorities thought Exxon had used few of the means within its powers to mitigate the consequences of the spill. Natives in the posttest sample were equally critical of the Federal Government and the Exxon Corporation. **Native:Non-Native** evaluations for the pretest and posttest appear in Table 11-3 where KIP pretest and posttest samples are subclassified on race/ethnicity. The KIP items Q12A-Q12C are dichotomozied into "No/Few" and "Many/All" (exercise of powers to mitigate the consequences of the <u>Exxon</u> <u>Valdez</u> oil spill).

Second wave panel respondents differed significantly from posttest respondents as to whether the <u>Exxon</u> <u>Valdez</u> oil spill was an unusual event (Q13A), but pretest and posttest respondents offered rather similar responses. A significantly larger proportion of panel respondents than posttest respondents think the spill is not an

Table 11-3

COGNITIVE ATTITUDES ABOUT THE RESPONSES OF THE FEDERAL GOVERNMENT, STATE GOVERNMENT, AND THE EXXON CORPORATION IN MITIGATING THE OIL SPILL, NATIVE:NON-NATIVE CONTRAST, 1989-1991

	Q12A FEDERAL AGENCIES		Q12B STATE OF ALASKA		Q12C EXXON CORPORATION	
Powers Used	Non-Native	Native	Non-Native	Native	Non-Native	Native
KIP 1989						
None/Few	71	69	43	50	54	72
Many/All	29	31	57	50	46	28
KIP 1991						
None/Few	48	67	38	44	55	64
Many/All	52	33	62	56	45	36

unusual event.[94] Change can only be assessed with a third research wave, almost surely while controlling for ethnicity (majorities of Natives think the spill is unique). There is a significant difference between pretest and posttest respondents (and second wave panel responses) about whether spills similar to the Exxon Valdez spill will occur in the future (Q13B). In 1991, Natives and non-Natives, residents of *Periphery* and *Hub* villages thought spills similar to the Exxon Valdez were more likely to occur in the future than did panel respondents or pretest respondents in 1989. The change is marked and probably a consequence of a myriad of observations since the spill, including local attempts to prepare for future spills (in particular, see Lynn Robbins, Kenai section in Social Indicators Study IV. Part 2 [HRAF 1993] for an account of the development of spill preparedness in Upper Cook Inlet).

There are no significant differences in responses between research waves or between theoretical contrasts (Native:Non-Native, *Hub:Periphery*) about whether responses to future spills will be "worse than," "the same as," or "better than" the response to the Exxon Valdez spill. More than 60 percent majorities think the responses will be better than for the Exxon Valdez spill (Q14A).

[94]See the analysis of Q13A in the preceding chapter. A large percentage of non-Native panel respondents changed their opinions between 1989 and 1991 from thinking the event was unusual to thinking the event was not unusual.

About one-quarter of every sample reported the oil spill decreased their incomes and one-quarter reported it had increased their incomes (Q15). A much larger proportion of Natives (32%) than non-Natives (20%) reported that the spill had increased their incomes in the 1991 posttest sample. Given their low average incomes, increasing incomes for Natives was more easily accomplished than increasing incomes for non-Natives. Inasmuch as non-Natives earned considerably more than Natives prior to 1989, the oil spill made it difficult for many persons to maintain their incomes at their previous level, let alone increase those incomes. The spill undoubtedly affected incomes. Beneficial consequences for some were matched by disbenefits for others.

Two questions ask whether the spill caused disputes between fishermen and between fishermen and nonfishermen (Q16A-Q16B). The latter proved unreliable and was jettisoned (see the preceding chapter). But the former provides clear evidence that non-Natives report more disputes than do Natives, and that respondents from *Hub* villages report more disputes than do respondents from *Periphery* villages (pretest, posttest, and panel). In addition, the proportion of persons who report that "many" disputes occurred between fishermen increases between the pretest and the posttest and the first and second waves of the panel.

Item Q16B is likely measuring change. Non-Natives reside in the larger villages, all of which have well established commercial fishing sectors in their economies. They are in a better position to observe, even participate, in disputes. We know that many disputes among fishermen that began soon after the spill continued and grew through 1991 (see Stephanie Reynolds, Effects of the 1989 Exxon Valdez Oil Spill on Cordova section, in Social Indicators Study IV. Part 1 [HRAF 1993] and Joanna Endter-Wada, Rachel Mason et al. The Kodiak Region section in Social Indicators Study IV. Part 2 [HRAF 1993]). So the differences in the responses between pretest and posttest, and by village type and ethnicity probably reflect changes in response to the Exxon Valdez oil spill.

Significant differences between the postspill pretest and posttest samples and between the first and second waves of the panel are obtained for 13 of the 46 KIP items (K1-K41) which proved to be either stationary or sensitive to change in the Schedule A and B research. These items form a constellation which appears to have been affected by the spill, and which will be tested in Social Indicators Study VI. Analysis (Jorgensen 1994). In our multivariate tests of Schedules A and B data, three items which measure the subsistence economic activity are highly and positively intercorrelated ([K1] "harvest expenses," [K2] "variety of species harvested," and [K3] "harvested protein in diet"). We see that respondents harvested significantly fewer species in the 1990-1991 year than in the 1988-1989 year (K2), and that on average they invested a smaller proportion of their incomes (K1) and had less protein in their diets (K3) in 1991 than in 1989.

Other items which have proved to be responsive to change are the income stability variables (K9-K10) and the twelve "sharing" variables (K11A-K16B). Earned income (K9) became more erratic and irregular in 1991 than was the case in 1989, but not significantly so. Unearned income, however, was much more stable for the posttest sample than for the pretest sample (K10), reflecting, perhaps, loss of jobs or businesses, or the economic slowdown a year after the spill. Although the frequency distribution of K10 for the second wave of the panel is not significantly different from the posttest, it is evident that the 1991 panel results are very similar to the 1989 pretest (and, by interpolation, the first wave panel) results. Item K10 reflects a change toward stable unearned income for posttest respondents, but reflects the status quo for panel respondents. These results confirm the income stability (earned and unearned) of panel respondents. The evidence appears to be conclusive that each subsequent wave of research among panel respondents unintentionally selects for the most stable members of the preceding research wave. The selection is unintentional because respondents in wave one who cannot be located for reinterview in wave two[95] are predominantly persons who lose their jobs, are youthful, have skills that facilitate relocation, and may have some place to

[95]Assuming that panels respond to three research waves, losses also occur among respondents who were interviewed in the first and reinterviewed in the second wave, but not in the third. Loss of respondents in reinterview waves is a real, if oblique, indicator of economic change in a community.

relocate to, or they are persons who do not have support networks of kinspersons and friends and relocate to places where support is available.

The sharing variables significantly affected are those that measure the giving and receiving of income within and between villages, and the giving and receiving of resources, such as food, animal by-products, and the like, by persons (households) in different villages (K11A-K12A, K16A-K16B). The pretest responses are significantly different from posttest responses, as are first and second wave panel responses, while second wave panel and posttest responses are not significantly different (from each other). The increase in occasional and regular sharing of income, both giving and receiving, with persons in households other than the informant's in the informant's village and in villages different from the informant's is very different from the responses in the Schedule A and B research. There, controlling for ethnicity, Natives with the largest incomes are donors and those with the least are recipients. The difference in the Schedule C research is that income sharing increased abruptly after 1989 within and between villages, among donors and recipients, and among non-Natives as well as Natives (see Table 11-5).

Income, rather than labor or resources, dominates as "coin of the realm" in the spill area, where subsistence harvests and subsistence resources are less prominent features of everyday life than they are in the areas north of the Gulf of Alaska. Yet, as resources in some areas became scarce or were feared to be tainted by Natives (fish, sea mammals, birds), or when nonpreferred food was distributed by Exxon Corporation to persons whose resource harvests were affected by the spill, distributions of wild resources and by-products between villages (as recipients and as donors, K16A and K16B) increased.[96]

Household dynamics, we have averred, are sensitive to internal and external economic factors. KIP items on household composition and dynamics (K19) and rules for household dynamics (K20) demonstrate significant differences between pretest and posttest and between first and second waves of the panel, but not

[96]See Stephanie Reynolds' account of sharing between Eyak community members (in Cordova) and Native households in Tatitlek and Chenega in Social Indicators Study IV. Part 1 (HRAF 1993).

between the posttest and the second wave of the panel. Between the late summer of 1989 and the winter of 1991, large proportions of households reported changes in their composition (a reduction of stability) and also reported that their rules for membership and behavior were less clear and formal than was reported in the earlier research wave. Economic exigencies influence changes in households and, it appears, even in the rules persons suggest operate within those households. The fit between the "ought" and the "is" on household composition, dynamics, and rules, then, appears to vary with economic conditions.

Taken together, a reduction in resource harvests, an increase in sharing, and fluctuation in household compositions suggest a pattern of responses which are consequences of the oil spill. The spill created several subsistence economic and other nonsubsistence economic problems which local residents of the spill area had to deal with. Their responses appear, perhaps, in their ability to identify political issues correctly (K25). The posttest and second wave panel respondents identified correctly significantly more political issues than did the pretest and first wave respondents. It is likely that the political and economic issues spawned by the spill and the responses to it were regarded as sufficiently serious to engage more persons in discussions of them and knowledge about them than did prespill political issues.

We expected second wave panel respondents to identify more issues correctly than first wave respondents. The spill was a much larger political event than several large, but more protracted events of the preceding several years, such as disputes over subsistence rights, revisions to ANCSA, and the economic downturn following the plunge in oil prices. We also anticipated that posttest respondents would identify more political issues correctly than pretest respondents, given the enormity of the spill, the consequences from it, and the responses to it. Non-Natives and Natives, alike, proved to be well informed on three or more political issues in 1991 (see Table 11-5).

The change in knowledge about political issues is complemented by a change in expectations for economic development. Pretest respondents were significantly more sanguine about local benefits from economic developments which occur locally than are posttest and second wave respondents. Among the latter two groups, majorities of over 60 percent think that benefits and control over any developments that occur locally will accrue to externally based companies and corporations. In 1989, about 60 percent thought benefits mainly would accrue locally. The difference, perhaps, can be explained by the large number of spill-related jobs and contracts created in response to the spill in 1989, many of which went to local persons, and then to a reassessment of who benefitted after the spill. It may be that an understanding of corporate and external control of local economic activities (they cannot be called "developments") was heightened by the spill (see several chapters in Social Indicators Study IV. Parts 1 and 2 [HRAF 1993], especially Cordova, Valdez, Karluk, Chignik, Kodiak City, and Kenai).

Items K33A and K33B, which measure whether respondents think economic conflicts occurred as a consequence of the spill, demonstrate that significantly more persons in 1991 thought that conflicts occurred and significantly fewer thought that economic conflicts had not occurred than thought so in 1989. The spill, which either caused or exacerbated problems between fishermen, probably accounts for the conflicts which respondents say occurred between summer 1989 and early 1991. These measures of changes do not appear to be testing artifacts.

IV. TESTING FOR TEST ARTIFACTS IN 1992

Table 11-4 provides frequency distributions for the 1992 posttest sample (*N374*) and for the 1992 total reinterview panel (*N143*). It also provides results of the tests of significance of differences between posttest and panel respondents on each item. The Total Postspill Reinterview Panel comprises all persons initially interviewed in 1989, 1990, or 1991. Some of those respondents had been reinterviewed once or twice prior to the 1992 research wave. The 1992 Total Postspill Posttest Sample comprises respondents from the same villages as those of the panel members.

The posttest has a significantly greater proportion of Natives and of males than does the panel, and the average age of panel members is significantly older than posttest members. These differences are not artifacts of testing. Rather, the Social

Table 11-4

FREQUENCY DISTRIBUTIONS IN PERCENTS AND SIGNIFICANCE OF DIFFERENCES, KEY INFORMANT PROTOCOL VARIABLES, POSTTEST (INITIAL INTERVIEWS, *N*374, 1992), AND PANEL (REINTERVIEWS, *N*143, 1992)*

Key Informant Protocol Variables	Total Postspill Posttest Sample 1992 *374N*	Total Postspill Reinterview Panel 1992 *143N*
RACE/ETHNICITY OF RESPONDENT		
ALASKA NATIVE	26.6**	16.8
NOT ALASKA NATIVE	73.4	83.2
SEX OF RESPONDENT		
MALE	61.2**	48.3
FEMALE	38.8	51.7
AGE CATEGORY OF RESPONDENT		
18 TO 34 YEARS	31.5**	22.5
35 TO 59 YEARS	57.1	63.4
60 YEARS AND OLDER	11.3	14.1
MEAN	41.8	44.8
Q12C ADEQUACY OF THE EXXON COMPANY RESPONSE TO THE <u>EXXON VALDEZ</u> SPILL		
DID NOTHING OF CONSEQUENCE	47.2	40.6
DID FEW THINGS WITHIN ITS POWERS	31.3	32.0
DID MANY THINGS WITHIN ITS POWERS	21.5	27.3
EXERCISED ALL OF ITS POWERS	0.0	0.0
Q16B DID SPILL CAUSE DISPUTES BETWEEN FISHERMEN AND NONFISHERMEN?		
NONE	62.8	62.5
VERY FEW	24.4	29.2
MANY	12.8	8.3
K4 HOUSEHOLD ANNUAL INCOME		
$0-10,000	18.1	15.5
$10,001-20,000	12.6	12.0
$20,001-30,000	10.7	9.9
$30,001-40,000	12.1	10.6
$40,001-60,000	16.5	21.1
$60,001 AND HIGHER	29.9	31.0
K11A INCOME GIVING WITHIN THE VILLAGE		
PERSONAL USE ONLY, NOT SHARED	20.3	13.9
POOLED WITHIN THE HOUSEHOLD	17.8	13.1
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	43.7	59.9
REGULAR SHARING WITH OTHER HOUSEHOLDS	18.1	13.1

*Significnce of differences ≤.10 are designated by * for Posttest vs. Panel for 1992 responses. The Kolmogorov-Smirnov test for two independent samples is used for ordinal variables. The differences of proportious test (X^2) is used for dichotomous nominal variables. The t-test is used for interval variables.

Table 11-4 (continued)

Key Informant Protocol Variables	Total Postspill Posttest Sample 1992 *374N*	Total Postspill Reinterview Panel 1992 *143N*
K13A LABOR GIVING WITHIN THE VILLAGE		
PERSONAL USE ONLY, NOT SHARED	15.9	7.2
POOLED WITHIN THE HOUSEHOLD	9.7	15.9
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	54.6	61.6
REGULAR SHARING WITH OTHER HOUSEHOLDS	19.8	15.2
K15A RESOURCE GIVING WITHIN THE VILLAGE		
PERSONAL USE ONLY, NOT SHARED	11.4	9.1
POOLED WITHIN THE HOUSEHOLD	18.4	14.7
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	54.3	62.2
REGULAR SHARING WITH OTHER HOUSEHOLDS	15.9	14.0
HOUSEHOLD SIZE		
1	16.3	16.1
2	25.7	20.3
3-5	49.7	55.2
6-8	7.8	7.7
9+	.5	.7
K24 POLITICAL PARTICIPATION IN HOUSEHOLD AT PRESENT		
NO OFFICIAL CAPACITIES	85.3	90.2
ONE OFFICIAL CAPACITY	9.9	6.3
TWO OR MORE OFFICIAL CAPACITIES	4.8	3.5
K26 RELIGIOUS PARTICIPATION IN HOUSEHOLD		
DO NOT PROFESS RELIGION OR PARTICIPATE	29.7	31.9
ATTEND CEREMONIES OCCASIONALLY	27.2	26.2
ATTEND CEREMONIES REGULARLY	43.1	41.8

Effects researchers did not draw their posttest respondents at random, and did not alternate male and female respondents.[97]

Regardless of the differences in proportions of males and Natives, and the differences in average ages, there are no significant differences between the 1992 posttest and the 1992 panel responses. On average, panel respondents earn more, reside in larger households, and donate more cash, labor, and resources more widely

[97]The sampling procedure followed in the Social Indicator research design was to select households at random from the known universe of each village. Then, selecting at random either a male or female as respondent in the first household, alternating females and males thereafter. If no male or no female was present, then that person was selected as the informant and a person of the opposite sex was selected at the next household. As a consequence, the Social Indicator samples and panels approximate 1:1 sex ratios.

than do posttest respondents. These features, although not significantly different, characterize differences between panel and initial interview samples in all of our tests. Panel respondents are more apt to think than are posttest respondents that the Exxon Corporation did many things to mitigate the consequences of the oil spill, and are less apt to think than are posttest respondents that the oil spill precipitated many disputes between commercial fishermen and noncommercial fishermen. The differences in political and religious participation are more trivial than the aforementioned.

There is, then, no suggestion of reactivity in the 1992 total reinterview panel.

V. KIP ITEMS TO BE RETAINED FOR FURTHER CONSIDERATION

All of the KIP items that survived the longitudinal reliability test (Chap. 10) have survived the test for testing artifacts. Items Q13A and Q17 are reliable for subsets of our samples, and as such should be retained. The following is a list of KIP Items that passed the testing artifacts tests and will be retained for the analysis of Social Indicators:

Q2A1	WALRUS, MANAGE?
Q2A2	WALRUS, WHO SHOULD MANAGE?
Q2B1	BOWHEAD, MANAGE?
Q2B2	BOWHEAD, WHO SHOULD MANAGE?
Q2D1	SALMON, MANAGE?
Q2D2	SALMON, WHO SHOULD MANAGE?
Q2G1	HALIBUT, MANAGE?
Q2G2	HALIBUT, WHO SHOULD MANAGE?
Q2K1	TANNER CRAB, MANAGE?
Q2K2	TANNER CRAB, WHO SHOULD MANAGE?
Q2N1	MOOSE, MANAGE?
Q2N2	MOOSE, WHO SHOULD MANAGE?
Q2R1	DUCKS, MANAGE?
Q2R2	DUCKS, WHO SHOULD MANAGE?
Q3A	MANAGEMENT OF WALRUS
Q3C	MANAGEMENT OF BOWHEAD
Q3D	MANAGEMENT OF POLAR BEAR
Q3F	MANAGEMENT OF MOOSE
Q3H	MANAGEMENT OF SALMON
Q3J	MANAGEMENT OF BOTTOMFISH
Q3K	MANAGEMENT OF CRABS
Q4A	INFLUENCE OVER SALMON
Q51A	KNOWLEDGE TO UNDERSTAND WATER
Q51E	KNOWLEDGE TO UNDERSTAND LAND MAMMALS
Q51F	KNOWLEDGE TO UNDERSTAND FISH
Q51G	KNOWLEDGE TO UNDERSTAND SEA MAMMALS
Q51H	KNOWLEDGE TO UNDERSTAND INVERTEBRATES
Q7	ENVIRONMENTAL SYMBOLS
Q8A	DRILLING ATTITUDES
Q8B	PUMPING ATTITUDES
Q8C	TRANSPORT ATTITUDES
Q8D	PIPELINE ATTITUDES
Q8E	ENCLAVE ATTITUDES
Q8F	RECREATION ATTITUDES
Q9	MEMORIES OF SHARING
Q12A	FEDERAL EXXON VALDEZ RESPONSE
Q12B	STATE EXXON VALDEZ RESPONSE
Q12C	EXXON EXXON VALDEZ RESPONSE
???Q13A	EXXON VALDEZ UNUSUAL?
Q13B	SIMILAR EVENTS OCCUR LATER?
Q14A	LATER RESPONSES
Q15	SPILL AFFECT INCOME?
Q16A	SPILL CAUSE FISHING DISPUTES?
K1	HARVEST EXPENSES
K2	VARIETY OF HARVESTED SPECIES
K3	HARVESTED PROTEIN IN DIET
K4	HOUSEHOLD INCOME
K5	HOUSEHOLD EARNED INCOME
K6	HOUSEHOLD UNEARNED INCOME
K7	GOVERNMENT SOURCES OF INCOME
K8	NON-GOVERNMENT SOURCE OF INCOME
K9	STABILITY OF EARNED INCOME
K10	STABILITY OF UNEARNED INCOME
K11A	INCOME GIVING IN VILLAGES
K11B	INCOME RECEIVING IN VILLAGES
K12A	INCOME GIVING BETWEEN VILLAGES
K12B	INCOME RECEIVING BETWEEN VILLAGES
K13A	LABOR GIVING IN VILLAGES
K13B	LABOR RECEIVING IN VILLAGES
K14A	LABOR GIVING BETWEEN VILLAGES
K14B	LABOR RECEIVING BETWEEN VILLAGES
K15A	RESOURCE GIVING IN VILLAGES
K15B	RESOURCE RECEIVING IN VILLAGES
K16A	RESOURCE GIVING BETWEEN VILLAGES
K16B	RESOURCE RECEIVING BETWEEN VILLAGES
K17	HOUSEHOLD SIZE
K18	AGE OF HOUSEHOLD HEAD
K19	HOUSEHOLD COMPOSITION AND DYNAMICS
K20	RULES FOR DYNAMICS
K22	DIVORCE OR SEPARATION
K23	SODALITY MEMBERSHIP
K24	POLITICAL PARTICIPATION
K25	IDENTIFICATION OF POLITICAL ISSUES
K26	RELIGIOUS PARTICIPATION
K27	EXTRACURRICULAR RELIGIOUS PARTICIPATION
K28	RESPONSIBILITY FOR ATTAINMENT
K29	ETHICS AND ENVIRONMENTAL SYMBOLS
K31	ENCULTURATION AND GENDER DISTINCTIONS
K32	EXPECTATIONS FOR DEVELOPMENT
K33A	ECONOMIC CONFLICTS
???K33B	PERSONAL ECONOMIC CONFLICTS
K34	SCHOOLING AND SUCCESS
K35	PERCEIVED OBJECTIVES OF SERVICES
K37	RESPONDENT RESIDENCE PATTERN
K37B	SPOUSE RESIDENCE PATTERN
K39	SERVICES USED BY RESPONDENT
K41	UTILITIES IN HOUSE

Below is Table 11-5, which distinguishes *Hub:Periphery* and Native:Non-Native responses to KIP items for the 1989S pretest and 1991W posttest samples.

Table 11-5

UNIVARIATE DISTRIBUTIONS IN PERCENTS, KIP PROTOCOL VARIABLES, THEORETICAL CONTRASTS FOR HUB:PERIPHERY AND NATIVE:NON-NATIVE, POSTSPILL, PRETEST, AND POSTTEST.[a]

Key Informant Protocol Variables	*Hub* 1989 (*N116*)	*Periphery* 1989 (*N100*)	*Hub* 1991 (*N61*)	*Periphery* 1991 (*N39*)	Non-Nat 1989 (*N145*)	Native 1989 (*N67*)	Non-Nat 1991 (*N61*)	Native 1991 (*N25*)
Q2A1 WALRUS, MANAGE?								
ONLY GOD CAN MANAGE	2.3	6.3	0.0	*7.7	2.5	8.9	0.0	12.5
NO PERSON CAN MANAGE	0.0	2.5	0.0	15.4	1.7	0.0	3.7	16.7
NO INSTITUTION CAN MANAGE	1.1	1.3	0.0	0.0	.8	2.2	0.0	0.0
PERSONS CAN MANAGE	3.4	10.0	3.8	15.4	5.0	11.1	7.4	8.3
INSTITUTIONS CAN MANAGE	93.1	80.0	96.2	61.5	89.9	77.8	88.9	62.5
Q2A2 WALRUS, WHO SHOULD MANAGE?								
ALASKA DEPARTMENT OF FISH & GAME	45.1	38.5	56.4	*23.1	46.6	*27.5	42.1	21.7
VARIOUS FEDERAL AGENCIES	18.3	12.8	3.6	2.6	18.1	7.5	5.3	0.0
COMBINATION OF GOVERNMENT & NATIVES	26.8	30.8	25.5	46.2	28.4	30.0	33.3	43.5
NATIVE ORGANIZATIONS	4.9	5.1	7.3	12.8	3.4	10.0	8.8	17.4
LOCAL NATIVES	4.9	12.8	7.3	15.4	3.4	25.0	10.5	17.4
Q2B1 BOWHEAD, MANAGE?								
ONLY GOD CAN MANAGE	2.3	5.0	0.0	*7.9	1.7	8.5	0.0	12.5
NO PERSON CAN MANAGE	0.0	3.8	0.0	15.8	2.6	0.0	3.8	16.7
NO INSTITUTION CAN MANAGE	1.2	1.3	0.0	0.0	.9	2.1	0.0	0.0
PERSONS CAN MANAGE	3.5	10.0	5.7	15.8	6.0	8.5	9.4	8.3
INSTITUTIONS CAN MANAGE	93.0	80.0	94.3	60.5	88.8	80.9	86.8	62.5
Q2B2 BOWHEAD, WHO SHOULD MANAGE?								
ALASKA DEPARTMENT OF FISH & GAME	40.7	35.4	54.5	*23.7	41.2	*31.0	41.1	21.7
VARIOUS FEDERAL AGENCIES	22.2	19.0	5.5	2.6	22.8	11.9	7.1	0.0
COMBINATION OF GOVERNMENT & NATIVES	27.2	30.4	25.5	47.4	29.8	26.2	33.9	43.5
NATIVE ORGANIZATIONS	4.9	3.8	7.3	10.5	2.6	9.5	7.1	17.4
LOCAL NATIVES	4.9	11.4	7.2	15.8	3.5	21.4	10.7	17.4

[a]Pretest research conducted in the summer of 1989 and posttest research conducted in the winter of 1991. Tests for significance of difference: the Kolmogorov-Smirnov test for two independent samples is used for all ordinal variables. Significance of difference of proportions (X^2) is used for nominal dichotomous variables. The differences are tested between *Hub:Periphery* for 1989 and again for 1991, and between **Natives:non-Natives** for 1989 and again for 1991.

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
Q2D1 SALMON, MANAGE?								
ONLY GOD CAN MANAGE	4.5	8.2	0.0	*7.9	2.8	14.1	0.0	12.5
NO PERSON CAN MANAGE	.9	2.1	0.0	15.8	2.1	0.0	3.6	16.7
NO INSTITUTION CAN MANAGE	.9	1.0	0.0	0.0	.7	1.6	0.0	0.0
PERSONS CAN MANAGE	5.4	14.4	3.6	15.8	7.1	14.1	7.3	8.3
INSTITUTIONS CAN MANAGE	88.4	74.2	96.4	60.5	87.2	70.3	89.1	62.5
Q2D2 SALMON, WHO SHOULD MANAGE?								
ALASKA DEPARTMENT OF FISH & GAME	79.4	*58.5	75.0	*36.8	77.2	*52.5	68.4	*30.4
VARIOUS FEDERAL AGENCIES	1.9	2.1	0.0	0.0	1.5	3.3	0.0	0.0
COMBINATION OF GOVERNMENT & NATIVES	13.1	25.5	16.1	36.8	16.9	23.0	22.8	30.4
NATIVE ORGANIZATIONS	3.4	2.1	3.6	7.9	2.9	3.3	3.5	13.0
LOCAL NATIVES	1.9	11.7	5.4	18.4	1.5	18.0	5.3	26.1
Q2G1 HALIBUT, MANAGE?								
ONLY GOD CAN MANAGE	4.6	*8.3	0.0	*7.9	2.9	*14.5	0.0	12.5
NO PERSON CAN MANAGE	0.0	2.1	0.0	15.8	1.4	0.0	3.7	16.7
NO INSTITUTION CAN MANAGE	.9	1.0	0.0	0.0	.7	1.6	0.0	0.0
PERSONS CAN MANAGE	4.6	15.6	3.7	15.8	7.2	14.5	7.4	8.3
INSTITUTIONS CAN MANAGE	89.9	72.9	96.3	60.5	87.8	69.4	88.9	62.5
Q2G2 HALIBUT, WHO SHOULD MANAGE?								
ALASKA DEPARTMENT OF FISH & GAME	81.0	*58.7	72.2	*40.5	78.4	*52.5	64.3	40.9
VARIOUS FEDERAL AGENCIES	2.9	3.3	1.9	2.7	3.7	1.7	3.6	0.0
COMBINATION OF GOVERNMENT & NATIVES	11.4	26.1	16.7	35.1	14.9	25.4	23.2	27.3
NATIVE ORGANIZATIONS	2.9	1.1	3.7	5.4	1.5	3.4	3.6	9.1
LOCAL NATIVES	1.9	10.9	5.6	16.2	1.5	16.9	5.4	22.7
Q2K1 TANNER CRABS, MANAGE?								
ONLY GOD CAN MANAGE	4.6	6.4	0.0	*5.3	2.2	13.1	0.0	8.3
NO PERSON CAN MANAGE	0.0	1.1	0.0	15.8	.7	0.0	3.7	16.7
NO INSTITUTION CAN MANAGE	.9	0.0	0.0	0.0	.7	14.8	0.0	0.0
PERSONS CAN MANAGE	5.5	14.9	3.7	15.8	7.2	0.0	7.4	8.3
INSTITUTIONS CAN MANAGE	89.0	77.7	96.3	63.2	89.1	72.1	88.9	66.7

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
Q2K2 TANNER CRABS, WHO SHOULD MANAGE?								
ALASKA DEPARTMENT OF FISH & GAME	79.0	68.9	74.5	*34.2	78.9	63.8	66.1	*30.4
VARIOUS FEDERAL AGENCIES	3.8	2.2	0.0	0.0	3.0	3.4	0.0	0.0
COMBINATION OF GOVERNMENT & NATIVES	12.4	20.0	16.4	42.1	15.0	17.2	25.0	34.8
NATIVE ORGANIZATIONS	2.9	1.1	3.6	5.3	1.5	3.4	3.6	8.7
LOCAL NATIVES	1.9	7.8	5.5	18.4	1.5	12.1	5.4	26.1
Q2N1 MOOSE, MANAGE?								
ONLY GOD CAN MANAGE	5.4	4.6	0.0	*7.9	3.5	9.3	0.0	12.5
NO PERSON CAN MANAGE	0.0	2.3	0.0	15.8	.7	0.0	3.7	16.7
NO INSTITUTION CAN MANAGE	.9	0.0	0.0	0.0	.7	0.0	0.0	0.0
PERSONS CAN MANAGE	5.4	12.6	5.6	15.8	7.1	13.0	9.3	8.3
INSTITUTIONS CAN MANAGE	88.4	80.5	94.4	60.5	87.9	77.8	87.0	62.5
Q2N2 MOOSE, SHOULD MANAGE?								
ALASKA DEPARTMENT OF FISH & GAME	78.7	61.7	69.1	*36.8	77.9	*53.1	62.5	*30.4
VARIOUS FEDERAL AGENCIES	.9	1.2	0.0	0.0	.7	2.0	0.0	0.0
COMBINATION OF GOVERNMENT & NATIVES	15.7	28.4	21.8	34.2	18.4	28.6	26.8	30.4
NATIVE ORGANIZATIONS	2.8	1.2	3.6	5.3	1.5	4.1	3.6	8.7
LOCAL NATIVES	1.9	7.4	5.5	23.7	1.5	12.2	7.1	30.4
Q2R1 DUCKS, MANAGE?								
ONLY GOD CAN MANAGE	5.4	9.3	0.0	*7.9	4.3	*14.1	0.0	12.5
NO PERSON CAN MANAGE	0.0	2.1	0.0	15.8	.7	0.0	3.7	16.7
NO INSTITUTION CAN MANAGE	.9	1.0	0.0	0.0	.7	1.6	0.0	0.0
PERSONS CAN MANAGE	5.4	14.4	5.6	15.8	7.1	15.6	9.3	8.3
INSTITUTIONS CAN MANAGE	88.4	73.2	94.4	60.5	87.2	68.8	87.0	62.5
Q2R2 DUCKS, WHO SHOULD MANAGE?								
ALASKA DEPARTMENT OF FISH & GAME	52.3	*44.6	60.7	*34.2	50.4	*45.0	54.4	26.1
VARIOUS FEDERAL AGENCIES	28.0	18.5	8.9	5.3	29.6	10.0	8.8	8.7
COMBINATION OF GOVERNMENT & NATIVES	14.0	26.1	21.4	39.5	17.0	25.0	28.1	34.8
NATIVE ORGANIZATIONS	3.7	1.1	3.6	5.3	1.5	5.0	3.5	8.7
LOCAL NATIVES	1.9	9.8	5.4	15.8	1.5	15.0	5.3	21.7

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
Q3A MANAGEMENT OF WALRUS								
POORER THAN NATIVES	6.9	*18.2	14.0	*39.5	7.6	*21.8	15.8	*52.2
EQUIVALENT TO NATIVES	17.2	35.1	17.5	26.3	21.2	41.8	14.0	34.8
BETTER THAN NATIVES	75.9	46.8	68.4	34.2	71.2	36.4	70.2	13.0
Q3C MANAGEMENT OF BOWHEAD								
POORER THAN NATIVES	6.9	*15.6	14.0	*38.9	7.0	*21.7	16.1	*52.2
EQUIVALENT TO NATIVES	18.4	35.1	17.5	25.0	20.9	41.3	14.3	34.8
BETTER THAN NATIVES	74.7	49.4	68.4	36.1	72.2	37.0	69.6	13.0
Q3D MANAGEMENT OF POLAR BEAR								
POORER THAN NATIVES	5.7	*10.5	14.0	*38.9	6.0	*13.3	16.1	*52.2
EQUIVALENT TO NATIVES	17.0	36.8	17.5	25.0	19.8	44.4	14.3	34.8
BETTER THAN NATIVES	77.3	52.6	68.4	36.1	74.1	42.2	69.6	13.0
Q3F MANAGEMENT OF MOOSE								
POORER THAN NATIVES	5.4	*12.2	10.2	*38.9	5.9	*15.1	13.8	*52.2
EQUIVALENT TO NATIVES	20.7	37.8	16.9	22.2	19.1	50.9	12.1	34.8
BETTER THAN NATIVES	73.9	50.0	72.9	38.9	75.0	34.0	74.1	13.0
Q3H MANAGEMENT OF SALMON								
POORER THAN NATIVES	7.3	*14.0	6.8	*38.9	5.9	*19.4	10.3	*52.2
EQUIVALENT TO NATIVES	16.5	34.4	16.9	22.2	17.6	41.9	12.1	34.8
BETTER THAN NATIVES	76.1	51.6	76.3	38.9	76.5	38.7	77.6	13.0
Q3J MANAGEMENT OF BOTTOM FISH								
POORER THAN NATIVES	6.5	*14.3	6.8	*33.0	6.6	*16.9	10.3	*43.5
EQUIVALENT TO NATIVES	15.7	34.1	18.6	25.0	16.9	42.4	13.8	39.1
BETTER THAN NATIVES	77.8	51.6	74.6	41.7	76.5	40.7	75.9	17.4
Q3K MANAGEMENT OF CRABS								
POORER THAN NATIVES	4.7	*12.4	6.8	*33.3	5.3	*13.8	10.3	*43.5
EQUIVALENT TO NATIVES	16.0	36.0	18.6	25.0	17.3	44.8	13.8	39.1
BETTER THAN NATIVES	79.2	51.7	74.6	41.7	77.4	41.4	75.9	17.4

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
Q4A INFLUENCE OVER SALMON								
NOT AT ALL	5.6	18.9	11.1	28.9	7.6	*21.0	12.5	33.3
RARELY OR SELDOM	39.3	40.0	40.7	44.7	36.4	46.8	48.2	37.5
FREQUENTLY	55.1	41.4	48.1	26.3	56.1	32.3	39.3	29.2
Q51A KNOWLEDGE OF WATER/WIND/ICE								
NATIVES CONTROL MOST KNOWLEDGE	10.5	*39.0	22.6	38.5	15.3	*44.6	20.3	*60.4
NATIVES AND SOME SCIENTISTS CONTROL	45.7	45.0	30.2	35.9	46.0	43.1	32.2	30.4
SCIENTISTS CONTROL MOST KNOWLEDGE	43.8	16.0	47.2	25.6	38.7	12.3	47.5	8.7
Q51E KNOWLEDGE OF LAND MAMMALS								
NATIVES CONTROL MOST KNOWLEDGE	9.4	*35.7	25.5	*25.9	13.1	*42.2	22.4	*63.6
NATIVES AND SOME SCIENTISTS CONTROL	40.6	45.9	21.8	41.0	43.1	42.2	29.3	31.8
SCIENTISTS CONTROL MOST KNOWLEDGE	50.0	18.4	52.7	23.1	43.8	15.2	48.3	4.5
Q51F KNOWLEDGE OF FISH								
NATIVES CONTROL MOST KNOWLEDGE	11.3	*37.4	24.1	35.9	15.2	*43.8	19.0	*60.9
NATIVES AND SOME SCIENTISTS CONTROL	40.6	43.4	27.8	41.0	41.3	42.2	32.8	34.8
SCIENTISTS CONTROL MOST KNOWLEDGE	48.1	19.2	48.1	23.1	43.5	14.1	48.3	4.3
Q51G KNOWLEDGE OF SEA MAMMALS								
NATIVES CONTROL MOST KNOWLEDGE	9.4	*36.1	23.2	*35.9	14.6	*39.7	19.0	*60.9
NATIVES AND SOME SCIENTISTS CONTROL	39.6	44.3	25.0	41.0	40.9	42.9	32.8	30.4
SCIENTISTS CONTROL MOST KNOWLEDGE	50.9	19.6	51.8	23.1	44.5	17.5	48.3	8.7
Q51H KNOWLEDGE OF INVERTEBRATES								
NATIVES CONTROL MOST KNOWLEDGE	8.6	*33.0	16.4	*35.9	12.4	*38.7	15.5	*56.5
NATIVES AND SOME SCIENTISTS CONTROL	37.1	46.4	25.5	41.0	41.6	40.3	32.8	34.8
SCIENTISTS CONTROL MOST KNOWLEDGE	54.3	20.6	58.2	23.1	46.0	21.0	51.7	8.7
Q6 TIME FOR ACQUISITION OF KNOWLEDGE								
ABOUT 1 YEAR	11.6	11.4	12.3	*5.3	12.1	*10.8	12.3	8.0
1-5 YEARS	31.3	37.5	47.4	21.1	36.4	27.7	42.1	28.0
6-20 YEARS	25.9	21.6	24.6	23.7	27.3	16.9	21.1	28.0
A LIFETIME	10.7	10.2	1.8	7.9	9.1	13.8	1.8	12.0
ACCUMULATED EXPERIENCES/SEVERAL GENS	20.5	19.3	14.0	42.1	15.2	30.8	22.8	24.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
Q7 SIGNIFICANT ENVIRONMENTAL SYMBOLS								
NONE	6.1	*6.2	10.5	*2.6	6.3	*6.1	6.8	4.0
A FEW	42.6	23.7	52.6	20.5	34.5	33.3	44.1	24.0
MANY	41.7	46.4	33.3	46.2	52.1	24.2	44.1	28.0
MANY OVER GENERATIONS	9.5	23.7	3.5	30.8	7.0	36.4	5.1	44.0
Q8A DRILLING ATTITUDES								
DELETERIOUS	42.6	*63.8	44.8	*86.8	47.6	61.9	63.8	76.0
NO CHANGE	21.7	19.1	29.3	7.9	24.5	11.1	13.8	16.0
MIXED	32.3	16.0	24.1	2.6	26.6	22.2	20.7	8.0
BENEFICIAL	3.5	1.1	1.7	2.6	1.4	4.8	1.7	0.0
Q8B PUMPING ATTITUDES								
DELETERIOUS	43.9	*67.4	43.6	*81.6	47.9	*68.8	63.6	68.0
NO CHANGE	32.5	17.9	32.7	13.2	31.0	14.1	16.4	24.0
MIXED	20.2	14.7	20.0	2.6	19.0	15.6	16.4	8.0
BENEFICIAL	3.5	0.0	3.6	2.6	2.1	1.6	3.6	0.0
Q8C TRANSPORTING ATTITUDES								
DELETERIOUS	37.9	*58.8	42.9	*81.6	41.0	*60.6	60.7	72.0
NO CHANGE	44.0	24.7	37.5	13.2	41.0	22.7	25.0	20.0
MIXED	18.1	14.4	17.9	2.6	17.4	15.2	12.5	8.0
BENEFICIAL		2.1	1.8	2.6	.7	1.5	1.8	0.0
Q8D PIPELINE ATTITUDES								
DELETERIOUS	34.2	*55.3	41.1	*81.6	38.7	*54.0	62.5	72.0
NO CHANGE	41.2	28.7	35.7	13.2	38.7	28.6	19.6	20.0
MIXED	19.3	14.9	19.6	2.6	19.0	14.3	14.3	8.0
BENEFICIAL	5.3	1.1	3.6	2.6	3.5	3.2	3.6	0.0
Q8E ENCLAVE ATTITUDES								
DELETERIOUS	45.7	*65.6	46.4	*84.2	49.0	66.7	66.1	76.0
NO CHANGE	32.8	19.4	32.1	10.5	31.5	15.9	17.9	16.0
MIXED	19.8	11.8	17.9	2.6	17.5	14.3	12.5	8.0
BENEFICIAL	1.7	3.2	3.6	2.6	2.1	3.2	3.6	0.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
Q8F RECREATION ATTITUDES								
DELETERIOUS	47.8	*65.6	42.9	*76.3	50.3	67.7	57.1	72.0
NO CHANGE	35.7	21.9	35.7	13.2	33.6	20.0	21.4	16.0
MIXED	14.8	11.5	17.9	5.3	14.7	10.8	16.1	8.0
BENEFICIAL	1.7	1.0	3.6	5.3	1.4	1.5	5.4	0.0
Q9 MEMORIES OF SHARING								
LESS THAN PRESENT	16.0	9.0	34.5	13.2	11.0	17.2	29.3	4.3
NO CHANGE	38.0	49.5	23.6	31.6	42.5	46.9	27.6	26.1
MORE THAN PRESENT	46.0	41.1	41.8	55.3	46.5	35.9	43.1	69.6
Q10 TREATMENT OF ELDERS								
LESS CARE THAN NECESSARY	31.7	20.6	18.9	21.6	28.9	22.7	17.0	24.0
APPROPRIATE CARE	61.4	78.4	77.4	51.4	65.6	75.8	71.7	54.2
MORE CARE THAN NECESSARY	6.9	1.0	3.8	27.0	5.5	1.5	11.3	20.8
Q12A ADEQUACY OF THE FEDERAL GOVT'S RESPONSE TO THE EXXON VALDEZ SPILL								
DID NOTHING OF CONSEQUENCE	4.3	*24.4	3.6	7.9	9.8	20.7	3.4	4.2
DID FEW THINGS WITHIN ITS POWERS	63.5	50.0	46.4	57.9	61.5	48.3	44.8	62.5
DID MANY THINGS WITHIN ITS POWERS	22.6	20.0	35.7	23.7	19.6	25.9	37.9	20.8
EXERCISED ALL OF ITS POWERS	9.6	5.6	14.3	10.5	9.1	5.2	13.8	12.5
Q12B ADEQUACY OF THE ALASKA STATE RESPONSE TO THE EXXON VALDEZ SPILL								
DID NOTHING OF CONSEQUENCE	2.6	9.9	1.8	2.6	7.1	3.3	3.6	0.0
DID FEW THINGS WITHIN ITS POWERS	42.1	37.4	35.7	42.1	36.2	46.7	33.9	44.0
DID MANY THINGS WITHIN ITS POWERS	41.2	37.4	48.2	28.9	42.6	33.3	50.0	20.0
EXERCISED ALL OF ITS POWERS	14.0	15.4	14.3	26.3	14.2	16.7	12.5	36.0
Q12C ADEQUACY OF THE EXXON COMPANY RESPONSE TO THE EXXON VALDEZ SPILL								
DID NOTHING OF CONSEQUENCE	.9	*8.3	0.0	7.9	2.1	7.8	3.4	4.0
DID FEW THINGS WITHIN ITS POWERS	46.1	66.7	46.6	63.2	52.4	64.1	51.7	60.0
DID MANY THINGS WITHIN ITS POWERS	41.7	19.8	39.7	23.7	35.0	23.4	39.7	20.0
EXERCISED ALL OF ITS POWERS	11.3	5.2	13.8	5.3	10.5	4.7	5.2	16.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
Q13A IS EXXON VALDEZ SPILL UNIQUE?								
NO	50.4	55.7	42.1	*64.1	54.6	47.7	55.2	48.0
YES	49.6	44.3	57.9	35.9	45.4	52.3	44.8	52.0
Q13B WILL EVENTS SIMILAR TO THE EXXON VALDEZ SPILL OCCUR IN THE FUTURE?								
NO	.9	1.1	5.5	0.0	1.4	0.0	3.5	4.3
RARELY	68.7	66.7	47.3	47.4	65.2	71.9	38.6	65.2
FREQUENTLY	30.4	32.3	47.3	52.6	33.3	28.1	57.9	30.4
Q14A HOW WILL FUTURE RESPONSES TO SPILLS COMPARE WITH THE RESPONSE TO EXXON?								
WORSE	5.3	2.2	3.6	0.0	4.3	3.1	0.0	0.0
SAME AS	29.8	40.2	26.8	31.6	37.7	25.0	26.8	29.2
BETTER THAN	64.9	57.6	69.6	68.4	58.0	71.9	73.2	70.8
Q15 HOW DID SPILL AFFECT YOUR INCOME?								
DECREASED	23.0	30.1	19.3	23.7	25.4	28.3	23.2	24.0
STAYED THE SAME	47.8	43.0	57.9	44.7	47.2	41.7	57.1	44.0
INCREASED	29.2	26.9	22.8	31.6	27.5	30.0	19.6	32.0
Q16A DID SPILL CAUSE DISPUTES AMONG OR BETWEEN FISHERMEN?								
NONE	10.9	*30.3	5.6	19.4	14.3	32.3	1.8	30.4
VERY FEW	29.1	18.0	27.8	27.8	26.3	19.4	27.3	17.4
MANY	60.0	51.7	66.7	52.8	59.4	48.4	70.9	52.2
Q16B DID SPILL CAUSE DISPUTES BETWEEN FISHERMEN AND NONFISHERMEN?								
NONE	23.6	*48.3	20.8	40.0	29.6	44.8	16.7	*59.1
VERY FEW	28.2	14.9	29.2	22.9	22.2	24.1	31.3	9.1
MANY	48.2	36.8	50.0	37.1	48.1	31.0	52.1	31.8

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
K1 HARVEST EXPENSES-PROPORTN OF INCOME								
VERY LOW, 0-9%	87.9	73.7	89.7	84.6	87.6	*68.2	86.7	84.0
LOW, 10-19%	6.0	12.1	8.6	10.2	6.2	13.6	10.0	12.0
MEDIUM, 20-29%	6.0	7.1	0.0	5.1	4.1	12.1	1.7	4.0
HIGH, 30% OR MORE	0.0	7.1	1.7	0.0	2.1	6.1	1.7	0.0
K2 VARIETY OF HARVESTED SPECIES								
NONE	14.7	*5.1	28.8	13.5	9.0	12.1	18.6	12.5
FEW, NONE IN SOME CATEGORIES	57.8	37.4	62.7	56.8	51.7	40.9	67.8	54.2
AT LEAST ONE SPECIES PER CATEGORY	12.1	15.2	8.5	5.4	14.5	12.1	8.5	8.3
TWO-THREE SPECIES PER CATEGORY	8.6	14.1	0.0	8.1	9.0	16.7	1.7	8.3
MORE THAN THREE SPECIES PER CATEGORY	6.9	28.3	0.0	16.2	15.9	18.2	3.4	16.7
K3 HARVESTED PROTEIN IN DIET								
LESS THAN 25%	59.5	*24.2	67.2	*36.8	51.7	*21.2	64.4	*25.0
25-49%	22.4	28.3	13.8	23.7	24.8	27.3	10.2	29.2
50-75%	12.9	33.3	13.8	21.1	16.6	36.4	15.3	29.2
76-100%	5.2	14.1	5.2	18.4	6.9	15.2	10.2	16.7
K4 HOUSEHOLD ANNUAL INCOME								
$0-10,000	5.5	*11.5	8.2	7.7	2.2	*21.5	4.9	*12.0
$10,001-20,000	10.1	18.8	14.8	17.9	8.8	24.6	9.8	32.0
$20,001-30,000	11.9	12.5	11.5	7.7	8.8	20.0	6.6	20.0
$30,001-40,000	14.7	18.8	21.3	10.3	16.8	15.4	16.4	8.0
$40,001-60,000	22.9	16.7	21.3	35.9	24.8	10.8	34.4	20.0
$60,001-100,000	31.2	21.9	23.0	20.5	35.8	7.7	27.9	8.0
OVER $100,000	3.7	0.0	0.0	0.0	2.9	0.0	0.0	0.0
K5 PERCENTAGE OF TOTAL HOUSEHOLD INCOME THAT IS EARNED								
0-24%	5.2	12.2	10.0	7.7	3.4	*19.7	8.3	12.0
25-49%	2.6	8.2	1.7	2.6	3.4	9.1	0.0	4.0
50-74%	5.2	8.2	3.3	12.8	4.8	10.6	1.7	20.0
75-100%	87.1	71.4	85.0	76.9	88.3	60.6	90.0	64.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 (*N116*)	*Periphery* 1989 (*N100*)	*Hub* 1991 (*N61*)	*Periphery* 1991 (*N39*)	Non-Nat 1989 (*N145*)	Native 1989 (*N67*)	Non-Nat 1991 (*N61*)	Native 1991 (*N25*)
K6 PERCENTAGE OF TOTAL HOUSEHOLD INCOME THAT IS UNEARNED								
0-24%	89.4	76.5	85.0	74.4	90.8	*66.7	88.3	64.0
24-49%	5.3	5.1	1.7	12.8	3.5	9.1	1.7	20.0
50-74%	2.7	5.1	1.7	2.6	3.5	4.5	0.0	4.0
75-100%	2.7	13.3	11.7	10.3	2.1	19.7	10.0	12.0
K7 GOVERNMENT SOURCE OF TOTAL HOUSEHOLD INCOME BY PERCENT								
0-24%	69.9	62.4	71.7	48.7	71.0	58.5	66.7	44.0
24-49%	5.3	5.4	3.3	7.7	5.1	6.2	1.7	12.0
50-74%	8.6	14.0	3.3	5.1	8.0	18.5	5.0	0.0
75-100%	15.9	18.3	21.7	38.5	15.9	16.9	26.7	44.0
K8 NONGOVERNMENTAL SOURCE OF TOTAL HOUSEHOLD INCOME BY PERCENT								
0-24%	20.7	22.7	23.0	43.6	20.0	23.1	26.2	*52.0
24-49%	7.8	11.3	3.3	2.6	6.9	15.4	3.3	0.0
50-74%	6.0	9.3	6.6	10.3	6.9	9.2	3.3	12.0
75-100%	65.5	56.7	67.2	43.6	66.2	52.3	67.2	36.0
K9 STABILITY HOUSEHOLD EARNED INCOME								
IRREGULAR	.9	*4.3	1.7	7.7	0.0	*8.2	1.7	12.0
ERRATIC	3.5	3.2	15.5	2.6	2.8	4.9	6.9	8.0
SEASONAL	12.2	46.2	15.5	35.9	24.5	34.4	27.6	24.0
MONTHLY	83.5	46.2	67.2	53.8	72.7	52.5	63.8	56.0
K10 STABILITY OF HOUSEHOLD UNEARNED INCOME								
(1) IRREGULAR	71.6	57.6	46.6	52.6	71.0	*53.0	50.8	28.0
(2) MONTHLY WELFARE OR TRANSFER PAYMENTS	6.0	7.1	12.1	7.9	5.5	9.1	11.9	8.0
(3) REGULAR RECEIPTS a/o ROYALTIES a/o LEASE w/(1) or (2)	21.6	29.3	39.7	36.8	22.1	30.3	37.3	60.0
(4) 1, 2, AND 3	.9	6.1	1.7	2.6	1.4	7.6	0.0	4.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 (*N116*)	*Periphery* 1989 (*N100*)	*Hub* 1991 (*N61*)	*Periphery* 1991 (*N39*)	Non-Nat 1989 (*N145*)	Native 1989 (*N67*)	Non-Nat 1991 (*N61*)	Native 1991 (*N25*)
K11A INCOME GIVING WITHIN THE VILLAGE								
PERSONAL USE ONLY, NOT SHARED	22.8	21.4	36.8	*7.9	19.4	27.7	22.8	*12.0
POOLED WITHIN THE HOUSEHOLD	59.6	50.0	31.6	15.8	59.0	47.7	33.3	8.0
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	12.3	23.5	22.8	47.4	15.3	23.1	29.8	56.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	5.3	5.1	8.8	28.9	6.3	1.5	14.0	24.0
K11B INCOME RECEIVING IN THE VILLAGE								
NO SHARING	29.7	32.2	59.6	*26.3	29.7	33.3	51.9	32.0
POOLED WITHIN THE HOUSEHOLD	58.6	50.6	17.0	23.7	57.2	50.9	18.5	16.0
OCCASIONAL SHARING	9.9	14.9	21.3	34.2	10.9	15.8	25.9	32.0
REGULAR SHARING	1.8	2.3	2.1	15.8	2.2	0.0	3.7	20.0
K12A INCOME GIVING BETWEEN VILLAGES								
PERSONAL USE ONLY, NOT SHARED	77.6	83.8	63.6	37.8	82.1	77.3	50.9	52.0
POOLED WITHIN THE HOUSEHOLD								
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	9.5	9.1	20.5	48.6	6.9	15.2	30.2	40.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	12.9	7.1	15.9	13.5	11.0	7.6	18.9	8.0
K12B INCOME RECEIVING BETWEEN VILLAGES								
NO SHARING	88.6	89.1	93.2	*59.5	90.8	85.0	83.0	64.0
OCCASIONAL SHARING	7.0	5.4	4.5	35.1	5.6	8.3	13.2	32.0
REGULAR SHARING	4.4	5.4	2.3	5.4	3.5	6.7	3.8	4.0
K13A LABOR GIVING WITHIN THE VILLAGE								
PERSONAL USE ONLY, NOT SHARED	3.4	*8.1	12.1	*7.9	6.2	*3.0	8.6	*8.0
POOLED WITHIN THE HOUSEHOLD	24.1	14.1	10.3	10.5	24.8	9.1	13.8	8.0
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	59.5	44.4	50.0	23.7	54.5	47.0	43.1	20.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	12.9	33.3	27.6	57.9	14.5	40.9	34.5	64.0
K13B LABOR RECEIVING IN THE VILLAGE								
NO SHARING	8.7	*5.2	12.3	*7.9	8.4	*3.1	8.9	*4.0
POOLED WITHIN THE HOUSEHOLD	28.7	13.4	10.5	10.5	26.6	12.3	14.3	8.0
OCCASIONAL SHARING	53.9	47.4	61.4	23.7	51.0	49.2	53.6	24.0
REGULAR SHARING	8.7	34.0	15.8	57.9	14.0	35.4	23.2	64.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
K14A LABOR GIVING BETWEEN VILLAGES								
PERSONAL USE ONLY, NOT SHARED	74.1	80.8	72.1	52.8	79.3	71.2	72.0	52.0
POOLED WITHIN THE HOUSEHOLD								
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	21.6	12.1	18.6	27.8	15.9	21.2	18.0	28.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	4.3	7.1	9.3	19.4	4.8	7.6	10.0	20.0
K14B LABOR RECEIVING BETWEEN VILLAGES								
NO SHARING	79.5	78.9	79.5	*50.0	83.7	67.7	74.5	52.0
OCCASIONAL SHARING	17.9	12.6	15.4	30.6	12.1	24.2	17.0	28.0
REGULAR SHARING	2.7	8.5	5.1	19.4	4.2	8.1	8.5	20.0
K15A RESOURCE GIVING WITHIN THE VILLAGE								
PERSONAL USE ONLY, NOT SHARED	2.6	*5.1	23.7	*10.5	4.9	*0.0	18.6	*4.0
POOLED WITHIN THE HOUSEHOLD	17.4	5.1	3.4	13.2	15.3	4.6	6.8	12.0
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	67.0	46.9	54.2	18.4	60.4	52.3	45.8	20.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	13.0	42.9	18.6	57.9	19.4	43.1	28.8	64.0
K15B RESOURCE RECEIVING IN THE VILLAGE								
NO SHARING	6.2	*3.1	14.0	*13.2	5.0	*3.0	8.8	*12.0
POOLED WITHIN THE HOUSEHOLD	20.4	8.2	1.8	13.2	17.7	9.1	7.0	8.0
OCCASIONAL SHARING	64.6	39.8	66.7	18.4	58.2	42.4	59.6	12.0
REGULAR SHARING	8.8	49.0	17.5	55.3	19.1	45.5	24.6	68.0
K16A RESOURCE GIVING BETWEEN VILLAGES								
PERSONAL USE ONLY, NOT SHARED	72.4	66.7	50.0	*44.4	75.9	*54.5	52.9	36.0
POOLED WITHIN THE HOUSEHOLD								
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	25.0	22.2	38.6	22.2	22.1	28.8	33.3	28.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	2.6	11.1	11.4	33.3	2.1	16.7	13.7	36.0
K16B RESOURCE RECEIVING BETWEEN VILLAGES								
NO SHARING	76.8	70.5	56.1	51.4	80.1	*58.1	55.1	50.0
OCCASIONAL SHARING	21.4	16.8	36.6	20.0	17.7	24.2	30.6	25.0
REGULAR SHARING	1.8	12.6	7.3	28.6	2.1	17.7	14.3	25.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
K17 HOUSEHOLD SIZE								
1-3	57.6	55.1	59.6	69.2	54.5	58.5	57.9	64.0
4-6	37.1	40.8	31.6	23.1	40.0	38.5	29.8	32.0
7-9	4.3	2.0	7.0	5.1	4.4	1.5	8.8	4.0
10-OVER	.9	2.0	1.8	2.6	1.4	1.5	3.5	0.0
K18 AGE OF HOUSEHOLD HEAD								
UNDER 25	2.6	*4.2	6.7	5.1	2.1	6.3	3.3	12.0
25-40	44.8	33.7	36.7	53.8	40.3	36.5	45.0	44.0
41-55	34.5	26.3	40.0	23.1	36.8	19.0	38.3	24.0
56-OVER	18.1	35.8	16.7	17.9	20.8	38.1	13.3	20.0
K19 HOUSEHOLD COMPOSITION/DYNAMICS								
OPEN AND FLUID (TRADITIONAL)	13.8	13.3	11.9	13.2	13.1	15.4	8.5	20.0
INFREQUENT CHANGE	12.9	13.3	33.9	28.9	12.4	13.8	33.9	36.0
STABLE (WESTERN)	73.3	73.5	54.2	57.9	74.5	70.8	57.6	44.0
K20 RULES FOR HOUSEHOLD DYNAMICS								
(1) NO STANDARD RULES (TRADITIONAL)	10.7	*27.1	34.0	23.7	12.8	*31.3	23.2	40.0
(2) BLEND OF 1 AND 3	13.4	16.7	16.0	23.7	12.1	20.3	16.1	28.0
(3) CLEAR EXPECTATIONS (WESTERN)	75.9	56.3	50.0	52.6	75.2	48.4	60.7	32.0
K22 DIVORCE OR SEPARATION								
ONE OR MORE BROKEN UNIONS	41.2	40.8	43.6	44.7	42.3	39.4	43.9	43.5
NO BROKEN UNIONS	58.8	59.2	56.4	55.3	57.7	60.6	56.1	56.5
K23 SODALITY MEMBERSHIP								
NO MEMBERSHIPS IN HOUSEHOLD	45.7	46.5	37.3	42.1	42.1	56.1	39.7	40.0
ONE MEMBERSHIP IN HOUSEHOLD	22.4	16.2	15.3	34.2	18.6	21.2	19.0	32.0
TWO OR MORE MEMBERSHIPS IN HOUSEHOLD	31.9	37.4	47.5	23.7	39.3	22.7	41.4	28.0
K24 POLITICAL PARTICIPATION IN HOUSEHOLD AT PRESENT								
NO OFFICIAL CAPACITIES	98.3	*71.7	98.3	*69.2	90.3	75.8	89.8	72.0
ONE OFFICIAL CAPACITY	1.7	15.2	1.7	23.1	5.6	13.6	6.8	24.0
TWO OR MORE OFFICIAL CAPACITIES	0.0	13.1	0.0	7.7	4.2	10.6	3.4	4.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 (*N116*)	*Periphery* 1989 (*N100*)	*Hub* 1991 (*N61*)	*Periphery* 1991 (*N39*)	Non-Nat 1989 (*N145*)	Native 1989 (*N67*)	Non-Nat 1991 (*N61*)	Native 1991 (*N25*)
K25 IDENTIFICATION OF POLITICAL ISSUES								
NO ISSUES CORRECTLY IDENTIFIED	8.0	9.3	6.7	5.1	6.3	14.1	6.7	8.0
ONE ISSUE CORRECTLY IDENTIFIED	17.7	22.7	10.0	15.4	17.6	21.9	8.3	20.0
TWO ISSUES CORRECTLY IDENTIFIED	34.5	31.0	28.3	20.5	36.6	26.6	30.0	16.0
THREE OR MORE ISSUES IDENTIFIED	39.8	36.1	55.0	59.0	39.4	37.5	55.0	56.0
K26 RELIGIOUS PARTICIPATION IN HOUSEHOLD								
DO NOT PROFESS RELIGION OR PARTICIPATE	37.2	31.3	43.3	38.5	35.9	30.3	38.3	36.0
ATTEND CEREMONIES OCCASIONALLY	30.1	32.3	26.7	20.5	31.0	31.8	26.7	24.0
ATTEND CEREMONIES REGULARLY	32.7	36.4	30.0	41.0	33.1	37.9	35.0	40.0
K27 EXTRACURRICULAR RELIGIOUS ACTS								
NO EXTRACURRICULAR ACTIVITIES	54.4	48.5	63.3	59.0	53.8	47.0	60.0	60.0
ONE/TWO ON OCCASIONAL BASIS	23.7	26.3	15.0	7.7	25.2	24.2	16.7	4.0
ONE/TWO ON REGULAR BASIS	11.4	14.1	10.0	7.7	10.5	16.7	10.0	8.0
MORE THAN TWO REGULARLY	10.5	11.1	11.7	25.6	10.5	12.1	13.3	28.8
K28 ETHICAL RESPONSIBILITY FOR ATTAINMENT								
SEEK SUCCESS FOR SELF (PERSONAL)	44.3	*16.3	53.8	*16.2	38.5	*16.7	47.3	*8.3
SEEK SUCCESS FOR SELF & FAMILY	40.9	48.0	21.2	43.2	47.6	37.9	25.5	45.8
SEEK SUCCESS FOR FAMILY, NETWORK OF KINSPERSONS, ELDERS, FRIENDS, VILLAGE	14.8	35.7	25.0	40.5	14.0	45.5	27.3	45.8
K29 ETHICS AND SIGNIFICANT ENVIRONMENTAL SYMBOLS								
(1) RESOURCES ARE COMMODITIES	46.9	*22.4	27.3	*13.9	38.9	*30.2	30.8	*0.0
(2) BLEND OF 1 AND 3	44.2	62.2	68.2	47.2	55.6	44.4	59.6	54.2
(3) RESOURCES AND ENVIRONMENT HAVE SPIRITUAL a/o CULTURAL SIGNIFICANCE	8.8	15.3	4.5	38.9	5.6	25.4	9.6	45.8
K30 ETHICS OF PERSONAL COOPERATION								
(1) PERSONAL COMPETITION FOR SELF-GAIN	30.4	*2.0	21.6	*13.5	22.4	*7.6	15.1	*4.0
(2) 1, 3 OR 4, DEPENDING ON SITUATION	51.3	45.9	45.1	18.9	51.7	40.9	49.1	16.0
(3) COOPERATION AND COMPETITION	9.6	22.4	21.6	32.4	13.3	19.7	24.5	32.0
(4) MAINLY COOPERATION-COMMUNITARIAN	8.7	29.6	11.8	35.1	12.6	31.8	11.3	48.0

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 (*N116*)	*Periphery* 1989 (*N100*)	*Hub* 1991 (*N61*)	*Periphery* 1991 (*N39*)	Non-Nat 1989 (*N145*)	Native 1989 (*N67*)	Non-Nat 1991 (*N61*)	Native 1991 (*N25*)
K31 ENCULTURATION AND GENDER DISTINCTIONS								
WESTERN ENCULTURATION & GENDER	79.6	*55.1	63.0	38.9	86.6	*26.2	65.4	*16.7
WESTERN AND TRADITIONAL ARE MIXED	15.0	29.6	32.6	38.9	10.6	47.7	28.8	54.2
TRADITIONAL ENCULTURATION & GENDER	5.3	15.3	4.3	22.2	2.4	26.2	5.8	29.2
K32 EXPECTATIONS FOR DEVELOPMENT								
MAINLY LOCAL BENEFITS AND CONTROL	4.3	8.2	10.5	*0.0	4.9	7.6	8.9	4.0
LOCAL AND NONLOCAL COMPANIES WILL SHARE BENEFITS AND CONTROL	13.8	13.3	15.8	2.8	12.5	15.2	12.5	4.0
LOCAL JOBS, BUT EXTERNAL CONTROL	41.4	33.7	28.1	5.6	40.3	33.3	21.4	12.0
EXTERNAL BENEFITS + EXTERNAL CONTROL	40.5	44.9	45.6	91.7	42.4	43.9	57.1	80.0
K33A ECONOMIC CONFLICTS?								
NO	15.0	*28.0	17.3	5.3	13.4	*37.3	12.3	12.5
YES	85.0	72.0	82.7	94.7	86.6	62.7	87.7	87.5
K33B PERSONAL ECONOMIC CONFLICTS?								
NO	26.0	27.0	22.0	*29.7	22.7	*37.7	24.5	34.8
YES	74.0	73.0	78.0	70.3	77.3	62.3	75.5	65.2
K34 SCHOOLING AND SUCCESS								
STRONG ASSOCIATION BETWEEN THE TWO	75.9	75.5	57.4	66.7	75.9	75.4	62.1	56.5
OCCASIONAL ASSOCIATION BETWEEN THEM	20.7	18.4	37.0	30.6	20.7	16.9	34.5	39.1
NO ASSOCIATION BETWEEN THE TWO	3.4	6.1	5.6	2.8	3.4	7.7	3.4	4.3
K35 PERCEIVED OBJECTIVES OF SERVICES								
CORRECT IDENTIFICATION OF OBJECTIVES	78.1	86.7	82.5	78.6	84.1	79.0	80.4	80.0
INCORRECT IDENTIFICATION OF OBJECTIVES	21.9	13.3	17.5	21.4	15.9	21.0	19.6	20.0
K37 PLACE RESPONDENT BORN AND REARED								
OUTSIDE THE REGION/ALASKA	85.8	*47.4	90.0	*60.5	83.8	*34.4	90.0	*37.5
IN THE REGION BUT NOT SUBREGION	4.4	4.1	3.3	7.9	4.2	4.7	3.3	12.5
IN THE SUBREGION BUT NOT THE VILLAGE	5.3	12.4	1.7	2.6	2.1	21.9	1.7	4.2
IN THE VILLAGE OF CURRENT RESIDENCE	4.4	36.1	5.0	28.9	9.9	39.1	5.0	45.8

Table 11-5 (continued)

Key Informant Protocol Variables	*Hub* 1989 *(N116)*	*Periphery* 1989 *(N100)*	*Hub* 1991 *(N61)*	*Periphery* 1991 *(N39)*	Non-Nat 1989 *(N145)*	Native 1989 *(N67)*	Non-Nat 1991 *(N61)*	Native 1991 *(N25)*
K37B RESPONDENT'S SPOUSE WAS BORN AND REARED								
OUTSIDE THE REGION/OUTSIDE ALASKA	89.2	*50.7	88.9	*52.2	83.2	*37.5	77.5	57.1
IN THE REGION BUT NOT SUBREGION	7.2	7.0	8.3	8.7	5.3	12.5	10.0	64.3
IN THE SUBREGION BUT NOT THE VILLAGE	1.2	8.5	0.0	0.0	2.7	10.0	0.0	0.0
IN THE VILLAGE OF CURRENT RESIDENCE	2.4	33.8	2.8	39.1	8.8	40.0	12.5	35.7
K38 SIZE OF VILLAGE								
VERY SMALL, UNDER 15	0.0	*42.0	0.0	30.0	5.5	*50.7	7.1	*23.8
SMALL, 151-300	0.0	10.0	0.0	16.7	0.0	14.9	0.0	28.6
MEDIUM, 301-500	0.0	13.0	0.0	23.3	6.2	6.0	10.7	9.5
LARGE, 501-800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VERY LARGE, 801-OVER	100.0	35.0	100.0	30.0	88.3	28.4	82.1	38.1
K39 SOCIAL SERVICES USED BY RESPONDENT								
(1) AVOID ALL SERVICES	35.1	*8.7	12.7	12.8	27.6	15.4	14.0	0.0
(2) HEALTH SERVICES	9.9	72.8	34.5	48.7	31.3	52.3	33.3	56.0
(3) FINANCIAL SERVICES	3.6	1.1	1.8	0.0	3.0	1.5	1.8	0.0
(4) FAMILY AND SOCIAL SERVICES	14.4	2.2	5.5	2.6	11.9	3.1	5.3	0.0
(5) HEALTH (2) AND FINANCIAL (3)	19.8	9.8	32.7	7.7	15.6	12.3	24.6	24.0
(6) FAMILY-SOCIAL (4) AND TWO OR MORE	17.1	5.4	12.7	28.2	10.4	15.4	21.1	20.0
K41 UTILITIES IN HOUSE								
NO UTILITY PRESENT OR WORKING	.9	0.0	0.0	0.0	.7	0.0	0.0	
ONE UTILITY PRESENT AND WORKING	.9	0.0	0.0	2.6	.7	0.0	1.6	
TWO OR MORE WORKING, BUT NOT ALL	1.8	13.1	4.9	5.1	4.2	13.6	4.9	
ALL PRESENT, WORKING	96.5	86.9	95.1	92.3	94.4	86.4	93.4	

CHAPTER 12
INTERINSTRUMENT, INTERINTERVIEWER, AND INTRAINFORMANT RELIABILITY

I. INTRODUCTION

At the outset of our Social Indicators research project in 1986, we anticipated that several AQI items suffered from several defects, including threats to construct validity and personal and cultural sensitivity. Questionnaires, by their nature, tend to trivialize questions about complex customs, ethical beliefs, kinship obligations, sentiments, and other features of social life to which persons assign significant symbols. We developed the KIP instrument in order to inquire about these aspects of culture in Alaska in order to supplement the AQI. As we have explained above, when some AQI items proved to be unreliable and invalid, we introduced items in the KIP instrument to provide information on items we had to jettison from the AQI. The reader has been introduced to the battery of tests we have employed to assess the reliability and validity of the AQI and KIP instruments and to our reasons for creating KIP questions to replace failed AQI questions.

We recognized that it was not sufficient to replace failed questions from one instrument by adding new questions to a different kind of instrument and conclude, upon gaining successful results from our tests for the reliability and validity of the new questions in the new instrument, that they work as they were intended to work. We presumed, of course, that we satisfied our intention to repair the damage we identified in the AQI. Yet there are several unresolved questions about the compatibility of the two instruments and the results obtained from the use of each. So as to provide tests to help us determine whether the AQI and KIP instruments provided responses which are compatible, we created several questions for the KIP that would elicit information similar to information elicited by the AQI. We assumed that if the AQI and KIP yielded similar results on similar questions from the same sample of respondents, that the items in the two instruments were reliable (interinstrument reliability). If all of the similar items in the two instruments proved reliable, we would be emboldened to assume that the two instruments possessed interinstrument reliability, thereby reducing threats to validity.

The complexity of the research design allows us to test the responses of the same informants on similar AQI and KIP items at two points in time (the postspill pretest conducted in 1989, and the postspill posttest conducted in 1991). In addition, we test for interinterviewer reliability because the AQI and KIP instruments were administered by different researchers to the same informant during the same year. There are two reasons for assigning different researchers to conduct the AQI interviews from those assigned to conduct the KIP interviews. The first is to assure that the in-depth, open-ended KIP instrument is administered by a professionally trained and experienced social scientist (the KIP interviewers hold Ph.D. degrees in the social sciences, usually anthropology, and have extensive field research experience). Most AQI interviewers are local residents, trained non-Natives and Natives, almost all of whom possess prior field research experience in social science inquiry. In addition, the Natives are Native speakers of the locally spoken Native language. So we sought expertise first. Second, we consider it imperative that two persons at different times in the same research season ask the same respondent some similar questions to avert, as best as possible, threats to validity caused by reactivity between the researcher and the respondent.

II. INTERINSTRUMENT RELIABILITY (AQI AND KIP): PRETEST AND POSTTEST SAMPLES

Here we test to determine whether the AQI and KIP instruments provide similar responses (information) on similar topics. Following the Exxon Valdez oil spill in 1989, we administered KIP instruments to 216 respondents to whom we had also administered the AQI. During the posttest in 1991, we administered KIP instruments to 100 respondents to whom we had also administered the AQI. The PRE tests that follow assess the reliability of the proportion of wild animal and plant proteins in respondents' diets (AQI A33, KIP K3), age of respondent (AQI RAGES, KIP K18), annual household income (AQI D2, KIP K4), place born and reared (AQI D24, KIP K37), and household size (AQI RHHSIZE, KIP K17). It is apparent that not one of these questions addresses ideational, symbolic, or belief topics, i.e., the topics that are most difficult to measure through questionnaire instruments. So we perforce restrict ourselves to topics that yield to direct elicitation of empirical information (size of household) or to cognitive summaries of empirical information (proportion of wild proteins in the annual diet).

The values (ranks or attribute classes) of every variable in the following tests are organized into class intervals. The class intervals are not identical for any pair of the matched variables. For example, household incomes both in the AQI (D2) and the KIP (K4) data sets are organized into seven class intervals. But the AQI class intervals begin at "Less than $5,000" and end at "More than $50,000." The KIP class intervals begin at "Less than $10,000 and end at "More than $100,000." The PRE for the pretest sample (γ_{D2K4} = .85) reduces error by 85 percent and the PRE for the posttest sample (γ_{D2K4} = .69) reduces error by 69 percent. The two measures have good interinstrument, intrainformant, and interinterviewer reliability. But the PRE score is not unity. To yield a PRE coefficient of unity for D2 by K4 (γ = 1.00), all of the frequencies must fall in the three class intervals of the two variables which are identical ($10,000 - 19,999, $20,000 - 29,999, $30,000 - 39,999). They do not do so. Upon adjusting for differences in categories between the two measures, an additional 8 percent of the error is accounted for in the pretest γ, and an additional 16 percent of the error is accounted for in the posttest γ, raising those values to .94 and .86 respectively. We do not adjust the PRE values in Table 12-1. The values are uniformly high and positive and do not require adjustment to demonstrate the high interinstrument, intrainformant, and interinterviewer reliability in our Exxon Valdez spill-area research.

Table 12-1

INTERINSTRUMENT, INTRAINFORMANT, AND INTERINTERVIEWER RELIABILITY, AQI AND KIP INSTRUMENTS, PRETEST, POSTTEST, AND EXXONKI PANEL, 1989 AND 1991[a]

	Pretest N = 216	Posttest N = 100	Panel Wave 1 N = 72
A33 Percent Wild Protein Eaten Last Year K3 Proportion Harvested Protein in Diet	.67	.67	.71
RAGES Respondent Age K18 Age of Respondent	.81	.94	.90
D2 Household Income K4 Household Annual Income	.86	.69	.87
D24 Respondent's Birthplace K34 Place Where Respondent Born and Reared	.85	.92	.92
RHHSIZE Respondent's Household Size K17 Household Size	.82	.81	.92

[a]The interval and ordinal data are grouped into class intervals and treated as ordinal level data. Goodman and Kruskal's Gamma (γ) for ordinal data is used to measure proportional reduction of error (PRE).

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APPENDIX: KIP, AQI, AND INSTITUTIONAL INSTRUMENTS

KIP VARIABLE DEFINITION CODE, 1989 AND 1991 (EXXON VALDEZ)

KI PROTOCOL VARIABLE DEFINITION CODE 1989 and 1991 (Exxon Valdez)

The version of the AOSIS questionnaire that was administered in Schedule A failed to yield valid attitudinal assessments of some topics that are central to Native culture, and failed to assess some important life areas altogether. We sought to rectify this problem in the Schedule B inquiry with some deletions from the questionnaire and some additions to the KI protocol. Since completing the 1988 field research we have uncovered several problems that require attention. Changes to variables are noted. Variable labels for coding and rating appear in bold brackets, e.g. **[Q1A1]** next to the item being measured.

I. Attitudes About Harvestable Resources

It is to be noted that the initial topics in the revised version of the protocol (below) seek cognitive attitudes about the quantity of naturally-occurring resources that are available for subsistence and commercial harvests. These topics are organized as a matrix. It is our experience that Natives prefer to discuss resources as species specific items and are willing to provide information on all key species without specific prompting. The questions will be introduced with "What do you think about the quantity of -------- available to harvest in this area for your needs during the past year?" We seek to determine whether the informants think that there were:

(1) not enough of the species in questions for their needs,
(2) an amount that was adequate for their needs, or
(3) an amount that was more than sufficient for their needs.

Resources that are unavailable in the environment will be recorded with (0). Responses for commercial needs will be sought for resources that are also sold on some market, such as fish, fur-bearers and walrus. Variable labels for these questions are the name of the resource, e.g., **Walrus**.

1. <u>What do you think about (how do you evaluate) the quantity of...</u>

SEA MAMMALS	RESPONSE	LAND MAMMALS	RESPONSE	BIRDS	RESPONSE
Walrus	1 2 3	Bears	1 2 3	Ducks	
Whales		Polar	1 2 3	List	1 2 3
Bowhead	1 2 3	Brown	1 2 3	spp.	
Minke	1 2 3	Black	1 2 3	Geese	
Gray	1 2 3	Caribou	1 2 3	List	1 2 3
Beluga	1 2 3	Moose	1 2 3	spp.	
Seals		Dall Sheep	1 2 3	Cranes	1 2 3
Bearded	1 2 3	Hares		Swans	1 2 3
Spotted	1 2 3	Snowshoe	1 2 3	Gulls	1 2 3
Ringed	1 2 3	Arctic	1 2 3	Auklets	1 2 3
Ribbon	1 2 3	Fox		Terns	1 2 3
		Arctic	1 2 3	Puffins	1 2 3
		Variant	1 2 3	Murres	1 2 3
		Wolf	1 2 3	Ptarmigan	1 2 3
		Otter	1 2 3	Owl	1 2 3
		Beaver	1 2 3	Grouse	1 2 3
		Ermine	1 2 3	Other	1 2 3
		Other	1 2 3		

FISH	RESPONSE
Salmon	
Chum	1 2 3
Pink	1 2 3
Red	1 2 3
Silver	1 2 3
King	1 2 3
Char	
Dolly	1 2 3
Arctic	1 2 3
Lake	1 2 3
Whitefish	
spp.	1 2 3
spp.	1 2 3
sheefsh	1 2 3
Grayling	1 2 3
Blackfish	1 2 3
Burbot	1 2 3
Pike	1 2 3
Herring	1 2 3
Smelt	1 2 3
Sculpin	1 2 3
Cod	1 2 3
Halibut	1 2 3
Flounder	1 2 3
Other	1 2 3

MARINE INVER.	RESPONSE
Clams	1 2 3
Crabs	1 2 3
Red King	1 2 3
Blue King	1 2 3
Snow	1 2 3
Tanner	1 2 3
Mussels	1 2 3
Shrimp	1 2 3
Sea Worms	1 2 3
Scallops	1 2 3
Sea Urch.	1 2 3
Starfish	1 2 3

PLANTS	RESPONSE
Roe-on-kelp	1 2 3
Kelp	1 2 3
Other Marine Plants	
Roots	1 2 3
Leaves	1 2 3
Berries	1 2 3
Fruits	1 2 3

Specify spp. as necessary.

2. Management of Harvestable Resources. Next we ask questions about the management of resources from which natives gain their subsistence and/or which they extract for sale or for sale of by-products. In the first set we seek to learn whether informants think that naturally-occurring resources, specifically birds, sea mammals, land mammals and fish, *can* be managed. We are referring here to harvest laws, legal seasons for extraction, accurate assessments of available resources by agencies charges with management. [Q2*1]

We anticipate that the cognitive attitudinal responses will be:
(1) only God can manage (based on the beliefs Natives hold about naturally-occurring phenomena),
(2) no person can manage,
(3) no institution can manage,
(4) persons (mortals) can manage,
(5) institutions can manage.

Yet we further anticipate that the informants will respond that even if only God can manage, or even if no person or institution can manage, that they recognize that agencies are vested with management authority.

The follow up topics seek to know who the informants think *should* manage the resources. We anticipate the responses as: [Q2*2]

(1) Alaska Department of Fish and Game,
(2) Various Federal Agencies,
(3) Combination of Government and Native Organizations or persons,
(4) Native Organizations (such as whale or walrus commission), and
(5) Local Natives.

RESOURCE	CAN IT BE MANAGED	WHO SHOULD MANAGE
Walrus	1 2 3 4 5 **[Q2A1]**	1 2 3 4 **[Q2A2]**
Bowhead	1 2 3 4 5 **[Q2B1]**	1 2 3 4 **[Q2B2]**
Other Whales	1 2 3 4 5 **[Q2C1]**	1 2 3 4 **[Q2C2]**
Salmon	1 2 3 4 5 **[Q2D1]**	1 2 3 4 **[Q2D2]**
Herring	1 2 3 4 5 **[Q2E1]**	1 2 3 4 **[Q2E2]**
Cod	1 2 3 4 5 **[Q2F1]**	1 2 3 4 **[Q2F2]**
Halibut	1 2 3 4 5 **[Q2G1]**	1 2 3 4 **[Q2G2]**
Other Fish	1 2 3 4 5 **[Q2H1]**	1 2 3 4 **[Q2H2]**
King Crabs	1 2 3 4 5 **[Q2I1]**	1 2 3 4 **[Q2I2]**
Snow Crabs	1 2 3 4 5 **[Q2J1]**	1 2 3 4 **[Q2J2]**
Tanner Crabs	1 2 3 4 5 **[Q2K1]**	1 2 3 4 **[Q2K2]**
Other Marine Invertebrates	1 2 3 4 5 **[Q2L1]**	1 2 3 4 **[Q2L2]**
Caribou	1 2 3 4 5 **[Q2M1]**	1 2 3 4 **[Q2M2]**
Moose	1 2 3 4 5 **[Q2N1]**	1 2 3 4 **[Q2N2]**
Dall Sheep	1 2 3 4 5 **[Q2O1]**	1 2 3 4 **[Q2O2]**
Other Land Mammals	1 2 3 4 5 **[Q2P1]**	1 2 3 4 **[Q2P2]**
Geese	1 2 3 4 5 **[Q2Q1]**	1 2 3 4 **[Q2Q2]**
Ducks	1 2 3 4 5 **[Q2R1]**	1 2 3 4 **[Q2R2]**
Swans	1 2 3 4 5 **[Q2S1]**	1 2 3 4 **[Q2S2]**
Cranes	1 2 3 4 5 **[Q2T1]**	1 2 3 4 **[Q2T2]**
Other Birds	1 2 3 4 5 **[Q2U1]**	1 2 3 4 **[Q2U2]**
Roe-on-kelp	1 2 3 4 5 **[Q2V1]**	1 2 3 4 **[Q2V2]**

3. <u>Attitude about State or Federal wildlife management.</u> In this set we seek to learn how informants evaluate the way in which the state or federal government manages the resources which they have asserted or received authority over. The intention is obvious in terms of Native 'wellbeing'. We anticipate that Natives and non-Natives responses will be expansive (e.g., when we got enough (of some species) we stopped hunting (or fishing), or, the quotas should be --(amount)-- because of factors x, y and z). Discussion should yield responses that are classifiable as: **[Q3*]**

(1) poorer than Natives could do,
(2) as good as Natives could do (equivalent), or
(3) better than Natives could do.

The KIs will ask something like "What do you think about the ways in which the ADF&G (or the Federal agencies) manage..." For commercial resources a second group of responses will be obtained

RESOURCE	EVALUATION OF MANAGEMENT
Walrus	1 2 3 [Q3A]
Seals	1 2 3 [Q3B]
Bowhead	1 2 3 [Q3C]
Polar Bear	1 2 3 [Q3D]
Caribou	1 2 3 [Q3E]
Moose	1 2 3 [Q3F]
Bears	1 2 3 [Q3G]
Salmon	1 2 3 [Q3H]
Herring	1 2 3 [Q3I]
Bottom fish	1 2 3 [Q3J]
Crabs	1 2 3 [Q3K]
Other resources as necessary	1 2 3 [Q3L]

4. Attitudes about Political Influence over Wildlife Management. Here we ask questions concerning the informant's cognitive attitudes about political influence (rather than political power as in the preceding). We ask the informant how they think the residents of their village influence management decisions made by the ADF&G regarding harvests of resources in their local areas, that is, the areas from which local residents extract resources. We anticipate that the responses will be: [Q4*]

(1) not at all,
(2) rarely or seldom, and
(3) frequently.

Informants may wish to separate types of resources by species. They may also say that local residents may influence the ADF&G on rare occasions and perhaps for one species, but that the rare influence is important. Notes should be kept on such a response. The classification, however, should be made on the most general evaluation.

RESOURCE	INFLUENCE ON ADF&G POLICIES
Salmon	1 2 3 [Q4A]
Herring	1 2 3 [Q4B]
Bottom fish	1 2 3 [Q4C]
Marine Invertebrates	1 2 3 [Q4D]
Other fish	1 2 3 [Q4E]
Geese	1 2 3 [Q4F]
Ducks	1 2 3 [Q4G]
Swans	1 2 3 [Q4H]
Cranes	1 2 3 [Q4I]
Other birds	1 2 3 [Q4J]
Caribou	1 2 3 [Q4K]
Moose	1 2 3 [Q4L]
Fur bearers	1 2 3 [Q4M]
Other land mammals	1 2 3 [Q4N]

5. Attitudes about Understanding Natural Resources. Several of the following questions seek cognitive attitudes about who understands natural resources and how that understanding is acquired. It is anticipated that there will be a difference between Native and non-Native responses to these questions in large part because Natives extracted resources for millennia without management or supervision. In so doing symbols were assigned to specific places, the behavior of species, the behavior of the elements, and the like. Those symbols are shared and passed through the generations. This question caused special problems for KIs. I seek to know whether there are differences in how Natives, who come to know environments through use, precept and tradition; oil company scientists who get to know an environment through research--conducted by themselves or by others in behalf of oil companies; and either ADF&G or MMS appointees, who get to know areas either by regulating them, or commissioning research on those areas, or both. I did not care to discriminate among various kinds of scientists. I only wanted to know what they thought about '*oil company* scientists.' Apparently respondents were unwilling to discriminate among kinds of scientists, recognizing no differences among 'pure' scientists, oil company scientists and scientists for regulatory agencies. KIs felt that the respondents were confused by the concept 'science,' but that they had no trouble discriminating between their attitudes about how use of resources *influenced* understanding of resources.

Therefore, I wish to change the original variable definition to two variable definitions. One will measure 'understanding via knowledge' and the other measures 'understanding via use.'

[Q5(1)*] Knowledge in relation to attitudes about understanding natural resources.

E.g., "Who do you think better understands the ______________ of your area?"

(1) Natives,
(2) Natives and Some Scientists,
(3) Scientists.

[Q5(2)*] Use in relation to attitudes about understanding natural resources.

E.G., "Who do you think best understands the ____________________ of your area?"

(1) Natives,
(2) Oil Companies,
(3) Alaska Department of Fish and Game,
(4) the Minerals Management Service (or the Federal Government).

ABIOLOGICAL PHENOMENA	**WHO BETTER UNDERSTANDS**
Water	1 2 3 4 **[Q5A]**
Ice	1 2 3 4 **[Q5B]**
Winds	1 2 3 4 **[Q5C]**
BIOLOGICAL PHENOMENA	
Plants	1 2 3 4 **[Q5D]**
Land Mammals	1 2 3 4 **[Q5E]**
Fish	1 2 3 4 **[Q5F]**
Sea Mammals	1 2 3 4 **[Q5G]**
Marine Invertebrates	1 2 3 4 **[Q5H]**

6. Attitude about Acquisition of Knowledge. Now we ask how long it takes to acquire knowledge about a place. Whereas the question should not be leading, that is so specific about the time and ways in which Natives may have come to understand an area, it is likely that Natives will give several responses before landing on the one that they will accept. On the basis of our 1988 inquiry among Schedule B villages Natives tended to answer this question in one of two ways (1. you never understand an environment but you're always learning more about it, or 2. you learn from the accumulated experiences of several generations of users) (either 1 or 6 in the original version of the protocol). We anticipated that non-Natives will provide a single response.

According to KIs in 1989, it was not possible in some areas to discriminate between "you're always learning" and "accumulation of knowledge from prior generations." The attributes have been changed to reflect the merging of these responses. We continue to anticipate that although Natives are very instrumental in their approach to the environment and learn by careful observation and precept, they also think about the environment in a different way from non-Natives. In asking "How long do you think it takes to become knowledgeable about an area in which a person lives, hunts, fishes and collects plants?" we seek explicit distinctions among: [Q6]

(1) about one year,
(2) one to five years,
(3) 6 to twenty years (a generation),
(4) a lifetime,
(5)a person never gets to know an area completely(they will probably mean something like 'A person never gets to know an area completely, you are always learning'); a person learns from the accumulated experiences of several lifetimes, that is, relying on the advice of previous generations of hunters.

7. Significant Symbols Attached to Places in Native Environments. Do you have special memories about the wildlife or the places, such as springs, promontories, lakes, capes, hills, woods, bays, lagoons, in your area which your family likes to recount? [Q7]

(1) none,
(2) a few,
(3) many,
(4) many which have accumulated over two or more generations.

8. Attitudes about Oil-related Changes. What do you think the effects of oil-related changes (type of oil-related phenomenon is specified) have been on the environment (specified)? Here we seek to know whether informants perceive that changes are [Q8]

(1) deleterious,
(2) no change,
(3) mixed (some harmful and some helpful) or
(4) beneficial.

I had originally intended that a matrix of responses would be generated from these questions such that the effect of drilling on water, fish, plants, land mammals, sea mammals and birds; pumping of oil on those same phenomena and so forth. In 1989 the KIs did not generate matrices, but rather restricted responses to the examples on the protocol. As things stand now, we have a small sample of responses measuring persons opinions about the consequences of oil-related activities to certain natural phenomena. KIs suggest that except in instances in which respondents have special knowledge about an activity, such as pumping of oil on some particular resource, such as marine invertebrates, there is little reason to think that persons discriminate among resources or the oil-related activities that may affect them. Thus, by default (although with reasonable empirical support) we treat Q8 as six variables, each one isolating one oil-related activity with one family of phenomena (such as sea mammals). **[A single response summarizing all effects was aggregated for each informant in 1988]**

OIL-RELATED PHENOMENON	EFFECT ON	CONSEQUENCE
Drilling	Water	1 2 3 4 **[Q8A]**
Pumping	Fish	1 2 3 4 **[Q8B]**
Transporting	Plants	1 2 3 4 **[Q8C]**
Pipe Line	Land Mammals	1 2 3 4 **[Q8D]**
Enclave Development	Sea Mammals	1 2 3 4 **[Q8E]**
Pursuit of Recreation	Birds	1 2 3 4 **[Q8F]**

II. Cognitive Checks on Affective Questions

The first two of the following three cognitive questions are intended to be specific checks on two affective questions in the AOSIS instrument (A37 and E7). The third seeks information about how Rs cognize the understandings of Natives held by elected and appointed state officials, specifically those officials whose actions influence Native affairs.

9. Memory of Sharing. Think about how things were ten years ago. In general, what do you remember about the amount of sharing (goods, foods, labor, cash and resources--such as boats, snowmachines and tools) that occurred between households and friends then. [Goods, foods, labor, cash and resources may have to be separated and treated in a matrix as above.] We anticipate classification as [Q9]

(1) less than present,
(2) no change,
(3) more than present.

10. Comparison of Treatment of Elders. What do you think about the way in which elders are treated, especially those who have few relatives in the village?
We anticipate classification as [Q10]

(1) less care is shown than should be,
(2) appropriate care is shown for their needs,
(3) more care and attention is paid than is necessary for their needs.

11. In this set of questions we seek to learn how respondents think that elected and appointed officials in the State of Alaska comprehend Native understandings (use, symbols, etc.) of the areas in which they reside. The question was frought with construct validity problems as interpreted by the KIs. The new variables should allow KIs to fit responses to the appropriate constructs.

Attitude about how non-Native State Representatives comprehend Native understandings. Do you think that non-Native persons elected to state government (representatives, senators), in general, comprehend how Natives understand the areas in which they reside? [Q11A]

Attitude about how Native State Representatives comprehend Native understandings. Do you think that Native persons elected to state government (representatives, senators), in general comprehend how Natives understand the areas in which they reside? [Q11B]

Attitude about how non-Native appointees to State Agencies, such as the ADF&G, comprehend Native understandings? [Q11C]

Attitude about how Native appointees to State Agencies, such as the ADF&G comprehend Native understandings? [Q11D]

(1) not at all,
(2) they have some limited comprehension,
(3) they understand completely how natives understand their locale areas.

III. Questions Address to the *Exxon Valdez* Oil Spill. 7/89 and 2/91

12. Attitudes about responses to oil-related disasters. Do you think that the Federal Government has [done none, few, many, or all] of the things within its powers to clean the ocean, shores, an;imals and personal property affected by the oil spilled by *Exxon Valdez* on March 24, 1989? **[Q12A]**

0. None
1. Few
2. Many
3. All
9. NA

Do you think that the State of Alaska has done [none, few, many, or all] of the things within its powers to clean the ocean, shores, animals and personal property affected by the oil spilled by *Exxon Valdez* on March 24, 1989? **[Q12B]**

0. None
1. Few
2. Many
3. All
9. NA

Do you think that EXXON has done [none, few, many, or all] of the things within its powers to clean the ocean, shores, animals and personal property affected by the oil spilled by *Exxon Valdez* on March 24, 1989? **[Q12C]**

13. Opinions about the frequency of oil-related disasters. Do you think that the *Exxon Valdez* spill is an isolated and unusual accident? **[Q13A]**

0. No
1. Yes
9. NA

Do you think that similar incidents, such as transport spills, pipeline spills, ruptured or blown wells, will ----------- occur in the future? **[Q13B]**

[In the following questions by 'worse' we mean any or all of the following "less responsive in analyzing the problem, less willing to meet obligations such as cleanup of the spill and compensating persons and businesses for economic losses, less willing to accept responsibility, and slower to act": by 'better' we mean "more responsive in analyzing the problem, more willing to meet obligations and accept responsibility, and quicker to act"]

14. Opinion about the response of oil companies to future disasters. In the event of a future spill from a tanker, pipeline, or oil well, do you think the responses of oil companies to clean the affected ocean, shores, animals, and personal property would be ----------- than EXXON's in the *Exxon Valdez* spill? [Q14A]

1. Worse
2. Same
3. Better
9. NA

Do you think EXXON has provided completely trustworthy information to the public about the effects of the spill and about their efforts to clean it up?

15. Consequences to household income from the *Exxon Valdez* spill? In what way, if any, hs the Exxon Valdez spill affected your household income? [Q15]

1. Decreased
2. Stayed same
3. Increased
9. NA

16. Consequences to relations in your community from the *Exxon Valdez* spill.

[In the following 2 questions, by 'disputes' we mean arguments, severing of contacts, refusals to communicate, public denoucements, gossiping or the like]

Do you think that the tanker has caused disputes between or among fishermen in your community, as between persons who work for VECO and persons who do not? [Q16A]

0. None
1. Very few
2. Many
9. NA

Do you think that the tanker spill has caused disputes between fishermen and non-fishermen (shopkeepers, government employees, oil workers, or persons from other areas who have come in to work on the cleanup) in your community [Q16B]

0. None
1. Very Few
2. Many
9. NA

17. <u>Opinion about assistance provided by Native institutions in relation to the spill</u>. Do you think that any of the Native institutions--regional or village, profit or nonprofit--have assisted your community in coping with the problems created by the *Exxon Valdez* spill? **[Q17]**

0. No
1. Yes

[At this point some open-ended interviewing about the role of Native institutions in responding to the spill and its primary, secondary, and tertiary consequences could be very informative.]

ORIGINAL KI VARIABLE DEFINITION CODE

The variable labels for these topics are the lettered items, e.g. [K1] that precede each question.

I Subsistence Economy

This set comprises questions about what a family harvests and/or consumes; how many resources (tools, cash) are allocated to the harvest; and what percentage of the total proteins in a household diet is derived from subsistence harvests? An activity list and a resource extraction area map focused on subsistence accompanies the genealogy.

K1. Subsistence harvesting expenses as an estimated percentage of total annual income. Expenses include purchase and repair of equipment, purchase of fuel, purchase and repair of clothing, ammunition, purchase of food and incidentals required for travel and camping.

1. Very Low (0 to 9%)
2. Low (10 to 19%)
3. Medium (20 to 29%)
4. High (30% and over)

K2. Variety of naturally-occurring resources harvested annually.
We seek information as to the number of species of plants, sea mammals, land mammals, birds, shellfish and fish harvested annually by the informant's family household. We want a tally of the total of all species for the aggregate six categories.

1. No naturally-occurring species harvested.
2. Few species harvested, and none harvested in some of the six categories.
3. At least one species in each category.
4. At least two but no more than three species in each category.
5. More than three species in each category (the exception is invertebrates--if not available).

K3. Harvested protein proportion of household diet. The proportion of protein in the aggregate household diet that is obtained from naturally-occurring species. This measure includes items that are harvested by the household as well as those that are received by household members through gifting, sharing, or exchange.

1. Less than 25%
2. 25-49%
3. 50-75%
4. 76-100%

II. Economics

This set comprises questions about household incomes, the sources and stability of incomes, and labor and resource allocation within and among households.

KIs have expressed some confusion about the income variables. Any household can have a total income that is derived from one or more members of the household. That income can be totally earned, totally unearned, or something in between, that is, the total is derived from a combination of earned and unearned income. I sought tallies of total household income and the relative contribution of earned and unearned income to that total. Thus, if a household's total income is solely earned, 100% of that household's income is earned. If that income is derived from North Slope Borough employment, it is, then, derived from the 'public sector.' If it is derived from Ryan Air, it is, then, derived from the 'private sector.' It is also true that most Ryan Air revenues are themselves derived from the 'public sector' (school teachers, HRAF researchers, ADF&G biologists, and the like flying around), but that is another question.

For an example of how these variables are supposed to work lets look at K10, 'stability' of household income. If a household has two incomes, one permanent (monthly, weekly, throughout the year), and others impermanent (part-time, bumpy), then that household is stable. The unearned-earned distinction again applies. If the permanent and stable income is unearned, the household has a stable unearned income (this income may be dwarfed by temporary earned income, but temporary income is less predictable than stable income, hence the distinction).

K4. Household annual income. Household income is an estimate provided by the informant of the aggregate income for all members of the household. The household comprises co-residents under a single roof, but includes persons residing in attached housing whose domestic activities are integrated with those of the main residence.

1. $0-10,000
2. 10,001-20,000
3. 20,001-30,000
4. 30,001-40,000
5. 40,001-60,000
6. 60,001-over

K5. Percentage of total household income earned. Income from salary, hourly work, product sales (including fish, shellfish), rents and investments.

1. 0-24%
2. 25-49%
3. 50-74%
4. 75-100%

K6. Percentage of total household income unearned. Income from per capita distributions, welfare, gifts, shareholder receipts, lease royalties and transfer payments.

1. 0-24%
2. 25-49%
3. 50-74%

4. 75-100

K7. Governmental (public) source of total household earned income by percentage. Employment with Federal, state, or local government, or through contracts with or sales and services to government agencies or government employees.

1. 0-24%
2. 25-49%
3. 50-74%
4. 75-100%

K8. Non-governmental (private) source of total household income by percentage.

1. 0-24%
2. 25-49%
3. 50-74%
4. 75-100%

K9. Stability of household earned income.

1. Irregular (piece work, short duration contract, catch-as-catch-can labor, etc.)
2. Erratic income from irregular, seasonal and monthly sources which varies (often from hh composition changes)
3. Seasonal receipts (summer fishing, fish processing, etc. from labor or entrepreneurship)
4. Monthly salary, or profits (draw) from self-employment, entrepreneurship.

K10. Stability of household unearned income.

1. None or irregular (gifts, unemployment compensation of short duration, etc.)
2. Monthly welfare or other transfer payments.
3. Regular shareholders receipts, and/or lease and/or royalty income, and welfare and/or transfer payments.
4. 1, 2 and 3 (above) present.

K11a. Income distribution, giving, within and among households in the village. Do household members pool and share income within the household for daily use, equipment purchases, travel for one or more household members and the like? Do persons in two or more households pool and share income for subsistence purposes, in times of need, or on some regular basis?

1. Each household member's income is personal. It is spent or saved by each person without restriction. Pooling or sharing of any parts of incomes from two or more persons is rare.
2. Household members regularly pool income for household purchases of food, equipment, utility bills, and the like, and/or to sponsor subsistence harvests.
3. Household members occasionally share some of their

incomes with relatives or friends in other households within the village (in emergencies, in preparation for subsistence harvests, and so forth).

4. Household members regularly share some of their incomes with relatives or friends within the village.

K11b. Income distribution, receiving. Same attributes as 11a.

K12a. Income distribution, giving, between or among households in different villages. The attributes in Variable 11, above, are to be followed for intervillage sharing of income.

1. No interhousehold intervillage sharing of income.
2. Occasional interhousehold sharing of income.
3. Regular interhousehold sharing of income

K12b. Income distribution, receiving. Same attributes as in 12a.

K13a. Labor practices, giving, within and among households within the village. We wish to know whether labor and skills are restricted to intrahousehold tasks, or whether they are shared between or among members of two or more households for some tasks (e.g., for construction, subsistence pursuits, repairs to equipment and housing, and the like).

1. Labor expended for personal needs only.
2. Labor expended for own household only.
3. Labor expended for relatives or friends in other households within the village on an occasional basis.
4. Labor expended for relatives or friends in other households within the village on a regular basis.

K13b. Labor practices, receiving. Same attributes as in 13a.

K14a. Labor practices, giving, between and among households in distant villages. We seek information similar to Variable 13a above, but the focus is on intervillage interhousehold labor sharing.

1. No labor sharing between households in different villages.
2. Sharing of labor with households in other villages on occasion.
3. Regular sharing of labor with households in other villages.

K14.b Labor practices, receiving. Same attributes as in 14a.

K15a. Sharing or gifting of resources and/or equipment, giving, within and outside the household within the village. The interest here is whether persons within a household share equipment and/or subsistence goods (dried fish, oil, greens, maktak, etc.) within and beyond the household, yet within the village.

1. Equipment and/or subsistence resources are used and consumed solely by the owner.
2. Sharing of equipment and/or subsistence resources with members of the household.
3. Occasional sharing of equipment and/or subsistence resources with relatives or friends in other households.
4. Regular sharing of equipment and/or subsistence resources with relatives or friends in other households.

K15b. Sharing or gifting of resources and or equipment, receiving. Same as attributes in 15a.

K16a. Sharing of equipment and/or subsistence goods, giving, between or among households in distant villages. We seek the same information for intervillage sharing of equipment and/or subsistence resources that we sought in Variable 15a above.

1. No intervillage household sharing of equipment and/or subsistence goods.
2. Sharing with households in other villages on an occasional basis.
3. Sharing with households in other villages on a regular basis.

K16b. Sharing of equipment and/or subsistence goods, receiving. Same as attributes in 16a.

III Social Organization

This set of questions seeks information on household size and composition, household dynamics, conflict resolution within households, divorce, and sodality membership.

K17. Household size. The number of persons residing under the same roof or residing under adjacent or attached roofs and whose domestic functions are integrated.

1. 1-3
2. 4-6
3. 7-9
4. 10-over

K18. Age of household head. The household head is the adult recognized as the key decision-maker in the household.

1. Under 25
2. 25-40

3. 41-55
4. 56-over

K19. Household composition/dynamics. We seek to learn whether households are fairly stable and rigid in their composition, or whether they are rather fluid. Movement from house to house is irrelevant if household composition is stable.

1. Households are open and fluid, experiencing frequent growth and decline through the movement of members in and out (excluding marriage, death, and relocation for school, three or more persons have joined or left the household in the past two years). [Examples, adoptions, elders moving in, divorcees returning, collateral relatives staying for a brief time].
2. Household compositions change through infrequent addition or loss of members (perhaps one person every two years other than marriage, death, or relocation for school).
3. Household compositions are stable. No changes in personnel over the past two years.

K20. Rules/expectations for household composition and dynamics.

1. No set rules or expectations for who can and who cannot join the household. Flexible acceptance of members and the behavior of those persons.
2. Blend of 1 and 3.
3. Clear expectations for the observation of rules by household members. Set expectations for the behavior of new members.

K21. Household conflict resolution. We seek to know the manner in which and the places where (within the household or larger family, or through institutions) conflicts are addressed and resolved.

1. Passive internal (within household or larger family) resolution, such as dialogue and withdrawal.
2. Active internal resolution, such as rewards, punishments, or fights.
3. Informal external resolution, such as advice from relatives, assistance from friends, informal/non-formal resources.
4. Formal external resolution, such as police, helping services in the village or region.
5. Combination of three types.

K22. Divorce/separation.

1. One or more parties to broken unions reside in the household.
2. Intermittent change of partners.
3. No broken unions in the household.

K23. Sodality membership. Sodalities, or clubs, are voluntary organizations within villages, regions, or the State of Alaska. Some may be world-wide, but represented by local chapters. "Search and Rescue", auxiliary organizations of churches (e.g., Knights of Columbus), the Native Brotherhood, YMCA groups, Young Republicans, quilting and sewing clubs, all qualify as sodalities.

1. No memberships in the household.
2. 1 membership in the household.
3. 2 or more memberships in the household.

IV Politics

We are concerned here whether members of the household are politically active, and whether the informant correctly identifies some political issues.

K24. Political participation in the household. We wish to know whether any (or more than one) person in the household occupies an elected position in the village IRA, corporation, or city government, or in the regional non-profit corporation, regional profit corporation, or borough government.

1. No official capacities
2. One official capacity at present
3. Two or more official capacities at present

K25. Identification of political issues. We want to know the number of political issues that are correctly identified by the informant from the following list. (a) ANCSA requires that regional and village corporations "go public" in 1991. What does that mean? (b) What is the "dissenters' rights" argument that pertains to ANCSA? (c) Who controls the harvests of fish and birds in Alaska? (d) Have the Reagan-Bush Administrations increased or decreased the number of programs and amounts of funds available to Alaska's Natives?

1. No issue correctly identified
2. One issue correctly identified
3. Two issues correctly identified
4. Three or more issues correctly identified

V Religious Participation

We want to know whether household members regularly attend religious services, and whether they are active in extracurricular activities associated with their church.

K26. Religious participation in the household.

1. Do not profess any religion or do not attend services
2. Attend religious services occasionally
3. Attend religious services on a regular basis.

K27. Extracurricular religious participation in the household.
We want to know whether members of the household are active inchorus practices, helping services sponsored by their church, church athletic teams, church sewing circles, home missionary activities, and the like.

1. Do not participate in church extracurricular activities
2. Participate in one or two activities on an occasional basis
3. Participate in one or two activities on a regular basis
4. Participate in more than two activities on a regular basis.

VI Ethics [Ethical Principles by which Persons Are Organized].

The following questions address some beliefs and practices people think should be followed, beliefs and practices to which significant symbols are assigned. These beliefs may be held, but not necessarily practiced. Contradictions between beliefs and practices should be noted.

The three variables in this set (K28-K30) may be fraught with construct validity.
I will appreciate a few paragraphs from any or all KIs informing me about how they rated these variables and the problems that they encountered in eliciting and rating the information. The questions are easily answered if a person has several months in a village. They are never easily answered from direct elicitation from the protocol variables and were not intended to be elicited from them. Ethics as we understand them here, are infused in some conversation and beliefs, implicit in some discussions and actions.

K29 is the sole variable in the set that can be elicited rather easily, that is because all people everywhere attach significant symbols to their spaces and places. K29 is not easily elicited if we also seek to know if 'spiritual' significance is attributed to those symbols. That knowledge must come from many sources, as if we are reading a complex Belgian text, looking at a Belgian tapestry, and finding the significant and underlying relations between the two. Natives often attribute spiritual (or deistic, or naturalistic) significance to their environments and often fail to regard their greater space as a commodity.

K28. Ethical responsibility for attainment. We want to know who is responsible for personal, family, and village attainments of all kinds: success in occupations, education, income, businesses, village affairs and security. Is the individual specified as the person who should be solely responsible for his/her attainments, and are individuals free of obligations to others except, perhaps, one's own nuclear family? Or is the individual recognized as having responsibilities toward others--in the family, a wider network of kinspersons and affines, or the village--and any successes that accrue do so in a group context through the efforts of several persons?

1. A person should strive to make himself/herself a success. Success is earned through individual effort (saving, delaying gratification, hard work).
2. A person should work hard to assist his/her family, save scarce resources to help his/her family in times of need and for future expectations, such as educations for one's children.
3. A person should work hard with whatever skills and resources he or she possesses to assist ones family, wider circle of kinspersons and affines, and the village. Giving and sharing take precedence over saving and assisting self or nuclear family to the exclusion of others.

K29. <u>Ethics and significant symbols attached to environment.</u>

1. The environment, or features of it (rivers, forests, coal seams, oil deposits, fish, sea mammals, etc.) are viewed as commodities, that is, items whose values are established in the marketplace and are available for purchase or sale.
2. Combination of commodity and spiritual views.
3. The environment, or features of it, are viewed as things endowed with spirits, or which possess special relations to natives and to which significant cultural symbols are attached (beauty, spirituality, helpfulness, traditions). The general environment is not conceptualized as a commodity. (Fish, ivory and other by-products may be sold, but what symbols are attached to those items?)

K30. <u>Ethics of personal cooperation/competition.</u>

1. A person should compete with others so as to do the best for one's self.
2. 1, 3 or 4 depending on circumstances.
3. A person should do the best one can in developing and employing skills. The fruits of some of those skills --such as hunting, fishing, and food preparation--should be shared widely throughout the family and beyond. Some other skills, such as net hanging or outboard motor repair, should be used for personal gain.
4. A person should develop and employ skills, work in cooperation with others, and share in a communitarian fashion (perhaps principally on the basis of presumed need) the products of those skills.

VII Enculturation

This question pursues the topic: how are children educated at home, traditionally (indulgent, quick to respond to requests, few formal demands, little badgering, traditional gender distinctions); in a Western fashion (directive, attach stipulations to requests, many formal demands, manipulation and encouragement for success, marked gender distinctions in treatment); or some combination of traditional and Western?

K31. <u>Enculturation and gender distinctions.</u>

1. Western enculturation and gender distinctions
2. Western and traditional practices are combined

3. Traditional enculturation practices and gender distinctions dominate

VIII Political and Economic Knowledge

In this set we want to learn whether informants correctly identify loci of ownership and control over economic projects, and loci of power over political decisions, and have reasonable knowledge (that is they are informed) and warranted expectation about the results of economic, social service and education programs, projects, and decisions that affect them.

K32. <u>Expectations for economic developments in region or village.</u>

If specific economic development projects, such as oil exploration, drilling, and pumping, are scheduled for the region in which the village is located, or if other projects are on-line, ask specifically about those projects. If not, use a hypothetical project, such as oil extraction, to gain a response to your query about native expectations.

1. The chief benefits of the project will accrue locally (in jobs, income, royalties, profits and economic spin-offs), and control over the project will be exercised locally (within the region, say).
2. Local and distant (e.g., Anchorage, Seattle, New York) companies and persons will benefit about equally and control will be shared.
3. Local job benefits, but external control.
4. Chiefly external benefits and control.

K33. <u>Economic conflicts.</u> Do natives perceive economic conflicts within their village or their region, and if so, who do they recognize as parties to the conflict (native corporations/non-native corporations/governmental units/native persons/non-native persons, or some combinations of the foregoing)?

Economic conflict, rather than political or 'cultural' conflict is chosen because money is a major concern in Alaskan villages--jobs, welfare and other transfers, economic development, and so forth. We choose here, then, to focus on this major concern, recognizing that there are other kinds of conflicts that can and do emerge in Native villages.

On the bases of 1988 and 1989 field research, it is evident that this protocol item poses a problem similar to those posed by K28-K30. It takes time, ethnographic research time, to ferret out appropriate classifications for this topic. I will appreciate a paragraph informing me how this variable was rated.

It is evident from discussions with KIs following the 1989 field season that 'economic conflict' is an important variable. I don't want to create a new one (or several) until I get some information from you people, but here is how I see it. We wanted to know whether 'economic' conflicts occurred within villages. Those conflicts can be over public sector funds, public sector jobs, private sector developments and so forth. Because villages and regions have become dependent on transfers of various kinds, and because villages and regions are dominated by public sector-stimulated institutions, we wanted to know what goes on in villages and whether we can understand conflicts (predict them) from the contexts in which villages are embedded.

First we ask whether economic conflicts are perceived, yes or no. **[K33A]**

0. No
1. Yes

Then we might ask if they are personal; that is, between persons in the village. **[K33B]**

0. No
1. Yes

Then we might ask if they are between Native and non-Native persons. **[K33C]**

0. No
1. Yes

Then we might ask if they occur between Native profit and Native non-profit corporations. **[K33D]**

0. No
1. Yes

Then we might ask if they occur between Native corporations (either or both types) and city government. **[K33E]**

0. No
1. Yes

We could then ask if they occur between village and Native regional organizations. **[K33F]**

0. No
1. Yes

We could then ask if they occur between non-Native corporations (extra-local, national, multinational) and Natives (lumping Native persons and Native village organizations). **[K33G]**

0. No
1. Yes

Finally we could ask if they occur between state and/or federal governments and local Native organizations. **[K33H]**

0. No
1. Yes

From these dichotomous (yes/no) (+/-) variables I can create indexes from the responses and probably arrive at what I really want to know, i.e., whether and how economic conflicts are perceived, and who or what corporations, agencies, units, persons or governments are thought to trigger them.

K34. Schooling and success

1. Natives perceive a strong association between formal schooling and success, if a person gets a formal education, success most often follows.
2. Occasionally success is associated with formal schooling.
3. No association between schooling and success.

K35. Perceived objectives of helping service programs. Here we are interested in knowing whether informants correctly understand the objectives of helping service programs, such as family counseling, health services, and the like. Choose two within the village and two within the region (but not in the village) and ask the informant the objectives of those programs.

1. Informant's perception is the same or equivalent to the actual goal of the program.
2. Goal incorrectly identified.

K36. Perceived control of program. Of the helping services discussed in the previous question, ask the informant where control over that program is exercised.

1. Control seen as local or regional
2. Control seen as external to the village and region

IX Demography

K37. Residence pattern (ego). Here we seek to know where the adult (ego) in the household was born and reared.

1. Adult in household was neither born nor reared in the village or region in which he/she currently resides.
2. Adult in household was born in the region, but not the same subregion in which he/she currently resides.
3. Adult in household was born or reared in the same subregion, but not the same village in which he/she currently resides.
4. Adult was born in the same village in which he/she resides.

K37b. Residence pattern (spouse). Same attributes as in 37. Yet here we seek to learn about the informant's (ego's) spouse.

K38. Village size

1. Very small (less than 150)
2. Small (151 to 300)
3. Medium (301 to 500)
4. Large (501 to 800)
5. Very large (801 and over)

X Social Service Utilization

K39. Social services used by informants.

1. Avoid services available to informants in village and region.
2. Use health services
3. Use financial services
4. Use family and social services
5. Use health (2) and financial (3)
6. Use family and social and others.

K40. Use of native healers

1. Native healers employed as necessary
2. Native healers are not used, even if available.
3. No native healers in village, not used.

K41. Utilities in houses. We wish to know whether among all utilities available in the village, any are present and working in the informant's household [electricity, gas, water, sewer, telephone (treated here as a utility)].

1. No utilities present and/or working.
2. One utility present, working.
3. Two or more working, but not all.
4. All utilities present, working.

KI INSTITUTIONAL PROTOCOL, 1989 AND 1991 (EXXON VALDEZ)

KI INSTITUTIONAL PROTOCOL 1989 and 1991 (Exxon Valdez)

SOME KI INSTITUTIONAL QUESTIONS

Note to Key Informant Interviewers: Use your discretion in asking the following questions to elected and appointed persons in city governments, Native corporations (profit and nonprofit), business persons, clergy, school teachers, social workers, law enforcement officers, and the like. It is not expected that you can talk to representatives of each and every one of these categories of public persons in the course of your research in each village, but speak to as many as you can, and record their responses. They will be very useful in preparing KI summaries for each village.

1. Should the local community have more say in the operations of oil-related activities in the area?
... and in the State of Alaska (in general)?

2. What positive effects has the spill had on your community?

3. What adverse effects has the spill had on your community?

4. Has the oil spill caused frictions in your community between residents and Exxon?
... between residents and VECO or its contractors?

5. Has the oil spill caused frictions in your community between residents and local institutions, especially by placing demands on institutions, such as city government or Native corporations, which they are powerless to resolve?

6. Have persons in local public institutions experienced 'burn-out' in attempting to cope with requests from beleaguered residents?

7. Have conflicts been created in your community between federal agencies and state agencies?
... between state or federal agencies and local commercial fishermen?
... between local fishermen or cannery employees, and non-local commercial fishermen?
... between Native and non-Native institutions?
... between commercial fishermen who work(ed) for VECO and those that do (did) not?

8. Have local tax revenues been affected by the oil spill?

9. Has local employment been affected by the oil spill?

10. Has tourism been affected by the oil spill?

11. Have state and federal funds normally destined for the community been affected?

12 Has the loss of commercial fishing income noticeably affected community businesses and residents?
... forfeiture on mortgages for boats, autos, houses?

13. Do people in the community express a reluctance to invest in businesses, houses and the like in the local community?

14. Do people express an interest in moving out of the village?

15. Have subsistence pursuits and the quantity and quality of bags and catches been influenced by the oil spill?

16. Have institutions within the village and region tended to cooperate in working on problems, or does disharmony appear a better way to talk about the relations among institutions?

17. Has the federal government made sufficient efforts to prevent future oil spills and other oil-related disasters?

... has the state government made sufficient efforts ... ?
... has EXXON made sufficient efforts ... ?

18. Are you satisfied with the federal government's efforts to clean up the oil from the Exxon spill?

... the state's efforts to clean up ... ?
... EXXON's efforts to clean up ... ?

19. Are you satisfied with the federal government's efforts to improve the safety of tankers and tanker traffic since the spill?

... the state's efforts ... ?
... EXXON's efforts ... ?

20. In hindsight, would you support the exploration, drilling, pumping, and transporting of Prudhoe Bay oil if you could start over with a clean slate in 1970?

Would you have modified the oil operations as they have developed in any way? Oil clean up preparedness in any way?

21. Do you (or people in your community, or others in your institution) think that the federal government has been forthright and provided accurate and trustworthy information about the spill and its consequences to the public?

... the State of Alaska has been forthright ... ?
... the Exxon Corporation has been forthright ... ?

22. Who or what do you think is responsible for the Exxon Valdez oil spill on 3/24/89?

23 Do you think that persons in your community perceive threats to their health from the spill?

24. Do people in your community think that it is safe to eat animals that have been in contact with the spilled oil, or that may have been in contact with spilled oil?

AQI AOSIS QUESTIONNAIRE [4TH REVISION] FOR C SCHEDULE/PRINCE WILLIAM SOUND, COOK INLET, NEW VILLAGES IN BRISTOL BAY, KODIAK, AND THE ALEUTIAN-PRIBILOF ISLANDS

OMB No. 1010-0069

AOSIS QUESTIONNAIRE
[4th Revision]

For C Schedule/Prince William Sound, Cook Inlet, new villages in Bristol Bay, Kodiak and Aleutian Pribilofs

HUMAN RELATIONS AREA FILES
Yale University
July 1989
[corrected]

RESPONDENT:

Name: ______________________

Address: ______________________

Village # ______

Region # ______

Phone: ______________________

Message Phone: ______________________

INTERVIEWER:

Name: ______________________

Region: ______________________

Village: ______________________

Date: ______________________

Time: ______________________

RHHTYPE=
RHHSIZE=
EMPLR=

	FIRST NAME	RELATIONSHIP TO RESPONDENT	RES-PON-DENT	SEX	AGE	OIL WOR-KER	NOW: FOOD STAMPS	NOW: AFDC G.A. WIC	NOW: UNEMPLYMT COMPENSA-TION	NOW: PENSION	NOW: SOCIAL SECURITY	NOW: SSI	12 MOS: ARTS & CRAFTS	12 MOS: TRAPPING
PERSONS 18 YEARS PLUS														
PERSONS UNDER 18 YEARS														
VISITORS														

SECTION A: TRADITIONAL ACTIVITIES

Interviewer:

Each respondent is asked about twelve activities, depending on region. Your supervisor has blocked out 21 activities that do not apply. For each activity, indicate whether, in the last twelve months, the activity was done alone, with another, and the number of days. Refer any questions ot your supervisor.

	When?	With?	Days?
1. Hunt moose or caribou			
2. Hunt ringed seal			
3. Hunt walrus			
4. Hunt bearded seal			
5. Hunt waterfowl			
6. Attend feast/ceremony			
7. Camp as part of hunting/fishing			
8. Winter fishing			
9. Gather greens/berries			
10. Gather eggs			
11. Hunt Beluka			
12. Fur trapping			
13. Herring fishing			
14. Build/repair boat			
15. Make/repair fish net, trap, wheel			
16. Make/repair sled			
17. Sew skins			
18. Harvest fur seals			
19. Hunt other seals			
20. Hunt sea lions			
21. Hunt other birds			
22. Harvest reef food or shellfish			
23. Hunt sheep			
24. Maintain/use ice cellar			
25. Bowhead whaling			
26. Hunt deer			
27. Hunt ptarmigan			
28. Hunt mouse caches			
29. Hook fishing			
31. Cut fish for drying			
32. Gather firewood			
33. Set black fish traps			
34. Set nets for salmon, etc.			

SECTION A: TRADITIONAL ACTIVITIES

A25A. Since the *Exxon Valdez* oil spill on 3/24/89, would you say the amount of game there is to harvest has . . .

1.	Decreased
2.	Stayed same
3.	Increased
9.	NA

A26A. During the last five years, would you say that the amount of game there is to harvest has . . .

1.	Decreased
2.	Stayed same
3.	Increased
9.	NA

A26A2. Since the *Exxon Valdez* oil spill on 3/24/89, would you say the amount of fish there is to harvest has . . .

1.	Decreased
2.	Stayed same
3.	Increased
9.	NA

A26B. During the last five years, would you say that the amount of fish there is to harvest has . . .

1.	Decreased
2.	Stayed same
3.	Increased
9.	NA

A28. Was subsistence food a large part of any of the meals you ate yesterday?

0.	No
1.	Yes
9.	NA

A30. How about the day before yesterday? Did you eat any meals in which subsistence food was a large part of the meal?

0.	No
1.	Yes
9.	NA

A31. On either day, was this food harvested by . . .

1.	Self
2.	Other, same HH
3.	Other
9.	NA

A32. In the last two days, how many meals did you eat with a relative who lives in another household?

1.	None
2.	1-3
3.	4-7
4.	More
9.	NA

A32B. Since the *Exxon Valdez* oil spill on 3/24/89, what percent of all meat (birds, fish, sea mammals, land mammals) and plants that you have eaten was native food?

1.	None
2.	< 50%
3.	< 75%
4.	75%+
9.	NA

A33. What percent of all the meat and fish that you ate in the last year was native food?

1.	None
2.	< 50%
3.	< 75%
4.	75%+
9.	NA

A35. When was the last time that you heard an elder tell a story?

1.	More than a year ago
2.	Last year
3.	Last month
4.	Last week
9.	NA

A36. When was the last time that you asked an elder for advice?

1.	More than a year ago
2.	Last year
3.	Last month
4.	Last week
9.	NA

A38. How often do you speak (native language) at home: Never, sometimes, most of the time, or always? (If response varies according to person R speaks to, get the best overall response.)

1.	Never
2.	Sometimes
3.	Most of the time
4.	Always
9.	NA

SECTION B: HEALTH

B1. In general, how would you describe your health? Would you say it was very good, good, fair, poor, or very poor?

1.	Very poor
2.	Poor
3.	Fair
4.	Good
5.	Very good
9.	NA

B9. Within the past two weeks, were there times when you could not do some of your everyday activities due to illness or injury?

0.	No
1.	Yes
9.	NA

SECTION C: EDUCATION AND EMPLOYMENT

C1. How many years of education do you have?

1.	None
2.	1-8
3.	9-12
4.	College
5.	Higher
9.	NA

C6. Last year, during which months did you work for pay for two weeks or more? (Have you included any commercial fishing?)

JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

Total months worked C6M. Total: ________
Employed last year (No=0, Yes =1)
C6N. ________

C9. What are the main kinds of work to earn money that you did in the last year?

____

C10. What kind of business did you work for in the last year?

C11. If you had your choice, what kind of work would you do?

____

C12. Did you work at all away from your community last year?

0.	No
1.	Yes
9.	NA

C12A. What kind of work did you do away from the community?

____

C12B. Where did you work?

____

C12C. During how many months did you work 2 weeks or more away from home?

JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

C12M. Total: ________

C13. Has any person(s) in your household gained employment as a consequence of the *Exxon Valdez* spill?

0.	None
1.	1
2.	2
3.	3 or more
9.	NA

C14. If some person(s) in your household gained employment as a consequence of the oil spill, in what occupations are/were they engaged?

____

____

C15. If some person gained employment (see C13, C14), did they have to leave the village to do so?

0.	No
1.	Yes
9.	NA

C16. Has any person(s) in your household lost employment (self-employment or otherwise) as a consequence of the Exxon Valdez spill?

0.	None
1.	1
2.	2
3.	3 or more
9.	NA

C17. If some person(s) in your household lost employment (see C16), in what occupations were they engaged?

____

____

C18. Has any person(s) in your household been forced to relocate (leave the village) because of the oil spill?

0.	None (i.e., no person)
1.	1
2.	2
3.	3 or more
9.	NA

C19. Has any person(s) in your household been forced to lose property, such as forfeiting a mortgage on a boat, fishing equipment, or a house, as a consequence of the oil spill?

0.	None (i.e., no person)
1.	1
2.	2
3.	3 or more

[In the following question we define 'adequately' as an amount equal to what a respondent thinks he/she would have earned this year if there had not been an oil spill]

C20. If you think you have incurred a financial loss this year as a consequence of the *Exxon Valdez* spill (inability to fish commercially, or to guide recreational fishermen, or to accommodate tourists and sightseers), has EXXON compensated you?

0.	None (i.e., no person)
1.	Inadequately (some, but not adequate)
2.	Adequately (about what R expeced to earn)
3.	More than adequately (greater than expected to earn)
9.	NA

SECTION D: INCOME, GOODS & SERVICES

D1. Annual household expenses:

D1B. Annual electricity cost?

1.	<$100	
2.	<$500	
3.	<$750	
4.	<$1000	
5.	<$1500	
6.	>$1500	
9.	NA	

D1C. Annual housing cost?

1.	<$1800	
2.	<$4800	
3.	<$8400	
4.	<$10800	
5.	>$10800	
9.	NA	

D2. Annual household income?

1.	<$5000	
2.	<$10000	
3.	<$20000	
4.	<$30000	
5.	<$40000	
6.	<$50000	
7.	>$50000	
9.	NA	

D3. Are you a commercial fisherman or do you own your own business?

0.	No	
1.	Yes	
9.	NA	

D3A. How much of your total household income last year went toward commercial fishing or business expenses?

1.	None	
2.	<$2K	
3.	<$5K	
4.	≥$5K	
9.	NA	

D4. What is the very smallest amount of income per month your household needs to make ends meet?

1.	<$500	
2.	<$1000	
3.	<$1500	
4.	<$2000	
5.	<$2500	
6.	≥$2500	
9.	NA	

D6. Would you say that your household is better off, the same, or worse off financially now than five years ago?

1.	Worse now	
2.	Same	
3.	Better off	
9.	NA	

D8. How many rooms do you have in your house?

Number of rooms ________ 999. NA

D9. Would you say that your household has no trouble getting enough good drinking water, some trouble, or much trouble?

1.	Much trouble
2.	Some trouble
3.	No trouble
9.	NA

D10. What happens to the drinking water you use for washing dishes and bathing: does it empty out on the ground near your house, does it go into a septic system, or is it piped away?

1.	Empties on the ground
2.	Septic system
3.	Piped away
7.	Other ________
9.	NA

D11. Does your household have honey buckets, flush toilets, or chemical toilets?

1.	Honey buckets
2.	Flush toilets
3.	Chemical toilets

D12. On cold, windy days, how easy is it to keep your house or apartment warm?

1.	Difficult
2.	Easy
3.	Very easy
9.	NA

D13. Now I would like to ask you some about your weekly activities. During the last week, on how many days did you go visit with friends or relatives? (What is your best guess?)

1.	None
2.	1-2 days
3.	3-4 days
4.	>4 days
9.	NA

D16. During the last month, how many times did you attend a public meeting?

1.	None
2.	1-2 times
3.	3+ times
9.	NA

D19. Did you happen to vote in the last city council election?

0.	No
1.	Yes
9.	NA

D20. Did you happen to vote in the last state wide election?

0.	No
1.	Yes
9.	NA

D20B. At the last Borough election?

0.	No
1.	Yes
9.	NA

D22. The last village Native Corporation election?

0.	No	○
1.	Yes	○
9.	NA	○

D23. The last regional Native Corporation election?

0.	No	○
1.	Yes	○
9.	NA	○

D24. In what community were you born?

1.	Other	○
2.	Alaska, but not this region	○
3.	This region	○
4.	Here	○
9.	NA	○

D25. How many years have you lived in (Community)?

1.	Year or less	○
2.	2-5 years	○
3.	6-10 years	○
4.	11+ years	○
9.	NA	○

D26. Where did you live before you moved to (Community)?

1.	Other	○
2.	Alaska, but not this region	○
3.	This region	○
4.	Here	○
9.	NA	○

D27. During the last year, how many times have you left your community and visited relatives or friends?

1.	None	○
2.	1-2 times	○
3.	> 2 times	○
9.	NA	○

D28. Do you consider yourself to be an Alaska Native?

1.	Alaska Native	○
2.	Other race	○
9.	NA	○

D29. Are you currently married?

0.	No	○
1.	Yes	○
9.	NA	○

D29A. Do you consider your spouse tobe an Alaska Native?

1.	Alaska Native	○
2.	Other race	○
9.	NA	○

Interviewer:

Valid responses to the following items are:

1. Not satisfied
2. Somewhat satisfied
3. Completely satisfied
9. NA

SECTION E: PERCEIVED WELLBEING

E10. How do you feel about your ability to speak (native language)?

1.	Not satisfied
2.	Somewhat satisfied
3.	Completely satisfied
9.	NA

E12. How do you feel about the social ties you have to people in other communities?

1.	Not satisfied
2.	Somewhat satisfied
3.	Completely satisfied
9.	NA

E29. How do you feel about the income you (and your family) have?

1.	Not satisfied
2.	Somewhat satisfied
3.	Completely satisfied
9.	NA

E30. How do you feel about your standard of living—the things you have like housing, snow machines, furniture, television, and the like?

1.	Not satisfied
2.	Somewhat satisfied
3.	Completely satisfied
9.	NA

E41. How do you feel about the amount of local influence over the condition of the land and water near your community?

1.	Not satisfied
2.	Somewhat satisfied
3.	Completely satisfied
9.	NA

E50. If the federal government lets oil companies search for oil in your region, do you think that the search for oil will create more jobs for residents of the region?

0.	No
1.	Yes
9.	NA

E51. Do you think the search for oil off shore in this area would reduce the amount of fish and game, increase the amount of fish and game, or not change the amount of fish and game?

1.	Reduce
2.	No change
3.	Increase
9.	NA

E52. Thinking about all the good things and bad things that might happen, do you think that the search for oil off shore in this area is a good idea, a bad idea, or do you have mixed feelings about it?

1.	Bad
2.	Mixed feelings
3.	Good
9.	NA

E58. Who or what do you think is responsible for the *Exxon Valdez* oil spill of 3/24/89?

1.	It was an unavoidable accident
2.	It was caused by the captain's errors
3.	It was caused by the breakdown of some of the ship's technology
4.	It was caused by Exxon Company's negligence
5.	It was caused by the State of Alaska's negligence
6.	It was caused by the Federal Government's negligence
7.	It was caused by a combination of all but 1

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. Administration.