

SOCIAL INDICATORS MONITORING STUDY PEER REVIEW WORKSHOP

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**SOCIAL INDICATORS MONITORING STUDY
PEER REVIEW WORKSHOP**

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Introduction
Social Indicators Monitoring Studies

INTRODUCTION TO THE SOCIAL INDICATORS MONITORING STUDIES

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During my tenure with the U.S. Minerals Management Service (MMS), I was one of the Contracting Officer's Technical Representatives for the social indicators research. It is my intent to present a brief overview of the social indicators projects, and the products that have been generated, and to clarify terminology such as "Key Informant Protocol" and "Key Informant Summary." I will also present topical coverage of the questionnaires that were utilized as well as a list of the communities included in the projects. I will then end with potential uses and where we may be going from here.

The products presented here today represent the effort expended since 1988: eight volumes on the Social Indicators Project produced by Dr. Joseph Jorgensen for the Minerals Management Service, and six volumes produced by Dr. James Fall and the Division of Subsistence at the Alaska Department of Fish and Game (ADF&G) (Table 1).

Social indicators is a research initiative that actually began about 1983 when Dr. Jorgensen, working with Berger and Associates, attempted to take a series of secondary source indicators, that is data that had already been published by the U.S. Census, by the State, Permanent Fund, etc. and formulate a series of social indicators. What are social indicators? Social indicators are measures that hopefully are sensitive enough that would allow the MMS to understand the impact of their activities on communities. It is part of an impact assessment or environmental impact statement process.

Therefore, early in the effort, there was an attempt to use the publicly available information to develop predictive tools. At this time there was no questionnaire used, and there was no face to face contact with people in communities. This was partially because of the time constraints associated with the Office of Management and Budget (OMB) authorization process.

The second phase of the Social Indicators Project was a contract issued to Steve Braund and Associates with Jack Kruse as the principal investigator. The task was to develop a questionnaire that could be used in research that would provide sensitive measures of the impacts of OCS development. It is important to understand that the approach was based on the literature from the western United States where large industrial or resource development projects have been documented to have a characteristic set of impacts on communities. For example, when a huge outside mining program is introduced into an area, it stresses the community infrastructure, the ability to deliver services, and creates inflation. It creates any number of problems. In the case of offshore development, some of these problems can be mitigated by the use of enclaves and other techniques. It was MMS's intent to examine the impact of OCS development, both positive and negative, and to abstract the effect from the ongoing economic and social processes occurring within the State.

Table 1. Products of the Social Indicators Monitoring Studies.

			MMS-I	MMS-IA	MMS-II	MMS-III
Year	1983	1985	1986	1989	1992-1994	1994-1998
Principal Investigator	Jorgensen Berger & Assoc.	Kruse Braund & Assoc.	Jorgensen Yale Univ.	Jorgensen Yale Univ.	Fall-ADF&G	Fall-ADF&G
Technical Report	TR-77 Vol. 1-3	TR-116	8 Volumes Provided	8 Volumes Provided	6 Volumes	
Study Title	"Social Indicators for Impact Monitoring"	"A Social Indicators System for OCS Impact Monitoring"	"Social Indicators Project"	"Social Indicators Project" Modification	"An Investigation of the Sociocultural Consequences of OCS Development in AK"	Sociocultural Consequences of AK OCS Activities: Data analysis/Integration
Method	Statistical Analysis of Available Data (Secondary Source) No questionnaire	Key Informant Interviews asking people their primary concerns	Multi-method Survey Res. Key Informant Ethnography History & Secondary Source Materials, AOSIS Quest., KI Protocol	Same as MMS-I AOSIS Quest. KI Protocol	Harvest Survey Questionnaire "Social Effects Questionnaire"	No questionnaire Objectives: 1. Create meta SPSS file. 2. Review existing literature 3. Time series analysis of harvest data. 4. Case studies
Intent	Quick way to monitor OCS activities	Develop questionnaire to measure Social Indicators	Collect & analyze a set of Social Indicators	Determine impact of EVOS on OCS	Determine the social, cultural and subsistence consequences of EVOS: 21 communities in PWS, Cook Inlet, & AK Peninsula	5. Oral histories 6. GIS deliverables.

Kruse, et al. went into the field and talked to a number of key informants, people in communities, etc., to attempt to determine what factors in their life they considered most important. These would be the issues or parameters targeted for measurement. Obviously, in small rural coastal communities where much of the impact from offshore oil development was anticipated, the primary issue was subsistence. There is a Technical Report 116 in the MMS series that covers that initiative.

In 1986, after this questionnaire was developed, there was a contract issued by MMS to implement this questionnaire in a series of communities, large and small throughout Alaska. That contract was awarded to Dr. Jorgensen and the Human Relations Area Files, from Yale University. It was that project that is sometimes called "MMS I." It was a multimethod research attempt to collect not only information from a survey questionnaire, but from historical sources, from Key Informants, and from ethnographic research.

In 1989, as a consequence of the *Exxon Valdez* oil spill, there was a modification of that existing contract. The intent up to this time had been to find a set of social indicators that would be sensitive enough detect change. The *Exxon Valdez* oil spill provided probably the worst case scenario of potential impacts of offshore development. In this case, the impact of the transportation of oil upon small rural communities. To MMS's credit they modified the existing contract to allow researchers to attempt to assess the effects. It is important to point out that this modification had three major constraints.

One was OMB, who once they have approved a questionnaire, do not allow for it to be modified. They will let you shorten it or change it by reducing it. But they won't let you ask new questions unless you go back to them for approval. That approval may take more than a year. So one major constraint was that the questionnaire that was going to be used was developed for other purposes.

The second constraint was that as part of the process, it is incumbent upon researchers to work with the communities, to obtain their permission to do research and to their regional entities. Given the litigious nature of the *Exxon Valdez* oil spill, there was some concern by the lawyers involved in the case to grant access. They weren't sure what would happen to the information. Therefore the number of communities that could have been included was reduced simply because of the potential litigation context.

The third constraint was that the original social indicators research had focused on coastal communities. Mostly coastal communities in those areas where MMS had anticipated oil development: North Slope, Navarin Basin, etc. It had been decided simply as a cost-effective measure to minimize the number of communities in the initial analysis. Prince William Sound, Cook Inlet region had been deleted, in favor of establishing baseline information for coastal communities in the North and West. We did not have baseline communities in Prince William Sound. Additionally there were other constraints in terms of money, time, and ability to complete the task.

This modification was designated "MMS IA." This used the Alaska OCS Social Indicators Study (AOSIS) questionnaire which I will talk about, and the Key Informant Protocols.

In 1992, the original questionnaire did not have a lot of detailed harvest surveys. We were very interested in subsistence — the role it plays in Native communities, the role it played, particularly for the young children, in terms of socialization, in terms of ethics; especially in terms of sharing and the profound issues that subsistence provides not only food, but kind of the "glue" that binds many of the Native communities and small rural communities. But the original questionnaire did not have a species by species harvest account similar to type of information systematically collected by the ADF&G. As a result, there was a cooperative agreement implemented in 1992 with ADF&G. This cooperative agreement was to: 1) continue their long term research in many of these, if not all, of these communities, in terms of harvest levels, and; 2) to add another questionnaire that would study the effects of the consequences of the spill for community, households, and individuals.

Finally, there was considerable information collected in a number of communities. There was not the time or resources to integrate and analyze that information. This led to MMS III which began last year.

MMS III is a three year project will integrate all of the information into a number of analytical products. There is no more survey research, but there will be an integration, a presentation of oral histories, talks with key people in a relaxed kind of format rather than the long survey protocols. It will also contain Geographic Information System (GIS) deliverables.

That is a brief overview of the Social Indicators-*Exxon Valdez* Oil Spill effort from 1983.

METHODS

The kinds of methods used in this research determine what kind of products that eventuate from the research process (Table 2). We have completed considerable survey research. Survey research involves a questionnaire, which requires you to sit down with an informant and ask systematic questions, and get a forced choice answer. In other words, a person is not allowed to present their contextual reaction to a question, but are forced to pick among a number of choices as that which best fits their possible answer. This process has a number of positive and negative aspects.

On the positive side, in the western science tradition and in terms of regulatory boards, it provides a context of representative data. You know that if you have gone into the field, have randomly sampled, and have sampled correctly, that the information that you get back is representative. This can be very powerful, in terms of lawsuits, in terms of arguments that may occur between different interest groups over regulatory or subsistence issues. I think that the social indicators projects, in general, have provided a firm foundation to be able to assert in any kind of forum, representativeness of the importance, for example, of subsistence in the everyday life of people in rural communities, Native and nonnative. I think it is indisputable. The kinds of arguments that are being presented by special interest groups in the State now are very important. Some people think that there is really no difference between sport hunting and subsistence, and there is. The Social Indicators Project results showed the differences, and they showed them as not anecdotal.

Table 2. Types of multi-method research.

Data Collection Type	Survey Research	Key Informant Protocol	Secondary Data	Oral History
Form of Respondent's Answer	Forced Choice	Open Ended	No Informants	Open-ended taped interview
Coding Format	Precoded	Coded after fact	Dependent on original collection source	Hypertext Links (HTML)
Examples	1. AOSIS questionnaire 2. Social Effects questionnaire 3. ADF&G Harvest Survey	Volume III: Part 3: Chapter 4- "Analysis of responses to Key Informant Protocol"	Statistical analysis of existing data sets, e.g., Bureau of Census materials	Life History Topical questions Transcripts Multimedia CD-ROM Project "Jukebox"

It showed them to be ubiquitous across rural communities in Alaska. So the strength of a survey research effort is that it provides information that is relatively unassailable. At a later date, if someone does another survey, with a larger sample, slightly different questions, etc. perhaps it may bring your results into question. But until that time, this is the foundation and basis for any argument.

On the negative side, forced choice questionnaires don't necessarily work. I found it out, unfortunately with the first question we had on the AOSIS questionnaire. We asked in an interview, "Do you think that fish and game have increased or decreased in the last two years?" My informant, a middle-aged hunter from Gambell, a very conscientious person, said, "Well, which fish and which game?" I knew I was in trouble right away. First of all it is a compound question: fish and game. One may have increased, and one may have decreased. But more importantly, people in rural communities, especially Native households, give very close attention by species. So we had to modify the questionnaire into what is called the "Key Informant Protocol," to go through all of the species. You can't say that fish has gone up or down. You can't say game has gone up or down. So we had to list all of the species. So there are some problems with what is called "construct validity" in terms of questionnaires. And there is also a problem in that, in my experience, the results of questionnaires never really tell the story. It is important to understand the context of the response. It is important to understand the feelings and reality behind why people are giving you the responses on a questionnaire. That can't be grasped in a questionnaire. But it can, to some extent, be reached in what is called Key Informant Protocols.

Key Informant Protocols were our attempt to buttress the social indicators questionnaire and avoid OMB. We said it is not fixed choice; it is not forced choice; it is not a questionnaire. They said, "Well all right. We will just charge you for the burden hours." For those of you who do not know, OMB requires that every minute you talk to someone, be calculated in terms of burden hours. If a questionnaire is an hour long and you talk to 100 people, that is 100 burden hours. OMB gave us permission to use the Key Informant Protocol but indicated they were still going to charge us for burden hours. So

figure out how long you talk to people. However, a Key Informant Protocol is open ended. You talk to people in a dialogue about some generic topics. Then, after the fact, you take that information and try to systematically code it so that it may be analyzed formally through statistical means.

"Secondary data" is another method. That is simply to take existing information and try to extract what you can, in terms of changes through time. Employment data, demographic data, health data, Permanent Fund data, etc. would be examples.

Finally, there is "oral history" data. Tomorrow we will have a presentation of what is called "Project Jukebox." Project Jukebox, on which I have had the privilege to work with Dr. William Schneider, really came from the communities. I can remember going into Iquiqig and someone saying to us, "You know we get a lot of reports and nobody reads them. What we want is something that is easily accessible, so that the children can have access to the experience of the elders." To accomplish this now we go into the community, and they select elders that they wish us to talk to. We tape record the elder. The elder gives a life history. Simply selecting from their experience and background, those incidents and those experiences, those morals that they wish to communicate to others and to the younger generation. We tape that interview which is transcribed and then assembled in a multimedia fashion with photographs of the elder, with maps of the region, and in some cases video clips. That is all transferred to several CD-ROMs for use on the computer. If other people in the community, especially children, are interested, they simply click on the image of the elder with a mouse and they can hear that elder speak and tell his or her story. All of the transcripts have "key words," and are annotated so if there is a specific topic they would like to hear from the elder they can click on the topic, or they can simply listen to the elder and read at the same time. These products, I have found, are especially well received in the communities. It is a delight to work with an elder who has never used a computer before, give them a mouse, and in about five minutes they are "really cruising."

TYPES OF SOCIAL INDICATORS PRODUCTS

There are several types of analysis that are produced in these volumes (Table 3).

Key Informant Summaries

The Key Informant Summaries form Volumes I and II, and Volume IV, parts 1 and 2. These are not Key Informant Protocols. Key Informant Summaries contain background information on the region and communities within the region. They contain historical data and demographic data. They also contain information from interviews with key informants, officials, significant people within a community about certain issues with which they are faced. These data provide an overview of the region and an historical look, especially demographic, at the communities involved.

Key Informant Protocol

The second kind of product is a detailed analysis of the survey and the Key Informant Protocol data. This would be Volumes III and VI in the eight volume set of the

Social Indicators Project. I highly recommend this volume, but Dr. Jorgensen has also provided copies of his article, "Ethnicity not Culture" published in the *American Indian Culture and Research Journal*. As is his wont, Dr. Jorgensen wrote a "brief" 124 page article. It is a synthesis of many of the issues that are contained in the analysis here and I highly recommend reading it. Dr. Jorgensen will spend some time, I believe, talking about some of the results from that analysis.

Table 3. Overview of the types of Social Indicators products.

Type of Analysis	Existing or Potential Products
1. Analysis of existing historical and secondary source data combined with open ended interviews with local officials	I. Key Informant Summaries: Vol. 1 & 2 IV. Post Spill Key Informant Summaries Parts 1 & 2
2. Analysis of survey research questionnaires and Key Informant Protocols	III. Social Indicators Study of Alaskan Coastal Villages: Analysis VI. Analysis of the <i>Exxon Valdez</i> spill area 1988-1992
3. Analysis of research design, sampling, questionnaire construction, validity & reliability	II. Research methodology... V. Research methodology for <i>Exxon Valdez</i> spill area
4. Descriptive and tabular analysis of harvest survey data and "Social Effects" questionnaire	An Investigation of the Sociocultural Consequences of OCS Development in Alaska. Vols. I-VI
5. SPSS data files [for independent analysis and to overcome "ecological fallacy"]	Available upon request
6. Oral history	Project "Jukebox" on CD/ROM
7. GIS deliverables	ArcView II format

Research Methodologies

Other products are some very esoteric volumes on research methodologies; these are Volumes II and V. These two volumes delve into issues of validity, reliability, and construction of the questionnaire, etc. They provide a primer on how to develop a research design. They also contain the condensation of wisdom attained during many of the problems, mistakes, and successes that we had in terms of the methodology employed in the Social Indicators Project. I highly recommend them to those that may want to initiate their own survey research, whether it is a cooperative agreement to do harvest surveys, or on issues of local or regional interest.

Descriptive and Tabular Information

The fourth type of product is descriptive and tabular information on a number of communities in Prince William Sound, the Alaska Peninsula, and Cook Inlet. These are the ADF&G products, Volumes I through VI. They contain all of the details on harvests over a three year period, the change in harvest per community, per species. They also contain details on what has been called the Social Effects Questionnaire.

Statistical Package for the Social Sciences Database

Finally, the last is the Statistical Package for the Social Sciences (SPSS) data files. Should you have the SPSS program on a computer in your region, community, or office, MMS can provide the SPSS data files which have been stripped of all identifying detail so the informants' anonymity remains preserved, but allow you to do analysis on the variables that have been collected. They are an important way to overcome one of the methodological problems called "ecological fallacy." Ecological fallacy can be illustrated simply by taking the mean from two parameters from some kind of study. For example, if you have a community that has a high average income and a high average harvest of subsistence species, can you make the connection that high income is correlated with high subsistence? You can't because you are dealing with averages there. What you really need to know is are the low or high income people harvesting high or low resources. The SPSS files allow you to do that. They allow you to associate per household which is a unit of analysis, income, harvest or any other variable.

TOPICAL COVERAGE OF THE SOCIAL INDICATORS STUDIES

Table 4 is a breakdown of the kind of topics that were covered in each of the questionnaires: the AOSIS questionnaire, the Key Informant Protocol, the Harvest Survey, and the Social Effects questionnaire. You will notice that there is overlap in some of the topics, but don't forget that they are asked in different ways. And these two are linked and independent of the research that we have done in the previous two.

One thing that I would like to point out is if you do want to look at the questionnaires they can be found in Volume II or in Volume VI in the ADF&G reports.

PARTICIPATING COMMUNITIES

Table 5 lists communities that were included in the "MMS I" study. Those communities in italics are "post spill" communities, i.e., sampled after the *Exxon Valdez* oil spill.

Communities Participating in MMS II.

Table 6 lists the communities that participated in MMS II. This sampling effort focused mainly on communities that were impacted by the *Exxon Valdez* oil spill, with some control communities from the Social Indicators Survey. The control communities served the purpose of being far away from the direct impacts of the spill. We tried to use them as a references against which we compared effects in communities subjected to the oil spill.

Table 7 shows a brief overview of the topical coverage of these volumes from ADF&G.

Let me end by making a brief generalization. In the current context it seems unlikely that there will be Federal funding devoted to research on these issues. However, I think that this workshop is a very positive process anyway. The responsibility for conducting future

research on subsistence and other issues is going to lie with the regions or the communities themselves. I would offer the experience contained in these products should you decide to engage and initiate your own research. And I would advise that you use the people in this room as a resource to provide expertise, background, and advice. It would be my hope that the communities initiate this research, do it cooperatively, and define the issues.

Table 4. Overview: topical coverage of Social Indicators/EVOS questionnaires.

AOSIS Questionnaire	Key Informant Protocol	Harvest Survey	Social Effects Survey
Household composition	Harvest expenses	Residence/age	Visiting
Traditional activities	Variety of species harvested	Ethnicity	Wild foods
Health	Stability of income	Educational level	Sharing
Education	Giving/receiving: labor, equipment, subsistence products within/between comm.	Commercial fishing: salmon marine invert.	Elders
Employment	Household size	Large game	Significance of place
Income, goods & services	Expectations for household composition	Non-commercial harvest: salmon, non-salmon finfish, shellfish	Participation and leadership
Voting	Politics	Marine mammals	Oil spill employment
Residence in community	Ethics	Furbearers	Childcare during spill
Perceived well-being	Attitude quantity of harvestable species	Birds	Services
<i>*Source: Appendix in II - Research Methodology</i>	Management of harvestable species	Wild plants	OCS development
	Attitudes about state & federal management	Give/receive most species	
	Understanding natural resources	Employment history	
	Acquiring knowledge		
	<i>*Source: Appendix in II - Research Methodology</i>	<i>*Source: Appendix I in Volume VI Summary</i>	<i>*Source: Appendix I in Volume VI Summary</i>

Table 5. Communities participating in the Social Indicators survey.

BOROUGH North Slope Barrow Anaktuvuk Nuiqsut Wainwright Point Hope Kaktovik	NON-BOROUGH Aleutians St. Paul Nikolski Unalaska Atka Sand Point <i>False Pass</i>	POST EVOS SPILL Prince William Sound/Cook Inlet <i>Kenai</i> <i>Tyonek</i> <i>Seldovia</i> <i>Valdez</i> <i>Tatitlek</i> <i>Cordova</i> <i>Chignik</i>
NANA Kotzebue Kivalina Deering Buckland	Bristol Bay Dillingham Manokotak Togiak Naknek <i>Ekwok</i>	
KODIAK Kodiak Old Harbor <i>Karluk</i>	Bering Strait Nome Shismaref Unalakleet Gambell Calista Bethel Nunapitchuk Toksook Bay Scammon Bay Alakanuk Aniak	

Note: Communities in italics are Post Spill communities.

Table 6. Communities participating in the Social Consequences of OCS Development in Alaska (MMS-II).

Prince William Sound Communities Chenega Bay Tatitlek Nanwalek Port Graham Seldovia Kenai Cordova Valdez	Kodiak Island Communities Akhiok Kodiak City Karluk Larsen Bay Old Harbor Ouzinkie Port Lions	Alaska Peninsula Communities Chignik Bay Chignik Lake	"Control Communities" Kaktovik Kivalina Kotzebue Nuiqsut
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Table 7. Topical coverage by community in the six volume: "An Investigation of the Sociocultural Consequences of OCS Development in Alaska."

1. Climate, Setting, and General History	7. Resource Harvest and Uses - Year Two Participation Rates Harvest Quantities
2. Previous Research	8. Resource Harvest and Uses - Year Three Participation Rates Harvest Quantities
3. Study Goals and Research Methods: Fieldwork Sample Selection	9. Discussion Harvest Trends Ongoing Issues
4. Demography	10. Social Effects Survey Findings
5. Monetary Economy	
6. Resource Harvests and Uses - Year One Participation Rates Harvest Quantities	

QUESTIONS AND DISCUSSION

Edenshaw: Did you ever ask nonnatives living in these coastal villages their definition of subsistence?

Callaway: Yes. All the sampling was random and while many of the communities were a high proportion of Natives, there were nonnatives included in the sampling. This brings up a very important issue now facing Federal and State government regulators. There are people that feel that the activity they engage in as urban sports hunters are identical, in terms of their civil rights, as the activities that a subsistence hunter in Kivalina engages in.

Hild: In regards to the two sets of documents, have any of these been scanned and put into electronic media that is accessible?

Callaway: I am told by Michael Baffrey of MMS that the second set are available on disk. It is my recommendation that the results of the last 15 years of research by MMS be placed on CD-ROM so that it can be made available to researchers and the local communities. Perhaps an Internet site could be established.

Luton: We are in the process of putting all the series on an Internet site.

Callaway: Is this the TIMS initiative? So they all are available on diskette. If you are interested in obtaining them, Michael Baffrey is the person to call.

Presentations and Discussions

SOCIAL INDICATORS OF "TRADITIONAL" CUSTOMS

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At the outset of social indicators research in 1986, a central issue was defining and measuring "traditional" customs. The items among the questions we asked in the AQI instrument (forced choice questionnaire) which survived our tests represented two dominant features of life in the bush: (1) communitarian acts and sentiments, such as the sharing of resources and meals with relatives, wider networks of kinspersons, and friends beyond one's household, even one's village, and also the active participation in community affairs; and (2) engaging in hunting, fishing, and other extractive activities—some solo and some with relatives or friends.

ON APPROPRIATE DEFINITIONS AND MEASURES OF SUBSISTENCE

We confirmed in all phases of our social indicators research that Native subsistence economies remain quintessentially subsistence economies in their organizations of production: ownership, control, labor, distribution, consumption. They are directly linked to procuring food and shelter for the maintenance of life itself. It is the social fabric in which the subsistence economy is embedded that is crucial within and among communities.

Throughout the first phase of the social indicators research in the 31 villages located from Kodiak Island northward to the Beaufort Sea, the data analyzed here, we measured features of subsistence activities as indicators of the subsistence mode of production under which they were subsumed. The difference between disparate extractive activities and the variety of related customs and practices that reflected a subsistence mode of production are obvious. A host of measures of subsistence economics and measures of communitarian customs in the Key Informant Protocol (KIP) and AQI instruments provide reasonable indicators of "traditional" customs and the way in which they are related within the structure of village life (Table 1).

Whereas, the harvests and preparation of wild animals occur as subsistence activities, and also as activities within a subsistence mode of production, the restriction of activities to a few species of large land mammals and salmon indicates a sport "tradition." When extraction, preparation, distribution (a panoply of sharing practices), and consumption of a wide variety of plants and animals are organized within kinship-affinal networks, extend to networks of friends and elders, and are embedded in a nexus of visiting customs, the relations among these variables indicate a subsistence mode of production "tradition," i.e., a set of related customs that have persisted over time. This is not to deny that changes occur within features of these relations.

Table 1. Contrasts between Pretest and Posttest Samples, and between *MIXED:NATIVE* Contrasts within those samples, 32 AOSIS Variables Measuring Respondent Characteristics and Traditional Customs, 1987-1988 and 1989-1990*

	PRE 1987-1988 (N=548)	PRE <i>MIXED</i> (N=264)	PRE <i>NATIVE</i> (N=284)	POST 1989-1990 (N=308)	POST <i>MIXED</i> (N=170)	POST <i>NATIVE</i> (N=138)
ETHNICITY						
Native	79%*	59%*	95%	67%	48%*	91%
Non-Native	21%	41%	5%	33%	52%	9%
AGE						
Mean	41.5	39.9*	43	42.4	39.9*	45.5
SEX						
Male	50.5%	44%*	57%	54%	45%*	64%
Female	49.5%	56%	43%	46%	55%	36%
EDUCATION COMPLETED						
Some High School	42%	38%	47%	46%	43%	50%
Some College or Beyond	33%	48%	19%	30%	42%	16%
SOURCE OF EMPLOYMENT						
Unemployed/Retired/Other	24%	19%*	29%	28%	25%	32%
Public Sector	37%	35%	39%	39%	42%	35%
Private Sector	39%	46%	32%	33%	34%	32%
EMPLOYMENT						
Md Months Employed	6	8*	3.7	8	9.9*	2.8
Persons Employed ≥ 4 Months	52%	73%	51%	60%	70%	48%
Persons Employed ≥ 10 Months	37%	44%	31%	44%	58%	28%
INCOME						
Median	\$22,940	\$34,185*	\$16,000	\$27,885	\$38,172*	\$19,017
Mean	\$30,160*	\$37,900	\$22,980	\$33,920	\$39,270	\$27,030
Income ≥ \$50,000	18%	30%	7%	27%	38%	13%
HOUSEHOLD SIZE						
Mean	2.84	2.64*	3.06	2.8	2.7*	2.9
3 Persons or More	71%	62%	80%	68%	66%	72%
6 Persons or More	23%	16%	30%	20%	13%	29%
HOUSEHOLD TYPE						
Single-Conjugal-Nuclear	80%*	83%	78%	66%	73%*	57%
Stem-Joint-Denuded-Composite	20%	17%	22%	34%	27%	43%
LENGTH OF RESIDENCE						
≤ 5 years	17%*	24%*	10%	18%	28%*	5%
> 10 years	69%	55%	83%	56%	38%	78%
LAND MAMMALS						
% Hunters	34%	33%	35%	42%	37%	47%
Months Hunting	2.4	1.8	2.8	2.5	2.4	2.6
Days Hunting	20.5*	19.2%*	21.4	11.5	12.6	10.5

Table 1. Continued.

SEA MAMMALS						
% Hunters	32%	16%*	44%	28%	12%*	48%
Months Hunting	4.3	4.2*	6.3	5.6	4.8*	6.3
Days Hunting	38*	35.5*	41.5	34.7	37.4*	34.1
CAMPING						
% Campers	49%	44%*	53%	42%	38%	47%
Months Camping	3	2.7*	3.2	2.4	2.4	2.4
Days Camping	13*	13.1	13.0	19.9	21.5*	18.2
FISHING						
% Fishers	41%*	36%*	46%	60%	55%*	69%
Months Fishing	4.3	5.1*	3.9	3.5	3.5	3.7
Days Fishing	20.9*	20.4	21.5	27.7	23.3*	32.4
SUBSISTENCE FOOD YESTERDAY						
Yes	64%	49%*	78%	58%	48%*	71%
SUBSISTENCE FOOD DAY BEFORE YESTERDAY						
Yes	61%	51%*	71%	57%	45%*	72%
EITHER DAY FOOD FROM OTHER HH						
Yes	37%*	49%	50%	36%	36%*	35%
MEALS WITH RELATIVES OTHER HOUSEHOLD PAST 2 DAYS						
1 or More	50%	43%*	56%	43%	33%*	54%
SUBSISTENCE MEAT AND FISH IN ANNUAL DIET						
≥ 50%	54%	40%*	67%	47%	34%*	64%
SPEAK NATIVE LANGUAGE AT HOME						
Most of Time or Always	47%	35%*	55%	40%	30%*	48%
THINK ABOUT GAME AVAILABLE PAST 5 YEARS						
Decreased	30%	22%*	41%	35%	40%	29%
Increased	31%	40%	20%	20%	18%	22%
THINK ABOUT FISH AVAILABLE PAST 5 YEARS						
Decreased	46%	40%	54%	42%	56%*	26%
Increased	17%	22%	10%	16%	16%	16%
DAYS VISIT FRIENDS LAST WEEK						
3 or More	46%	44%	47%	43%	45%	41%
PUBLIC MEETINGS ATTENDED LAST MONTH						
1 or More	44%	41%	47%	48%	42%	54%

Table 1. Continued.

VOTE IN RECENT CITY COUNCIL ELECTION						
Yes	69%*	64%*	73%	57%	54%	60%
VOTE IN RECENT VILLAGE CORP ELECTION						
Yes	68%	63%*	72%	64%	60%	67%
SOCIAL TIES WITH PERSONS IN OTHER VILLAGES						
No Satisfaction	6%*	6%	5%	10%	12%	7%
Complete Satisfaction	22%	20%	23%	57%	51%	65%
FEELINGS ABOUT INCOME						
No Satisfaction	16%*	6%*	25%	25%	27%	22%
Complete Satisfaction	11%	13%	10%	30%	29%	30%

* Asterisks (*) denote *Pretest/Posttest* and *Mixed/Native* contrasts significant at $P \leq .05$. Pretest (I)/Posttest (II) contrasts are designated in the second column under Roman I. *Mixed/Native* contrasts for the pretest sample appear in the third column under PRE MIXED and for the posttest sample appear in the sixth column under POST MIXED. Significant differences for *Mixed/Native* contrasts of nominal dichotomous variables are based on the test for the difference between proportions; the Kolmogorov-Smirnov two independent sample test is used for ordinal variables; and the *t*-test is used for interval variables.

Native: Nonnative Contrasts in Reference to Subsistence and Traditions

The first phase of our social indicator research demonstrated that a strongly and positively correlated group of traditional customs continued to be practiced through 1990 in large, complex, multi-ethnic villages as well as small, simple, more homogeneous ones. The most powerful contrast between respondents who engaged in a traditionally organized subsistence economy of production, and those who did not, was not between contrasting types of villages, but between Natives and nonnatives (Tables 2 and 3).

Knowledge that a person was not a Native proved to be the best indicator that he or she did not engage in subsistence extraction activities; that subsistence foods were not eaten in the previous two days; that subsistence foods constituted small proportions of the annual diet; that few meals were eaten with relatives in other households, and that ties with persons in other villages were satisfactory or less than satisfactory.

The nonnative factor was mitigated somewhat by interracial marriages, referred to here as "mixed marriage," i.e., a nonnative respondent whose spouse is Native. The mitigation, however, further evinces the power of race/ethnicity in accounting for traditions of subsistence practices. Mixed racial couples were twice as likely as nonnative couples to have eaten meals in relatives' homes and twice as likely as nonnative couples to have received subsistence foods from persons in households other than their own. Indeed, the best predictor of the source of subsistence foods for some of the meals eaten in the previous two days by mixed couples was that someone other than the respondent had harvested the food (12% from someone in the respondent's household, 53% from someone in a different household). Yet even this prediction in regard to meal sharing was weak because the best

Table 2. Univariate comparisons of incomes, household sizes and types, and several measures of traditional communitarian customs, Native and nonnative respondents, entire pretest-posttest sample, N=856, 1987-1990^a.

	Income		Household Type				Household Size		Total Types of Subsistence Acts		Subsistence Food in Meals		Meals With Relative Past Two Days	Visit Friends/Relative Past Week (Days)	Visits (Trips) Out of Village Past Year	
	<\$40K	>\$40K	Single	Conjuga	Nuclear	Nonnuc	Mean	6 +	0	3 +	Yesterday	Day Before Yesterday	Harvest Person Not Self	Yes	3 +	3 +
Native (N619)	80%	20%	12%	22%	38%	28%	3	28%	24%	57%	74%	70%	80% (of 72%)	58%	48%	41%
Non-Native (N212)	39%	61%	20%	39%	26%	15%	2	7%	39%	36%	30%	34%	61% (of 32%)	14%	39%	23%

^aAll differences between native and nonnative distributions are significant at $\leq .01$

Table 3. Gamma (γ) coefficients, educational attainment by months of annual employment, controlling for income and ethnicity, MIXED:NATIVE contrast for pretest-posttest sample, N=856, 1987-1990.

VILLAGE	NATIVE INCOME						NONNATIVE INCOME					
	<\$10K	<\$20K	<\$30K	<\$40K	<\$50K	>\$50K	<\$10K	<\$20K	<\$30K	<\$40K	<\$50K	>\$50K
MIXED	.56	.58	.71	.25	.61	.38	.60	.53	.01	.34	-.19	-.05
NATIVE	.60	.44	.32	.42	.32	.55		.25		-.25		.16

^a No nonnative respondent earned less than \$20,000 annually.

^b One nonnative respondent earned \$30,000 annually. That person had some post-graduate education.

^c Two nonnative respondents earning between \$40,000 and \$50,000 annually have high school educations.

prediction among mixed racial couples was that no meals were eaten in relatives' homes during the preceding two days, and that the respondent had not eaten in a relative's (or affine's) home recently.

Who, we asked, among all nonnatives in our original samples practiced the greatest number of "traditional subsistence" activities which are widely practiced by Natives. We discovered that a tiny proportion (6%) of nonnative respondents best fitted the "traditional subsistence" practices characteristic of Natives, but the fit was not very good. The 6% were between the ages of 35 and 59, had resided in the village in which they were first interviewed for more than ten years, earned more than \$50,000 annually, engaged in hunting several species of land mammals *and* fishing for several species of fish *and* established camps for several extraction activities each year. Yet less than 50% had eaten at a relative's home, or received food from a person in a household other than the respondent's, or gained more than 50% of the meat and fish in their annual diets from naturally-occurring resources.

Thus, a tiny percentage of middle-aged nonnative "rural village" respondents in our 31 village samples practiced some of the subsistence and sharing customs characteristic of the Native subsistence economy of production. The results reveal marked differences between Native and nonnative "rural subsistence" hunters, fishers, and gatherers.

ECONOMY AND ACCULTURATION

The adoption of big game hunting *and* fishing and the limited practices and visiting and sharing meals by a tiny and select group of long-term, middle-aged nonnative residents in Alaskan villages may be what some anthropologists in the 1950s and 1960s conceived as acculturation: two cultures in contact, each accommodating to and adopting cultural features of the other. The other 94% of nonnatives, by this accounting, are in the process of becoming more Native-like, and vice versa. Acculturation, a concept of the 1940s that lingered through the 1960s, was seldom defined or measured, although it was often used to clinch arguments when accounting for culture change.

The results of the first phase of our social indicators research revealed the consequences of modifications to Native subsistence practices from new technologies, legal restrictions, population growth, and federal takings. The responses were integrated into modifications of a subsistence-based mode of production necessarily integrated with public and private sector economic forces. Few nonnatives in our sample — all 31 villages are "rural" — had adopted many subsistence traits characteristic of Native residents. To be sure, some were active sport hunters and fishers, and some benefitted from the "rural subsistence" privileges which allowed them to place setnets in rivers, to harvest four caribou annually, and the like. The evidence suggests that self-selection of nonnative persons for life in the bush, coupled with long-term employment, and marriage to a Native is the most likely explanation of the engagement of nonnatives in some activities that appear to be Native traditions.

In sum, the multiple factors, taken together, that account for nonnative participation in several subsistence activities associated with Native subsistence modes of production are:

mixed marriage, more than ten years residence in a village, middle-age (35-59), high income (over \$50,000 in 1988 dollars), and employment in the public sector. Even if we exercise all of these controls, the best prediction is that if a person is a nonnative, he or she participates in one or less subsistence activity, eats few subsistence foods, does not eat at the home of relatives, and does not receive subsistence foods from others.

The reasons for public sector differences from private sector appear obvious, although non-trivial. Public sector employees in coastal Alaskan villages who are nonnatives, whether working for Native regional corporations (for-profit or non-profit), Native village corporations (for-profit or non-profit), boroughs (equivalent to counties), the State of Alaska, or the Federal government are overwhelmingly self-selected for life in the bush, earn high incomes, and the majority have contacts of various kinds with Natives every day. They reside in the villages year around, exercise their political franchise, and attend public meetings. Private sector employees and entrepreneurs, if in commercial fishing, have minimal contacts with Natives and seldom reside in Alaska year around.

Regardless of whether Natives reside in small, homogeneous villages with modest infrastructure and services (*Periphery* and *Native* villages in our theoretical contrasts), or large, heterogeneous villages with well-developed infrastructures (*Hub* and *Mixed* villages in our contrasts), a variety of public services, and a relatively complex local economy of public and private sectors, participation in the hunting of several sea mammal species and doing so for 45 days or more per year are consistent indicators of many traditional activities and customs, including the frequent hunting of several species of land mammals, the extraction of several species of fish, the establishment of several camps throughout the year to procure these resources, and the maintenance of equipment which makes camping and extraction successful.

Natives who are actively engaged in fishing, hunting, and camping are also apt to speak their Native language at home most of the time, to visit friends frequently during the week, to vote in city council and village corporation elections, and to feel that their social ties with persons in other communities are satisfactory. To make predictions even simpler, knowledge that a person in our original sample is Native, unemployed, unemployable or retired and earning less than \$17,000 (household income) per year (in 1989-90 dollars) is a very strong indicator (75%) that the person participates in subsistence extraction activities and related customs specified above.

Income and age influence household composition and size, as well as Native participation in subsistence extraction activities. Yet almost every Native in our original sample shared naturally-occurring resources with persons outside their own household, and almost every Native consumed wild resources as well. The differences between high and low income earners among Natives appeared in every one of our samples and panels. Households of Native high earners were likely to be nuclear and to have more than four members. Unless they were very elderly, respondents in high income households were much more apt to engage in several subsistence activities and to be donors of resources than were low earners. Composition of the households of low earners were likely to be some non-nuclear variety (denuded, fragments, single-parent, composite, stem). Low earners, particularly elders and women who head households, were more apt to be a receivers of resources (food, meals) than are extractors and donors.

Differences obtained between Natives in large, heterogeneous villages and those in small, homogeneous ones. In general, Natives in the largest villages were better educated, employed for more months of the year, and earned greater incomes than their counterparts in the small villages. They were less apt to have had subsistence food as parts of their meals the preceding two days, less apt to have gained 75% of their sustenance from naturally-occurring resources, less apt to have dined and snacked regularly with relatives, less apt to have received subsistence food from persons in households other than their own, and less apt to speak their Native language at home most of the time than was the case for their congeners in the small, homogeneous villages.

Nevertheless, the best predictor in large, complex villages for the practice of every traditional custom cited above is that every Native engages in every one of them. The differences between Natives and nonnatives in the large, complex villages was much greater than the differences between Natives in either large and complex or small and simple villages. Finally, as income increased, Natives in complex villages increased their participation in subsistence extraction activities and the consumption and sharing activities that accompanied them.

THE PERSISTENCE OF "TRADITIONS"

First, Natives have maintained a variety of practices that were common features of the lives of their forebears. Extraction of sea mammals, eating meals with relatives and friends in their homes, and frequent visits with friends and neighbors are powerful indicators of the retention of traditional practices in the fabric of Native lives in the 1990s. The hunting of walrus in an 18 ft aluminum skiff, powered by a 50 hp Evinrude outboard motor; meals in which Rice Krispies are served with low bush cranberries, murre eggs, and black meat (smoked seal); and visits in which some of the discussion centers on action, which is occurring on the TV screen (piped in by satellite), may fool the nonnative observer as being wholly modern traits. To the contrary, these activities, and many others that we have measured here, have been modified by modern technology and integration into the periphery of a world-wide market, albeit as a dependent whose stability fluctuates with the ups and downs of the public sector whose stability fluctuates—although with slower reaction times—with the ups and downs of the private sector.

Sharing is traditional, as is the extraction of animals and plants of the land and the sea (birds and their eggs included). The participation in village affairs as if the village was, what it is, a network of friends and relatives sharing, for the most part, resources, labor, and even cash, for survival, is also a "tradition," if altered by modern circumstance. Traveling to work at the post office astride a snowmachine, then, shouldn't fool us into thinking that Alaska Native Claims Settlement Act (ANCSA) and oil have transformed Native societies to a variant of Western society that has nearly matched the model.

For the initial phase of the social indicators study that commenced two years prior to the *Exxon Valdez* spill and that has been discussed, albeit briefly here, the methodologies through which the questionnaire and the protocol indicator systems were developed, and the extensive analyses of those systems appear in *Social Indicators Study of Alaskan Coastal Villages II. Research Methodology: Design, Sampling, Reliability, and Validity*. TR 153 Minerals Management Service, Alaska OCS Region. New Haven: Submitted by Human Relations Area Files Inc. (1993) and *Social Indicators Study of Coastal Alaskan Villages III. Analysis*.

TR 154 Minerals Management Service, Alaska OCS Region. New Haven: Submitted by Human Relations Area Files Inc. (1994).

QUESTIONS AND DISCUSSION

Edenshaw: Do you have information on the types of species that nonnatives harvested versus Natives?

Jorgensen: In our *Exxon Valdez* study we inquired about 200 species but the list was too long and had to be reduced to 77 species. We did measure what was harvested. I distinguished between Hub and Periphery villages; Hub would be complex villages, Periphery would be simple villages. Hub village people identified the species that were commodities. But they didn't know nearly so many as the Natives in the Periphery villages. The Hub villages were 69% nonnative in our samples.

Edenshaw: Why wasn't or was time a factor? If you look at all of the different variables you have in regards to harvesting, I'm not sure how it is with other Natives but we have traditional lands, certain places where we go to harvest.

Jorgensen: We asked those questions in Bethel, in Kotzebue. It is clearly becoming a problem for long-term residents to use many of the places that they used traditionally. It is probably much harder for people who have just moved into the villages. There were pressures on the places where you could harvest resources in the very large villages. Not that there weren't resources there, but for everybody to have access to places that were rich was another question. We found in this research that many people who worked in Anchorage, or even Kodiak, would take vacations in home villages when they can harvest resources.

Edenshaw: I would like to see a community like Eagle or Soldotna included. If you look at the key species and what a person from Soldotna or Eagle harvests versus what someone from....

Jorgensen: It is there, it is Kenai instead of Soldotna. But look at the next study on "Ethnicity not Culture."

Hild: In regards to your matrices, what I have seen here is that they have all been predictive. Have they been evaluated to take that perception from the other two walls of your box? To see if you have any other loopings or parameters?

Jorgensen: If you have a one dimensional solution it is like looking at a matrix. If you have a matrix of correlation coefficients and you organize them so the strongest correlations are fitted next to one another, that is the first dimension. Then, if you say but every one of those items is related to every other item, not just the ones most strongly related to, and so the best that you can do is say what is the next best order we can get out this? That is the second dimension. Whether you do it one more time and say how many ways are these things going to scale? We can get to a third dimension, but it is generally beyond the capabilities of all but mainframe computers.

Armstrong: I had a question on the word "subsistence." Would it have been better to use "cultural" and "traditional" instead of subsistence?

Jorgensen: Maybe. The way I see it is you define phenomena that you think are traditional. Then you measure them, and it is an issue of measurement. Culture has no standing in court. Subsistence does because it has been defined in law and has a standing in court. So if you were to change things to traditional culture or cultural traditions and if they included all of these activities that swirl around the harvesting of resources, knowledge of resources, knowledge of the environment, significant symbols attributed to the environment, the way in which resources are prepared and distributed and consumed, the way people visit—all of those things together—there is a structure to them.

Endter-Wada: In light of the relationship between the variables and how they are structured over time, would you imply that we would need to monitor a full set of variables?

Jorgensen: Oh, no. I found so many redundant variables. It is not to say that they measure exactly the same thing, but they were giving the same kind of information. Why I got rid of them and how I got rid of them takes up most of Volume II. If you were going to monitor a village I can give you eight variables out of the entire list to monitor. I think that you would be very successful in monitoring a village.

Now if you were going to monitor a village you would have to have a panel. With the panel you would have to keep going back year after year. Alaska people move around, especially nonnatives. They are gone. If the economy goes south, so do they. So you chase them and try to find them. Let's say you have a 33% sample of those that remained; the very next year, you go back again and you only find 80% of the group you sampled last year. It goes down. Everybody who works with panels finds that out. Here's what we found out about panels. If they are nonnative and employed, they tend to be employed in the public sector; therefore they are year-round residents. They tend to have lived in the villages for more than six years. They are stable. What do we find for Natives? They tend to be employed. They have been in the village for more than ten years. Or they tend to be elderly or infirm. They are women with children and no husband. They have stability in the village. Panels are stable and stationary. They tend to have higher incomes if they are nonnatives, higher incomes if they are Natives. So when you are monitoring from a panel you have to realize that you have long term residents and they are not going to be the same completely as people who are moving through the villages that we kept capturing in our pretest samples. But the differences are not significant.

EMPIRICAL FINDINGS OF THE SOCIAL INDICATORS PROJECT

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My talk today focuses on the experience of doing fieldwork with the Social Indicators Research Project. I was asked to comment on general concerns of people in the study communities where I conducted research and on some of the impacts from the *Exxon Valdez* oil spill. In relation to the project overview given this morning, I did a portion of the ethnographic and key informant research in the Bristol Bay and Kodiak regions. This research contributed to the key informant summaries for those regions, which are part of one of the seven volumes of Social Indicators reports. My intention is to give you a sense of some general findings from the ethnographic and key informant data, which were gathered in addition to the survey data that were talked about more extensively this morning by Dr. Jorgensen.

The Process of Conducting Field Research

I want to begin with a brief overview of the process of conducting Social Indicators field research. Several different types of data were gathered as part of that research process, which is one of the strengths of the Social Indicators Project. Field researchers administered the key informant and questionnaire survey instruments that Dr. Jorgensen discussed this morning. Local people were hired to administer the questionnaire surveys, while senior researchers conducted the key informant surveys. In addition, the senior researchers recorded ethnographic observations, conducted institutional interviews with local officials and heads of various regional and native corporations, gathered secondary literature and documentation, and obtained oral histories in instances where people recounted their own history.

As part of the process of conducting these activities, field researchers gained insights that enabled them to formulate impressions and hypotheses about local situations. Those hypotheses helped to guide and inform the statistical analyses. In the process of conducting interviews, field researchers noticed patterns and even came to expect certain responses. For instance, the significant differences between Native and nonnative households that Dr. Jorgensen talked about this morning were apparent to us when we conducted field work. Households that did not fit the expected pattern of distinction were interesting. I remember specific interviews with Anglos who had not been raised in Alaska but who reported having household harvests of a wide range of subsistence resources, many of which were generally preferred by Natives, and being involved in extensive sharing networks. Since that was not an expected pattern, I would look around the room for pictures of the spouse. Invariably there was a Native spouse in that household. Dr. Jorgensen commented this morning that the statistical analysis bears out the fact that mixed households are more like Native

households in terms of their subsistence patterns. So, the research experience is important for starting to sense what later becomes systematized, documented and much more legally defensible from the statistical data.

The Research Products

The key informant summaries on each region are the reports that senior researchers who conducted field work produced. Those reports contain observations and analysis that, in large part, come from the insights that local people gave to us. We attempted to capture and reflect that information as well as we could. These summaries are integrated and synthetic ethnographic descriptions that give readers a sense of the regions and the people who inhabit them.

The key informant summaries follow a common outline so that there are systematic and comparable descriptions for each of the regions. Researchers attempted to integrate insights from all of the types of data that were mentioned previously into the key informant summaries. In general, the key informant summaries provide historical overview, identify significant sources of change and community trends, characterize the present context, and describe the issues of concern to local residents. This information is important since the purpose of the entire Social Indicators Project was to identify sources of change and sources of stability. These summaries are useful for interpreting the survey data.

This morning, Dr. Callaway showed an overhead of the outline used in the key informant summaries. Let me comment briefly on the elements of that outline. The key informant summaries begin with a description of the historical context in each region, which is important for understanding how the findings of the Social Indicators Project fit into longer series of changes that have occurred. Next, patterns and trends in population and demography are described, which are important for understanding the characteristics of the people who live in the region. The third major category of information is community organization and the economy, within which are descriptions of the different governmental organizations in the region, the status of land ownership and management, natural resource management issues, the sectors of local commerce and industry, the various services that are available in local communities (health, education, social), voluntary associations active in the region and community activities (the more informal patterns of social interaction), and trends of political-economic and social change. Fourth, household organization and kinship patterns are outlined in a more descriptive fashion than what Dr. Jorgensen has demonstrated with the systematic survey data. The final topic is ideology, people's perceptions of the world and how they explain events based upon their own experiences.

Significant Findings

Instead of going into detail on many of the specific findings, I would like to talk more generally about some of the significant things that we learned. These findings come from my reflections on the fieldwork experience.

Land and Natural Resource Issues. The first significant finding was that land and natural resource issues drive what happens in the Social Indicators Study areas. These are

resource-dependent areas and natural resource issues are of major concern to the local people that we interviewed. The dependence of local people, particularly Native Alaskans, on naturally-occurring resources for subsistence purposes was discussed often in interviews. Not only did we hear about the historical and present importance of subsistence, but we heard local people articulate their desire for it to continue in the future. People were concerned about planning for that continuance and about passing their subsistence traditions on to future generations.

The areas that I worked in, Bristol Bay and Kodiak, were affected by a long history of change related to the increased commercialization of land and natural resources. The significant changes in this regard have been due to expansion of the fur trade, development of commercial fisheries, more recently to increased use of resources from these regions for sports hunting and fishing, and, finally, to the potential for non-renewal resource extraction, particularly oil. This commercialization of land and resources is often juxtaposed to continued subsistence use of natural resources by local people.

Institutional expansion has occurred in the Bristol Bay and Kodiak regions over the past half century, and especially since the 1970s. That expansion has been driven largely by increased government control over the allocation, management, and regulation of land and natural resources. The most significant pieces of federal legislation relating to Alaska have focused on these resource allocation and management issues, such as the Alaska Native Claims Settlement Act and the Alaska National Interest Lands Conservation Act.

For local residents, difficulties related to sorting out ownership of, control over, and access to resources are overriding concerns. Interviewees often addressed the issues of how local people can protect their ability to continue to engage in subsistence activities and how rights are being allocated to increasingly commercialized resources.

Variations in Relationships with the Natural Environment. A second major finding is that there are significant variations in the ways local residents relate to their natural environment, both behaviorally as well as conceptually. Dr. Jorgensen has done a thorough job of documenting those differences and of explaining those findings to us this morning. The differences were apparent and striking as I conducted field research. Natives' relationships with the natural environment were generally based upon their being "rooted" in the local areas, having very long-term historical and genealogical connections to the resources and to other people in the use of those resources, and continuing to rely upon the surrounding natural environment for subsistence purposes. The depth of wisdom and insights about the natural environment that Natives have, which is based upon their traditional ecological knowledge, was apparent. It is hard to do research in rural Alaska without gaining a tremendous amount of respect for the knowledge that local residents have of their environment.

The relationships that nonnative residents have with the natural environment were obviously different. Those relationships are generally based upon short-term residence, a commodity or sports orientation toward natural resources, and a more rational scientific approach to understanding the natural world. Kinship connections in inter-marriage situations would modify or influence that general pattern. Many of the nonnatives who live

in Bristol Bay and Kodiak are involved in resource management, often working for government agencies or service and community organizations that have been part of the institutional expansion mentioned previously. The nonnatives' rational scientific approach to understanding resources was clearly distinct from the Natives' approach. I heard several great stories about young college graduates who had been trained in colleges of natural resources but who were very naive in attempting to apply a book-learned knowledge of the environment in a situation where local people have such a profound traditional knowledge. The point of the stories generally related to differences of opinion on which type of knowledge carries more weight.

Local Frustrations in Dealing with External Influences. A third significant finding from the Bristol Bay and Kodiak areas is that local residents experience a tremendous amount of difficulties and frustrations in dealing with external forces such as state and federal government, corporate America, and sports and other recreational interest groups. Bristol Bay and Kodiak have been affected by a tremendous amount of change in relation to the increased competition over natural resources by sports, commercial, and subsistence users. Many contemporary land and resource management issues are in response to that increased competition over the allocation and control of natural resources.

Another element contributing to local frustrations in dealing with external influences is a basic "culture clash," and I use this phrase because it was used by local residents. Natives and nonnatives have different perceptions of the world, different behaviors and conduct in relation to the natural environment, and different ways of interacting with each other. Those differences are often a source of conflict as local people try to deal with the external forces of change that are increasingly affecting them. This was a major issue in regards to the social impacts from the *Exxon Valdez* oil spill experienced by people in the Kodiak region. Kodiak residents, many of whom are independent fishermen, experienced a tremendous amount of frustration from dealing with Exxon and its hierarchical corporate structure of decision-making. This culture clash is also evident in the interactions between local subsistence users and out-of-state sports hunters and fishers, particularly in relation to differences between them in what they perceive to be appropriate ways of using natural resources. Some of the Alaska Department of Fish and Game research (e.g. work by Dr. Robert Wolfe) has pointed out how Natives view sports fishing as "playing with the fish," while sports fishers view feeding prize salmon to dog teams as a misuse of resources.

The powerlessness of rural Alaskans, particularly Natives, is a third element contributing to the frustrations they experience in dealing with external influences. The inability of local people to have significant influence in many areas of government decision-making is a source of great concern to them.

Prospects of OCS Development. The last significant finding that I would like to discuss today concerns the prospects for OCS oil and gas development and local responses to those prospects. This issue needs to be understood in light of the historical and contemporary context in the study areas. In particular, local people's responses to those prospects are conditioned by alternative uses of resources in the region.

Take the case of the controversial leases off the North Aleutian Shelf in Bristol Bay. Native residents of Bristol Bay have historical precedence and legally-protected rights to

harvest natural resources for subsistence purposes. However, there are also people and corporations in the fishing and sports industries with significant commercial interests in the region's natural resources. Local people, particularly Natives, have tried to understand what they interpret to be the inconsistency in why those oil leases were offered for bid, purchased, and, then subsequently, bought back. Many of them have come to the conclusion that their legally-protected subsistence rights were not given the same considerations as the commercial value of the fishing and sports industries. They think the commercial values assigned to resources in the region carried more weight in the political battles to have the government buy back those oil leases.

Having worked in both Bristol Bay and Kodiak, it was interesting to observe differences between these two regions on the issue of OCS development. Residents of Bristol Bay have long been opposed to OCS development in their region. The trade-off of developing non-renewable oil resources and posing risks to renewable resources, particularly salmon, just never made sense to them, especially in the early 1990s when high salmon prices and low oil prices made an average-sized red salmon worth more than a barrel of oil. In contrast, prior to the *Exxon Valdez* oil spill, a majority of the people we interviewed in Kodiak thought it was worth considering oil development. The opinion of Kodiak residents changed dramatically after they were impacted by the *Exxon Valdez* oil spill, while the opposition of Bristol Bay residents to OCS development was reinforced by that event.

***Exxon Valdez* Oil Spill**

I also was asked to talk about research findings concerning the *Exxon Valdez* oil spill. My comments will be brief since I talked at greater length about this issue at a previous information transfer meeting (see "Social, Economic, and Subsistence Effects of the *Exxon Valdez* Oil Spill on the Kodiak Region," delivered at the Fourth Minerals Management Service-AOCS Region Information Transfer Meeting, Anchorage, Alaska, January 28-30, 1992).

I conducted field work in Kodiak in February and March of 1989 and had left just two weeks prior to the *Exxon Valdez* oil spill. By the time the Social Indicators Project was modified to conduct a wave of research in response to the spill, it was August of 1989. When I returned to Kodiak, local residents had had nearly five months of dealing with the oil spill. People were very tired and frustrated by that point. The impacts that we documented relate to the timing of our return, with the advantage, we later realized, of the fact that after several months, people had begun to reflect upon and summarize their experiences and we had the opportunity to try and understand what they had been through in dealing with the oil spill.

Several major themes run through Kodiak's experience with the *Exxon Valdez* oil spill. The first theme is that the *Exxon Valdez* oil spill exacerbated existing pressures on, and tensions within, the Kodiak fishing industry. Kodiak has a large commercial fishing industry and, at the time, local fishers had been trying to position themselves in a highly competitive and evolving seafood market. Kodiak fishing organizations had been working to build market recognition and reputation for Kodiak seafood, in particular, and for Alaskan seafood, in general. The oil spill negatively affected those efforts. In addition, the fishing industry was being restructured and some segments of the Kodiak industry, as well as some

individual Kodiak fishermen, were struggling to make transitions that would allow them to remain in fishing. The oil spill negatively affected those who were vulnerable at the time due to that industry restructuring.

A second theme in the Kodiak oil spill story is that Exxon's response in handling the oil spill resulted in some of the most significant social impacts. The physical impacts from the oil spill were enough to anger local residents, but the addition of multiple problems related to the response efforts exacerbated the tensions and frustrations surrounding the accident. By the time drifting oil reached Kodiak, Exxon was retreating from its publicly stated commitment to "make everyone whole" and to hire anyone who wanted to assist in the cleanup efforts. In its attempt to limit its sphere of responsibility and prepare for litigation, Exxon fought over what they would and would not clean and what they would and would not pay for. They engaged in battles over definitions of clean beaches and measures of sufficient effort, appealing for public support based upon figures of how much they had spent. Exxon also attempted to circumvent local environmental regulations pertaining to various aspects of the clean-up effort. These actions led to concerns and frustrations over equitable treatment within and between communities affected by the spill.

A third major theme is that the *Exxon Valdez* oil spill differed significantly from two previous natural disasters experienced by people living in the Kodiak region, the eruption of Mt. Katmai in 1912 and the Great Alaskan Earthquake of 1964. People who had lived through those events or who knew the history of them recalled a spirit of cooperation as the community attempted to recover and rebuild. Courageous acts of assistance undertaken at personal risk had become part of the documented and the oral history. Efforts undertaken in response to the *Exxon Valdez* oil spill, in contrast, caused divisions and tensions within the community.

More specific impacts from the *Exxon Valdez* oil spill included institutional impacts, economic impacts, and social, cultural, and psychological impacts. Institutional impacts included burdens placed on local government, disruption of existing programs, strain on local officials, and difficulties in dealing with Exxon. Economic impacts included: loss of subsistence and commercial resources; the unequal distribution of those impacts; concern over the long-term impacts to Kodiak's evolving position in the international seafood market; impacts to the tourism industry which people in Kodiak had been promoting and building; various effects on the service industry and local labor markets; and, increases in the prices of various goods and services. The social, cultural, and psychological impacts included: effects on the activities related to subsistence harvesting; community conflicts; disruptions to customary habits and patterns of behavior; emotional impacts and stress-related disorders; the strain of confronting environmental degradation and death; stress in dealing with Exxon; and the violation of community values.

Usefulness and Implications of the Social Indicators Research

Finally, I would like to make a few comments pertaining to the usefulness and the implications of the Social Indicators Research Project, which I understand is one of the purposes of this meeting.

First, the Social Indicators Project has tremendous scientific value. The project is significant in terms of identifying indicators that can be used to monitor change over time throughout a large portion of Alaska, as has been explained by Dr. Jorgensen. In addition, the project provides valuable documentation of conditions and trends obtained over a four-year period of time through repeated visits to study communities and through reliance on multiple sources of data. Such documentation is important for ongoing and future assessments of the stability and change that will occur over even longer periods of time. As historical documentation and as input into future assessments of trends, this research project has a very long "shelf-life."

I mention the shelf-life of the products from the Social Indicators Research Project because questions pertaining to the shelf-life of social research have been raised in funding allocation decisions within the Minerals Management Service. I think these questions come from the misconceptions that natural resource managers and people in other realms of science have about what social scientists do. Their understanding of social research is often limited to survey research that is more akin to opinion polling, and consequently they perceive it as having a very short shelf-life in terms of agency decision-making. The Social Indicators Project is one of the best examples of the sophistication that can be achieved in social science research and of its usefulness for monitoring change over time.

Secondly, the Social Indicators Project has important implications in terms of Minerals Management Service decision-making. The Social Indicators Key Informant Summaries and the statistical data document issues and concerns that are important from the perspective of local residents and local governmental entities. As such, these research products give federal decision-makers a better understanding of some of their clients.

The findings regarding the frustrations that many local people experience in dealing with federal and state agencies imply that these agencies need to find more cooperative mechanisms for working with local populations in order to have effective resource management. Reinventing government needs to be understood not just in terms of its efficiency but also in terms of its responsiveness. The Arctic region, as a whole, is ahead in this regard and offers important examples of attempts to engage in co-management, adaptive management, and cooperative management.

The experience of Kodiak with the *Exxon Valdez* oil spill has implications for oil spill response. Oil spill contingency plans have been too focused on how to get oil out of the water, and may need too be revised to incorporate more guidelines for how emergency response will be handled and how response efforts will deal with local populations in spill-affected areas. More planning on how to deal with people in oil spill situations can help to ensure that people will be dealt with in equitable ways and that they will know what to expect in terms of how response efforts will be handled.

My third point about the usefulness and implications of the Social Indicators Project pertains to its policy relevance. As researchers, we always hope that our work will provide data that have relevance in terms of informing resource management decisions. I end with this point because I think this is the message that local people who participated in the research would want to have conveyed. When we conducted this research, we had to convince people to be interviewed not only once, but twice or three times. We did this by

trying to persuade them of the importance of their sharing information with us because of its potential usefulness for government decision-making on issues that would likely affect their lives. I believe their participation was generally based upon their hope that their concerns would be documented and that decision-makers would pay attention to them. The data that the people we interviewed provided can help to recognize and evaluate what is at stake in these study areas, what trade-offs might be entailed, what the risks are as perceived by local populations, and what the potential consequences to them might be.

Through their participation, their information, and their inquiries, the people in the local areas where I conducted research posed an underlying, key question: what do we value in this country and how do we decide that? This is a particularly important question in many parts of Alaska where there are abundant renewable and non-renewable resources and where equity issues involving different segments of the population are apparent. Hopefully, the Social Indicators Research Project provides information that is useful for thinking about and answering that question.

QUESTIONS AND DISCUSSION

Hild: Have you received any feedback in regards to another set of clients, which are the people who make the decisions about funding this type of thing in the future? One of the things that I have heard from the National Science Foundation, through the Arctic System Science program, is that the feedback in Washington, D.C. asks very specifically, "So what?" What does it really mean? Why should we fund this aspect of the "human component?" This question is becoming increasingly of higher profile. In studies like this, do you see that coming full circle? Do you see the policy makers coming back and saying what's in this stuff?

Endter-Wada: They haven't talked to me specifically. But that is a good question to pose to the people from the agency who are in attendance today. In general, funding is being cut. Every type of research confronts greater scrutiny and must be justified.

Hild: But the point was made this morning about the list of questions. You go in with 150 questions and can you get it down to 20 or 40 key topics that could be debated, in order to continue the evaluation? There are bigger questions there regarding the more things you gain, the more things you can do with it to see the relationships. But when push comes to shove and you only have seven or eight contact hours, burden hours, as that shrinks, can you make a decision within these documents to focus in on the most critical pieces to give the answers to the people who are going to give you further funding to demonstrate that this is important?

Baffrey: It's got to be tied into the decision process. It is great to see it on the screen, but our analysts don't use this information. It would be great if one of the deliverables was to sit down with the agencies and show their people how the information can actually be integrated into the decision process. Right now, it is a study and then we do an environmental assessment, and there is no connection.

Hild: One of the reasons that I asked that question, is that last fall, there was a recommendation to go back and do an evaluation of all the environmental impact statements that have been done in the past. Such as evaluation would assess what was predicted and whether it was accurate or inaccurate. Was this a whole waste of time in regards to long-term impacts? Where is the North Slope Borough now compared to what we predicted? Has anyone taken a look at that?

Callaway: Harry Luton and I have written EISs and realize that EISs are a compromise document. They are not necessarily the scientist's best projection of what is going to occur, but perhaps the best projection of what could get through the interminable review process of what the impacts are.

Jorgensen: Even if we did, and we found 50 EISs and two of them proved to be somewhat true and 48 were not, how do you know that those that appeared to be true are true because of the factors that were used in the prediction? That is a serious empirical question that you can raise only prior to research, then must be followed after the research. So if in your design you forecast certain things to happen for the following reasons, that still doesn't mean that you have got it right. It still means that other factors could have intervened to cause that result. So I think that you would be wasting an awful lot of time by going back to the old ones. But I do not happen to think that about the Social Indicators Study. It is very good work. I am not worried at all about that. Not every variable works. I do not think that science can necessarily be human concerns only, though they are important. But if you really want to make the case where you eliminated threats to validity, you better integrate all of the best tools that you have to do just exactly that, eliminate those threats.

Hild: Are your social indicators values being incorporated in the new EISs?

Jorgensen: Michael just said no, they weren't. I don't know how many EISs are being written now, but a lot of the science that you can do that would benefit an EIS statement may require an awful lot of specific training on the part of those who write EISs. I cannot expect everybody on the street to know the difference, even with Ph.D.s in social sciences, between metric and nonmetric types of approaches. If you are going to deal with nonmetric, how are you going to integrate them and how are you going to deal with panels, and posttest, pretest designs? So it just may well be that you will have to have the MMS Environmental Studies people working with the EIS people too, but that is time consuming, from a management viewpoint, to do such work. What would be the final goal of all of this? I remember the arguments from NEPA about EISs. It was not to really find out what factors there are that must be mitigated and how to mitigate them, but to produce the document and that was it. It could be of benefit, perhaps, to persons in the affected areas, this is what things were like and this is what we might expect will happen. If they happen, the government will do certain things.

It doesn't take a genius to know that the public sector is going to be challenged when there is a normal accident, like the *Exxon Valdez* spill. That is, as you look over time, there is going to be more stress, that downsizing in the mental health care delivery will exacerbate that. If there is downsizing, they actually need more people to help out. So that

is one simple prediction that I can make. And that would hold everywhere in western North America where impacts might take place.

The first principal investigator for social indicators was Bob Weiss who had worked on stress in Gillette, Wyoming and other places. He told us essentially the things that we keep discovering year after year, that when there is big time stress like this, people need a lot of help.

Callaway: Joanna, you sit on the MMS scientific advisory committee that provides research advice. What is coming out of that committee with respect to recommendations and have they been accepted?

Endter-Wada: Harry is going to talk more about that tomorrow. A lot of research has been driven by the EIS process, where we attempt our best guess at predicting what will be affected. But the real strength of studies like this is to show how we could actually monitor those changes.

Hild: To get back to the question, what is the value of the EIS?

Luton: This region demonstrated what they thought was the value of the EIS. We do an EIS every five years, more or less. The last one was air-freighted up here on pallets and we buried it. Several tons of EISs.

Callaway: That was a normal accident though.

Luton: One of the problems of EISs here, in Alaska and the region, is that this is about the only place where cultural and traditional issues of people are addressed at all. The EIS tradition comes out of a real simple projection process. You have this much employment, these many services will be needed, that will drive up prices of housing this much, etc. It is really a simple linear projection. That part of the EIS we have. The demographic model that was used, the agency took a long time developing it and it is better than most. We know sort of how that relates to reality, but not really well. But with the other stuff, what we have been really trying to deal with here, I think you could say that you can spin your wheels a lot in how to do it. This is the first time that it has been done. These studies were the first real long-term systematic approach to looking at culture that any government agency has ever done. I don't know where it goes, nobody does.

Edenshaw: When you were talking about the *Exxon Valdez* oil spill and what you have done with EISs and when I look at what happened with the oil spill and incidents such as that — I grew up in Sitka, and I watched a pulp mill from the time it started until it shut down. People talked about what we would do when the mill shuts down, how to address social, cultural, economic issues. Never once did they talk about the Natives. As soon as the mill shut down, all of them started working over at the hospital. I really don't believe that when someone was working at the mill, a Native who was making \$40,000 or \$50,000 a year compared to someone who wasn't working; they were always going out to do subsistence, they were always traveling to Juneau. For me, when I went up to Unalakleet and some of the village places, through the southwest over by Bethel, it is almost like I envisioned how Sitka was prior to development. This gentleman is talking about EISs. I can see a clear

pattern of how the nonnatives have proliferated from Metlakatla all the way up here to exploit the resources, "get in and get out." The locals are still going to be there. There is nothing too complicated about figuring that out because there is nothing too complex. The local person who has lived there all of their lives sees how things have changed.

Endter-Wada: I think that what Harry was saying is a point well taken because a lot of the assumptions of the traditional EIS models have been based upon a western view of labor as mobile. By having the element of trying to distinguish between populations, between long-term residents who are rooted in place vs. mobile populations, we gain more understanding.

Edenshaw: Go up to Kotzebue and look at the Red Dog mine, when that shuts down what is going to happen? There is already a lot of documentation on that.

Endter-Wada: In response to the question about the MMS scientific committee, one of the discussions has been to make better use of existing data and to do more generalizing from one region to another about what has been learned.

**OVERVIEW OF RESEARCH BY THE DIVISION OF SUBSISTENCE, ALASKA
DEPARTMENT OF FISH AND GAME, ON THE SOCIOCULTURAL
CONSEQUENCES OF
THE *EXXON VALDEZ* OIL SPILL**

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INTRODUCTION

This paper provides an overview of research by the Division of Subsistence of the Alaska Department of Fish and Game to document changes to subsistence hunting, fishing, and gathering, and other community characteristics, after the *Exxon Valdez* oil spill. Under state law, the division is charged with collecting information about all aspects of subsistence hunting and fishing. It has had an active research program since 1980 (Fall 1990).

The *Exxon Valdez* oil spill of March 24, 1989 fouled waters and lands used for subsistence activities by 15 predominately Alaska Native communities, as well as many residents of four other rural communities in the spill area (Figure 1). In total, these communities had a population of about 15,000 people in 1990 (Table 1). Of this, 2,036 (13.4%) lived in the 15 small communities; 21.3% was Alaska Native in the area overall, and 82.3% in the 15 small communities.

Before the spill, the division had conducted at least one round of systematic household surveys in each of the 15 small communities. Additionally, map interviews and key respondent interviews had taken place. This information had been reported in a series of technical papers and other ADF&G publications (see Fall and Utermohle 1995 for a list of these papers). The findings of this research demonstrated the importance of subsistence hunting, fishing, and gathering to the economies, cultures, and well-being of these communities.

After the spill, the division began an oil spill response program that had several components, one of which was systematic collection of subsistence harvest and use data that would be comparable that available for pre-spill years. For 1989, the year immediately after the spill, division researchers conducted 403 interviews in the 15 small, predominately Alaska Native communities of the spill area. For 1990, funded in part by the US Fish and Wildlife Service, 221 interviews in seven of these communities took place (Fall 1992). Beginning in 1991 and continuing for three study years, the division entered into a cooperative agreement with the US Department of the Interior, Minerals Management Service called "An Investigation of the Sociocultural Consequences of Outer Continental Shelf (OCS) Development in Alaska" (Fall and Utermohle 1995). Interviews took place in 12 of the small communities of the spill area, five other southcentral Alaska communities,

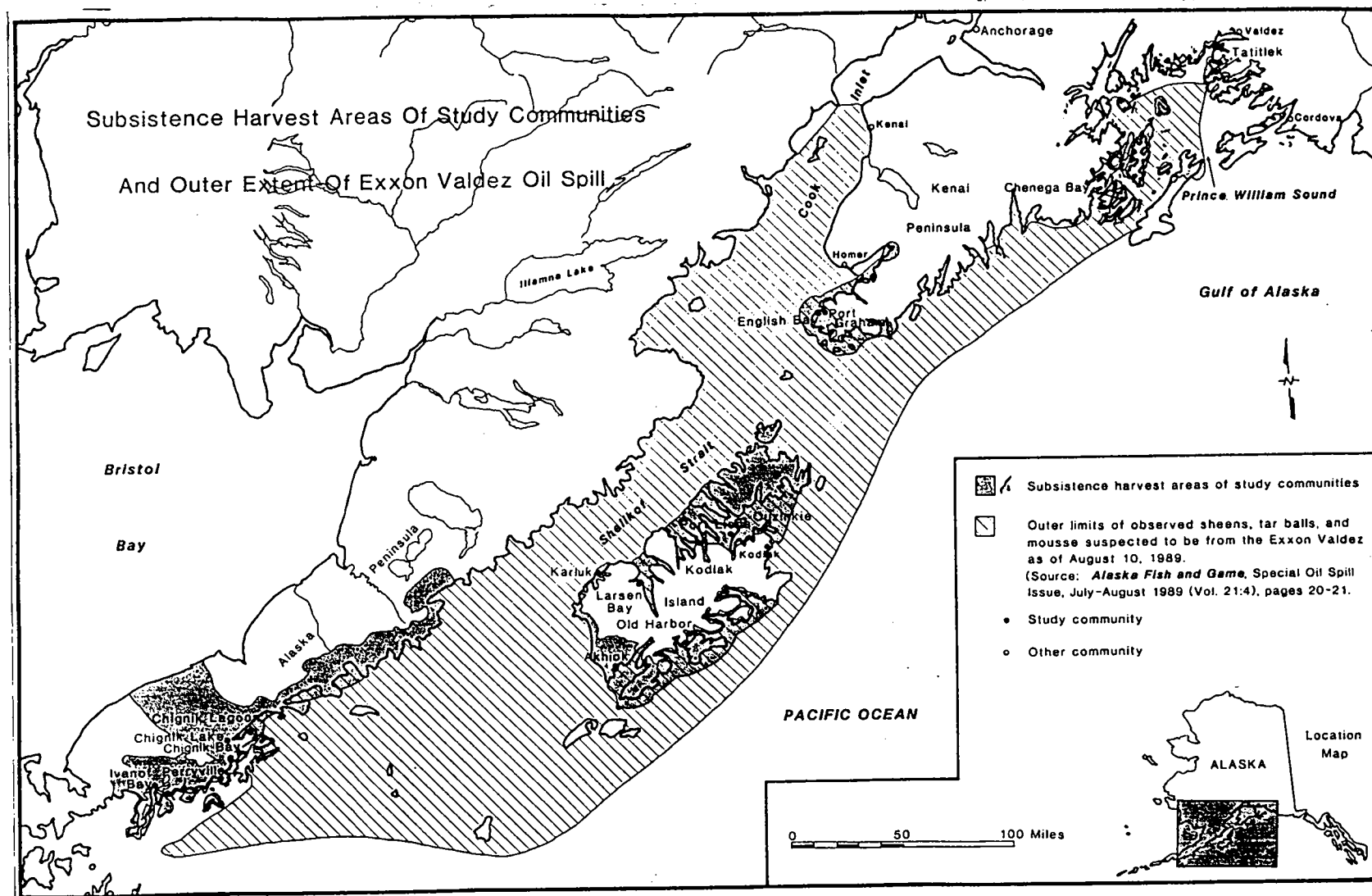


Figure 1. Subsistence harvest areas within the area affected by the *Exxon Valdez* oil spill.

Table 1. Population of communities in the area affected by the Exxon Valdez oil spill, 1990.

Community ¹	Total Population	Alaska Native Population	% Alaska Native
Small, predominately Alaska Native communities			
Akhiok	77	72	93.5%
Chenega Bay	94	65	69.1%
Chignik Bay ²	160	85	53.1%
Chignik Lagoon	53	30	56.6%
Chignik Lake	133	122	91.7%
Ivanof Bay	35	33	94.3%
Karluk	71	65	91.5%
Larsen Bay	147	124	84.4%
Nanwalek	158	144	91.1%
Old Harbor	284	252	88.7%
Ouzinkie	209	178	85.2%
Perryville	108	102	94.4%
Port Lions	222	150	67.6%
Port Graham	166	150	90.4%
Tatitlek	119	103	86.6%
Subtotal	2,036	1,675	82.3%
Other communities			
	2,579	272	10.5%
Cordova ³	10,274	1,251	12.2%
Kodiak ⁴	316	48	15.2%
Seldovia			
Subtotal	13,169	1,571	11.9%
Totals	15,205	3,246	21.3%

Source: Alaska Dept. of Labor 1991.

¹ Listed are communities and areas classified as "rural" by the Alaska Joint Board of Fisheries and Game in 1989 and thereby eligible for subsistence uses.

² Excludes 28 in group quarters in Chignik Bay.

³ Cordova Census subarea.

⁴ Kodiak Island Borough excluding the six small villages and the Coast Guard Station.

subsistence uses and harvests, demography, cash economy, and some assessments of changes in subsistence uses. It was based on earlier instruments administered by the division throughout Alaska, and was designed to collect information compatible with that appearing in the division's Community Profile Database (CPDB; Scott et al. 1995). For the MMS cooperative project, a second instrument, the "social effects questionnaire," was developed. It was based in part on questionnaires and interview protocols used in prior social indicators research funded by MMS. It addressed changes in social and community organization which could be affected by the oil spill and future OCS development. For further discussion of the development of these survey instruments, see Fall and Utermohle (1995:I-3 - I-8).

and four Arctic communities. A total of 2,381 interviews took place over the course of the project, including 968 for 1991, 668 for 1992, and 745 for 1993 (Fall and Utermohle 1995).

Because the detailed findings from these studies are available elsewhere, this overview focuses on several general topics which relate to issues of long-term research programs and impact assessments. These include comparisons over time, comparability of methods and data, and application of findings in a variety of forums.

METHODS

Study Communities

Table 2 lists the communities included in the study and the sampling fractions achieved in each study year. For the MMS cooperative project, interviews were conducted in the Arctic communities of Kotzebue, Kivalina, Kaktovik, and Nuiqsut for comparative purposes and to contribute baseline data for evaluation of future OCS developments in the Arctic region.

Survey Instruments

All data were collected during voluntary fact-to-face interviews which took place in the study communities. Two survey instruments were administered during the project. The first, the "harvest survey questionnaire" collected information on

Table 2. Study communities and sampling fractions.

Community	Study Year: 1989		Study Year: 1990		Study Year: 1991		Study Year: 1992		Study Year: 1993	
	Total Households	Percent Sampled	Total Households	Percent Sampled	Total Households	Percent Sampled	Total Households	Percent Sampled	Total Households	Percent Sampled
<i>Oil Spill Area</i>										
<i>Small Communities</i>										
Akhiok	13	76.9%					24	100.0%		
Chenega Bay	21	85.7%	21	85.7%	22	81.8%	26	88.5%	28	82.1%
Chignik Bay	39	89.7%			44	68.2%				
Chignik Lagoon	15	100.0%								
Chignik Lake	28	75.0%			33	72.7%				
Ivanof Bay	7	100.0%								
Karluk	17	82.4%	19	89.5%	15	86.7%				
Larsen Bay	39	87.2%	40	87.5%	43	88.4%	42	88.1%	49	81.6%
Nanwalek	41	80.5%	41	85.4%	41	70.7%	41	78.0%	37	89.2%
Old Harbor	93	51.6% *			66	63.6% *				
Ouzinkie	69	50.7% *	59	89.8%	55	58.2% *	59	88.1%	71	85.9%
Perryville	31	87.1%								
Port Lions	67	53.7% *							80	56.3% *
Port Graham	61	78.7%	55	83.6%	58	84.5%	58	82.8%	61	83.6%
Tatitlek	28	78.6%	28	60.7%	27	70.4%			28	71.4%
Subtotal	569	70.8%	263	84.0%	404	72.8%	250	86.4%	354	77.1%
<i>Other Communities</i>										
Cordova					784	12.9% *	784	5.2% *	946	11.0% *
Kenai					2137	4.7% *	2137	1.7% *	2274	4.4% *
Kodiak**					3207	6.5% *	1753	5.7% *	1994	5.3% *
Seldovia**					116	56.9% *	137	47.4% *	153	42.5% *
Valdez					1231	8.1% *	1257	8.0% *	1388	2.5% *
<i>Outside the Oil Spill Area</i>										
Kaktovik							63	74.6%		
Kivalina							72	86.1%		
Kotzebue					809	12.4% *				
Nuiqsut									91	72.5% *

* Randomly selected samples

** Sampling area included road connected areas for Kodiak in 1991 only; includes road connected areas for Seldovia for 1992 and 1993 only.

Sample Achievement

Prior to beginning fieldwork each year, approval of the research was sought from village governing bodies. In all cases, this approval was granted. Additionally, informed consent was sought from each household selected to be interviewed; participation was entirely voluntary. High sampling fractions were achieved in most communities in all years of the study. However, during the three years of the cooperative study with MMS, a higher refusal rate was encountered (Figure 2). Notably, refusal rates were substantially higher in the larger communities (most of which were predominately non-Native) than in the small Alaska Native villages. Some reasons for these differences include:

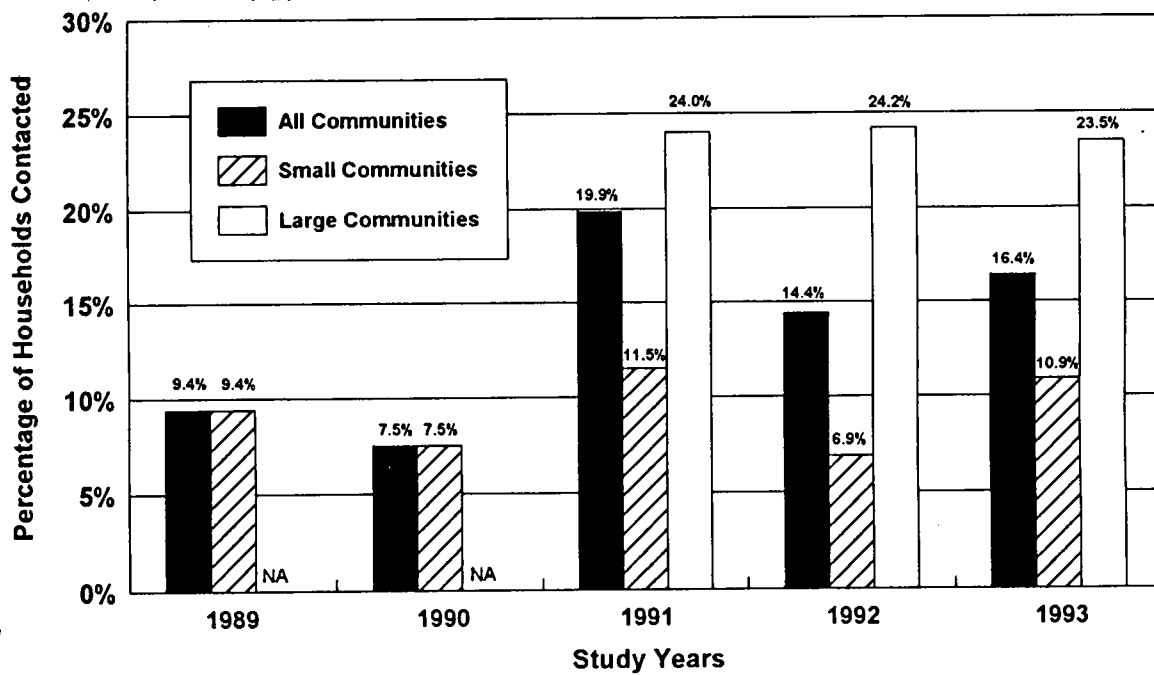


Figure 2. Percentage of households declining to be interviewed.

- The importance of subsistence uses in the villages, and the consequent interest that households in these communities had in the project
- The use of local assistants to conduct interviews and/or assist with introducing the project to the community (see additional discussion below)
- Endorsement of the project by village councils and community leaders.
- Familiarity with Division of Subsistence researchers, many of whom had a great deal of previous experience working with the study communities.
- In the small communities, knowledge about the interviewing spread by word of mouth; people expected to be contacted and had prepared to be interviewed.

Some reasons for a higher rate of refusals included the following:

- Disinterest in resource issues and/or the oil spill, especially in the larger, non-Native communities
- The length of time required to do the interview (generally an hour or more when both the harvest survey and the social effects questionnaire were administered).
- "Survey burnout": many studies took place after the spill, and some people were tired of being interviewed.
- Distrust about the uses of the information and/or a desire for privacy
- Frustration about the prolonged effects of the spill, the lengthy litigation which followed, and the federal court's dismissal of much of the Alaska Native Class's claim against Exxon (Fall and Utermohle 1995: I-24 - I-26); these factors produced a feeling of "what's the use" [in doing more research] among some potential respondents.

Local Assistants

A goal of the project was to train residents of study communities to conduct interviews. Training consisted of workshops in villages instruction in interviewing, and review of completed work. A training manual was prepared and periodically updated. Of the 2,381 interviews (harvest surveys) conducted during the three-year cooperative project with MMS, 381 (16.0%) were done by local assistants (Figure 3). The percentage was higher in some of the smaller and predominately Alaska Native communities. Communities with the largest percentage of interviews conducted by local assistants were Port Graham (62.2%),

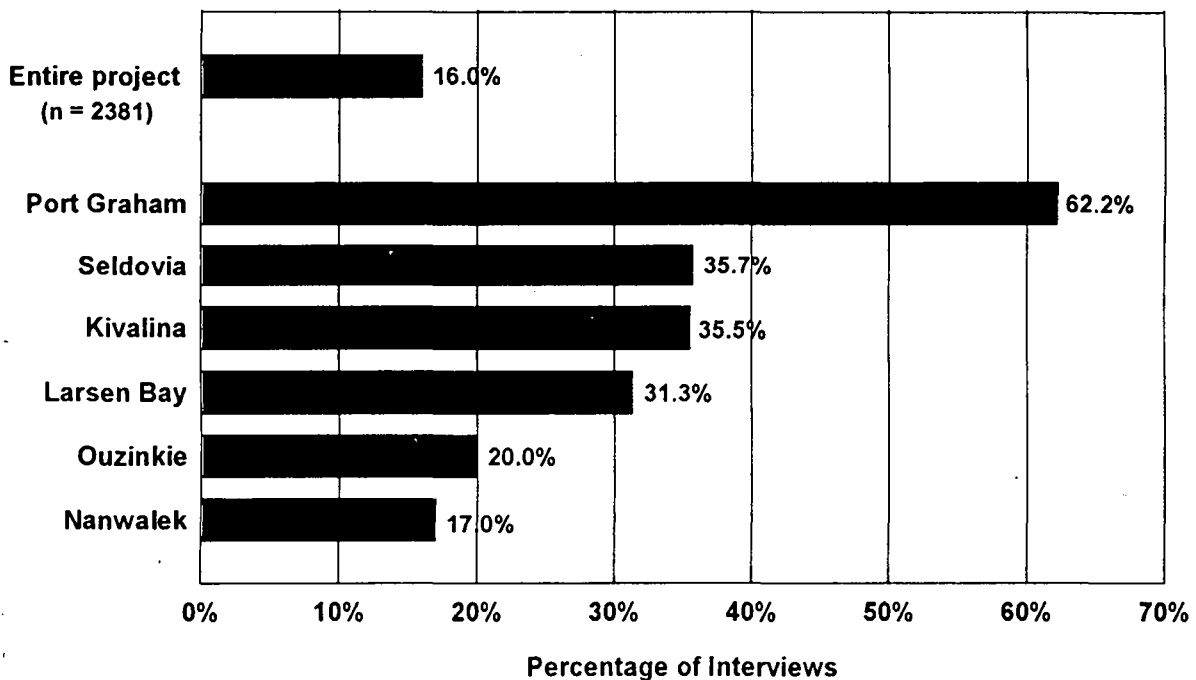


Figure 3. Percentage of interviews conducted by local research assistants.

Table 3. Changes in characteristics of subsistence uses by region, spill year (1989) compared to pre-spill averages.

Characteristic Region	Pre-spill Average	Post-spill Average	Change
<i>Per Capita harvests (pounds)</i>			
Prince William Sound	436.0	188.3	-56.8%
Lower Cook Inlet	255.4	130.9	-48.7%
Kodiak Island Borough	391.1	195.5	-50.0%
Alaska Peninsula (AKP)	287.0	338.6	18.0%
All Regions	369.0	216.0	-41.5%
All Regions except AKP	381.8	180.5	-52.7%
<i>Average number of resources used per household</i>			
Prince William Sound	19.0	9.0	-52.6%
Lower Cook Inlet	22.9	12.2	-46.7%
Kodiak Island Borough	15.4	11.2	-27.3%
Alaska Peninsula (AKP)	15.7	16.5	5.1%
All Regions	16.5	12.3	-25.5%
All Regions except AKP	16.6	11.2	-32.5%
<i>Average number of resources attempted to harvest per household</i>			
Prince William Sound	12.5	5.7	-54.4%
Lower Cook Inlet	16.1	8.5	-47.2%
Kodiak Island Borough	11.8	8.0	-32.2%
Alaska Peninsula (AKP)	10.3	11.5	11.7%
All Regions	12.1	8.6	-28.9%
All Regions except AKP	12.4	7.9	-36.3%
<i>Average number of resources harvested per household</i>			
Prince William Sound	11.4	5.2	-54.4%
Lower Cook Inlet	15.4	8.6	-44.2%
Kodiak Island Borough	11.5	7.6	-33.9%
Alaska Peninsula (AKP)	9.8	11.4	16.3%
All Regions	11.7	8.4	-28.2%
All Regions except AKP	12.0	7.6	-36.7%
<i>Average number of resources received per household</i>			
Prince William Sound	11.3	4.8	-57.5%
Lower Cook Inlet	12.3	6.6	-46.3%
Kodiak Island Borough	6.6	5.5	-16.7%
Alaska Peninsula (AKP)	9.1	9.8	7.7%
All Regions	8.5	6.5	-23.5%
All Regions except AKP	8.4	5.7	-32.1%
<i>Average number of resources given away per household</i>			
Prince William Sound	9.1	4.0	-56.0%
Lower Cook Inlet	8.1	5.5	-32.1%
Kodiak Island Borough	4.5	4.3	-4.4%
Alaska Peninsula (AKP)	5.8	6.7	15.5%
All Regions	5.9	5.0	-15.3%
All Regions except AKP	5.9	4.6	-22.0%

subsidence harvests as estimated in pounds usable weight per person dropped substantially: from 436 pounds to 188 pounds in Prince William Sound; from 255 pounds to 131 pounds in lower Cook Inlet; and from 391 pounds to 196 pounds in the Kodiak Island Borough (Figure 4). Expressed as a percentage (Figure 5), subsidence harvests were down about 57%

Seldovia (35.7%), Kivalina (35.5%), Larsen Bay (31.3%), Ouzinkie (20.0%), and Nanwalek (17%). This was a significant achievement, given the complexity of the survey instruments and the length of time required to complete the questionnaires. Indeed, these factors discouraged other study community residents from helping with the survey administration. Additionally, other local community residents served as facilitators and liaisons, although they did not conduct surveys on their own.

Community Review and Products of the Research

Preliminary results of the surveys were provided to village governing bodies for review and comment. In some cases, village council meetings were held to discuss these interim results. Study findings have been reported in a series of technical reports, including the Division of Subsistence Technical Paper Series and the MMS Technical Report Series. The study findings have also been presented at symposia. Additionally, a findings synopsis for each community included in the MMS cooperative project, and an overview of the general study findings, were mailed to research participants, and in the case of small communities, to each household in the community.

SELECTED FINDINGS OF THE RESEARCH

The Year Following of the Exxon Valdez Oil Spill

Table 3 reports some of the changes in subsidence use characteristics that took place in 1989, the first year following the oil spill. In three of the four subregions,

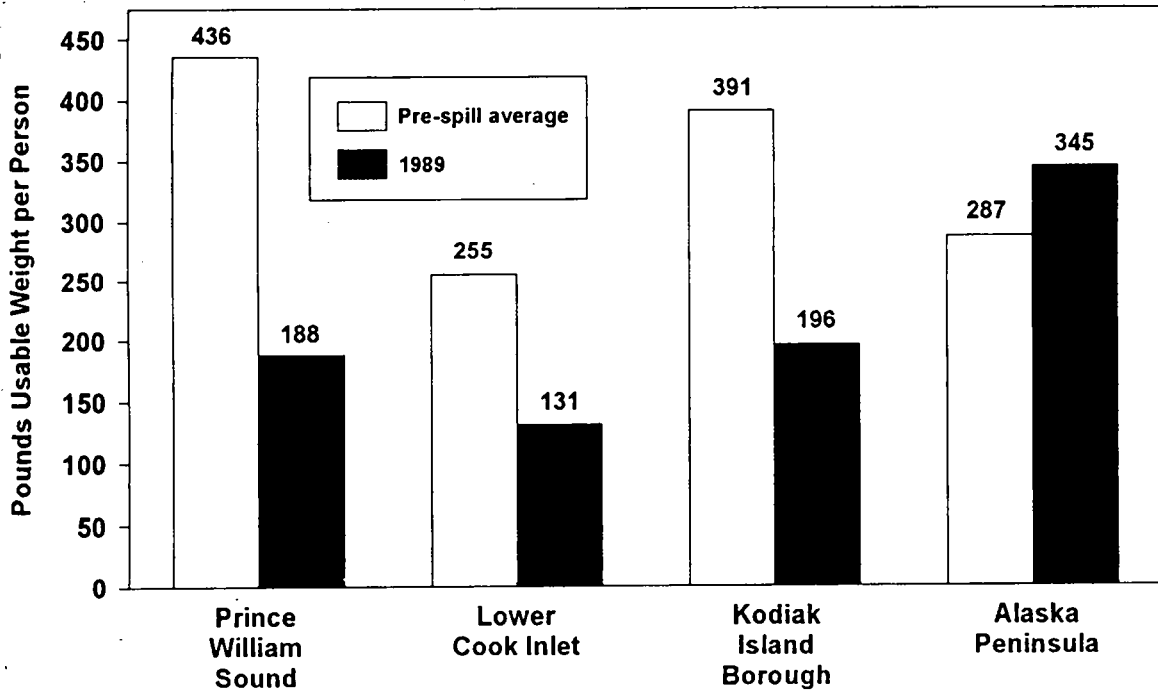


Figure 4. Subsistence harvests in the oil spill year compared to pre-spill averages.

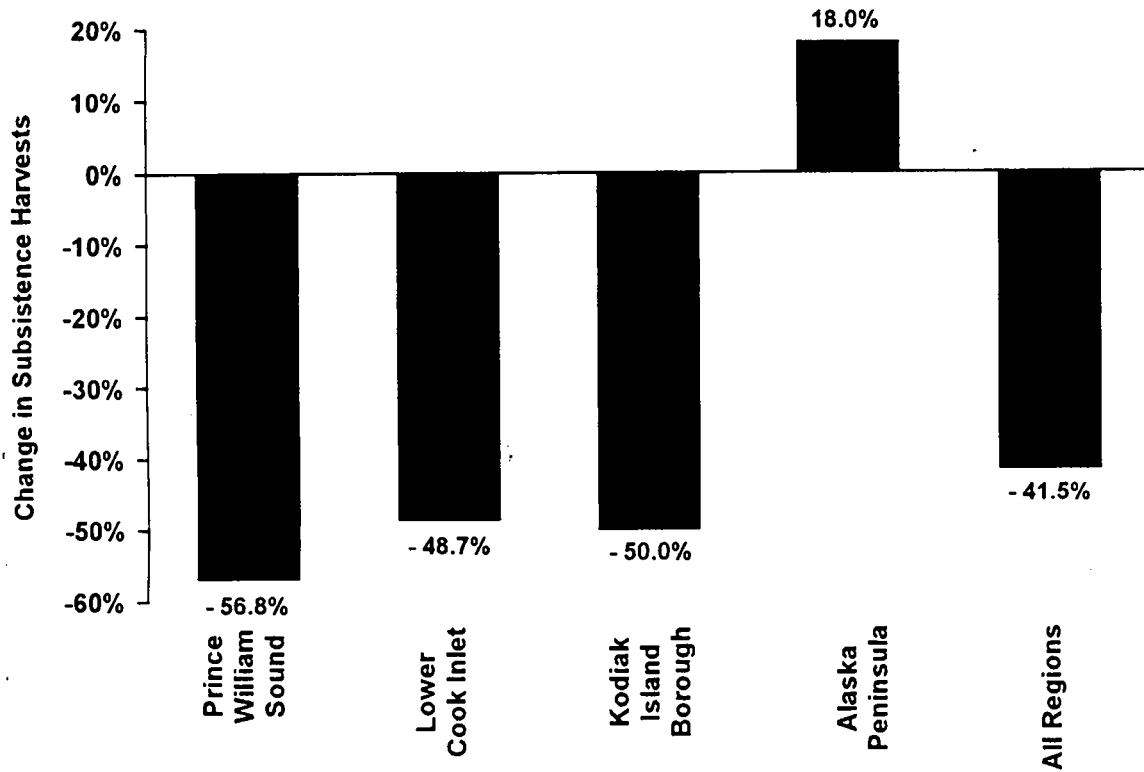


Figure 5. Changes in subsistence harvests, spill year (1989) compared to pre-spill averages, by region.

in Prince William Sound and about 50% in lower Cook Inlet and the Kodiak Island Borough. This geographic pattern to the spill's effects, in which communities closest to the origin of the spill and its most destructive consequences to the natural environment, became more evident over time. Also supporting this geographic pattern is the relative stability of overall subsistence harvests in the five Alaska Peninsula communities for the first post-spill year as a whole. In the spill area overall, subsistence harvests declined 42% in 1989.

Further evidence of the effects of the oil spill is provided by data on the average number of resources used, harvested, and shared per household. As shown in Table 3 and Figure 6, the average household in the Prince William Sound communities used about 53% fewer kinds of resources in 1989 than before the spill; the range of resources used declined 47% in lower Cook Inlet, and 27% in the Kodiak Island Borough. This shows the sharp decline in the variety of subsistence foods in the diets of spill area residents in 1989. Evidence of a large decline in participation in subsistence activities is provided by the drop in the average number of kinds of resources attempted to harvest per household, down 54% in Prince William Sound, 47% in lower Cook Inlet, and 32% in the Kodiak Island Borough (Figure 7). The research also demonstrated declines in sharing of subsistence foods (Figure 8).

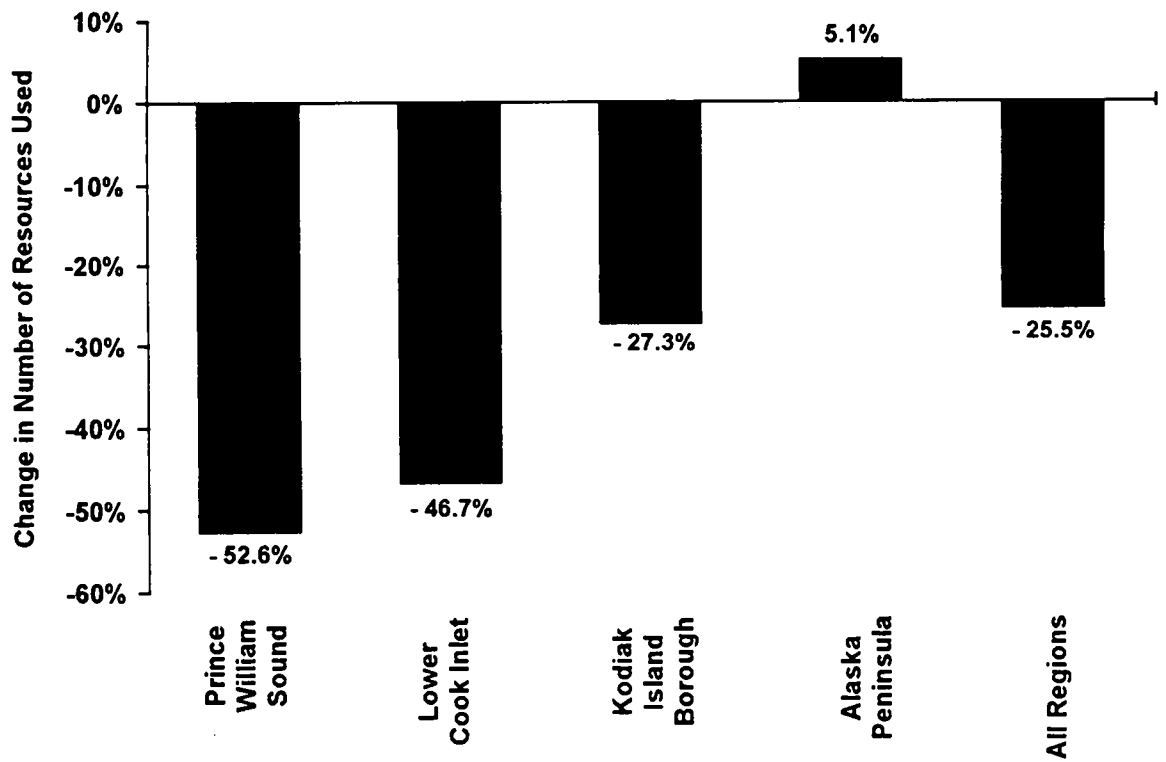


Figure 6. Changes in average number of subsistence resources used per household, spill year (1989) compared to pre-spill averages, by region.

Interviewed households' evaluations of subsistence uses in 1989 matched the findings from the harvest estimates (Figure 9). Almost all the Prince William Sound (87%) and lower Cook Inlet (93%) households said that their subsistence uses had declined in 1989 compared to pre-spill levels, as did 56% in the Kodiak Island Borough and 36% in the

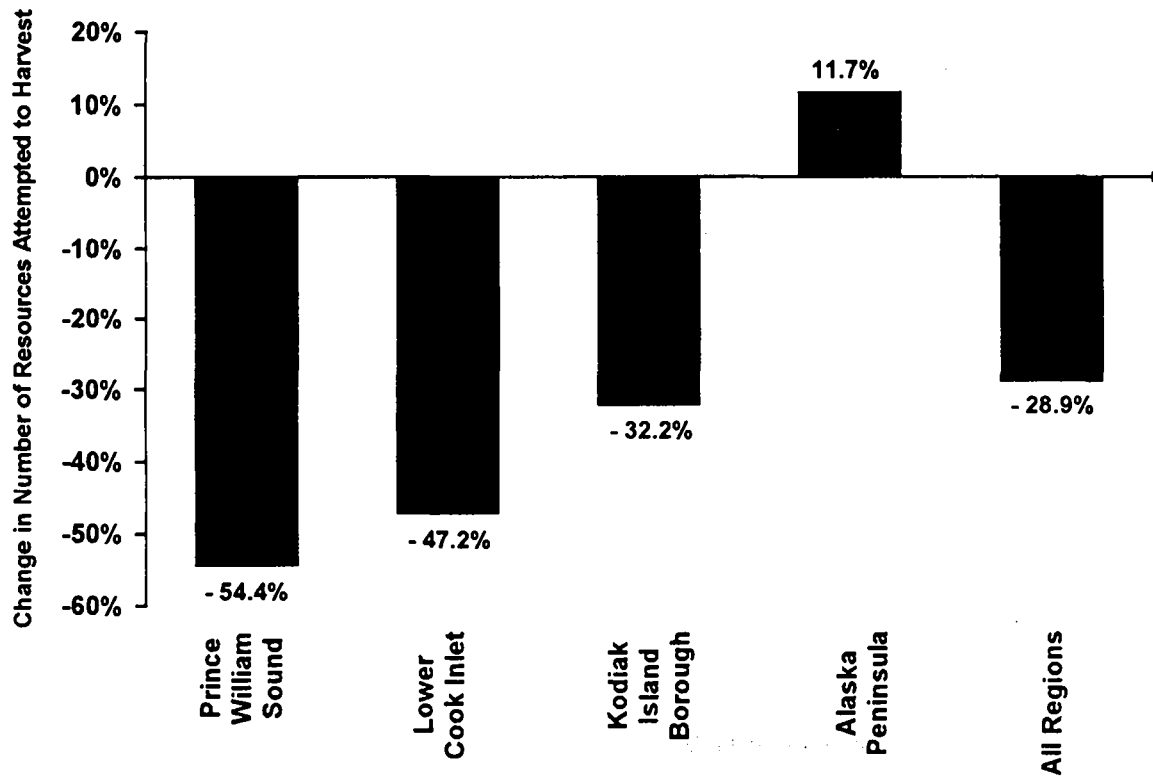


Figure 7. Changes in average number of subsistence resources attempted to harvest per household, spill year (1989) compared to pre-spill averages, by region.

Alaska Peninsula. Even higher percentages reported declines in at least one kind of subsistence resource: 97% in Prince William sound, 100% in lower Cook Inlet, 84% in the Kodiak Island Borough, and 71% in the Alaska Peninsula. When asked to offer an explanation for these changes, most households pointed to the effects of the oil spill. Here, again, geographic differences were evident. Virtually every Prince William Sound and lower Cook Inlet households with lower subsistence uses blamed the spill. While most Kodiak and Alaska Peninsula households with lowered uses also pointed to the spill, households from these communities were more likely to offer non-spill explanations or say they were not sure why the change occurred.

Of all oil spill reasons for declines in subsistence uses in 1989, fear of contamination of natural resources by the spilled oil was by far the most prevalent (Figure 9). This was the reason for reduced overall subsistence uses for about two thirds of the Prince William Sound and lower Cook Inlet households; an even larger majority of these households said that contamination fears led to their reduced uses of at least one resource. While contamination concerns were a significant reason for reduced uses among Kodiak Island Borough and Alaska Peninsula households also, the percentage of households which cited this as a cause of lowered subsistence uses was much lower than in the other two subregions. (For more discussion on the issue of contamination of subsistence foods by the spilled oil, see Fall 1991; Walker and Field 1991; Fall and Utermohle 1995: I-18 - I-23; and Fall and Field, forthcoming.)

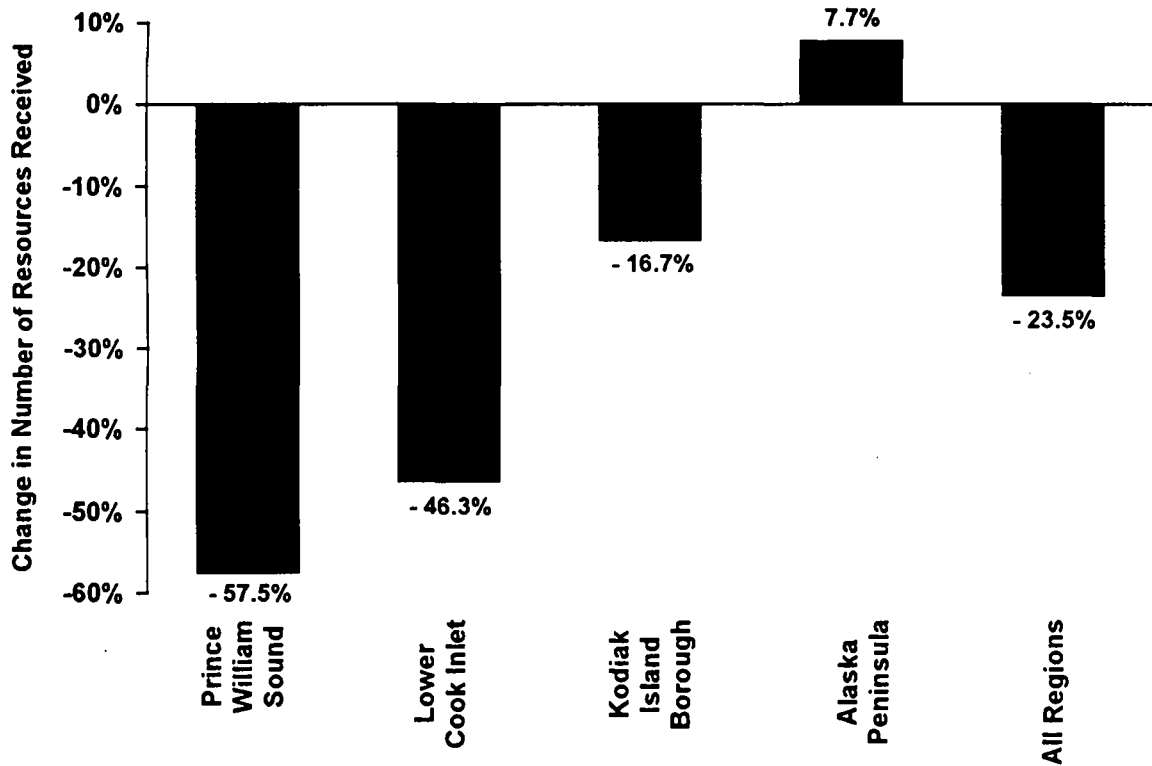


Figure 8. Changes in average number of subsistence resources received per household, spill year (1989) compared to pre-spill averages, by region.

Findings for Study Years since 1989

For the second post-spill year, subsistence uses rebounded in the study communities of lower Cook Inlet and the Kodiak Island Borough, although harvests in general remained below pre-spill levels (Figure 10). Although some respondents reported reduced levels of concern about oil contamination, others said that they had returned to using these resources reluctantly, despite their misgivings, because they could no longer afford to do without them or because of their cultural value. Subsistence uses in the two Prince William Sound communities of Chenega Bay and Tatitlek showed little signs of recovery during the second post-spill year. Contamination concerns remained high in these villages, and perceptions of severe reductions in many important resources were increasingly cited as causes of reduced levels of use.

Over the three years of the cooperative project with MMS (1991 - 1993), further evidence of this geographic pattern developed, with communities closer to the spill in Prince William Sound and lower Cook Inlet (and in Ouzinkie in the Kodiak Island Borough) reporting higher levels of spill impacts on subsistence harvests and slower rates of recovery than more distant communities. In all communities, subsistence harvests appear to have rebounded from their very low levels in 1989 and 1990, but in some communities, such as Tatitlek, Chenega Bay, and Ouzinkie, harvests remained below pre-spill averages. In many communities, respondents reported that while their harvests had increased, this increase had been the result of greater effort and monetary cost than was needed before the spill due to scarce resources.

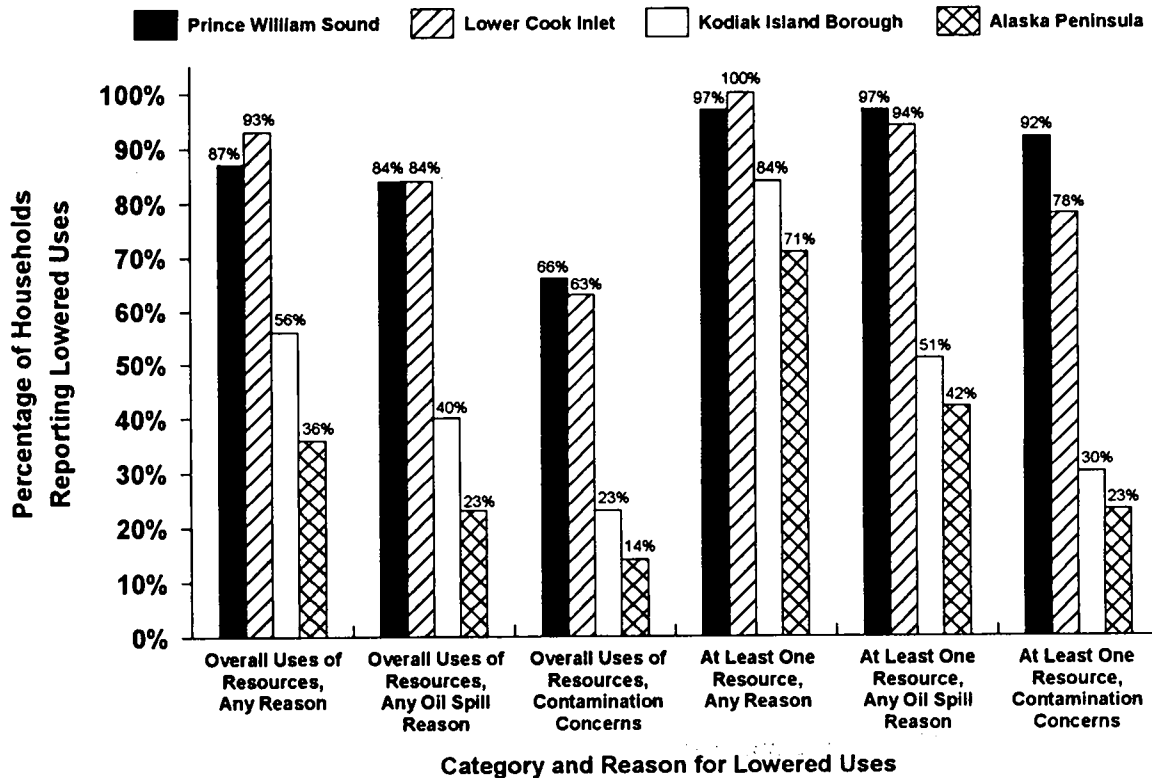


Figure 9. Household evaluations of subsistence uses in 1989.

The gradual return to pre-spill levels of subsistence harvests and uses is also illustrated in the range of resources used, harvested, and shared for subsistence purposes. As shown in Figure 11, the average number of resources used per household in both Chenega Bay and Tatitlek has bounced back from very low levels in 1989. In neither village, however, has diet breadth yet equaled that estimated for years before the spill. In other study communities, such as those of Lower Cook Inlet, this range of resources used, harvested, and shared had, by 1993, returned to match pre-spill levels.

There has been an important shift in the explanations people offer concerning why the spill's impacts reduced their resource uses (Figure 12). As noted earlier, in 1989 a large majority of households with spill-caused reductions in resources used cited fear of oil contamination as the reason for the decline. By 1993, the vast majority of households who still said that the spill's effects were impacting subsistence uses cited reduced resource populations as the cause of the decline.

Results of the social effects questionnaire provided evidence of the persistence of oil spill effects in certain communities and households, and the geographic pattern to these effects. These include the effects of the spill on teaching children subsistence skills (Figure 13), effects on sharing (Figure 14), and the percentage of respondents who like living in their community less since the spill (Figure 15).

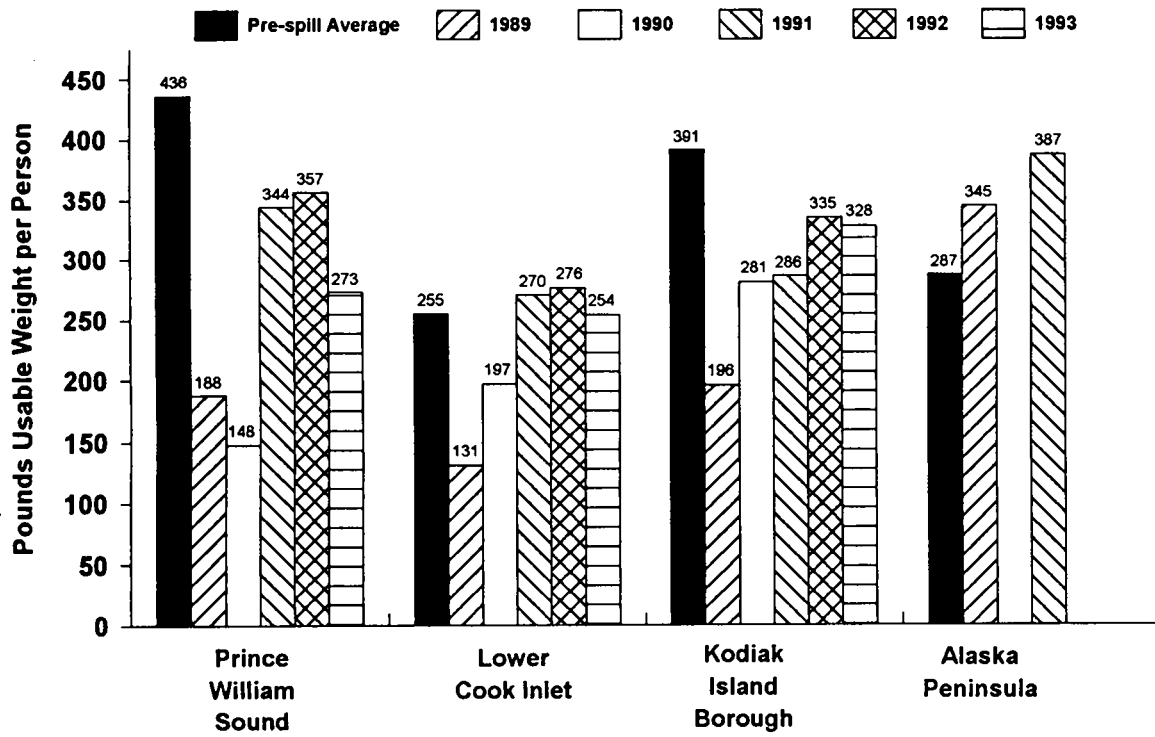
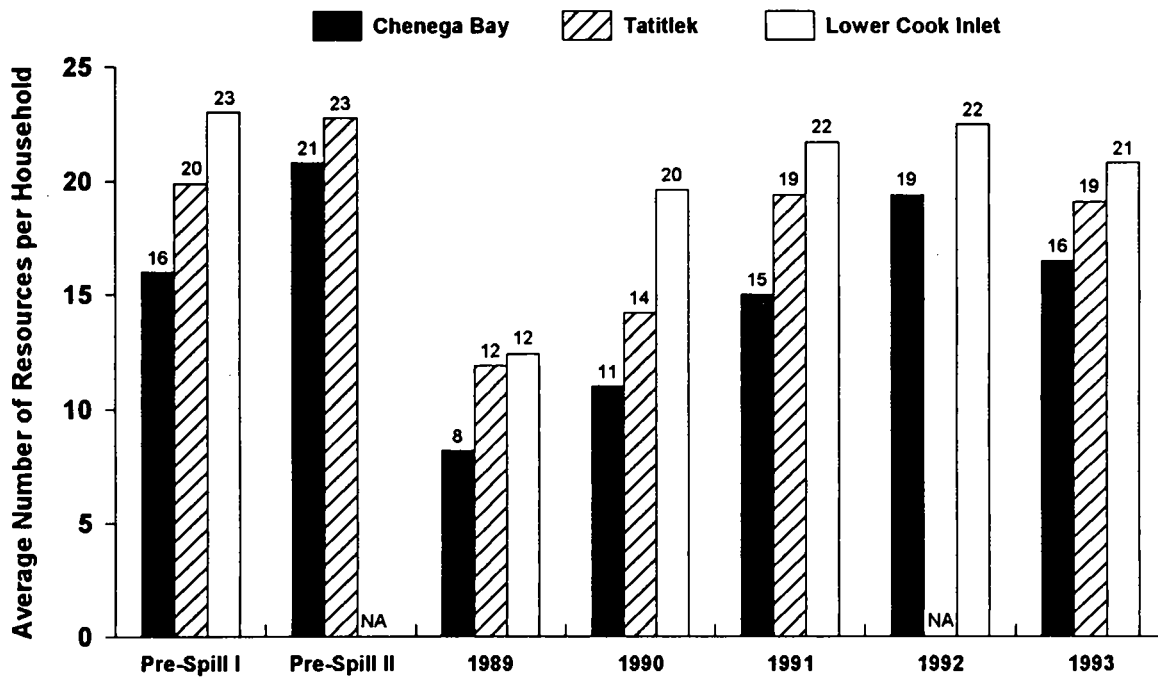


Figure 10. Estimated subsistence harvests in oil spill area villages.



Note: Pre-spill averages for Chenega Bay are minimums, because a less detailed list of resources was used than in subsequent research.

Figure 11. Average number of resources used per household, Chenega Bay, Tatitlek, and Lower Cook Inlet.

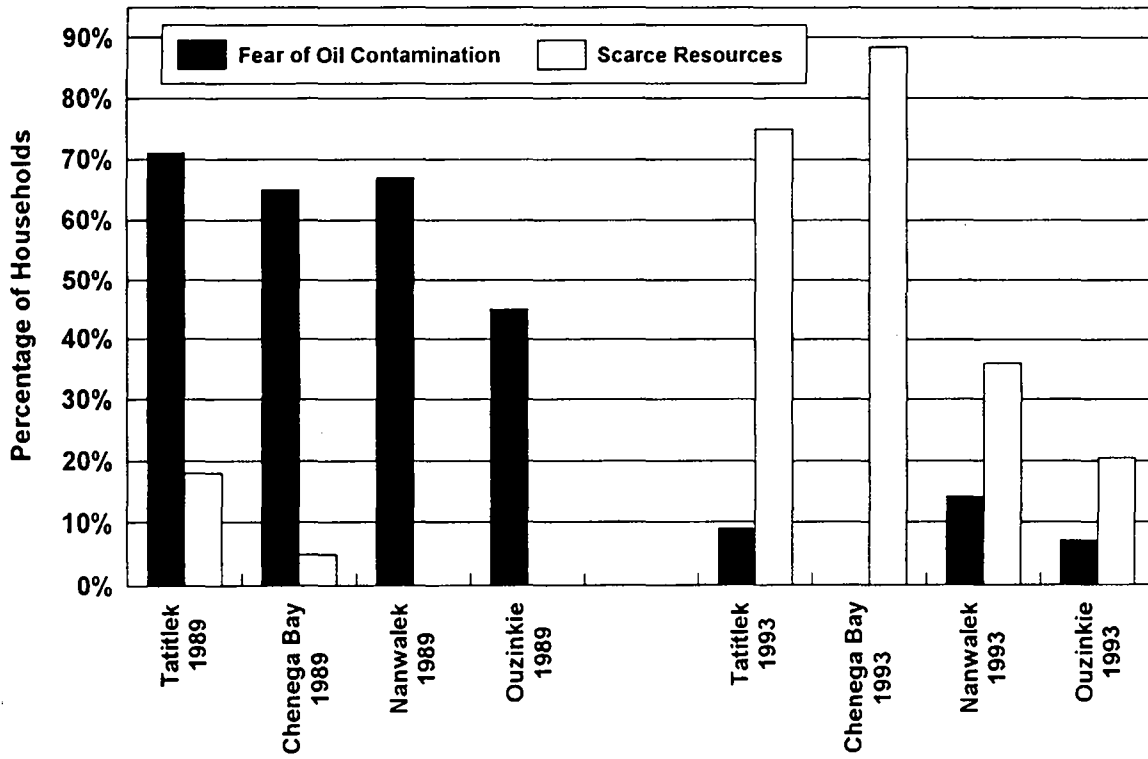


Figure 12. Reasons given for reduced subsistence uses.

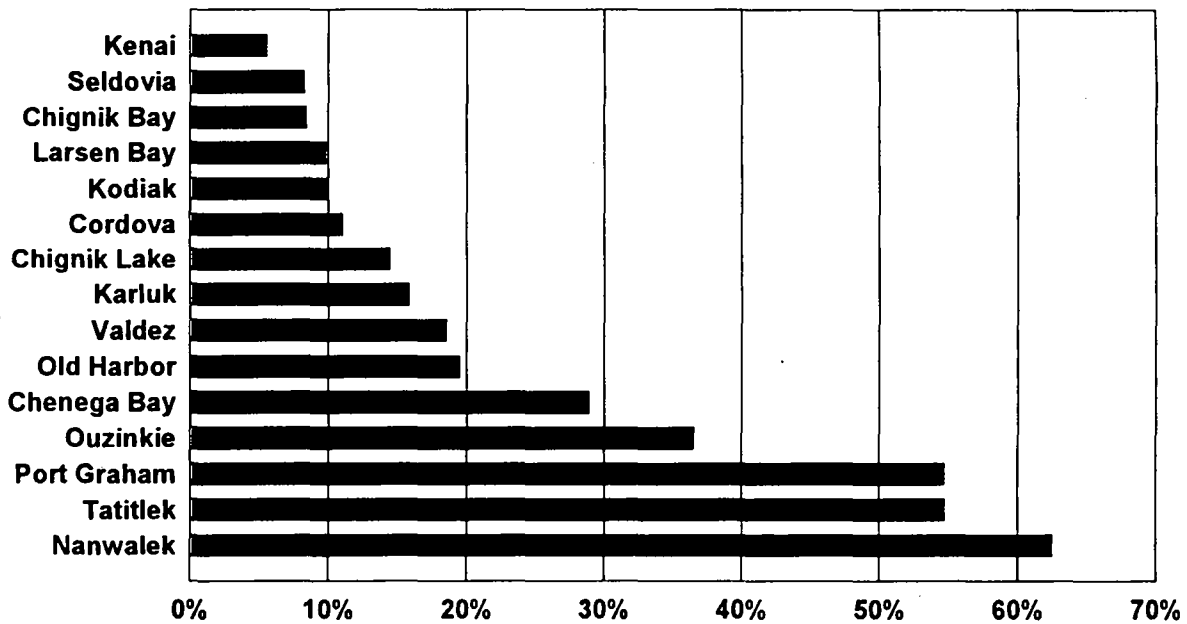


Figure 13. Percentage of respondents who reported that the oil spill affected children's participation in subsistence activities (1993 or latest year interviewed).

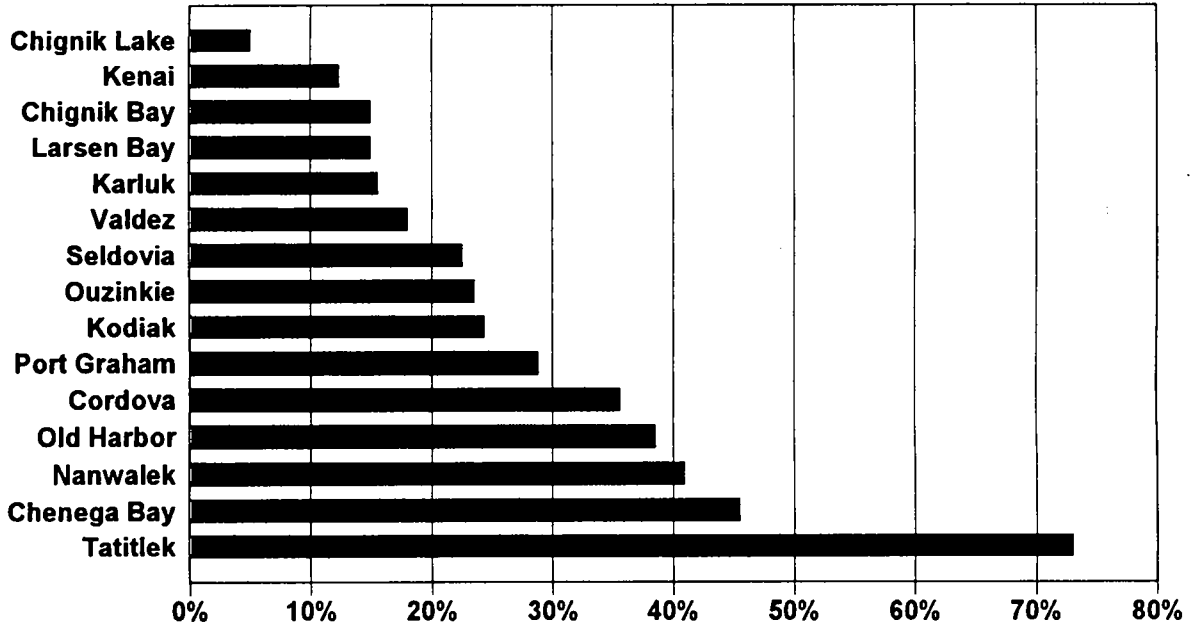


Figure 14. Percentage of respondents who reported less sharing of subsistence resources since the oil spill (1993 or latest year interviewed).

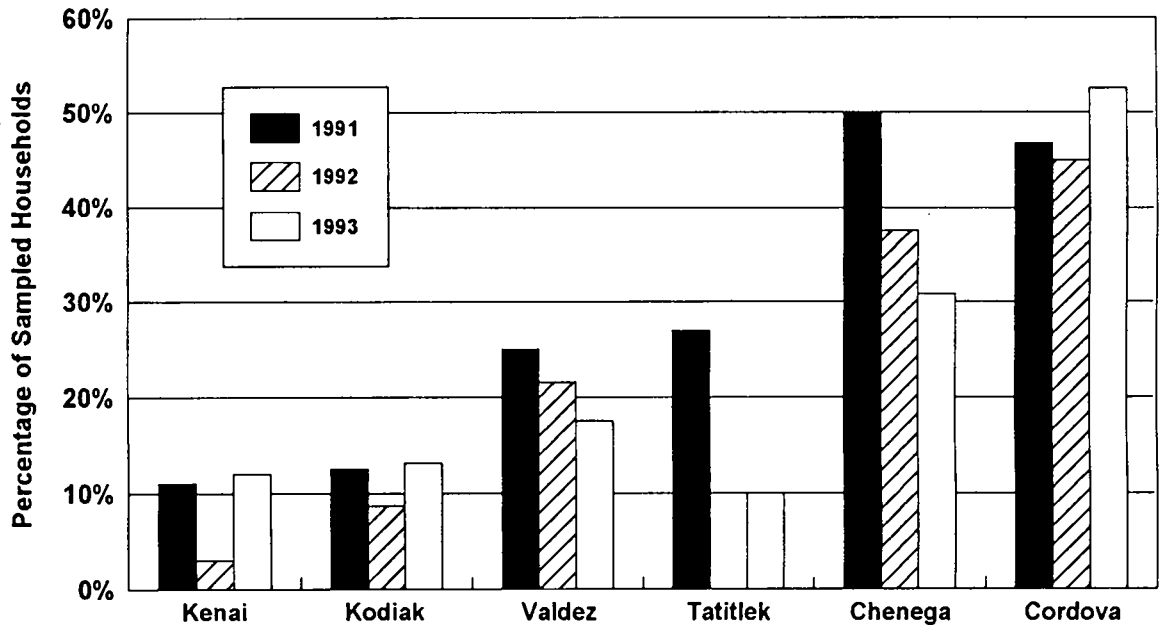


Figure 15. Percentage of respondents liking living in their community less since the oil spill, selected study communities.

SOME APPLICATIONS OF THE RESEARCH FINDINGS

Litigation. Study findings were available to the litigants (both the plaintiffs and the defendants) in litigation concerning natural resource and socioeconomic and sociocultural damages alleged to have been caused by the oil spill. Respondent anonymity was preserved through a protective order negotiated between the State of Alaska and Exxon. Key documents prepared by experts for the Alaska Native Class were based to a large degree on Division of Subsistence research conducted before and after the spill (e.g. Braund and Associates 1993).

Fish and game management. The results of these projects have broad applicability in a range of fish and game management issues, and have been used in both state and federal regulatory processes to assess regulations and for customary and traditional use findings.

Oil spill restoration projects. The study findings have been used to demonstrate the persistent impacts of the oil spill on spill-area communities, and especially on Alaska Native communities. The findings have been helpful in promoting subsistence restoration projects.

Impact assessment. State and federal agencies have used the study findings to illustrate the potential effects of outer continental shelf development on uses of natural resources. (For example, recently, the Environmental Protection Agency has used some of the study findings in risk assessments of oil and gas development in lower Cook Inlet.)

DISCUSSION

The following section lists some of the major points about the division's research program on the effects of the *Exxon Valdez* oil spill on subsistence uses. These include issues and considerations pertaining to future long-term research programs.

Importance of baseline data. In order to demonstrate the effects of the spill, it was essential to have reliable information about subsistence harvests and uses for pre-spill years. It was also important to have these data for as many communities as possible in the spill area.

Importance of consistent methods. The research attempted to collect information with similar instruments and questions. This helped in having comparable data for the pre- and post-spill periods.

Importance of updating data. In order to understand the long-term effects of the spill, it was necessary to repeat the interviews over a long period of time (five years). To some extent, pre-spill comparisons were hampered by having only one pre-spill baseline study. It is important to periodically update baseline data to keep it current and to understand variations in subsistence systems.

Benefits of an ongoing program. The project had a high rate of participation, especially in Alaska Native communities, in part because the division program and many of its personnel were known and trusted in the communities.

Training of local research assistants. In some communities, local research assistants made substantial contributions to the fieldwork. This was another reason for low refusal rates in some communities. The combination of local researchers and regional specialists contributed to a strong research design.

Respondent burden and "burnout". Despite an ongoing program, familiarity with the researchers, community support, and generally acknowledged importance of the data, this project did have a relatively high "respondent burden" as measured by the length and complexity of the survey forms and repeated visits over five years. In some communities, non-response from "respondent burnout" was an issue.

A combination of quantitative and qualitative data. Harvest estimates, demographic, and economic data were combined with respondents' assessments, evaluations, and opinions. These data complemented each other.

Importance of "neutrality." Especially in the litigation arena, the study findings were strengthened because they were part of a well-established research program conducted by a "neutral" third party.

There are a variety of applications for the study findings because the information is readily available to the public. Perceived applicability and usefulness of the information collected is a key to continued participation by respondents in long-term research.

The data are available in a variety of formats. These include formal technical reports, workshop presentations, plain language summaries, and data bases.

The research was based on confidentiality and informed consent. Informed consent was obtained at both the community and household (individual) level. The division successfully protected respondent confidentiality during the prolonged discovery period associated with the *Exxon Valdez* litigation.

REFERENCES CITED

- Alaska Department of Labor. 1991. Alaska Population Overview: 1990 Census and Estimates. Juneau, AK.
- Braund, S.R. and Associates. 1993. Effects of the *Exxon Valdez* Oil Spill on Alutiiq Culture and People. Prepared for Cohen, Milstein, Hausfeld & Toll, and Sonosky, Chambers, Sachse, Miller & Munson. Anchorage, AK.

- Fall, J.A. 1990. The Division of Subsistence of the Alaska Department of Fish and Game: An Overview of Its Research Program and Findings: 1980 - 1990. *Arctic Anthropology* 27(2):68-92.
- Fall, J.A. 1991. Subsistence Uses of Fish and Wildlife and the *Exxon Valdez* Oil Spill. *Arctic Issues Digest* 1:12-25.
- Fall, J.A., Ed. 1992. Subsistence Harvests and Uses in Seven Gulf of Alaska Communities in the Second Year following the *Exxon Valdez* Oil Spill. Report prepared for the U.S. Fish and Wildlife Service. Alaska Department of Fish and Game, Division of Subsistence. Anchorage, AK.
- Fall, J.A. and L.J. Field. Forthcoming. Subsistence Uses of Fish and Wildlife and the *Exxon Valdez* Oil Spill. In *Exxon Valdez* Oil Spill Symposium Proceedings. S.D. Rice, R.B. Spies, D.A. Wolfe, and B.A. Wright, Eds. American Fisheries Society Symposium Number 00.
- Fall, J.A. and C.J. Utermohle, Eds. 1995. An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska. Six Volumes. U.S. Department of the Interior, Minerals Management Service. Technical Report No. 160. Anchorage, AK.
- Scott, C., A. Paige, G. Jennings, and L. Brown. 1995. Community Profile Database Catalog. Alaska Department of Fish and Game, Division of Subsistence. Juneau, AK.
- Walker, A.H. and L.J. Field. 1991. Subsistence Fisheries and the *Exxon Valdez*: Human Health Concerns. Proceedings of the 1991 International Oil Spill Conference, pp. 441-446. American Petroleum Institute Publication No. 4529.

QUESTIONS AND DISCUSSION

Jorgensen: Did non-response from Natives go up during the last year?

Fall: Yes. That has to do in part with that Judge Holland ruling. Certain communities that weren't in the second year came back in the third.

Armstrong: Who was the assistant for Kivalina?

Fall: We had several: Gretchen Booth, Becky Norton, and Joe Swan, Jr.

Levine: Does the publication of the survey results in your newsletter make villages enhance their reported takings by the next survey?

Fall: That is an interesting question: Do you think by providing study findings and as people become more aware of the political context and other contexts of this work, do we increase the chances of strategic bias in the responses? I don't see any evidence of that in our work. Maybe that is something we should talk about, but I don't see it. I think that I can come up with a whole set of scenarios that people in Tatitlek and Chenega Bay, for

example, really might want to emphasize. "Well our harvest went up but we better say it went down so we can enhance our damage claim." You will see it didn't happen. Communities situated in the same general geographic area responded in similar ways, People couldn't have made it up. That will be evident when you examine the results.

Edenshaw: Have you seen other villages actually embracing and doing the surveys themselves? One example is at Stephen's Village where they had a proposal to shut down a drainage where they had customary and traditional lands. The village had the actual data that went back many years and made a strong case because of the impacts of the pipeline.

Fall: That is one of the points of this work. The importance of anticipating [the need for] baseline information. Information that communities have worked on with an agency or on their own using established methods is very important. I think the oil spill work really demonstrates that.

Levine: Were there community differences among Alaska Peninsula communities in spill effects on subsistence?

Fall: Not among the Chigniks (Bay, Lagoon, Lake). They all stayed about the same as before the spill, and Chignik Lake actually increased. They had a big caribou harvest that year. And caribou is not a spill-affected resource which is another reason why the Alaska Peninsula is different.

Jorgensen: Two questions: 1) Did villages on the Alaska Peninsula increase the harvest of land mammals, and 2) if the onshore fisheries were closed commercially, were they closed to the extent that we observed around the Kodiak Islands? And if they were, did that account also for the larger harvest of subsistence foods?

Fall: The answer to the second question is no. Because they didn't have their commercial areas closed entirely, but they were confined to certain boomed-off areas or protected areas like in Chignik Lagoon itself. That resulted in less incidental harvest of certain marine resources that people would have gotten in other years. So we saw some declines in other fish and marine resources.

Mason: The oil took a lot longer to get down to those communities. Maybe people were stocking up on subsistence resources before the oil arrived, stopped harvesting during the oil spill, then stocked up again after it was apparent there was not as much damage as anticipated.

Fall: I never heard of that in the Alaska Peninsula. However it did happen in Nanwalek and Port Graham where people went out and harvested a lot of clams and bidarkies, etc. before the oil arrived. On the Alaska Peninsula people did stop doing things over the summer and fall. Then they went back. They didn't see a lot of effects, so they decided to give it a try. Not for all resources, not all households. But they were more likely to spend a part of the year not harvesting and then go back within the year. Remember this is over the course of a year. At other locations people just stopped for the entire year, and never returned that year, and in some cases didn't return for three years.

Schwantes: Do you have those differences broken down by resource?

Fall: Yes. We can do that.

Schwantes: For Kodiak Island Borough as an example, could we detect a shift from shellfish to using more of another resource?

Fall: That's right, that could be the case. In fact, that is the case in Prince William Sound in the third and fourth years where we did see a tremendous increase and a continuing increase in Kodiak Island Borough, Lower Cook Inlet. But in Prince William Sound it is very notable that in the third postspill year that people really did get back to the into the subsistence uses. However, the composition of the harvest in these years was dramatically different than before the spill. The harvest that really decreased was marine mammals in Chenega Bay and Tatitlek. People there harvested much more salmon and other finfish than they had before the spill. In part that is because those resources were considered to be safe, from the food testing program. It was pretty certain that fish were okay. However, people were worried about seals.

Schwantes: I have a comment on the Kodiak Island area. There has been a problem with paralytic shellfish poisoning (PSP) and shellfish and many people think it may associated with the oil spill. I would really like to see a breakdown of what resources replace shellfish?

Fall: You can extract that information from the database.

Jorgensen: In 1989 what proportion of those samples in Prince William Sound and Lower Cook Inlet are nonnatives? Are they all Natives?

Fall: No, they are not all Natives.

Jorgensen: Our results showed nonnatives actually increased their harvest. They increased their harvest in 1989 following the spill. The signal appears in the winter of 1990 sampling, then drops out afterward. Since you were working with Natives, did you see a similar pattern?

Fall: Prince William Sound does not include Cordova or Valdez.

Jorgensen: Oh, that is right, you left them out.

Fall: There are probably only four or five TOTAL nonnative households being interviewed in Tatitlek and Chenega Bay. The only place where we find a substantial population of nonnatives in our 1989 sample is probably in some Kodiak communities and Chignik Bay.

THE CONTINUING RELEVANCE OF THE SOCIAL INDICATORS STUDY TO SUBSISTENCE MANAGEMENT

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My perspective on the Social Indicators project comes from my involvement in two phases of it, both of them studies of the impacts of the *Exxon Valdez* oil spill (EVOS). In three different years of the post-EVOS Social Indicators study (1989, 1990, and 1991), I conducted research in Kodiak City, Karluk, and Chignik. I was also employed by the Alaska Department of Fish and Game (ADF&G) Division of Subsistence in 1992 and 1993 to work on the Social Effects metamorphosis of the Social Indicators study. For that project, I conducted research in Kodiak City, Ouzinkie, Karluk, Larsen Bay, and Old Harbor. Most of the examples I give will be from Kodiak City.

The previous papers have given you more details about the empirical findings of those two projects. I want to talk about the continuing value of both the general approaches and the findings of these two studies for subsistence management. First I will address the Social Indicators Key Informant protocol, which although not explicitly linked to any specific subsistence issue, told much about the behaviors, beliefs, and values associated with subsistence, both for Alaska Natives and nonnatives. I will then discuss the Social Effects study, which was conducted by the ADF&G Division of Subsistence in conjunction with a subsistence harvest survey and, like the Social Indicators study, examined issues of individual and community well-being, mainly as related to the EVOS. Finally, I will talk about how the findings of both studies might be used today in the Federal Subsistence Management Program, where I currently work.

There are still many people who see subsistence in Alaska as a matter of putting food on the table. There is little understanding of the spiritual or moral components of Alaska Natives' harvesting and processing of wild foods. The anti-subsistence arguments that subsistence rights shouldn't apply where people can drive to grocery stores, or the suggestions that subsistence users be given meat from sport guiding operations as a substitute for getting it themselves, fail to see the importance of harvesting the food yourself, processing it, sharing it with others, and teaching young people about harvesting, processing, and sharing.

It is unfortunate, then, that the view has emerged in the Federal subsistence management program that the most crucial of the eight factors, or possibly the only important criterion used to determine customary and traditional eligibility is a long-term consistent pattern of use, measured by documented harvests in the appropriate areas. The Social Indicators study's insistence on the inclusion of ideological components in understanding behavior, and the study's focus on the distinction between Western ideology and traditional-communitarian ideology, make its findings useful for the Federal subsistence

program. The Social Effects study's combination of the harvest survey with questions addressing traditional culture and community well-being offers an opportunity to look at harvest levels in the context of beliefs and values. I will suggest that both studies are particularly germane to the Federal subsistence program's consideration of proposals to make determinations of customary and traditional uses.

THE SOCIAL INDICATORS STUDY

The Social Indicators study sought to discover, in various ways, the "quality of life" experienced by people in Alaskan coastal communities (McNabb and Jorgensen 1992:14). To the extent that subsistence is inextricably connected to the quality of life, the Social Indicators project offers relevant material for subsistence management questions. The "quality of life" aspect is often overlooked in debates over subsistence that focus on material or nutritional needs.

The EVOS, while incurring tremendous losses to Alaskan coastal communities, did allow insights (through the Social Indicators study and others) into residents' world view by showing how they responded to this prolonged crisis. For example, the 1989 oil spill happened two months after I arrived in Kodiak to do research on the commercial fishing industry. It shut down that year's commercial salmon fishing season, curtailing my plans for participant research in salmon fishing. But it did give me many opportunities to learn about fishing lifestyle, because I went to a lot of meetings in which commercial fishermen described their loss of self-esteem and well-being at being denied the opportunity to fish—even if they were paid off by Exxon for their monetary losses. In a different way, I probably learned as much about fishermen's occupational identity in those meetings as I would have from fishing. Similarly, the Social Indicators study, especially the post-oil spill findings in Kodiak, offers a window through which to look at the cultural meanings of subsistence, by way of people's statements about what they had lost or stood to lose because of the spill.

The study made a distinction between communities that were hub and periphery, Native and mixed, and commercial fishing and non-commercial fishing¹. The Key Informant reports combine material from historical and ethnographic secondary sources with interviews with local officials, service providers, local knowledgeable people, and sampled respondents. They give information on employment by industry, income, household size, length of residence, patterns of intermarriage between communities, age and gender profiles, sources of economic conflict, and competition among user groups. This last factor is complicated by the fact that in commercial fishing communities such as those in the Kodiak region, commercial, sport, and subsistence fishing are often done by the same people.

The high transience of the Kodiak City population was apparent in the administration of the multi-year Social Indicators study. In fact, it was sometimes difficult to locate respondents who had been there for three years in a row. It is not too surprising,

¹ Hub villages had well-developed infrastructures and superstructures, while periphery villages did not; Native villages were at least 75% Native; commercial fishing villages derived at least 60% of their total incomes from commercial fishing (Jorgensen 1995:15).

then, that in both 1989 and 1991, about two-thirds of key informants (KIs) thought it took less than five years to acquire knowledge about an area. Only one KI, who was Native, said her family had accumulated many significant symbolic places over generations (Endter et al. 1993:591, 659).

Kodiak is essentially a nonnative community; the population in 1990 was 12.7% Native American. The city is economically and culturally dominated by commercial fishing. Although other employment sectors, particularly services and government work, are well represented, much of that work is also connected to the fishing industry. The KI summaries contain many quotes from residents detailing their views on nature, wildlife, sharing, and traditional values.

Before the oil spill, people in Kodiak had already been divided on their views of the potential benefits or deleterious effects of oil development. In 1988, for example, there was considerable debate between pro-development and quasi-environmentalist factions about whether a new Navy base should be placed in Kodiak—an issue that became moot after the oil spill. The EVOS diminished respondents' enjoyment of recreational and subsistence activities, and it lessened their sense of control over their own destinies.

One Key Informant question asked people whether they took a spiritual or a commodity view of resources. In 1989, Kodiak interviewees tended to see the environment in commodity terms. In 1991, few of those interviewed in Kodiak wanted to be associated with a purely commodity view. Fifty-three percent of the KI respondents said they combined spiritual and commodity views (Endter et al. 1993:656-657).

More nonnative respondents than Native ones thought it was important to teach children to be competitive, rather than to cooperate with others. Some people said they wanted to raise their children to be more cooperative than competitive. Others saw competition as inevitable, especially in a fishing community such as Kodiak.

Between 1989 and 1991, Kodiak respondents expressed increasing opposition to either Federal government or Native management of resources. In 1989, 43% of KI interviewees favored management by ADF&G, while in 1991, 66% favored the State. There was a strong bias against Federal management in both years, related more, perhaps, to the impending imposition of Individual Fishing Quotas for halibut and sablefish than to the McDowell decision (Endter et al. 1993:586-587). Both in 1989 and 1991, Kodiak KIs gave more recognition to Western scientists' understandings than to Natives' understanding. They thought scientists were more objective (Endter et al. 1993:590-591).

Most Kodiak City KIs were confident that they had a strong voice in resource management decisions. In 1989, almost 64% said local people frequently influence ADF&G decisions. In 1991, almost all (94%) thought that local people had at least some influence on ADF&G (Endter et al. 1993:589). This confidence can be partly explained by the presence of the ADF&G regional office in the community and relatively high access (as opposed to the surrounding Kodiak area villages) to area biologists and to participation in the local advisory committee system. After the EVOS, it was particularly frustrating for these Kodiak residents (most of them nonnative, many of them commercial fishermen) to

deal with the unwillingness of Exxon and government agencies to incorporate local people's suggestions in the cleanup effort.

Before the oil spill, Kodiak respondents were the most optimistic of all regions about the potential local benefits of oil and gas development. The majority were not especially concerned about the possible harmful effects of oil. They related to a pro-technology, anti-environmentalist sentiment prevalent in the community. In 1991, Kodiak residents were less sure about the local benefits of development. Half of them thought the benefits would be largely outside the community (Endter et al. 1993: 607, 609).

The oil spill response and cleanup caused great disruption in the city of Kodiak, and this was reflected in interviews with local government officials and in the responses of residents to the questionnaire. It was particularly difficult for Kodiak residents to deal with Exxon's presence in Kodiak after the oil spill, and the company's management of cleanup efforts, because of the perception that Exxon treated communities and individuals unfairly. The belief in fair competition is an essential part of the occupational culture of fishing, at least for the dominant voices in the Kodiak fishing industry. Another valued part of fishermen's self-image is independence. Exxon's manner of channeling decisions through a corporate hierarchy rubbed Kodiak residents the wrong way. It conflicted with commercial fishing values of hard work, taking risks, and developing local knowledge.

In Kodiak, as also occurred in some Kodiak-area Native villages, there was division between those who thought the oil spill damage was cataclysmal and those who thought the damage was not that great. In a 1991 interview, a Native woman in Kodiak reflected that, "The Johnny-come-latelies who were screaming about the environment and all were the first ones in to get their claims. The old-timers were more philosophical about the situation." Interestingly, one of the findings of the Social Indicators study was that Natives were considerably more likely than nonnatives to think the EVOS was a unique event. Nonnatives tended to think that spills similar to the EVOS were likely to occur again (Jorgensen 1995:89).

THE SOCIAL EFFECTS STUDY

The Social Effects questionnaire was administered at the same time as a harvest survey which continued oil spill impact research begun two years earlier by the ADF&G Division of Subsistence. The harvest survey collected information on levels of subsistence takes of wild resources. The finely-tuned list of resources had been developed over several years in consultation with knowledgeable local people. The surveys also asked for information on commercial fishing, amounts of resources taken for household use from commercial catches, use areas, patterns of sharing, cash employment (including occupation, industry, hours and months worked, and amount earned), and other sources of household income. Birthdate, birthplace, length of residence, ethnicity, levels of formal education, and relationship to household head were recorded for each household member. In the first year of the Social Effects study, people in some communities were asked for an inventory of equipment they used for subsistence activities.

When the Social Effects study began in 1992, the Division of Subsistence had in the previous two years already documented dramatic declines since before the 1989 spill in the

levels of subsistence resources harvested by communities in the oil spill area. There were questions on the survey about specific resource issues, mainly relating to the oil spill. Either for each major resource group (the first year) or for all resources (in years 2 and 3), respondents were asked whether their harvests had increased, decreased, or stayed the same since before the oil spill.

Respondents were also asked to describe any resources they had discarded because of perceived abnormalities (Fall and Utermohle 1993:I-2). This was intended to address residents' concerns about potential oil contamination of subsistence foods. Other current subsistence issues were also incorporated. In Year Three of Social Effects research in Kodiak communities, the survey solicited residents' views on proxy hunting, an issue then on the table in both State and Federal subsistence management.

The Social Effects questionnaire, administered at the same time as the harvest survey, explored social relationships, community and individual well-being, and views toward oil development, with the goal of measuring changes that had occurred as a result of the oil spill. Some of the questions originally used in the Social Indicators study survived the transformation and were included in the Social Effects questionnaire. Others were modified to address individual and community well-being in the context of the EVOS or in a locally appropriate way. For example, the Social Effects questionnaires used in the Kodiak area asked respondents how important bidarkies (chitons) and seal meat were to them and whether those foods were safe for children to eat. These questions were based on the knowledge that bidarkies and seal meat were favorite and meaningful subsistence foods in the Kodiak area.

The questionnaire also asked whether respondents had eaten any wild foods yesterday or the day before. It asked people to assess the health of various animal and fish populations. It addressed sharing patterns and the importance of sharing, not only of wild foods but also of labor and money. It asked respondents whether their households would be affected if they could not harvest subsistence foods for three months, six months, or three years. It asked how effective various entities had been in dealing with the EVOS.

The Social Effects questionnaire recorded concerns about the disruption of sharing and of interruptions in teaching young people about subsistence. The study was an opportunity for respondents to tell the implications of the loss of subsistence because of the oil spill. However, many respondents mentioned other possible disruptions as well. Forty-three percent of Kodiak City respondents, for example, did not feel confident about hunting, fishing, or gathering opportunities in the future. A third of these (34%) said that their opportunities would be curtailed by increased regulations and restrictions, 22% cited population pressure, 17% feared future environmental damage, and 15% thought their access to Native lands would be restricted in the future (Mishler et al. 1995:X-22). This contrasts with the responses to the same question in Larsen Bay in 1991, where 82% of respondents were confident about future harvesting opportunities, or Ouzinkie, where 75% of respondents were confident they could harvest wild foods in the future (Mishler et al. 1995:XII-19; XIII-20).

Most Kodiak City residents were happy to live in their community. Many expressed the underlying importance of subsistence harvesting in their lives. Some said that the opportunity for subsistence harvesting² was one of the main reasons they had moved to the community or the reasons they stayed in the community. More than half (58%) of Kodiak respondents said they had come there for reasons related to employment (Mishler et al. 1995:X-22).

Like the Social Indicators KI summary, the Social Effects data show the city of Kodiak's focus on commercial fishing. Of total income reported, about 19% came from commercial fishing and nearly 5% from manufacturing, mainly cannery work. That data also showed the continuing importance of government employment (which include the military and teachers) in the community; the combined income from local, State and Federal government employment came to more than that from commercial fishing (Mishler et al. 1995:X-8).

Another trend reflected in both the Social Indicators and the Social Effects studies was the Kodiak City residents' opposition to Federal management. Many respondents reported to the State employees administering the survey the same thing they had told Social Indicators researchers: that they were unhappy with Federal management of subsistence. The three-year study began at about the same time that the Federal government assumed management authority from the State on Federal public lands.

Like the Social Indicators questionnaires, the Social Effects survey asked about OCS development. By 1993, the third year of the study, Kodiak City residents seemed to have regained some of their earlier optimism about oil and gas development. In Kodiak in Year Three, 50% of Social Effects respondents said that OCS development would decrease the amount of shellfish and marine mammals available for harvest. A majority, 66%, thought such development would create more jobs for local people (Mishler et al. 1995:X-23).

Finally, the administration of the Social Effects study benefitted from its association with the Division of Subsistence's harvest survey. Most of the ADF&G researchers had long-established contacts with the communities; some of them were Native village residents. The researchers' knowledge of local issues and their cooperation with communities contributed both to respondents' understanding of the research and to the researchers' understanding of responses.

RELEVANCE TO FEDERAL SUBSISTENCE MANAGEMENT PROGRAM

The findings of the Social Indicators and the Social Effects studies offer an opportunity to place subsistence harvests in the context of qualitative factors such as cultural identity, self-esteem, family and community ties, and spiritual links to subsistence resources. The way people dealt with the oil spill in Kodiak and elsewhere reflected the ways they deal with and think about everyday life. The findings of the Social Indicators and Social Effects studies are relevant to other studies that seek to find out values and world view—or that

² Many Kodiak City respondents saw sports harvesting as synonymous with subsistence harvesting (Mishler et al. 1995:X-18).

could benefit from the discovery of such things. Specifically, the findings are relevant to the Federal subsistence program. One of the main duties of the anthropologists employed in this program is to complete Customary and Traditional analyses to determine rural residents' eligibility to harvest specific resources.

The Customary and Traditional determinations currently on the books under State management of subsistence were adopted by the Federal program in 1991 when it assumed management authority for hunting on Federal public lands. The purpose of Customary and Traditional determinations is to separate the sheep from the goats, i.e., to eliminate non-traditional uses and users from eligibility for subsistence priority. The eight factors are:

1. A long-term consistent pattern of use, excluding interruptions beyond the control of the community or area;
2. A pattern of use recurring in specific seasons for many years;
3. A pattern of use consisting of methods and means of harvest which are characterized by efficiency and economy of effort and cost, conditioned by local characteristics;
4. The consistent harvest and use of fish or wildlife as related to past methods and means of taking; near, or reasonably accessible from the community or area;
5. A means of handling, preparing, preserving, and storing fish or wildlife which has been traditionally used by past generations, including consideration of alteration of past practices due to recent technological advances, where appropriate;
6. A pattern of use which includes the handing down of knowledge of fishing and hunting skills, values and lore from generation to generation;
7. A pattern of use in which the harvest is shared or distributed within a definable community of persons; and
8. A pattern of use which relates to reliance upon a wide diversity of fish and wildlife resources of the area and which provides substantial cultural, economic, social, and nutritional elements to the community or area.

According to materials presented to the Alaska Boards of Fisheries and Game by the Division of Subsistence in 1989, the eight criteria were originally meant to represent a gestalt, i.e., a whole pattern that is more than the sum of its individual parts (ADF&G 1989). Taken as a whole, the criteria would ideally separate traditional subsistence practices, and associated belief systems, from non-traditional ones.

In the Federal subsistence management program, however, some of the eight factors have been given more weight than others. In considering customary and traditional proposals, the Federal Subsistence Board tends to see quantitative information about particular harvest levels and use areas as the most important, and to view cultural factors

as too vague or general to be helpful. These two studies, Social Indicators and Social Effects, offer some means of quantifying nebulous cultural data to show how the behavior and ideology of traditional subsistence users differ from those of non-traditional people.

In April of this year, the Federal Subsistence Board considered a proposal for a positive customary and traditional determination for brown bear in Unit 8, which incorporates all the Kodiak-area villages and Kodiak City. (Perhaps ironically, the customary and traditional analysis was based in large part upon one completed by the ADF&G Division of Subsistence for the State Board of Game in 1992.) In this example, examination of harvest levels alone indicates that in some years the predominantly nonnative Kodiak City, and even the entirely nonnative Coast Guard base, registered a higher percent of households participating in brown bear harvests than some of the surrounding, predominantly Native villages. A 1983 survey which asked "Have members of your household eaten brown bear?" found a higher percentage of "yes" answers in Kodiak City (23%) than in Port Lions (16%), Karluk (15%) or Ouzinkie (9%) (USFWS 1996). How should one distinguish uses by Kodiak City residents from those of the villages? A common-sense answer would be that most of the residents of Kodiak are not heirs to the well-documented Native tradition of subsistence use of brown bears³. ADF&G Division of Subsistence surveys in both the 1980s and the 1990s have consistently shown much lower average per capita harvests for all resources in Kodiak City than in the surrounding Native villages, and a lower average number of different resources used. However, the Social Indicators and Social Effects studies offer support for the view that harvest levels do not tell the whole story. By recording differences between Native and nonnative responses, they might even help to document the distinctive subsistence patterns of enclave Native communities within predominantly nonnative communities such as Kodiak.

I have mentioned above the Social Indicators study's finding that nonnatives tend to view sharing as direct reciprocity, while Native sharing is done without thought of immediate return. The post-EVOS version of the Social Indicators study hypothesized that sharing would increase among Natives after the spill and cleanup, and that there would be less internal divisiveness in Native communities than in nonnative communities (Jorgensen 1995:20-21). This was borne out by the Kodiak area findings.

Another way for the Social Indicators and the Social Effects studies to offer valuable examples for customary and traditional analysis comes from the open-ended questions in both protocols, and summary reports which honor people's own expressions of their views. Stephanie Reynolds' Cordova report, in particular, contains many testimonies from local Natives on the importance of subsistence in their lives. The losses or potential losses of subsistence opportunities caused by the EVOS and Exxon's oil spill response inspired reflection about the meaning of harvesting, processing, sharing, and consuming subsistence foods. As an example, people's strong reactions in Kodiak area communities to the Social Effects question, "What would happen to your household if you could not harvest wild foods for six months, one year, three years?"—reactions predicting rage or despair, or of being

³ In making customary and traditional determinations, the Federal subsistence management program has not yet found a consistent manner of dealing with subsistence uses by Native enclave communities within larger nonnative communities.

unable to imagine the possibility—show the high importance of subsistence activities in their lives.

However, a professed love of subsistence and professed espousal of a spiritual view of resources may also be deceptive if taken at face value, as shown in the reluctance of Kodiak City respondents to be associated with a commodity view of resources. During the preliminary phases of a proposed customary and traditional determination in another part of the state, I have heard that a sportsman's club claimed that its hunter safety classes for youth qualified as the transmission of skills, knowledge, and values from generation to generation. The findings of the Social Indicators and Social Effects studies could help to document ideological and lifestyle differences between and within communities. Certainly recreational hunting and fishing are deeply meaningful to participants. There are large cultural differences, however, between pursuing a subsistence way of life and occasionally enjoying sport harvesting.

The continuing relevance of the Social Indicators and Social Effects studies comes as much from their combination of approaches as from the empirical findings. The studies looked at many factors that contribute to quality of life. Subsistence managers would do well to incorporate this multifaceted approach.

REFERENCES

- Alaska Department of Fish and Game, Division of Subsistence. 1989. Defining Subsistence Uses: The Eight Criteria. Materials Presented to the Alaska Boards of Fisheries and Game, Anchorage, October 22-24, 1989.
- Endter-Wada, J., R. Mason, J. Mulcahey, and J. Hofmeister. 1993. The Kodiak Region. Social Indicators Study of Alaskan Coastal Villages. IV. Postspill Key Informant Summaries. Schedule C Communities, Part 2: (Kenai, Tyonek, Seldovia, Kodiak City, Karluk, Old Harbor, Chignik). Alaska OCS Region, Social and Economic Studies Program. Washington:U.S. Department of the Interior. Pp. 553-721.
- Fall, J.A. and C.J. Utermohle, Eds. 1993. An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska: A Preliminary Overview of Selected Findings from the Household Harvest for the First and Second Years of Research, 1992 and 1993.
- Jorgensen, J.G. 1995. Ethnicity, Not Culture? Obfuscating Social Science in the *Exxon Valdez* Oil Spill Case. *American Indian Culture and Research Journal* 19(4):1-124.
- McNabb, S.L. and J.G. Jorgensen. 1992. Key Informant Summary Introduction. Social Indicators Study of Alaskan Coastal Villages. I. Key Informant Summaries. Volume 1: Schedule A Regions (North Slope, NANA, Calista, Aleutian-Pribilof). Alaska OCS Region, Social and Economic Studies Program. Washington: U.S. Department of the Interior. Pp. 1-59.

Mishler, C., R. Mason, and J. Barnhart. 1995. Draft Report on the Third Year of the Social Effects Study. Chapter X: Kodiak City.

U.S. Fish and Wildlife Service, Office of Subsistence Management. 1996. Draft Staff Analysis, Proposal 26. Request for a positive customary and traditional use determination for brown bear in Unit 8 for residents of Unit 8.

QUESTIONS AND DISCUSSION

Jorgensen: By about 1993 in Kodiak, at least the nonnatives were rather sanguine about the value of oil. This is characteristic of those boom towns in the West. It doesn't matter whether you are talking about lumber or coal. A community could have gone through five boom-bust cycles, and if you ask two years after the last bust, they have forgotten all about the negative consequences and they are optimistic. That is one of the real differences between Natives and nonnatives. Natives think: "there might be a job for my children" and they may stay around, even if they are only spending six months of the year in Kodiak City and the rest of the year in Seattle. The attitude of "...that there might be..." has been displayed again and again. I would have predicted that result.

Mason: I have seen that in the fishing industry which has gone through many booms and busts in Kodiak. You would think that people would lose faith after a bust. But there is always hope.

Schwantes: I have a question regarding how you determine Native populations?

Mason: It was people's own self identification.

Schwantes: Do you ask whether they consider themselves a Native?

Mason: The question was, "What is your ethnicity?" It was basically self identification.

Schwantes: Culturally, being a Native wasn't "accepted" for many years. Still, many Native people say they are Russian, Norwegian, etc. and identify more with a subsistence life style rather than ethnicity. What would the results have been if you had done studies in winter months when the trend in populations is down?

Mason: That is particularly true in the Kodiak area, where ethnicity has been questioned. People do identify more with the idea of subsistence life style. I think both of these studies were sensitive to the fact that people aren't going to be around in the summer. The question of other ethnic groups is a very interesting one. We didn't look at the distinguishing factors of households that were Filipino or Hispanic. I do know that in the Filipino households there were some distinctive sharing patterns. Often they would send money to relatives that lived outside of the U.S.

Schwantes: How do you provide reliable documentation of subsistence use? No one reports what they take; they are leery of reporting the actual amounts, which may be higher.

Mason: That is a separate sort of survey from the ones that I was discussing, which asked for the recall of harvests over the years. The hunting tickets that you are talking about are notoriously inaccurate measures of what people have actually gotten. Whereas these instruments, the harvest survey that Jim has described, are very well-tuned and have been shown to be remarkably accurate, or that people are remarkably candid about their harvest in the year to year reporting.

Callaway: It is a factor of about ten to one throughout the State on many different measures between what people report on tickets, and what they report on face to face interviews. So these data are hugely more reliable and valid over the tickets.

Jorgensen: Reliable but not truthful. It sounds as if the reports to ADF&G are very reliable. But the claim is that there are doubts. Do they report the same four species year after year by the same person?

Mason: Some communities like Karluk never report harvest tickets.

Callaway: So they are reliable in that sense. You can count on them not reporting anything.

Edenshaw: I look at patterns, not so much the oil spill but the decline in subsistence activities. Is there a correlation with alcoholism?

Jorgensen: No one has successfully correlated those social dislocations in Alaska. We tried with at least 200 back in 1981 and 1982 to correlate them with any event. Was there an increase in alcoholism, an increase in murder, rape, or divorce? The trends were absolutely uninformative. It is not to say that it couldn't be done. It is just that the research that is required is personal, and they can't rely on the archival data that has been collected by various institutions.

Endter-Wada: I like the fact that you are working with a different Federal agency and trying to puzzle through the utility of this information for what you do, that is a helpful approach.

I have two questions: 1) We have the National Park Service and U.S. Fish and Wildlife Service represented here today. It seems this is only because there is a personal link between both of you, and the history of this project. Is there any formal agency sharing of information and does this study have utility beyond the Minerals Management Service, and; 2) We made this central finding from the study that the distinctions between Natives and nonnatives are more salient than distinctions on a geographic or community basis. Can the Customary and Traditional determinations from a political point of view be responsive to those findings?

Mason: They haven't been, but I think that they should be responsive to differences between communities.

Callaway: They can't be in the sense that the preference is rural so the Customary and Traditional analysis is rural. They can be with respect to an 804 determination, or what the State calls a Tier II. There is very nebulously defined criteria for apportioning access to resources among equally qualified subsistence users. Who is first among equals? Ethnicity has not been necessarily the fulcrum. In my experience there is a continuum from subsistence users to what I call "headhunters." Regardless of ethnicity I think you can separate people by the parameters we have discussed here such as the number of species used, how much of the animal is used, with respect to socialization with children, with respect to certain ecological components, etc. Ethnicity does not have to be one of the criteria. I think that Native people engage in a subsistence life style as do mixed couples to a large extent, as well as some long-term nonnative residents. But they can be parceled out from sports hunters, commercial guiders, and trophy hunters. They haven't been, but they can be.

Mason: I just wanted to quickly address interagency cooperation. I think it is pretty deplorable, and should be made more responsive in the future.

Callaway: The sad fact is that Fish and Wildlife Service is the only agency that I know that has not had a steady decline in the number of social scientists employed. MMS has had a decline; the National Park Service is not going to add any in the near future.

OUTSIDE PERSPECTIVES

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When Michael Baffrey contacted me about doing this and then sent me all seven volumes, it reminded me of a conversation that I had with Dennis Tippelman up in Kotzebue several years ago. Dennis and I were scheduled to go to the same conference together. Dennis at that point was the president of the village corporation for Kotzebue. He called me up about a week before we were supposed to leave for the conference and said that he couldn't make it. He asked if I could make his presentation. The presentation was going to be on the Red Dog Mine, which at that point hadn't been developed yet. Of course, I had my own presentation to do. I didn't exactly want to do his, too. So we discussed it back and forth. Then, finally, I pulled out my trump card. I said, "Dennis, I have never been to Red Dog." He replied, "Aha! I knew you would qualify as an expert." But then I read Jorgensen's description of the field work that the consulting anthropologist for Exxon did (Jorgensen 1995) and I decided that he was an even better expert than I.

An advantage of coming last is that nobody really minds if you do not go on and on. I wanted to talk first about the implications of this research for understanding cultural change. I also think it important to talk about two related areas that suggest some possibilities, in my mind, for follow-on research.

I would like to explain a little bit about my background. On one side, the part that I will talk about first, is that I have had the opportunity of living in Alaska Native communities for six years. I was working on programs that were largely aimed at providing Native people and corporations and other organizations with bachelors' degrees in Alaska. I had the opportunity to spend a year in Finland, including time with people at the Nordic Sami Institute in Kautokeino, Norway, which is a Sami-run institute funded by the Nordic Council of Ministers. I spent six months in New Zealand at a place called the Center for Maaori Studies and Research at the University of Waikato. It is another that is run by Maaoris. Finally, I had the opportunity to go to India in association with the Sardar Sarovar dam fiasco that the World Bank got into.

A striking thing about my experiences in all these areas is that I have heard many of the same arguments about indigenous peoples. It is somehow universal. The same arguments that you find throughout the North and other parts of the world, are what I call the "Assumptions of Change." These assumptions go something like this (I am making them Alaska-specific):

1. Change is inevitable. The people who live in small villages are going to be faced with change. They are going to have to accommodate, and they are probably better off doing it sooner rather than later.
2. All change is from traditional to modern. This change is unidirectional change: As people become more involved in the larger world, they are going to become more like mainstream, middle class, U.S., lower-48 people.
3. Subsistence is going to decline.
4. If things are different from before, then the new situation is not traditional.

The interesting thing that always comes out for me in these assumptions is that we can go back and read Sheldon Jackson in the early 1890s and see that he is saying precisely the same things. A hundred years ago when Sheldon Jackson was writing, he assumed that things were going to change. Here we are, however, a hundred years later and these assumptions are precisely the same. Obviously, things have changed but they have not changed so much that these assumptions have dropped out. They remain assumptions.

We can point to several instances in which tradition continues to soak through the clothing of modernity: Jorgensen's studies suggest that more income tends to create a florescence in Native culture. Money does not destroy traditions or necessarily move the villages away from their long-held values. We can show any number of instances down through ethnohistory, where we know when money has come in it has been used for very Native purposes. This goes for the totem poles on the northwest coast and for the florescence of the whaling culture on the North Slope when commercial whaling first came in. We saw it in the Barrow area recently: as wage income went up, more people went whaling.

The Maaori in New Zealand argue that they have a right to change. They had a right to go and change according to their own precepts (J. Ritchie, personal communication). This ability would be part of maintaining their identity as Maaori. Under this right, a social indicators study would be unnecessary.

Anyway, what we now know and what we have seen over the last century is that change is neither linear nor unidirectional. It is a very complex process where one can see cultural strengthening based upon improved circumstances. Whaling is one example. In Greenland, they developed a home rule authority. The language of political discourse went from Danish to Greenlandic in the last ten years. We can see things go back and forth in various ways between what might be termed "traditional" and "modern." All of which says that we have to be very careful about predicting the effects of external change.

A virtue that I see in social indicators monitoring studies is that they avoid prediction. Prediction is not just difficult, but dangerous as well. It is dangerous in the sense that assumptions of change appear and the predictions can themselves be external forces for change, albeit ideological. Monitoring studies on the other hand don't have that difficulty. Social indicators studies argue for continuity. The approach assumes a continuous

thread that emerges despite the various major changes, booms and busts, that have gone on in rural Alaska through the years.

This returns us to the final assumption of change: when are things still "traditional?" I would like to quote Ulric Nayamin, now deceased, of Chevak, Alaska. Back in 1981, in a meeting with a group of oil men, he tried to describe to them just how important coastal resources were to the people of Chevak. He said, "Well, you know, you kassat [non-Cupiit], you have banks. Whenever you get low on money or need some extra money to get through, you go back and borrow from the bank. For us the coast is our bank." The point being that it has always been traditional to adapt and that is what constitutes tradition. People may go off and do other things for a while, but they still have a reserve, be it of resources or of culture.

These studies may also be important as a baseline. We may be able to show that, in fact, cultures have been strengthened as well as weakened. The original purpose of the social indicators was to draw out the possible negative effects of oil development. It may be equally possible to show that other kinds of change bring improvements. The proposed co-management program for the western arctic caribou herd might be one example. It will be interesting to go back in 10 years and see what influence co-management has had on people's perceptions.

Another point: As I was sitting here listening, a story occurred to me. When I was a graduate student in Maine, I was doing research for a state regulatory board that set prices on a certain commodity. A group was fighting the board. They had brought in a very fancy lawyer from New York, who turned out to be a nice guy. Even though he was on the other side, he took me out to lunch. He told me a story from when he was a young lawyer and working for the New Jersey public utilities board. For the very first time, they had an electric company come in and request a rate change with a thick document written by an econometrician at Princeton University. They were completely overwhelmed because they had never seen anything like it. He referred to the document as being written in Greek. "We decided," he said, "to go out and get our own Greeks."

To be frank, these social indicators studies are very difficult reading. The statistics are of a high order. They show the level of sophistication that we have gotten into in the argument over subsistence. Now we have to go out and get our own Greeks to make these arguments. It is important, however, to make a sophisticated case for subsistence and what it means. Using the Guttman-Lingoes statistical analyses shows that being Native is a multidimensional feature. Nor is subsistence a single thing. These are points that Native people make themselves. It is good to try and capture some of that multidimensionality.

The use of these statistics also leads to a discussion of science as a dialect of policy. It has become necessary to use science in Alaska to produce some parts of policy. Policy debates often center around natural resources. Scientists have something to say about natural resources. Very often science is used as the trump card in arguments: We have the science and you don't. We are right and you are wrong. Nobody, however, has really looked at the science to see whether it is good or bad. One serious instance may be found in the reported drastic decline of the western arctic caribou herd in the mid-1970s. The issues that surround those findings and their scientific merit have never been investigated thoroughly.

Yet the consequences of those studies, in terms of the divisive subsistence debate, continue within the State. It is very important to do good science, particularly when it becomes a gatekeeper for people entering into policy and management discussions.

I would now like to turn to a second area of observations. These have to do with the role that social indicators studies might play in other studies and how these particular studies might be carried on under new auspices. For instance, large scale environmental change has become of concern in recent years. There have been various predictions about the future of the Arctic as a result of global change studies and particularly climate change research. You have probably heard predictions that climate warming, if it happens, will occur at a much more rapid rate in the Arctic because of snow melt and a resulting drop in albedo. What would be the consequences for local societies? The kinds of arguments that I listed under assumptions on change (above) are reappearing in the scientific community: If large environmental systems change from processes that are outside the scope of local communities or regions, changes in the communities are going to be inevitable, the reliance on local resources will be eliminated, and a loss of traditions will result.

To tie this social indicators research to other possible programs, I would like to enumerate some of the sources of global change. Global change is not all climate change. There are various forces that people are predicting will affect the Arctic. Climate change is certainly one. There is a very real concern about the increase in greenhouse gases that may come with thawing the tundra. We do know that if climate change occurs it is likely to be nonlinear, very precipitous, and something that will be possibly outside the human experience of the last ten thousand years. It is a very, very difficult question to deal with from the perspective of human impacts and policy.

But, there are other sorts of changes that may have a similar effect in the shorter run. Air pollution is present and visible in arctic Alaska. The effects are stunning in areas of the Russian arctic, like the Kola Peninsula. In regions around the industrial cities, the trees have just disappeared. But, the effects have spread beyond there. Traditional activities in these areas, such as reindeer herding, have been severely curtailed.

Ocean pollution may be more significant. Heavy metals, organochlorides, and possibly radionuclides are found concentrated in the marine mammals upon which people depend. When I was in Greenland a few years ago there was a quiet discussion about the level of heavy metals found in seals. Greenlanders are heavily dependent upon seals as a major subsistence resource and as a source of cash income from fur sales. The concern was that the contaminant levels were a public health threat. But if the health authorities were to tell people about it, people might stop eating seals. What would they then do for food? Because, in fact, there were very few alternatives.

Dr. Joe Jorgensen talked a bit about the expansion of the market system into the Arctic. That is something that will probably continue to occur, in boom and bust cycles, into the foreseeable future. We also have to remember non-market forces, which include things like government transfer payments. In the former Soviet Union, the complete collapse of the transportation system that had supplied most of the northern areas has had tremendous consequences for people of those regions.

And finally under global processes, international agreements have become important. The International Whaling Commission and its decision making is an example: It has brought profound changes to the way in which people pursue traditional resources. Limits on the take of whales in Greenland, for instance, has put pressure on community social organization. Whales may not be a major livelihood, but, in contrast with cod and salmon fishing that are organized around a cash relationship, the whaling crews are built on extended kinship. To allow people to continue the cash-based economy without whaling may have an effect on those relationships.

Military activities are another area of significant change. They have not been well studied, but are certainly worthy of mention in the wake of the Cold War.

All of these global changes have impacts. They may not be the same. They do, however, have one similarity with the *Exxon Valdez*: they affect people's ability to harvest resources. They may have the same consequences that we see in the spill study.

The kind of data set that was developed under the social indicators study serves as a good baseline for understanding future impact from global changes. Change from many different sources needs to be followed. Does the hypothesis that I implicitly started with hold in the future: That many of these things don't necessarily or immediately destroy the differences between Native and nonnative peoples. In some cases external changes will emphasize differences, in other cases they will lessen the differences. Melding, however, is not a foregone conclusion.

I would just mention three research programs that might follow similar research. One is the Arctic Systems Science Program (ARCSS) at the National Science Foundation, which is developing a human dimensions component. This component should have growing levels of funding. One of the major foci is the relationship between the biophysical and human spheres. Do changes in one lead to changes in the other? If so, what kinds of changes? The social indicators studies would aid in answering this question.

Another set of research programs is sponsored by the International Arctic Science Committee. Two of them have focused integrated assessments or particular regions: One on the Barents Sea, which is called BASIS, and a companion study on the Bering Sea (BESIS). The idea is essentially to do impact studies of climate change scenarios for these seas and their surrounding human communities.

And finally, the International Northern Sea Route Operations Program (INSROP) would be another project that might benefit from social indicators studies. This research program is looking at the possible consequences to communities in Alaska, Russia, and Scandinavia of opening the northern sea route to international traffic. The northern sea route is the way that Russia has provisioned isolated communities by shipping goods from Vladivostok and other areas of the east coast, by ice reinforced ships through the Northeast Passage. The goods are then sent down the major rivers that empty into the Arctic Ocean. International shipping could have several unforeseen consequences that should be monitored.

This list summarizes the possible tie-ins for the key informant studies. I will end here.

REFERENCES CITED

Jorgensen, J. 1995. Ethnicity, not culture? Obscuring social science in the *Exxon Valdez* oil spill case. *American Indian culture and research journal* 19 (4): 1-124.

QUESTIONS AND DISCUSSION

Holder: Was what you did part of the Corps of Engineers study?

Flanders: No, that was a different study. INSROP is actually out of the Nansen Institute in Oslo.

Holder: This was independent of the CRREL [US Army Corps of Engineers] study?

Flanders: It is a long story as to why they are independent. It has to do with politics. But it is the same topic, different players. The INSROP study is actually the European-Russian view. The Corps of Engineers was actually commissioned to help Ted Stevens formulate the Alaskan view.

That was essentially what I had to talk about this afternoon. Like I said I figured if I kept it relatively short nobody would object. There are some questions that I had but given that most of the community participants, regional participants have left, I will save them. I was curious to know from their perspective, particularly given our efforts at trying to develop research, do they feel that the Social Indicators have selected or captured important aspects of their culture? The other question being, is it possible [to capture them]?

One of the conclusions that I had was just the fact that the study was able to capture differences is significant. As was pointed out in the talk this morning, if you know a guy is nonnative, you are able to predict a lot of things about him. This, in a sense, indicates that you have been able to at least show that there are these differences.

Jorgensen: A few years ago, I was on a committee of the National Academy of Sciences that was talking to an attorney and a mining engineer for the Kennicott Corporation. The mining engineer finally asked me, "Just what is it you are trying to do?" What we were trying to do was determine the consequences to mining communities and the consequences to non-mining communities if a surface mine would open near them. And he said, "That is like trying to lasso a cloud!"

Flanders: My story about that was when I lived in Kotzebue back in the 1980s, the Northwest Alaska Native Association Corporation (NANA) hired someone to try and predict the consequences of Red Dog [a lead-zinc mine], and John Schaeffer said that the bottom line was, I am sure they spent thousands of dollars on this, but the bottom line was that you can't really predict anything except one thing: out of all the studies that they have done about the consequences of mining you can predict one thing and that is you will have an influx of population, a population increase. What happened in Kotzebue? The population went down. So that shows you what you can predict.

So that is the long and the short of it. I wanted to point out that there are some possibilities. There are some possible connections with other research. We hope funding will be available for that. I will be interested to know what the communities themselves say about this.

Jorgensen: Is it dependent upon the NSF arctic budget or from several sources?

Flanders: There are two things about this. First of all, it is like everything you have heard about Washington and what you may have heard about NSF. There are parts of NSF that are getting more money.

Jorgensen: Yes, the Arctic got \$300,000 more but they had such a tiny budget. They only had \$1 million to start with.

Flanders: Yes, that is the Arctic Social Science. The Arctic Section as a whole is, in year FY 97, receiving over ten percent increase in their budget. Part of that has to do with the fact that Ted Stevens has finally put his foot down and said that NSF has to spend as much on science in the Arctic as they spend on science in the Antarctic. The difference is that the logistics for the Arctic comes out of the science budget. For the Antarctic they have \$168 million for logistics. But the science budget is \$29 million. The difference is when you fill out an application to do research in the Antarctic, you don't fill in the travel costs except as far as costs to New Zealand, from then on it's all paid for.

So that is one of the thing ARCUS is working on. We are trying to set up logistics. We are doing a white paper right now for the U.S. Arctic Research trying to describe the academic research community's logistical needs in order to argue for assistance similar to what is in Antarctica. Though, social scientists don't want to have to fly in C-130s.

Callaway: It would be tough flying into Kivalina.

**AN ANALYSIS OF SOCIAL INDICATORS OF THE
EXXON VALDEZ OIL SPILL**

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HYPOTHESIS ABOUT WHY, POSSIBLY, NATIVE AND NONNATIVE PRACTICES ARE DIFFERENT

Soon after the spill occurred and as we prepared to expand our sample to include ten villages affected by the spill, we hypothesized on the basis of our previous research among 31 villages, all of 29 of which were outside the spill area, that Natives would express grief over the spill and attempts to clean it up. We also hypothesized that sharing would increase among Natives as subsistence and commercial fishing pursuits were reduced or thwarted altogether. We doubted that anything beyond temporary divisiveness would occur among Natives within their communities over the spill. We expected considerable divisiveness among nonnatives—personal as between commercial fishermen who contracted their boats to Exxon/VECO and those who did not, grass roots organizations vs. public officials, business owners vs. erstwhile employees who abandoned low paying jobs for high paying employment in the cleanup, renters vs. landlords who raised rents, public agencies vs. Exxon/VECO for failing to assist in accommodating public needs and personal complaints about unmet needs.¹

We reasoned that if Natives in the spill area were similar to Natives residing north of the Gulf of Alaska, we expected households to be interdependent, not independent. We expected Natives to exercise their political franchise at greater rates than nonnatives. We expected Natives to espouse ethics about obligations to the community which were correlated with their practices and which devalued some forms of competition by not referring to them when asked. We expected ethics and practices to connect old and young, employed and unemployed, healthy and impaired into Native networks which were communitarian, not individualistic, in nature. These networks and the activities in which the members engaged, we averred, served to spread risks and distribute resources, not as a means of leveling pain, but as a successful means of maintaining friends, assisting elders, and providing for households in good times while coping with difficult problems in bad times. The ideology does not change when needs increase. Education, employment, high incomes, good health, and political involvement need not generate Protestant Ethic behavior, particularly when the alternative is communitarian behavior.

¹ There were too few landlords and too few small business owner-operators in our samples to test our hypotheses about conflicts between landlords and tenants, employers and employee. The "ethnographic" evidence collected by our key investigators supports all of our hypotheses about conflicts between nonnatives as distinguished here. This evidence yields "concluding hypotheses" and informed our analyses of the AQI and KIP responses.

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For nonnatives to engage in practices we presumed would be commonplace for Natives, we thought that nonnatives would have to be connected in extensive friendship networks in the region, dispense with any bookkeeping about who owes whom, and be willing to risk foreclosure, repossession, bankruptcy when giving and helping reduced their own resources to the levels of the persons they assisted. For short-term residents among nonnatives—1 to 5 years—we presumed selfless giving of resources and labor would not occur or would be very rare. For long-term residents—10 to 20 years—to engage in practices common to Natives, they likely would have to forsake their retirements and risk foreclosure and bankruptcy. We hypothesized greater divisiveness among nonnatives in the spill area, especially those engaged in or dependent upon the commercial fishing industry, stemming from (1) perceptions of mistreatment by government, Exxon, or both, (2) fears of insolvency, and (3) demands for solutions.

THE SUBSISTENCE MODE OF PRODUCTION AND CULTURAL "TRADITIONS"

We confirmed in our research among the original 31 villages, that Native subsistence economies remain quintessentially subsistence economies in their organizations of production: ownership, control, labor, distribution, consumption. They are directly linked to procuring food and shelter for the maintenance of life itself. It is the social fabric in which the subsistence economy is embedded that is crucial within and among communities.

Knowledge of naturally occurring resources in the local area. In 1989 and 1991 we asked 388 Key Informant Protocol (KIP) respondents in the spill area, 69% nonnatives and 31% Natives, to identify 77 naturally occurring resources (animal and plant species, such as spotted seals (*Phoca largha*), or groups of species, such as berries (*Rubus spp.*, *Vaccinium spp.*) in the areas in which respondents reside. We inquired about which of the 77 specific species or groups of species were available locally, and whether the amounts that were available were sufficient or not sufficient for local purposes. Those purposes could be defined by the respondents.

We presumed, but did not know, that persons engaged in a complex subsistence organization would know more about plants and animals and think about more relations among them than a person who harvested very few wild resources, or harvested a limited number of species, or harvested none at all, and who was not engaged in networks of sharing resources, labor, and meals, or regular visiting, and who seldom established camps for resource extraction. We further presumed that if persons harvested few species or no species at all, but were engaged in sharing and visiting networks, as is common for many elderly Natives, those persons would be knowledgeable about local flora and fauna. Knowledge in these cases would stem from current conversations with extractors, sharing in the bag, catches, and quarry, and preparing and storing food and by-products.

Response rates among respondents were lower on the questions about species among 1989 (postspill pretest) than 1991 (postspill posttest), while responses among panel members were about the same in 1989 and 1991. The lower rates in 1989 reflect the differences between a period five months after the spill in which transiency was at its peak, and a period nearly two years after the spill when transiency had lessened.

Upon tallying proportions of response rates from highest to lowest for the 77 species or groups of species, the principal ones about which residents of the spill area professed knowledge were those which were extracted for commodities (e.g., salmon, halibut, cod, crabs). Response rates were much higher for more species in *Periphery* villages than in *Hub* villages (Table 1).

Table 1. Response Rates by Species, *Hub:Periphery* Contrast, KIP Instrument, Pretest and Posttest Samples Combined, N316, 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.	<i>Berries</i> ^a	48%	5.	Pink salmon	82%
6.	King salmon	44%	6.	Clams	80%
7.	<i>Moose</i>	43%	7.5.	Halibut	79%
8.5.	Cod	36%	7.5.	<i>Ducks</i>	79%
8.5.	<i>Other mammals</i>	36%	9.5.	Cod	69%
			9.5.	Tanner crab	69%
			11.5.	Red King crabs	68%
			11.5.	Snow crabs	68%
			13.5.	<i>Ptarmigan</i>	67%
			13.5.	<i>Brown bear</i>	67%
			16.	<i>Dolly Varden</i>	64%
			16.	Variant fox	64%
			16.	Otter	64%
			19.5.	<i>Moose</i>	61%
			19.5.	<i>Kelp</i>	61%

^a *Italicized* items are not sold as commodities.

Table 1 rank-orders and contrasts the species by whether respondents resided in *Hub* or *Periphery* villages. Nonnatives comprise about 90% of the populations of the three *Hub* villages, Kenai, Valdez, and Kodiak City. Nonnatives also constitute 75% of the two largest *Periphery* villages (Seldovia and Cordova), while Natives comprise from 78% to 100% of the smaller *Periphery* villages. The differences between *Hub* and *Periphery* responses reflect different knowledge based on different uses and different familiarity with environments.

Although the recognition of the differences between these two types of villages is inescapable, the remarkable similarities among Natives is masked by the *Hub:Periphery* dichotomy. Upon controlling for race/ethnicity, we discovered that over 95% of Natives in *Hub* and *Periphery* villages responded to all 77 questions about resource sufficiency. No nonnative responded to all 77 questions.

Natives and nonnatives differ significantly and dramatically in the knowledge they claim to possess about the naturally occurring species in the local areas in which they reside. Inasmuch as nonnatives responded to queries about so few species, and inasmuch as the species about which nonnatives responded were almost exclusively harvested and sold as

commodities, we may question, then, whether Natives and nonnatives perceive the environment in the same way.

Perceptions of local environments. The spill exercised effects on the ideas that Native and nonnative populations expressed about the biological and abiological environment. We addressed several ideological and ethical topics with the protocol, some about the environment and some about the acquisition of skills to gain livelihoods in the environment. We thought the ideas about environment and about ethical principles were related and we hypothesized that traditional Native ideas would prove to be different from nonnative ideas. We further hypothesized that if Natives were well-educated, fully employed, and high earners, that they would more likely express ideas similar to those expressed by nonnatives about ethical principles pertaining to competition and to the personal benefits from acquiring and using skills.

Our reliability and validity tests yielded four variables which addressed (1) how respondents envisaged the environment (K29), (2) whether they attached significant symbols to features of the environment (Q7), (3) whether they expressed ethical ideals about the responsibility for acquiring skills and about who should benefit from those skills once acquired (K28), and (4) whether a person should compete for personal gain, or cooperate with others for communitarian ends (K30). (See the box below, and also see the frequency distributions of AQI and KIP data in Tables A1-A2.)

Q7. Significant Symbols Attached to Places in Native Environments. Does the respondent have special memories about the wildlife or the places, such as springs, promontories, lakes, capes, hills, woods, bays, lagoons, in his/her area which the respondent's family likes to recount?

- (1) none,
- (2) a few,
- (3) many,
- (4) many which have accumulated over two or more generations.

K28. Ethical Responsibility for Attainment. 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 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.

K29. Ethics and Significant Symbols Attached to Environment.

- (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. 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. 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.

Table 2 tallies only the proportions of Natives and nonnatives in 1989 and 1991 whose responses on the ideology and ethical topics were "Traditional-Communitarian." The

variables are ordered into either 3 or 4 ranks. The highest rank (3 or 4) represents "traditional-communitarian;" the lowest rank (1) represents "Western;" and the mid-ranks are blends. Thus, in Table 2 we see the proportions who thought that a person should seek success for family, networks of kinspersons, elders, friends, and the village (K28), that resources and the environment have spiritual and also cultural significance (K29), that personal ethics should seek cooperation-communitarian ends (K30), and that he/she personally has many significant places in the environment to which memories of events are attached (Q7).

Table 2. Communitarian, Historical, and Non-Commodity Ideas about the Environment, Native:Non-Native Contrasts, KIP Postspill Pretest and Posttest Samples in Percent, N316, 1989 and 1991.

	K28 Success for Kin- Friends-Village (Communitarian)	K29 Resources & Env Spiritual/Cultural Significance	K30 Persons Should Cooperate (Communitarian) and Compete	Q7 Many Symbols over Generations
Natives 1989	46	25	51	36
Natives 1991	46	46	80	44
Non-Natives 1989	14	6	26	7
Non-Native 1991	27	10	36	5

The differences between Natives and nonnatives are significant for each variable (Table A1), suggesting that Natives and nonnatives have very different views about why persons should acquire skills and for whom they should be used, how they cognize the environment, and the symbols attached to significant memories and places within their local environments. It is also likely that the spill affected (upward) Native and nonnative assessments of the non-commodity values of the environment and the ethical idea that cooperation should dominate work behavior, or should be coequal with competition.

The differences in proportions of responses for Natives and nonnatives on these ideology and ethical questions between 1989 and 1991 reflect changes almost surely attributable to the spill. To measure changes that occurred among ethics that were espoused immediately after the spill and two years after the spill while controlling for specification error, we assessed the responses of panel members in 1989 and 1991 and tested for the significance of differences between panel responses and the responses of pretest and posttest sample responses for the same years. The differences on the four items (Q7, K28-K30) are not significant when controlling for ethnicity. Table 3 demonstrates changes in responses by panel members on two items between 1989 and 1991.

The differences between ethnic subsamples in the pretest and posttest samples and both waves of the panel are significant, although as is demonstrated in Tables 2 and 3 slightly larger proportions of nonnatives in 1991 than in 1989 expressed the idea that the environment possessed an intrinsic spiritual value beyond the commodity value of the resources which comprise it, and that personal responsibility extends beyond self (or conjugal pair or nuclear family) to a wider network of kinspeople. Nevertheless, nonnatives changed the least in their ideas about the environments value (K29 principally commodity or a blend of commodity and such features as clean water and pristine views of the landscape and seascape) and about whether they claimed to have many significant memories

Table 3. Ethical codes for personal responsibility and ideas about the environment, Native and nonnative panel, N72, 1989-1991.

1989 ⇒ 1991 ↓	Native			Non-Native		
	Personal	Family	Fam&Village	Personal	Family	Fam&Village
Personal Succ.	5	16	5 26	16	18	7 41
Family Success	11	16	11 38	18	22	4 44
Village -Family Success	5	5	27 37	2	9	2 13
	21	37	43	36	49	13
K29 Ethics and Significant Environmental Symbols						
1989 ⇒ 1991 ↓	Native			Non-Native		
	Commodity	Blend	Spirit-Symbol	Commodity	Blend	Spirit-Symbol
Commodity	6	13	12 31	8	16	3 27
Blend	6	19	19 44	14	48	6 68
Spirit-Symbolic	6	6	13 25	2		3 5
	18	38	44	25	64	11

about their environments to which they attached significance (Table 2 only). The changes in the Native panel toward communitarian ideas and ethics are more marked on all topics.

I conclude, as an hypothesis, that these changes do not represent chance variation, but rather for nonnatives they represent reflection about the consequences of the oil spill for the environment, for their occupations, and for family life in Alaska following a period in which assistance among neighbors was more widespread than in the prespill period. Assistance between and among nonnatives fitted the context of emergencies—immediate and short-lived.

Among Natives, too, the oil spill and its protracted consequences influenced reconsideration, or deeper consideration of the environment's meanings to them. Those meanings are "traditional-communitarian." Their expressions of communitarian ethics about responsibilities and ideas about the spiritual nature of the environment and the symbols they attach to it, were perforce complemented by increased visiting and increased distributions through wider networks of kinspersons and friends in and out of their home villages following the spill.

Subsistence activities and the uses of local environments. There were huge discrepancies between nonnative and Native incomes in each of the six waves of our research from the winter of 1987 through the winter of 1991.² Nonnative households, which were smaller than Native households, enjoyed incomes which averaged twice those of Native households. Two years after the spill the incomes of nonnatives were less than they were immediately following the spill, while paradoxically the incomes of Natives were higher in 1991 than in 1989. Native sample and panel respondents earned about 50% of what nonnatives earned in 1989, and about 60% in 1991.

² We conducted two research waves in 1989, one before and one after the spill. The KIP variable K4 measures household annual income. It is based on an estimate provided by the respondent for the aggregate income of 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.

With that backdrop let us review the differences between Natives and nonnatives in 1989 and 1991 as to how they used their incomes and how subsistence is fitted into the organization of those uses. In both years Natives invested more of their incomes into the harvests of wild resources than did nonnatives, but in 1991 Natives invested less than they invested in 1989. A similar pattern of change occurs in the item measuring the variety of species harvested. Natives harvested a greater variety of species than nonnatives, but less than they had harvested in 1989.³

The most interesting difference obtains for the proportions of wild food in the diet.⁴ The proportion of Natives reporting 50% or more in 1989 was 52% and in 1991 was 46%. The proportion of nonnatives reporting diets containing more than 50% wild foods was 24% and 26% in 1989 and 1991. The proportion of Natives who gained more than 50% was less for Natives and more for nonnatives in 1991 than 1989 (panel responses confirm these differences, although panel respondents, both Native and nonnative, gained less of their diets from wild resources in 1989 and 1991 than did pretest and posttest respondents).⁵ In good years and bad the proportion of Native households that gained more than 50% of their diets from wild resources was twice that of nonnative households. There were fewer species and less biomass harvested by Natives in the 18 months following the spill than in the 18 months prior to the spill. There were, consequently, less wild resources to eat and less wild resources to share during 1990 and early 1991.

The sharing variables—distributions of cash, labor, and resources as donor or recipient—reveal incommensurable differences between Native and nonnative subsistence activities, the ways in which those relations are organized, and the ideas that rationalize them. The 12 protocol items⁶ measuring sharing—4 cash, 4 labor-services, 4

³ The KIP ordinal variable K1 measures the household's subsistence harvesting expenses as an estimated percentage of total annual income. The expenses include the purchase and repair of equipment, purchase of fuel, purchase and repair of clothing, purchase of ammunition, food, and incidentals required for travel and camping. The ranks from (0) None to (4) High (30% and over). The ordinal variable K2 measures the variety of naturally occurring resources harvested annually by the informant's family household. The responses are classified into 5 ranks in which (1) = no naturally occurring species harvested, (5) = more than 3 species in each of the following categories for which species are available in the respondent's local environment: land mammals, sea mammals, waterfowl or seabirds, marine invertebrates, fish (fresh, anadromous, and/or saltwater species), and plants (marine or land). Ranks (2) through (4) measure intermediate amounts of varieties harvested.

⁴ The KIP ordinal K3 measures the proportion of naturally occurring harvested protein (wild meat) in the annual diet of the household. It is an aggregate estimate for household members and includes items that are harvested by members of the household as well as items that are received by household members through gifting, sharing, or exchange. The range is from (1) less than 25% to (4) 75% to 100%.

⁵ In 1989 and 1991 Native panel respondents gained less of their diets from wild foods than did Native pretest and posttest respondents during those same years. For example, in 1991 50% of Native panel respondents gained more than 25% of their diets from wild foods, whereas 75% of Native posttest respondents gained more than 25% of their diets from wild foods.

⁶ Regular sharing within the village means that respondents, on a regular basis, donate or receive cash (K11A-B), labor-services (K13A-B), and goods-resources (K15A-B) from persons in households other than their own, not necessarily relatives. Regular sharing outside the village means that respondents donate to or receive cash (K12A-B), labor-services (K14A-B), or goods-resources (K16A-B) from residents of a village different from

goods-resources—are divided into donors and recipients, and divided again into whether the sharing occurs between persons in the same village or different villages.

The mechanism of sharing remains deeply embedded in the economic system of Natives in contemporary Alaska, even as they have been integrated into the peripheries of the market. Things—food, services, cash loans—are bought and sold in the market. Except as occasional gifts to relatives and friends, gifts to legally sanctioned institutions that can be deducted from gross income in calculating taxes, and a variety of trusts that allow persons to transfer resources while minimizing tax obligations, sharing is a modest feature of a market system carried out in a very different spirit and rationalized in a very different way from Native sharing.

In good times and bad, Natives have maintained their sharing practices, and these practices are not restricted to holidays or to actions to avert tax liabilities. These practices cannot be characterized as activities that occur solely because of exigencies, nor are they practices in which each person who participates does so with the specific expectation of being repaid in kind, amount, and in a specified time by the persons and households for whom he or she gives or does something. The system works in a context of seasonal and annual variations—frequently severe—so there is no intention to deny the utility of the system. If anything, Natives are instrumental and are expert at adjusting to the vagaries of environmental fluctuation. So whereas the Native system evens out bad times as best Natives can, the Native organization of production has persisted because goods and services are shared for their own sake and not for a hidden agenda or for a misunderstood agenda.⁷

Regardless of the season, most sharing between households occurs within villages. The sharing is characterized by small quantities of food, short term uses of equipment, and small services, such as tending children or repairing windows. Sharing also takes place between persons who reside in different villages. Our data demonstrate that intervillage sharing increased following the spill as fewer resources were harvested.

The sharing variables in the protocol are very informative. We note that the variables that measure the sharing of income behave differently from the variables that measure the sharing of goods (equipment, food) and the sharing of labor-services. Native:Nonnative contrasts among sharing variables are especially distinct. Let us focus on the sharing of cash to highlight the differences (Table 4). In 1989, Natives shared cash more widely within and beyond the village (as donors and recipients) than did nonnatives. And

the respondents' on a regular basis. Sharing within the village is ranked from (1) "none," through (2) "pooled within the household," and (3) "occasional sharing with other households in the village," to (4) "regular sharing with other households in the village." There are three ranks for sharing with distant villages: "none," "occasional," and "regular."

⁷ There is a large literature that treats subsistence economics such as the Alaska Native economy described here, as self-regulating systems which work to optimize Native survival in places of unequally distributed and fluctuating resources. The actions of giving resources, labor, and the like by the participants in the system are unwitting, albeit crucial elements in maintaining a system that regulates itself. There are no independent measures of the self-regulating system. It is an idea without empirical warrant, but then, so is the invisible hand of the market.

in 1991, with larger incomes but fewer wild foods in their larders, Natives reported increases in sharing cash in and out of the village.

Table 4. Proportions of "regular" cash sharing, KIP pretest and posttest, contrasts of Native and nonnative subsamples in percent, N316, 1989 and 1991.

	1989		1991		1989		1991	
	Cash-Donor		Cash-Donor		Cash-Receipt		Cash-Receipt	
	In	Out	In	Out	In	Out	In	Out
Natives	2	8	24	8	0	7	20	4
Non-Natives	6	11	14	19	2	4	4	4

Greater proportions of nonnatives, too, shared cash more widely in 1991 than 1989. Yet the only form of income sharing in which they outstripped Natives was in the regular sharing of cash with households in other communities (K12B). It is this item, over all others, that distinguishes the way in which nonnatives fit into local subsistence economies. They regularly (some occasionally) remit funds to households located in different communities, presumably the communities from whence the respondent came, where members of his family reside, and to which he/she will return. Following the spill in 1990 and 1991, unusually large proportions of married nonnative respondents, including long-term residents, were not co-residing with their spouses and families in the villages in which they were interviewed (nonnative residency is discussed below). Remittances to family members were commonplace for such respondents.

The relations between income and the three forms of sharing among Natives is very much affected by employment. As months of employment increase, so do incomes. And as incomes increase, the higher earners among Natives tend to share income, and resources (equipment, say), but little else. Employment restricts the time that can be given to harvesting, preparing, and storing wild resources, and also restricts the time in which labor can be shared.

In 1989, when Native incomes were less than 50% of nonnative incomes, Natives who earned the most tended to be frequent donors of cash and less frequent donors of labor and services within the village. These high earners were also donors of resources (such as equipment or food), although infrequent, to relatives in other villages from whence they also received resources. The employment rates for and the months employed by the higher earners were high, and several had recently returned from the spill cleanup as we conducted our research in September of 1989. They had some time to share labor at home, and some funds to share. They did not have time or, perhaps, the inclination to harvest resources which they deemed oiled and tainted and then share those resources at home.

In 1991 Native employment and incomes increased. Most of the employment increase was for short term jobs (between 1 and 9 months). The larger incomes among people who were not employed full time correlates positively with every form of sharing, significantly with sharing of resources—giving and getting—in and out of the village.

Some comparisons of the sharing of labor and resources that occurred in spill area villages in 1989 and 1991 reveal the differences in the scale locations of Native and nonnative practices. Table 5 compares "regular" sharing activities of Natives and nonnatives.

Table 5. Proportions of "Regular" Labor and Resource Sharing Within and Outside the Village, KIP Pretest and Posttest, Contrasts of Native and Non-Native Subsamples in Percent, N316, 1989 and 1991.

	1989 Labor-Donor		1991 Labor-Donor		1989 Resource-Donor		1991 Resource-Donor	
	In	Out	In	Out	In	Out	In	Out
Natives	41	8	64	20	43	17	66	36
Non-Natives	15	5	35	10	19	2	29	14

	1989 Labor-Receipt		1991 Labor-Receipt		1989 Resource-Receipt		1991 Resource-Receipt	
	In	Out	In	Out	In	Out	In	Out
Natives	35	8	64	20	45	18	68	25
Non-Natives	14	4	23	9	19	2	25	14

In 1989, significantly greater proportions of natives engaged in all types of labor- and resource-sharing practices than did nonnatives. In 1991, although the proportions of nonnatives increased in sharing practices, the proportional increase of natives was significantly greater, as was the extensiveness of the practices (Table A1).

Native incomes increased between 1989 and 1991, and so did all forms of sharing. Nonnative incomes decreased, but all forms of sharing increased. The increases in sharing by Natives are functions of (1) the decrease in wild resources available to Natives, and (2) the reluctance of Natives to harvest tainted resources. Our prespill data demonstrate that economic exigencies were more influential than either the availability of resources or the reluctance to harvest tainted resources in accounting for the increases in nonnative sharing practices during the emergencies of 1989 and the resumption of the bust cycle of 1991. The proportions of nonnatives engaged in sharing increased between 1989 and 1991, but the extensiveness of the sharing is very modest when compared with Natives.

Although Natives report sharing cash more widely than do nonnatives, the effects of greater incomes are apparent in the Native subsamples for 1989 and 1991. Focussing first on transactions within the village, in 1989 less than 50% of Natives were "regular" labor donors or recipients, or were regular resource donors or recipients. In 1991 about two-thirds of Natives were regular donors and recipients of labor and resources. Sharing with persons in other villages reveals similarly marked changes. In 1989 less than one-tenth of the Native respondents gave to or received labor assistance from residents of other villages, and less than one-fifth gave to or received resources from residents in other villages. In 1991 a fifth of the respondents both gave and received labor assistance. The most significant differences are in the increases in regular sharing of resources with persons in other villages. Thirty-six percent of Native respondents regularly gave to, and 25% regularly received resources from persons in other villages. Thus, in 1989 sharing outside the village was less frequent than sharing inside the village for Natives, but cash—an easy item to transport—was shared by

many who engaged in sharing between villages. As incomes increased and wild resources decreased, all forms of regular sharing increased.

Nonnatives, too, increased the extent to which labor and resources, labor in particular, were shared between 1989 and 1991. Nonnatives donated labor within the village nearly two-and-one-half times more frequently in 1991 than 1989. Yet in 1989 Natives were regular donors and recipients of labor and resources within the village at a rate 2.7 times greater than nonnatives. The comparisons of relations between villages is more striking. Natives gave and received labor 1.8 times as often as nonnatives, and gave and received resources regularly 9 times as often as nonnatives. In 1991, the average rate differential between Natives and nonnatives is nearly identical for all comparisons except the giving and receiving of resources between persons in different villages. The marked increase in the regularity with which nonnatives gave and received resources reduces the differential with Natives to 1:2.2.

On univariate differences between Natives and Nonnatives in subsistence practices.

If we ask whether Natives and nonnatives invest portions of their income into the harvesting of wild foods, the answer is "yes" for both. If we ask whether Natives and nonnatives identify some species in their environments, again the answer is "yes" for both. If we ask whether any Native and nonnative identifies spiritual nature as the preeminent attribute of the environment, reports that places in the environment have special meanings for them and their kinspersons (past and present), harvests a variety of species, have wild foods in their annual diets, and share resources and labor with persons within and beyond their village, and if the answer to each is "yes" for at least one person in each population, then the difference between Natives and nonnatives does not exist except, perhaps, as a matter of degree.

Our interest was not only whether some Natives and nonnatives observed these customs, held these beliefs, or engaged in these practices. We sought to learn what proportions of, and to what extent persons in each subsample observed those customs, held those ideas, and engaged in those practices. The topics, taken one at a time, reveal that the "degree" of difference between Natives and nonnatives is significant on every idea, every ethic, every sentiment, and every activity compared (Table A1). The sum of the differences is interesting, while the claim that the differences are of degree is redundant. The organization of the differences is more interesting than the sum of the differences. In the sixth and final volume in the social indicators project (*Social Indicators Study of Coastal Alaskan Villages VI. Postspill Analysis of the Exxon Valdez Spill Area, 1988-1992*. TR 157 Minerals Management Service, Alaska OCS Region. New Haven: Submitted by Human Relations Area Files Inc., 1995) we focus our attention on a very large number of topics, one of which is the organizations of the differences in the spill area, one Native and one nonnative.

In that volume, far too complex to summarize here, I demonstrate that the spill had effects on both the Native and nonnative populations. The responses to the spill were not the same. Indeed, the differences between the responses of Natives and nonnatives were characterized by marked differences in the manner and amount in which Natives engaged the mechanisms through which they shared, including wide kinship and friendship networks not available to nonnatives. The mechanisms and the activities of Natives were distinguished

from nonnatives by dint of place of birth, ethnicity, long-term residence, and different ideas about community, the environment, and the benefits from work.

CULTURALLY DISTINCT RESPONSES TO THE SPILL

Some of the spill's effects were immediate and short-lived, others accumulated, as differences between our 1989 and 1991 data presented in *Social Indicators Study (SIS)* Volumes V and VI demonstrate. The spill:

- occasioned changes in some household compositions;
- precipitated disputes between commercial fishermen;
- prompted persons in large proportions of households to avail themselves of a wide variety of social services, including family counseling, personal emotional counseling, financial assistance, and health care;
- occasioned an increase in participation in extra-curricular activities and events sponsored by church-related organizations;
- made increasing numbers of persons aware of political issues, economic conflicts within their villages, and personal economic conflicts within their villages;
- made almost all respondents skeptical that future economic developments that may occur in their local areas would provide benefits to local residents or be controlled locally; and between 1989 and 1991,
- occasioned an increase in the proportion of nonnatives who espoused ethics, sentiments, and ideas about rules in household membership and behavior, the goals for the attainment of skills to become successful (in life's several pursuits), the roles of competition and cooperation in economic and subsistence activities, and the principles that should be followed in enculturating children that mixed Western and communitarian principles, while also occasioning a significant increase in the proportion of Natives who espoused communitarian ethics, sentiments, and ideas.

Several ideological items and their corollaries distinguish Native from nonnative social and economic organizations. These items comprise two contrasting sets (with some overlap): one "Communitarian" (Native) and the other "Western" (nonnative). Among the KIP data, some of the ideological items that characteristically differentiate Natives from nonnatives are rules for household dynamics (K20), ethical responsibility of attainment (K28), environmental ethics (K29), and ethics of personal cooperation (K30). The corollaries in social practices of these ideological items include gender distinctions and other behaviors commonly employed in the enculturating of children (K31), the dynamics of household composition (K19), the kinds and amounts of sharing practices in which persons engage (K11A-K16B), and the kinds and amounts of subsistence activities in which people engage (K1-K3). I have demonstrated that Natives and nonnatives are organized differently on these key social features--ideas, sentiments, acts. In *SIS VI* I demonstrate that these organizations, one "Western" and the other "communitarian," disposed nonnatives and Natives to respond differently to the oil spill on several related indicators.

The differences between the structure of Native society, in general, and nonnative society, in general, are measurable, empirical, real. Let us call the differences "cultural." The movement of nonnative positions toward those of Natives I presume to be temporary responses to the threats to household economies created by the spill and exacerbated by the changes in the commercial fish markets. The movement of many Natives toward espousing the most extreme communitarian ideas, too, is a response to exigencies. But those "exigencies" were protracted over 22 months during our investigations, and continued through mid-1993, 4½ years after the spill.⁸

There are some marked differences between Natives residing north of the Gulf of Alaska and those south.⁹ Natives in the spill area are different from their congeners in western and northern Alaska in that a much larger proportion of them fish commercially and reside in complex villages in which they are a minority. Average Native households in the spill area are smaller, the proportion of single person households is greater, the proportions of persons employed, and employed in the private sector, are greater. There is, then, some evidence that Natives in the commercial fishing, oil- and tourist-industry regions of Kodiak Island, the Alaska Peninsula, Cook Inlet, and Prince William Sound are more similar to nonnatives on some employment and demographic measures than are Natives north of the Alaska Peninsula.

In the spill area, the major businesses—commercial fishing-related and oil-related—and minor businesses—tourism and guiding—are owned and controlled by nonnatives, as are the businesses that service the larger communities. Native practices have accommodated to nonnative practices in this context, but Natives, even in the largest villages, maintain communitarian activities that distinguish them from nonnatives.

The spill accounts for the increase of Natives who attribute spiritual and cultural significance to the environment, espouse cooperation rather than competition, report that they attained skills with the help from and so as to benefit their households, wider networks of kinspersons and friends, and the community, and that they indulge their children, while teaching them by precept to do likewise with their own children. For Natives, the spill is as memorable as the earthquake of 1964, yet the spill was man-made, a "normal accident," not a natural disaster. The response to the normal accident was to recognize the source of the problem and the differences in power between the persons and corporations responsible for the problem (and its cleanup) and the persons and environment which suffered the consequences.

In response, Natives came to accentuate the communitarian principles of Native society. They did so through reflection, through conversations that accompany daily practices of sharing and visiting, and through attendance at public meetings that addressed consequences of the spill for the community and region and remedies for those consequences. In some cases as consequences of the spill, Natives accepted new members to their households or bid their goodbyes to former members. Native recognition of the

⁸ See *Social Indicators Study*, Volume VI, Chapter 2.

⁹ See *Social Indicators Study*, Volume III.

ideological basis of Native society was heightened by their postspill predicaments, the practical responses to those predicaments, and the conversations and activities in which Natives engaged about the spill. The wide-spread similarity among Native social, political and religious responses to the spill are drawn from the structure I will call "culture," empirically warranted, that our measures confirm.

Nonnative responses to the spill provide evidence of ideological and practical changes in daily life as responses to a disaster that harmed the environment from which they gained their livelihoods and which threatened their ability to survive economically. The responses appear to be crisis-oriented and do not suggest a permanent change toward Native practices, ethics, ideas, and sentiments.

Changes in Household Compositions and Sizes as Spill Consequences

The AQI samples and panel yield results that complement the KIP results. I introduce AQI data to analyze changes in household composition and household size because the protocol ratings lump household sizes of 1 to 3 persons into a single category, whereas AQI data distinguish 1 person households from 2 and from 3 person households. AQI data allow for a more careful analysis, then, of fluctuation in 1 and 2 person households.

Whereas Native households were slightly larger than nonnative households in the postspill samples and in the waves of the panel in 1989 and 1991, both Native and nonnative households were smaller in 1991 than they were in 1989. The decrease in household sizes, in conjunction with changes in household types between 1989 and 1991, reveal changes occasioned by the spill and the consequent depression of fish prices. Nonnative household arrangements demonstrate considerable flux in 1989, with a marked change toward single person households in 1991.

The household arrangements for about 85% of nonnatives in coastal Alaska prior to the spill were single person,¹⁰ conjugal pair, or nuclear family. During the summer of 1989 when population movement was at its greatest through commercial fishing closures and clean-up activities, single, conjugal pair, and nuclear households accounted for about 76% of nonnative living arrangements; 24% of nonnatives co-resided in a variety of non-family households as renters and co-renters (Table 6).

In 1991 about 88% of nonnatives resided in single, conjugal pair, or nuclear family arrangements. Among the 12% that did not, 4% were single parent households (stable for the panel, and increase in proportion for postspill 2 over postspill 1). The changes in 1991 clearly indicate a return to the dominant household arrangements before the spill, and demonstrate that households of panel respondents were volatile in 1989 when large numbers of households had boarders.

¹⁰ Single person households comprise large proportions of nonnative living arrangements in the commercial fishing villages, whether or not the respondent is married.

Table 6. Household Living Arrangements of Natives and Non-Natives, AQI Data, N566, 1989 and 1991.

	Non-Native		Native	
	Single, Conjugal Pair, Nuclear	Other Forms	Single, Conjugal Pair, Nuclear	Other Forms
1989				
Panel-Wave 1	77	23	49	51
Postspill	76	24	68	32
1991				
Panel Wave 2	91	9	61	39
Postspill 2	86	14	66	34

Native households in 1989 and 1991 reflect states of flux. In every measure of Native household types conducted both in the first phase and in the *Exxon Valdez* spill phase of the social indicators research, household living arrangements other than single person, conjugal pair, and nuclear family comprise large proportions of the totals. It is the case that most married Native respondents between the ages of, roughly, 25 and 45, sought conjugal pair or nuclear household residences. Economic circumstances normally determined whether those persons could satisfy their wishes and how long they would be able to maintain those residences.

Among Natives, conjugal pair and nuclear arrangements increase as months of employment and income increase, while mixed and remnant households (and other composite household arrangements) increase as employment and income decrease and/or become less stable. Instability of months of employment, sources of income, and amounts of income characterize Native respondents in both postspill samples and in both waves of the panel.¹¹ The contrasts with nonnative panel household arrangements in 1991 are interesting. Discounting changes from conjugal pair to nuclear households (due to birth of children), changes occurred among 27% of Native and 11% of nonnative panel households between 1989 and 1991. The changes for both correlate with fluctuating sources and amounts of income.

Unlike nonnatives, household living arrangements among Natives, I reiterate, do not always coincide with domestic functions. It is common for two or more Native households, linked through kinship, to recognize themselves as a domestic unit, storing food together, eating together, tending children communally, and the like. The expectations for, and the behavior of close kinspersons — such as an adult son or daughter, or aging parent¹² — living nearby, but not in the household, facilitates the movement of persons from one house to another as exigencies arise. The Native response to exigencies is to share and accommodate.

¹¹ Differences in panel household arrangements are direct measures of change. Panel:postspill differences are not significant for 1991.

¹² Frequently the son or daughter is divorced or separated and co-residing with children—notes that 27% of Native households in both panel waves are single parents with children, and sometimes the son or daughter is married and co-residing in a conjugal pair arrangement.

Communitarian Behavior: Visiting, Dining as Guests, Attending Public Meetings

Again I use AQI data to supplement KIP data. Inferring from our prespill research among nonnatives in coastal Alaska,¹³ the period immediately following the spill occasioned visiting and dining among nonnatives much beyond our expectations: about 52% visited friends or relatives within the village 3 or more days in the week prior to being interviewed, and about 21% had eaten at least one meal as a guest in a friend's or relative's home during the 2 days prior to being interviewed. In 1991 visiting and dining among nonnatives in the days immediately prior to being interviewed had decreased markedly since 1989, but the proportions who engaged in each activity remained high: about 40% visited persons on 3 or more days and about 17% dined as guests in the homes of friends or relatives (Table 7). The visiting and dining activities of non-Natives in 1989 reflect the response to the crisis caused by the spill, as analyzed in the section on subsistence. By 1991 both visiting and dining had decreased to levels significantly below those of Natives.

Table 7. Frequency of visiting and dining with friends or relatives in past few days, Natives and nonnatives, AQI data, N566, 1989 and 1991.

	Non-Native		Native	
	Visits on 3+ Days in Past Week	1 or More Meals in Last 2 Days	Visits on 3+ Days in Past Week	1 or More Meals in Last 2 Days
1989				
Panel Wave 1	52	21	61	42
Postspill	49	22	53	52
1991				
Panel Wave 2	36	16	56	42
Postspill 2	44	18	53	34

The important point here is that proportions of nonnatives and Natives who made frequent visits to friends and neighbors were quite similar in the summer of 1989. In 1991 Natives continued to make frequent visits to friends and relatives while nonnatives visited significantly less often. The difference between the proportions of Natives in the postspill 1 and 2 samples who recently ate meals as guests, however, was greater (18%)¹⁴ than the differences between the comparable nonnative subsamples in 1989 and 1991. Natives more frequently visited and shared meals than nonnatives in both research waves, but the decrease in meals for Natives is a consequence of Natives having harvested many fewer wild resources in the year following the spill than was normally the case for them.

Nonnative visiting and sharing of meals, although high in both postspill waves, had reduced considerably by 22 months following the spill. As the early crisis response waned, nonnative crises responses waned.

¹³ See *Social Indicators Study*, Volume III.

¹⁴ The proportions of the Native postspill 1 (1989) and 2 (1991) samples who recently ate several meals as guests are highlighted in Table 10.

In the first phase of our study we found that one communitarian activity that consistently proved to engage Natives was attendance at public meetings focussed on public or corporate issues. As we predicted from the first phase research and from the prespill:postspill Kodiak Island research, Native attendance at public meetings was high in 1989 and also in 1991: about one-third of all Native postspill respondents and from one-third (1989) to one-quarter of all panel respondents (1991) had attended at least one public meeting in the month prior to the date of their interviews. The summer of 1989 was certainly a crisis period during which public meetings were held in every community in our sample. Yet all business and all complaints and all problems triggered by the spill were not resolved in the summer of 1989. Compensation claims were discussed, as were changes in plans by various communities for local infrastructure developments, readiness preparations for the next spill, issues in relation to the 1991 commercial fishing season, and the like.

In 1989 nonnatives matched, and in 1991 nonnatives exceeded the proportions of Natives who attended public meetings.¹⁵ This was no fortuity, nonnatives—whether employed in the private or public sectors—were vitally concerned about maintaining their livelihoods in the spill area. Acquiring information, discussing alternatives, exerting political pressure were deemed important to doing so: fish prices had plunged, and debts had therefore gone unpaid for many spill area residents.

Another finding of the research conducted in the first phase was that greater proportions of Natives than nonnatives voted in state and local elections. It is evident from Table A2 that Natives and nonnatives voted at rates much in excess of national rates in the most recent local and state elections. In the entire spill area, it is also the case that following the spill nonnative panel members (not shown) increased their participation in statewide elections by 20% (to 83%). Our interviews left little doubt that panel respondents were voting their interests. The proportions of Natives who voted in the most recent Native corporation elections following the spill were clearly voting their interests as well (about 80% of eligibles exercised their franchise).

The spill increased the communitarian activities of nonnatives for almost a year following the event, but by two years after the event many of those activities had waned (visiting, dining with friends and relatives and other activities discussed in the subsistence chapters). Attendance at public meetings and exercising the franchise had not. These legal-rational means to influence personal, occupational, and economic interests enjoyed very wide participation during the two years immediately following the spill.

Is There a Difference in the Native and Nonnative Expectations for Normal Accidents?

We established that commodity valuation takes precedence in the nonnative definitions of the environment and resources within the environment, whereas instrumental use, cultural and spiritual valuation takes precedence in the Native definition of the environment. We also established that Natives know more about the local environments than do nonnatives. So which of the two, Natives or nonnatives, think that the sky is falling

¹⁵ In 1989 33% and 1991 40% of nonnative postspill respondents attended public meetings during the month prior to the spill.

in? If the *Exxon Valdez* can founder once and wreck havoc, are other spills as large or larger than the *Exxon Valdez* spill, i.e., normal accidents of disastrous proportions, in the oiled area likely to follow?

When asked, Natives were significantly less likely than nonnatives to think that spills similar to the *Exxon Valdez* will recur frequently (Q13B). Natives thought the Exxon spill was unique, nonnatives did not (Q13A). Nonnatives fitted what we have learned about nonnatives elsewhere in the United States. Natives fitted what we have learned about Indians.

SIGNIFICANT CONCLUSIONS

Native culture—that organization of acts, objects, ideas and sentiments that are characteristic of Natives in the spill area—was implemented by Natives to cope with the spill's consequences to the naturally occurring resources on which Native lives depend. Nonnatives implemented acts and expressed ideas and sentiments that were common to their culture to cope with the crisis caused by the spill. The responses were different.

On a wide variety of economic, subsistence, social, ethical, and political measures prior to the *Exxon Valdez* spill, differences between Natives and nonnatives in Kodiak Island villages that were oiled by the spill were significant and systematic. Following the spill, Native and nonnatives in all villages in our spill area sample proved to be systematically different in the amounts of income, number of months employed, amount of education completed, proportion of persons employed in the public sector, proportion of persons receiving unearned income, stability of income, amounts of income invested into the harvests of wild resources, the variety and amount of wild resources that are harvested, the manner in which those resources are distributed and consumed, the amounts in which goods, equipment, and income are shared and the persons with whom they are shared, the practices of contributing labor to relatives and friends, the way in which symbols are attached to the environment, the places to which persons retire, the consequences of job or business loss, the expectations for local benefits from oil-related developments, the sizes and compositions of households, rules for membership and behavior in the household, the amount of visiting and dining as guests in the homes of relatives or friends, cognitive attitudes about whether and what species can be managed, who or what agency should manage them, who best understands the biologic and abiologic environments, and what consequences are most likely from oil-related activities.

The longitudinal, multidimensional, multivariate analyses of samples and panel demonstrate stability in the principles which distinguish nonnative from Native societies, and the temporary crisis created by the spill demonstrates the differences between Native and nonnative responses to the environmental, political, and economic consequences of the crisis.

QUESTIONS AND DISCUSSION

Johnson: In your studies did you ever evaluate the effect of many of your respondents being Russian orthodox?

Jorgensen: In Volume IV, I address that topic. We didn't break down things in the Protocol as to the nature of the Christianity. However there seems to be a beautiful coordination between Native sharing practices, and the ethics that support them, and the ethic espoused in the New Testament (but not necessarily practiced). I think the Natives win on that one.

Johnson: My relatives are mostly from the Prince William Sound area, Cordova. I am part Chugach, and my wife is Athabaskan. My family encouraged sharing, to give everything you have, and there was a belief that you don't expect anything back, but it will come back three times what you gave.

Jorgensen: It would come back to you spiritually in things unexpected and unimagined.

One thing that I didn't touch upon at all in this paper that has some relevance on things that we heard this morning from Carl Hild. A series of questions that we asked and Rachel Mason touched upon them, we wanted to know among the respondents: 1) whether they thought resources could be managed, naturally occurring resources; 2) we wanted to know who they thought knew the most about naturally occurring resources: scientists, Natives, or ?; 3) we wanted to know whether there was some fit between whether they should be managed and who knew the most. So we asked the question about who should manage. In the questions of resource management and knowledge about resources, what emerged were significant differences again between Natives and nonnatives. The things that we learned in 1989 were not the same things that we learned in 1991. And they fitted again how we had predicted Natives and nonnatives would differ. So without going into them too much, you can see the evidence and how I think it fits with difference by ethnicity. We had a suspicion even by the time that we entered into this research that the village contrasts would not work quite so well as they had to the north because every village had been affected by the oil. So that took out test and control. And because most of the villages we had were very large and complex and because of the small villages that we were able to get into, we could get into only one Native village in Prince William Sound, one time. We got in a second time and Eric Morris got pitched out, thrown out of Tatitlek. So we were able to do Eyak and Cordova outside of it and do Valdez within it. But we couldn't go to Chenega, though we were invited into Nanwalek and Port Graham, after we arrived there we were invited out because the attorneys had signed an agreement with a consortium of regional nonprofits that denied our access to some of the small villages. So of the ten villages we had, we did not get Chenega and we only had one look at Tatitlek right after the spill. But I have no doubts that in those little villages, Chenega, Tatitlek, Port Graham and Nanwalek, that we wouldn't have learned anything that would have changed the results that we had from our 1800 or so interviews.

Baffrey: Native and nonnative respondents prior to oil spill... the surveys completed in the last wave prior to spill?

Jorgensen: Yes. We have a lot of information throughout all of those 31 villages. We completed all but the last in a few villages in 1990. Most of the things that we predicted came to be as a result of what we had learned on Native and nonnative differences in those villages. But many of the questions that we asked after the spill, of course, we hadn't asked

before the spill. That was one of the great things about the protocol because the OMB gave us a green light to add some questions.

Callaway: Joe, we didn't ask OMB!

Jorgensen: The OMB would have given us the green light had we asked! Therefore we could use the protocol to create questions that we did not have prior to the spill. Particularly those about management, and knowledge of the resources. Questions such as do Natives have knowledge of locally occurring resources and the environment? How is it acquired? How long does it take?

"How long does it take to get knowledge of the environment?" was a standard question. You would get at least one nonnative person in every sample that would answer, "...well about five years." We never got that answer from a Native, never. For a Native, you knew a local environment. You knew its fluctuations, the resources in that environment, etc. Time was not expressed. It wasn't an uncommon response to say that it isn't just a lifetime. It is cumulative lifetimes, in other words those that precede you. Now, the differences are significant again between populations as to how you perceive. So when you then ask them a question who knows most about the environment, what we found among Natives was their willingness to be generous in 1989. That they recognized that scientists had considerable information about the environment from experience and from research. They recognized as well from their own observations and those from their parents and grandparents, that they had considerable knowledge about the local environment. Nobody could predict what the ice would do, except it could do anything it wanted to if the wind was pushing it. So they had real knowledge. Who should manage it? They recognized who was managing it and they recognized political obstacles between them managing it, and State or Federal government managing it. So they thought it would be very good in 1989 that there would be some sort of shared management, but they weren't sanguine that they were going part of such a process. But by 1991, positions had firmed up quite a bit. It was recognized that Natives knew a lot about the environment, and yes, they should be managing or co-managing the environment. Had it been managed properly? No, it hadn't. So there is no doubt that not only did nonnatives begin espousing ethics that other Natives had espoused in those other 31 villages, but there was an increase in both our panel and in the posttest of the espousal of Native ethics and principles by Natives. What would you call that? Could that be perhaps like relearning a language that had been nearly sentient? Would it be like taking up Native dancing and singing again? Would it be as if you were restoring a tribe? Yes, a little bit like that. Certainly you can act upon those things that you already knew but you now espoused.

Schwantes: Of total respondents what percentage were small villages?

Jorgensen: Probably about 25 to 30% resided in small villages. If we distinguish small village residents from Kodiak, Kenai, Valdez, and Cordova, about 25% are in small villages: Tatitlek, Seldovia, Chignik, Karluk, and Old Harbor. We found the same patterns in the spill area... the small periphery villages, the hub villages, and the real difference was Native and nonnative. That is the most interesting part, there is persistence to it.

Callaway: I might mention that I worked with Joe on this project for a number of years. The enormous amount of time and hours Joe spent working with the data and

analyzing the data. I can't even imagine how many it is, but I sure it was 14 hour days, day in and day out. Thank you Joe.

Table A1. Frequency distributions in percents, KIP variables, theoretical contrasts for nonnative:Native subsamples, postspill pretest and posttest samples.*

Key Informant Protocol Variables	Nonnat 1989 (N145)	Native 1989 (N67)	Nonnat 1991 (N61)	Native 1991 (N25)
Q7 SIGNIFICANT ENVIRONMENTAL SYMBOLS				
NONE	6.3	*6.1	6.8	4.0
A FEW	34.5	33.3	44.1	24.0
MANY	52.1	24.2	44.1	28.0
MANY OVER GENERATIONS	7.0	36.4	5.1	44.0
Q13A IS EXXON VALDEZ SPILL UNIQUE?				
NO	54.6	47.7	55.2	48.0
YES	45.4	52.3	44.8	52.0
Q13B WILL EVENTS SIMILAR TO THE EXXON VALDEZ SPILL OCCUR IN THE FUTURE?				
NO	1.4	0.0	3.5	*4.3
RARELY	65.2	71.9	38.6	65.2
FREQUENTLY	33.3	28.1	57.9	30.4
Q14A HOW WILL FUTURE RESPONSES TO SPILLS COMPARE WITH THE RESPONSE TO EXXON?				
WORSE	4.3	3.1	0.0	0.0
SAME AS	37.7	25.0	26.8	29.2
BETTER THAN	58.0	71.9	73.2	70.8
Q15 HOW DID SPILL AFFECT YOUR INCOME?				
DECREASED	25.4	28.3	23.2	24.0
STAYED THE SAME	47.2	41.7	57.1	44.0
INCREASED	27.5	30.0	19.6	32.0
Q16A DID SPILL CAUSE DISPUTES AMONG OR BETWEEN FISHERMEN?				
NONE	14.3	*32.3	1.8	*30.4
VERY FEW	26.3	19.4	27.3	17.4
MANY	59.4	48.4	70.9	52.2
Q16B DID SPILL CAUSE DISPUTES BETWEEN FISHERMEN AND NON-FISHERMEN?				
NONE	29.6	*44.8	16.7	*59.1
VERY FEW	22.2	24.1	31.3	9.1
MANY	48.1	31.0	52.1	31.8

* Postspill, pretest research conducted in the late summer of 1989 and the early winter of 1990. Posttest research 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 Nonnatives:Natives for 1989 and again for 1991.

Table A1 continued.

Key Informant Protocol Variables	Nonnat 1989 (N145)	Native 1989 (N67)	Nonnat 1991 (N61)	Native 1991 (N25)
K1 HARVEST EXPENSES-PROPORTN OF INCOME				
VERY LOW, 0-9%	87.6	*68.2	86.7	84.0
LOW, 10-19%	6.2	13.6	10.0	12.0
MEDIUM, 20-29%	4.1	12.1	1.7	4.0
HIGH, 30% OR MORE	2.1	6.1	1.7	0.0
K2 VARIETY OF HARVESTED SPECIES				
NONE	9.0	12.1	18.6	12.5
FEW, NONE IN SOME CATEGORIES	51.7	40.9	67.8	54.2
AT LEAST ONE SPECIES PER CATEGORY	14.5	12.1	8.5	8.3
TWO-THREE SPECIES PER CATEGORY	9.0	16.7	1.7	8.3
MORE THAN THREE SPECIES PER CATEGORY	15.9	18.2	3.4	16.7
K3 HARVESTED PROTEIN IN DIET				
LESS THAN 25%	51.7	*21.2	64.4	*25.0
25-49%	24.8	27.3	10.2	29.2
50-75%	16.6	36.4	15.3	29.2
76-100%	6.9	15.2	10.2	16.7
K4 HOUSEHOLD ANNUAL INCOME				
\$0-10,000	2.2	*21.5	4.9	*12.0
\$10,001-20,000	8.8	24.6	9.8	32.0
\$20,001-30,000	8.8	20.0	6.6	20.0
\$30,001-40,000	16.8	15.4	16.4	8.0
40,001-60,000	24.8	10.8	34.4	20.0
\$60,001-100,000	35.8	7.7	27.9	8.0
OVER \$100,000	2.9	0.0	0.0	0.0
K9 STABILITY HOUSEHOLD EARNED INCOME				
IRREGULAR	0.0	*8.2	1.7	12.0
ERRATIC	2.8	4.9	6.9	8.0
SEASONAL	24.5	34.4	27.6	24.0
MONTHLY	72.7	52.5	63.8	56.0
K10 STABILITY OF HOUSEHOLD UNEARNED INCOME				
(1) IRREGULAR	71.0	*53.0	50.8	28.0
(2) MONTHLY WELFARE OR TRANSFER PAYMENTS	5.5	9.1	11.9	8.0
(3) REGULAR RECEIPTS a/o ROYALTIES a/o LEASE w/(1) or (2)	22.1	30.3	37.3	60.0
(4) 1, 2 AND 3	1.4	7.6	0.0	4.0
K11A INCOME GIVING WITHIN THE VILLAGE				
PERSONAL USE ONLY, NOT SHARED	19.4	27.7	22.8	*12.0
POOLED WITHIN THE HOUSEHOLD	59.0	47.7	33.3	8.0
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	15.3	23.1	29.8	56.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	6.3	1.5	14.0	24.0
K11B INCOME RECEIVING IN THE VILLAGE				
NO SHARING	29.7	33.3	51.9	32.0
POOLED WITHIN THE HOUSEHOLD	57.2	50.9	18.5	16.0
OCCASIONAL SHARING	10.9	15.8	25.9	32.0
REGULAR SHARING	2.2	0.0	3.7	20.0

Table A1 continued.

Key Informant Protocol Variables	Nonnat	Native	Nonnat	Native
	1989 (N145)	1989 (N67)	1991 (N61)	1991 (N25)
K12A INCOME GIVING BETWEEN VILLAGES				
PERSONAL USE ONLY, NOT SHARED	82.1	77.3	50.9	52.0
POOLED WITHIN THE HOUSEHOLD				
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	6.9	15.2	30.2	40.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	11.0	7.6	18.9	8.0
K12B INCOME RECEIVING BETWEEN VILLAGES				
NO SHARING	90.8	85.0	83.0	64.0
OCCASIONAL SHARING	5.6	8.3	13.2	32.0
REGULAR SHARING	3.5	6.7	3.8	4.0
K13A LABOR GIVING WITHIN THE VILLAGE				
PERSONAL USE ONLY, NOT SHARED	6.2	*3.0	8.6	*8.0
POOLED WITHIN THE HOUSEHOLD	24.8	9.1	13.8	8.0
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	54.5	47.0	43.1	20.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	14.5	40.9	34.5	64.0
K13B LABOR RECEIVING IN THE VILLAGE				
NO SHARING	8.4	*3.1	8.9	*4.0
POOLED WITHIN THE HOUSEHOLD	26.6	12.3	14.3	8.0
OCCASIONAL SHARING	51.0	49.2	53.6	24.0
REGULAR SHARING	14.0	35.4	23.2	64.0
K14A LABOR GIVING BETWEEN VILLAGES				
PERSONAL USE ONLY, NOT SHARED	79.3	71.2	72.0	52.0
POOLED WITHIN THE HOUSEHOLD				
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	15.9	21.2	18.0	28.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	4.8	7.6	10.0	20.0
K14B LABOR RECEIVING BETWEEN VILLAGES				
NO SHARING	83.7	67.7	74.5	52.0
OCCASIONAL SHARING	12.1	24.2	17.0	28.0
REGULAR SHARING	4.2	8.1	8.5	20.0
K15A RESOURCE GIVING WITHIN THE VILLAGE				
PERSONAL USE ONLY, NOT SHARED	4.9	*0.0	18.6	*4.0
POOLED WITHIN THE HOUSEHOLD	15.3	4.6	6.8	12.0
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	60.4	52.3	45.8	20.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	19.4	43.1	28.8	64.0
K15B RESOURCE RECEIVING IN THE VILLAGE				
NO SHARING	5.0	*3.0	8.8	*12.0
POOLED WITHIN THE HOUSEHOLD	17.7	9.1	7.0	8.0
OCCASIONAL SHARING	58.2	42.4	59.6	12.0
REGULAR SHARING	19.1	45.5	24.6	68.0
K16A RESOURCE GIVING BETWEEN VILLAGES				
PERSONAL USE ONLY, NOT SHARED	75.9	*54.5	52.9	36.0
POOLED WITHIN THE HOUSEHOLD				
OCCASIONAL SHARING w/ OTHER HOUSEHOLDS	22.1	28.8	33.3	28.0
REGULAR SHARING WITH OTHER HOUSEHOLDS	2.1	16.7	13.7	36.0

Table A1 continued.

Key Informant Protocol Variables	Nonnat	Native	Nonnat	Native
	1989 (N145)	1989 (N67)	1991 (N61)	1991 (N25)
K16B RESOURCE RECEIVING BETWEEN VILLAGES				
NO SHARING	80.1	*58.1	55.1	50.0
OCCASIONAL SHARING	17.7	24.2	30.6	25.0
REGULAR SHARING	2.1	17.7	14.3	25.0
K19 HOUSEHOLD COMPOSITION/DYNAMICS				
OPEN AND FLUID (TRADITIONAL)	13.1	15.4	8.5	20.0
INFREQUENT CHANGE	12.4	13.8	33.9	36.0
STABLE (WESTERN)	74.5	70.8	57.6	44.0
K20 RULES FOR HOUSEHOLD DYNAMICS				
(1) NO STANDARD RULES (TRADITIONAL)	12.8	*31.3	23.2	40.0
(2) BLEND OF 1 AND 3	12.1	20.3	16.1	28.0
(3) CLEAR EXPECTATIONS (WESTERN)	75.2	48.4	60.7	32.0
K23 SODALITY MEMBERSHIP				
NO MEMBERSHIPS IN HOUSEHOLD	42.1	56.1	39.7	40.0
ONE MEMBERSHIP IN HOUSEHOLD	18.6	21.2	19.0	32.0
TWO OR MORE MEMBERSHIPS IN HOUSEHOLD	39.3	22.7	41.4	28.0
K24 POLITICAL PARTICIPATION IN HOUSEHOLD AT PRESENT				
NO OFFICIAL CAPACITIES	90.3	75.8	89.8	72.0
ONE OFFICIAL CAPACITY	5.6	13.6	6.8	24.0
TWO OR MORE OFFICIAL CAPACITIES	4.2	10.6	3.4	4.0
K25 IDENTIFICATION OF POLITICAL ISSUES				
NO ISSUES CORRECTLY IDENTIFIED	6.3	14.1	6.7	8.0
ONE ISSUE CORRECTLY IDENTIFIED	17.6	21.9	8.3	20.0
TWO ISSUES CORRECTLY IDENTIFIED	36.6	26.6	30.0	16.0
THREE OR MORE ISSUES IDENTIFIED	39.4	37.5	55.0	56.0
K26 RELIGIOUS PARTICIPATION IN HOUSEHOLD				
DO NOT PROFESS RELIGION OR PARTICIPATE	35.9	30.3	38.3	36.0
ATTEND CEREMONIES OCCASIONALLY	31.0	31.8	26.7	24.0
ATTEND CEREMONIES REGULARLY	33.1	37.9	35.0	40.0
K27 EXTRACURRICULAR RELIGIOUS ACTS				
NO EXTRACURRICULAR ACTIVITIES	53.8	47.0	60.0	60.0
ONE/TWO ON OCCASIONAL BASIS	25.2	24.2	16.7	4.0
ONE/TWO ON REGULAR BASIS	10.5	16.7	10.0	8.0
MORE THAN TWO REGULARLY	10.5	12.1	13.3	28.8
K28 ETHICAL RESPONSIBILITY FOR ATTAINMENT				
SEEK SUCCESS FOR SELF (PERSONAL)	38.5	*16.7	47.3	*8.3
SEEK SUCCESS FOR SELF & FAMILY	47.6	37.9	25.5	45.8
SEEK SUCCESS FOR FAMILY, NETWORK OF KINSPERSONS, ELDERS, FRIENDS, VILLAGE	14.0	45.5	27.3	45.8

Table A1 continued.

Key Informant Protocol Variables	Nonnat 1989 (N145)	Native 1989 (N67)	Nonnat 1991 (N61)	Native 1991 (N25)
K29 ETHICS AND SIGNIFICANT ENVIRONMENTAL SYMBOLS				
(1) RESOURCES ARE COMMODITIES	38.9	*30.2	30.8	*0.0
(2) BLEND OF 1 AND 3	55.6	44.4	59.6	54.2
(3) RESOURCES AND ENVIRONMENT HAVE SPIRITUAL a/o CULTURAL SIGNIFICANCE	5.6	25.4	9.6	45.8
K30 ETHICS OF PERSONAL COOPERATION				
(1) PERSONAL COMPETITION FOR SELF GAIN	22.4	*7.6	15.1	*4.0
(2) 1, 3 OR 4, DEPENDING ON SITUATION	51.7	40.9	49.1	16.0
(3) COOPERATION AND COMPETITION	13.3	19.7	24.5	32.0
(4) MAINLY COOPERATION-COMMUNITARIAN	12.6	31.8	11.3	48.0
K31 ENCULTURATION AND GENDER DISTINCTIONS				
WESTERN ENCULTURATION & GENDER	86.6	*26.2	65.4	*16.7
WESTERN AND TRADITIONAL ARE MIXED	10.6	47.7	28.8	54.2
TRADITIONAL ENCULTURATION & GENDER	2.4	26.2	5.8	29.2
K33A ECONOMIC CONFLICTS?				
NO	13.4	*37.3	12.3	12.5
YES	86.6	62.7	87.7	87.5
K33B PERSONAL ECONOMIC CONFLICTS?				
NO	22.7	*37.7	24.5	34.8
YES	77.3	62.3	75.5	65.2
K35 PERCEIVED OBJECTIVES OF SERVICES				
CORRECT IDENTIFICATION OF OBJECTIVES	84.1	79.0	80.4	80.0
INCORRECT IDENTIFICATION OF OBJECTIVES	15.9	21.0	19.6	20.0
K37 PLACE RESPONDENT BORN AND REARED				
OUTSIDE THE REGION/ALASKA	83.8	*34.4	90.0	*37.5
IN THE REGION BUT NOT SUBREGION	4.2	4.7	3.3	12.5
IN THE SUBREGION BUT NOT THE VILLAGE	2.1	21.9	1.7	4.2
IN THE VILLAGE OF CURRENT RESIDENCE	9.9	39.1	5.0	45.8
K37B RESPONDENT'S SPOUSE WAS BORN AND REARED				
OUTSIDE THE REGION/OUTSIDE ALASKA	83.2	*37.5	77.5	57.1
IN THE REGION BUT NOT SUBREGION	5.3	12.5	10.0	64.3
IN THE SUBREGION BUT NOT THE VILLAGE	2.7	10.0	0.0	0.0
IN THE VILLAGE OF CURRENT RESIDENCE	8.8	40.0	12.5	35.7
K39 SOCIAL SERVICES USED BY RESPONDENT				
(1) AVOID ALL SERVICES	27.6	15.4	14.0	0.0
(2) HEALTH SERVICES	31.3	52.3	33.3	56.0
(3) FINANCIAL SERVICES	3.0	1.5	1.8	0.0
(4) FAMILY AND SOCIAL SERVICES	11.9	3.1	5.3	0.0
(5) HEALTH (2) AND FINANCIAL (3)	15.6	12.3	24.6	24.0
(6) FAMILY-SOCIAL (4) AND TWO OR MORE	10.4	15.4	21.1	20.0

Table A2. Frequency distributions by total samples and by Native:nonnative contrasts, AQI variables, postpill pretest (N=350, 1988-1989) and posttest (N=216, 1990-1991).^a

	PRE N = 350	NATIVE N=100	NONNAT N=231	POST N = 216	NATIVE N = 59	NONNAT N = 129
Race? D28						
Alaska Native	30.2%			31.4%		
Other race	69.8%			68.6%		
Respondent Sex RSEX						
Male	50.3%	53.0%	50.2%	50.5%	50.8%	48.1%
Female	49.7%	47.0%	49.8%	49.5%	49.2%	51.9%
Respondent Age Group RAGES						
18 to 34	37.6%	45.0%	34.9%	38.5%	33.9%	44.1%
35 to 59	46.8%	39.0%	49.3%	50.7%	57.6%	44.9%
60+	15.5%	16.0%	15.7%	10.8%	8.5%	11.0%
Age of Respondent RAGE						
Mean	42.33	41.20	42.70	40.73	40.54	40.03
Respondent Health? B1						
Very poor	.9%	0.0%	1.3%	1.5%	4.1%	.8%
Poor	1.4%	2.0%	.9%	1.5%	2.0%	1.6%
Fair	11.1%	18.0%	9.1%	10.8%	22.4%	8.7%
Good	42.3%	46.0%	40.7%	34.3%	26.5%	36.2%
Very Good	44.0%	34.0%	47.6%	35.3%	32.7%	33.1%
NA	.3%	0.0%	.4%	16.7%	12.2%	19.7%
Where Were You Born? D24		*			*	
Outside Alaska	66.0%	13.0%	87.4%	71.8%	11.9%	95.3%
Alaska	11.1%	28.0%	4.8%	7.4%	20.3%	1.6%
This region	7.7%	21.0%	2.6%	6.0%	18.6%	1.6%
Here	13.7%	37.0%	3.9%	13.9%	49.2%	.8%
NA	1.4%	1.0%	1.3%	.9%	0.0%	.8%
How Many Years Have You Lived in This Village? D25		*			*	
Year or Less	10.9%	3.0%	14.3%	8.4%	3.5%	10.9%
2-5 Years	14.0%	7.0%	17.7%	21.0%	1.8%	27.9%
6-10 Years	18.3%	8.0%	23.4%	19.2%	22.8%	18.6%
11 Years or More	56.6%	81.0%	44.6%	51.4%	71.9%	42.6%
NA	.3%	1.0%	0.0%	0.0%	0.0%	0.0%
Respondent's Home Before Locating in Village? D26		*			*	
Beyond Alaska	47.3%	11.5%	59.6%	53.6%	11.3%	69.0%
Alaska	31.0%	32.2%	30.9%	25.1%	22.6%	24.6%
This region	6.0%	11.5%	4.3%	10.1%	26.4%	4.8%
Here	15.8%	44.8%	5.2%	11.1%	39.6%	1.6%

^aTests of significance are calculated for dichotomous nominal data (proportions), ordinal data (Kolmogorov-Smirnov for independent samples), and interval data (t-test for independent samples). Differences at $\leq .07$ are demonstrated by asterisks (*). Asterisks in column 1 (PRE) represent differences between Pretest and Posttest, in column 2 (Native) between Native:Non-Native in the Pretest, and in column 5 (Native) between Native:Non-Native in the Posttest.

Table A2 continued.

	PRE N = 350	NATIVE N=100	NONNAT N=231	POST N = 216	NATIVE N=59	NONNAT N=129
Currently Married? D29		*			*	
No	37.2%	44.9%	33.3%	39.8%	54.2%	29.5%
Yes	62.8%	55.1%	66.7%	60.2%	45.8%	70.5%
Race of Spouse? D29A	*	*			*	
Alaska Native	36.4%	83.1%	11.8%	26.0%	66.7%	12.8%
Other race	63.6%	16.9%	88.2%	74.0%	33.3%	87.2%
Number of Years of Education Completed? C1		*			*	
1-8 Years	9.2%	24.2%	3.5%	5.6%	11.9%	3.9%
9-12 Years	39.9%	52.5%	33.5%	45.1%	55.9%	36.7%
College	39.7%	18.2%	48.3%	40.5%	30.5%	47.7%
Higher	11.2%	5.1%	14.8%	8.8%	1.7%	11.7%
Employment Sector PPEMP	*				*	
Public	27.3%	34.2%	23.6%	30.3%	41.4%	27.9%
Private	72.7%	65.8%	76.4%	55.8%	41.4%	59.0%
NA	0.0%	0.0%	0.0%	11.6%	17.2%	13.1%
Months Employed Last Year? C6M		*			*	
None	18.6%	22.0%	18.3%	14.0%	16.9%	13.2%
1-3 Months	10.9%	25.0%	4.8%	11.2%	25.4%	4.7%
4-6 Months	12.3%	13.0%	11.3%	12.1%	13.6%	12.4%
7-9 Months	9.2%	12.0%	8.3%	13.0%	15.3%	13.2%
10-12 Months	49.0%	28.0%	57.4%	49.8%	28.8%	56.6%
Household Income D2		*			*	
<\$5,000	4.6%	13.0%	1.4%	5.2%	12.1%	3.1%
<\$10,000	9.2%	22.8%	4.1%	10.4%	22.4%	4.7%
<\$20,000	13.5%	25.0%	8.8%	16.5%	19.0%	15.0%
<\$30,000	15.1%	15.2%	14.3%	15.1%	15.5%	13.4%
<\$40,000	13.2%	8.7%	13.8%	15.5%	6.9%	17.3%
<\$50,000	12.3%	7.6%	14.7%	12.3%	12.1%	12.6%
>\$50,000	32.0%	7.6%	42.9%	25.5%	12.1%	33.9%
Number of Rooms in House D8	*	*			*	
<3 rooms	5.8%	11.1%	3.9%	9.3%	1.7%	11.6%
3-4 rooms	19.3%	24.2%	18.3%	32.4%	28.8%	33.3%
5-6 rooms	29.4%	30.3%	27.9%	31.0%	32.2%	29.5%
7+ rooms	45.5%	34.3%	49.8%	27.3%	37.3%	25.6%
Household Size HHSIZE						
1	18.3%	17.0%	16.9%	21.3%	13.6%	20.2%
2	27.4%	26.0%	29.0%	20.8%	27.1%	15.5%
3-5	45.4%	47.0%	45.0%	51.9%	50.8%	58.1%
6-8	8.9%	10.0%	9.1%	5.6%	8.5%	5.4%
9-11	0.0%	0.0%	0.0%	.5%	0.0%	.8%
Total Composite Activities in which Respondents Engaged Last Year TOTACT						
None	46.9%	46.0%	47.2%	46.4%	51.9%	40.2%
1 Composite Act	24.6%	20.0%	26.8%	28.2%	18.5%	32.3%
2 Composite Acts	16.9%	19.0%	15.6%	15.3%	20.4%	15.7%
3 Composite Acts	10.9%	12.0%	10.4%	10.0%	9.3%	11.8%
4 Composite Acts	.9%	3.0%	0.0%	0.0%	0.0%	0.0%

Table A2 continued.

	PRE N = 350	NATIVE N=100	NONNAT N=231	POST N = 216	NATIVE N=59	NONNAT N=129
Household Type HHTYPE						
Single Person	17.5%	17.0%	15.7%	32.4%	19.6%	35.8%
Conjugal Pair	21.2%	15.0%	23.9%	15.5%	16.1%	12.2%
Nuclear	35.0%	36.0%	35.7%	33.8%	30.4%	38.2%
Stem	1.7%	3.0%	1.3%	.8%	0.0%	.8%
Sibling Set	.3%	1.0%	0.0%	1.9%	5.4%	.8%
Non-Sibling Set	2.6%	2.0%	3.0%	1.0%	0.0%	1.6%
Single Parent	5.7%	12.0%	2.6%	7.2%	16.1%	4.1%
Remnants	3.7%	5.0%	3.0%	3.9%	10.7%	1.6%
Mixed	12.3%	9.0%	14.8%	3.4%	1.8%	4.9%
Subsistence (Wild) Food Part of Meals Yesterday? A28						
No	64.7%	54.5%	70.4%	67.3%	50.8%	71.7%
Yes	35.3%	45.5%	29.6%	32.7%	49.2%	28.3%
Subsistence Food Part of Meals Day Before Yesterday? A 30						
No	63.8%	54.1%	68.8%	72.1%	67.8%	70.3%
Yes	36.2%	45.9%	31.2%	27.9%	32.2%	29.7%
Either Day Was Subsistence Food Harvested by Self or Others? A31						
Self	36.3%	33.8%	36.9%	47.4%	45.5%	47.4%
Other, Same Household	24.6%	23.1%	27.2%	19.6%	21.2%	19.3%
Other, Different Household	39.1%	43.1%	35.9%	33.0%	33.3%	33.3%
Number Meals Eaten with Relatives in Other Household Last Two Days A32						
None	69.5%	47.5%	78.3%	77.0%	66.1%	81.3%
1-3 Meals	22.7%	36.4%	16.8%	21.1%	32.2%	16.3%
4-7 Meals	6.4%	15.2%	3.1%	1.0%	1.7%	.8%
8+ Meals	1.5%	1.0%	1.8%	1.0%	0.0%	1.6%
Percent Wild Meat/Fish in Diet Last Year? A33						
None	7.5%	2.0%	9.6%	7.5%	3.4%	7.1%
<50%	63.0%	51.5%	68.4%	69.6%	71.2%	66.1%
<75%	13.9%	19.2%	11.8%	10.7%	15.3%	11.0%
75% +	15.6%	27.3%	10.1%	12.1%	10.2%	15.7%
Game Increase or Decrease in Last Five Years? A26A						
Decreased	24.5%	25.5%	25.2%	37.7%	39.0%	38.4%
Stayed Same	38.2%	39.8%	35.8%	36.8%	42.4%	32.8%
Increased	25.4%	26.5%	25.2%	13.7%	11.9%	15.5%
NA	12.0%	8.2%	13.7%	11.8%	6.8%	13.6%
Fish Increase or Decrease in Last Five Years? A26B						
Decreased	22.6%	32.3%	19.4%	43.9%	47.5%	48.0%
Stayed Same	25.2%	29.3%	24.2%	30.4%	30.5%	25.2%
Increased	44.9%	33.3%	48.9%	16.8%	16.9%	16.5%
NA	7.2%	5.1%	7.5%	8.9%	5.1%	10.2%

Table A2 continued.

	PRE N = 350	NATIVE N=100	NONNAT N=231	POST N = 216	NATIVE N=59	NONNAT N=129
Game Available Since Exxon Valdez Spill? A25A						
Decreased	29.7%	38.3%	27.1%	39.2%	53.3%	34.4%
Stayed Same	48.7%	39.5%	51.2%	45.8%	37.8%	49.5%
Increased	2.7%	2.5%	3.0%	3.6%	2.2%	3.2%
NA	19.0%	19.8%	18.7%	11.4%	6.7%	12.9%
Fish Available Since Exxon Valdez Spill? A26A2						
Decreased	44.7%	43.2%	43.3%	47.0%	51.1%	50.5%
Stayed Same	31.7%	30.9%	33.5%	37.3%	35.6%	33.3%
Increased	13.7%	16.0%	13.8%	7.2%	8.9%	5.4%
NA	10.0%	9.9%	9.4%	8.4%	4.4%	10.8%
Percent Wild Food in Diet Since Exxon Valdez Spill? A32B						
None	22.0%	14.8%	25.6%	10.1%	5.1%	8.7%
<50%	61.3%	59.3%	62.1%	78.6%	76.9%	79.3%
<75%	10.0%	17.3%	7.4%	5.7%	10.3%	5.4%
75% +	6.0%	7.4%	4.4%	4.4%	7.7%	4.3%
NA	.7%	1.2%	.5%	1.3%	0.0%	2.2%
Days Visited Friends/Relatives in Past Week? D13						
None	17.2%	12.0%	20.1%	21.3%	20.3%	20.2%
1-2 Days	32.5%	35.0%	31.0%	34.3%	27.1%	35.7%
3-4 Days	19.5%	21.0%	19.7%	18.5%	16.9%	21.7%
5 + days	30.7%	32.0%	29.3%	25.9%	35.6%	22.5%
Times Visited Friends/Relatives in Other Communities in Past Year? D27						
None	17.7%	13.3%	19.8%	19.6%	13.6%	19.7%
1-2 Times	34.9%	30.6%	34.8%	40.2%	33.9%	43.3%
2+ Times	47.4%	56.1%	45.4%	40.2%	52.5%	37.0%
Vote in Most Recent City Council Election? D19						
No	43.1%	42.9%	44.2%	45.8%	51.2%	48.0%
Yes	56.9%	57.1%	55.8%	54.2%	48.8%	52.0%
Vote in Most Recent Statewide Election? D20						
No	33.3%	36.4%	32.6%	34.8%	33.3%	37.1%
Yes	66.7%	63.6%	67.4%	65.2%	66.7%	62.9%

Table A2 continued.

	PRE N = 350	NATIVE N=100	NONNAT N=231	POST N = 216	NATIVE N=59	NONNATIVE N=129
.Number of Public Meetings Attended Last Month? D16						
None	66.2%	66.7%	67.5%	63.7%	67.2%	60.5%
1-2	19.5%	24.2%	17.3%	23.7%	24.1%	24.8%
3+	14.3%	9.1%	9.1%	12.6%	8.6%	14.7%
Vote in Last Village Native Corporation Election? D22						
No	20.5%	20.7%	NA	19.5%	17.5%	NA
Yes	79.5%	79.3%	NA	80.5%	82.5%	NA
Vote in Last Region Native Corporation Election? D23						
No	21.3%	21.6%	NA	18.5%	17.0%	NA
Yes	78.7%	78.4%	NA	81.5%	83.0%	NA
Employed Last Year? C6N						
No	18.6%			15.7%	20.3%	14.7%
Yes	81.4%			84.3%	79.7%	85.3%
Work Away from Your Community Last Year? C12						
No	87.4%	92.0%	84.8%	78.9%	82.1%	75.0%
Yes	12.6%	8.0%	15.2%	21.1%	17.9%	25.0%
Months Left Village for Employment Last Year? C12M						
None	76.2%	74.7%	75.8%	84.7%	83.1%	83.7%
1-3 Months	12.2%	16.2%	11.0%	8.3%	10.2%	8.5%
4-6 Months	5.8%	7.1%	5.7%	4.6%	6.8%	3.9%
7-9 Months	3.2%	1.0%	4.4%	1.4%	0.0%	2.3%
10-12 Months	2.6%	1.0%	3.1%	.9%	0.0%	1.6%
Employment of House Member Due to Exxon Valdez Spill? C13						
None	66.7%	69.1%	68.3%	74.1%	75.6%	76.7%
One Job	23.3%	19.8%	24.1%	16.9%	11.1%	16.7%
Two Jobs	7.0%	8.6%	6.0%	6.0%	11.1%	5.6%
Three or More Jobs	1.7%	2.5%	1.5%	1.2%	2.2%	1.1%
Did Spill-Related Employee Leave Village for Work? C15						
No	57.0%	51.2%	66.6%	81.0%	71.4%	80.6%
Yes	43.0%	48.8%	33.3%	19.0%	28.6%	19.4%
Loss of Employment Due to Exxon Valdez Spill? C16						
None	83.0%	79.2%	83.2%	74.4%	73.7%	74.7%
One Job	13.5%	13.8%	13.3%	18.6%	26.3%	15.7%
Two Jobs	2.5%	7.0%	2.0%	4.8%	0.0%	7.2%
Three or More Jobs	1.0%	0.0%	1.5%	2.2%	0.0%	2.4%

Table A2 continued.

	PRE N = 350	NATIVE N = 100	NONNAT N = 231	POST N = 216	NATIVE N = 59	NONNAT N = 129
Relocation Due to Exxon Valdez Spill? C18						
None	86.0%	88.9%	85.2%	88.6%	82.2%	90.3%
One Time	2.3%	1.2%	2.5%	1.2%	2.2%	1.1%
Two Times	.7%	2.5%	0.0%	0.0%	0.0%	0.0%
Three or More Times	.3%	0.0%	.5%	0.0%	0.0%	0.0%
NA	10.7%	7.4%	11.8%	10.2%	0.0%	0.0%
Smallest Monthly Income Required by Household? D4						
<\$500	11.1%	24.7%	5.0%	8.9%	16.9%	7.1%
<\$1,000	26.1%	34.0%	22.5%	20.7%	28.8%	15.0%
<\$1,500	18.6%	16.5%	19.3%	22.1%	30.5%	18.1%
<\$2,000	20.1%	17.5%	21.1%	15.5%	13.6%	17.3%
<\$2,500	8.1%	2.1%	10.6%	13.1%	5.1%	18.1%
\$2,500+	15.9%	5.2%	21.6%	19.7%	5.1%	24.4%
Is Household Better Off Now than Five Years Ago? D6						
Worse Now	20.2%	22.9%	19.0%	27.9%	32.2%	27.3%
Same	23.2%	35.4%	17.6%	23.3%	30.5%	18.0%
Better Off	56.5%	41.7%	63.3%	48.8%	37.3%	54.7%
Adequacy of Current Income? E29						
Not Satisfied	25.0%	36.4%	20.0%	32.6%	39.0%	27.3%
Somewhat Satisfied	42.8%	40.4%	43.5%	46.5%	40.7%	50.8%
Completely Satisfied	32.2%	23.2%	36.5%	20.9%	20.3%	21.9%
Is Respondent Commercial Fisherman or Owner of Business? D3						
No	57.9	55.5%	61.9%	68.7%	65.3%	68.2%
Yes	42.1	44.4%	38.1%	31.3%	34.7%	31.8%
Amount Invested in Commercial Fishing or Own Business in Past Year? D3A						
None	17.7%	23.5%	16.7%	38.0%	49.0%	23.4%
<\$2,000	12.7%	22.2%	9.9%	7.0%	8.2%	6.4%
<\$5,000	4.3%	3.7%	3.9%	1.2%	0.0%	1.1%
\$5,000+	18.0%	16.0%	18.2%	12.9%	4.1%	20.2%
NA	47.3%	34.6%	34.6%	40.9%	38.8%	48.9%
Will Search for Oil Create More Jobs for Locals? E50						
No	27.4%	28.3%	25.4%	34.0%	40.7%	33.6%
Yes	72.6%	71.7%	74.6%	66.0%	57.6%	66.4%
How Will Search for Oil Affect Fish and Game? E51						
Reduce	47.7%	45.7%	45.8%	51.6%	61.5%	52.2%
No Change	40.7%	29.6%	46.8%	42.8%	35.9%	41.3%
Increase	1.7%	2.5%	1.5%	2.5%	0.0%	4.3%
NA	10.0%	22.2%	5.9%	3.1%	2.6%	2.2%

Table A2 continued.

	PRE N = 350	NATIVE N=100	NONNAT N=231	POST N = 216	NATIVE N=59	NONNAT N=129
Is the Search for Oil a Good or a Bad Idea? E52						
Bad	33.2%	41.4%	26.4%	24.7%	22.2%	25.8%
Mixed Opinion	41.8%	35.4%	47.2%	42.8%	57.8%	39.8%
Good	21.2%	12.1%	25.5%	30.7%	17.8%	32.3%
NA	10.3	11.1%	.9%	1.8%	0.0%	2.2%
Who is Responsible for the Exxon Valdez Oil Spill? E58						
Unavoidable Accident	3.3%	2.5%	3.4%	4.2%	6.6%	2.2%
Captain's Error	17.7%	32.1%	13.3%	22.5%	26.7%	21.5%
Breakdown of Ship's Technology	.3%	0.0%	.5%	0.0%	0.0%	0.0%
Exxon Corp's Negligence	10.3%	9.9%	9.9%	4.8%	8.9%	2.2%
State of Alaska's Negligence	32.0%	30.9%	34.0%	.6%	0.0%	0.0%
Federal Gov'ts Negligence	0.0%	0.0%	0.0%	1.8%	0.0%	2.2%
Combination of all but "Unavoidable Accident"	15.3%	8.6%	11.8%	65.1%	57.8%	70.0%
NA	21.0%	2.5%	27.1%	3.0%	0.0%	1.1%
Property Lost Due to Exxon Valdez Spill? C19						
None	95.7%	95.1%	95.6%	95.2%	93.3%	96.8%
One Item	1.0%	1.2%	1.0%	1.2%	2.2%	1.1%
Two Items	.3%	1.2%	0.0%	0.0%	0.0%	0.0%
Three or More Items	1.3%	0.0%	2.0%	1.8%	0.0%	2.2%
NA	1.7%	2.5%	1.5%	1.8%	4.4%	0.0%
If Respondent Sustained a Financial Loss Due to the Spill, Did Exxon Compensate? C20						
None	46.0%	60.5%	40.9%	64.6%	60.5%	54.7%
Inadequate	10.7%	7.4%	11.8%	29.1%	21.1%	43.8%
Adequate	0.0%	0.0%	0.0%	1.6%	5.3%	0.0%
More than Adequate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
NA	43.3%	32.1%	47.3%	4.7%	13.2%	1.6%
Has Exxon Compensated Respondent for Loss? C20A						
No				29.2%	40.6%	28.6%
Inadequate				12.5%	6.3%	20.6%
Adequate				3.3%	6.3%	3.2%
More than Adequate				0.0%	0.0%	0.0%
NA				55.0%	56.9%	47.6%
Did You Gain (Financially) from the Oil Spill? C20B						
No				90.8%	96.8%	85.7%
Yes				8.4%	3.2%	12.7%

DEMONSTRATION PROJECT JUKEBOX

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Project Jukebox was demonstrated on June 19, 1996 in the "Ongoing Research" section of the Social Indicators Monitoring Study, Peer Review Workshop. Unlike many of the other presentations which featured quantitative research techniques, Project Jukebox features individual narratives which are accessed via a computer and are accompanied by associated photos, maps, and text. Also, unlike the other presentations, the jukeboxes focus on local perspective as opposed to research reports which talk about a particular population.

Research will begin shortly in Prince William Sound communities to document the history and cultures of the region and the changes that have ensued in subsistence activities in recent years with the *Exxon Valdez* disaster. Initial meetings have been held in the communities and at the regional level. The research will be coordinated by the State Department of Fish and Game and the technical construction of the computer-based program will be done by the Oral History Program at the University of Alaska Fairbanks. Copies of the program will be available in the communities. Each community will play an integral role in the design of the program.

QUESTIONS AND DISCUSSION

Audience Member: If you take it (the computer program) back to communities do they ever say we don't want it?

Schneider: No. They sign a release. People are conscious that they are making a public record.

Audience Member: How much computer memory is needed?

Schneider: Five or six CD-ROMs.

Audience Member: Have any legal issues come up yet?

Schneider: Yes. One community was concerned with providing an historical record that disclosed fishing patterns. In one administration it was against law to fish in an area; in another administration it was not. There are some very difficult decisions that have to be addressed.

Ivanoff: Have Native organizations and corporations been contacted?

Schneider: Yes.

Callaway: Bristol Bay is putting in high transmission lines so they can access this and other programs.

Audience Member: Do you plan to run a network to schools?

Schneider: In the near future, we will give the CDs and the hardware to people. But in the future we would like to set up on local area networks. Alternative users will benefit and reinforce the lifespan of information.

Callaway: The National Park Service is using "jukeboxes" in parks.

Schneider: We would encourage agencies to use this approach to get information back out to the regions.

Audience Member: Being on line would be a good resource.

Schneider: We are not moving quickly enough to put it out to the "Great Unwashed."

Audience Member: There is an Alaska Traditional Knowledge Home Page. Part of this is on line.

Audience Member: How could we get the Social Indicators information out to the public?

Callaway: I would like to see the text put on CD-ROM and have a key word search mechanism.

Levine: That has appeal but it is a different kind of information.

Schneider: One could have a village council meeting with Joe Jorgensen and video tape it and put it on.

Schwantes: With the Trustee Council, a big issue is how to get information back to the public. They have been summing up research conclusions in radio spots.

**SOCIOCULTURAL CONSEQUENCES OF ALASKA
OUTER CONTINENTAL SHELF ACTIVITIES: DATA ANALYSIS AND INTEGRATION**

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In 1995, the Division of Subsistence of the Alaska Department of Fish and Game (ADF&G) entered into a three-year cooperative agreement with the U.S. Department of the Interior, Minerals Management Service (MMS) to continue the investigation of the sociocultural consequences of Alaska Outer Continental Shelf (OCS) development. The study's major goals are to analyze and integrate subsistence, economic, and sociocultural data from two previous cooperative agreements between ADF&G and MMS, to provide comparative data analyses for Alaska's OCS planning areas, to collect unique information about socioeconomic change at the household and community levels for *Exxon Valdez* Oil Spill-affected communities, to cooperate with agencies and community and regional organizations in assessing the occurrence and implications of sociocultural continuity and change, and to effectively communicate study results to local communities and regional organizations. Below, the seven project tasks are briefly described.

Task 1. Creation of an ADF&G SPSS¹ Meta File

The purpose of this task is to develop a database using the results of earlier ADF&G systematic household interviews. These include harvest surveys and social effects questionnaires. The database will include information from 24 communities in Prince William Sound, Cook Inlet, the Kodiak Island Borough, the Alaska Peninsula, and the Arctic. The database will protect the anonymity of participants in earlier household surveys, and none of the products which are based on this information will reveal individual or household identities.

Task 2. Literature Review

This task consists of a review of relevant literature of the *Exxon Valdez* Oil Spill and other socioeconomic studies as they relate to understanding sociocultural change and continuity in communities of the spill area. The literature review will serve as the basis for developing testable hypotheses which will be explored through analysis of the database and follow-up key respondent interviews. Under a subcontract with ADF&G, Dr. Joanna Endter-Wada of Utah State University is assisting with this task.

¹ Statistical Package for the Social Sciences.

Task 3. Time-Series Analyses of Data Sets

Using the database assembled as part of Task 1, work under this task will include a multivariate analysis of all independent variables, and an investigation of presumed relationships between variables that were identified during the literature review. The findings will be reviewed in a workshop and evaluated by key respondents. Most of this analysis is being undertaken by Dr. Douglas Levine of the Bowman Gray School of Medicine as part of a subcontract with ADF&G.

Task 4. Ethnographic Case Studies and Key Respondent Interviews

Products of this task will be five ethnographies (case analyses) of communities for which information has been collected in previous studies. Several case ethnographies will involve paired communities. Pending community approval, case communities will be from Prince William Sound, Lower Cook Inlet, and Kodiak Island. These are:

- Chenega Bay/Tatitlek
- Nanwalek/Port Graham
- Valdez
- Cordova/Kodiak
- Old Harbor/Ouzinkie

Additional fieldwork will take place to fill in gaps from earlier research. This fieldwork will consist of key respondent interviews and participant observation. No systematic household surveys are planned for the project. Each ethnography will be a separate "stand alone" report. Thorough review of the ethnographies by each study community is a requirement of the cooperative agreement.

Task 5. Oral Histories ("Project Jukebox")

The goal of this task is to plan, develop, and distribute a series of oral histories from Alaska Native elders and other knowledgeable people in Chugach Region communities using the techniques developed by the University of Alaska's Project Jukebox. Jukebox is an interactive, multi-media computer system which preserves oral histories and associated photographs, maps, and tests in a CD-ROM format (compact disk - read only format). The content and themes of the oral histories will be developed in collaboration with each study community and regional Alaska Native groups. A project goal is to coordinate closely with other ethnographic and cultural heritage programs. Two regional workshops to demonstrate Project Jukebox products and plan the program took place in Anchorage. Also, demonstrations of Project Jukebox were held in the four proposed study communities of Tatitlek, Chenega Bay, Port Graham, and Nanwalek. Following these workshops, approvals to move forward with the Project Jukebox and ethnographies tasks were obtained from the four study communities. Taped interviews will take place with about 20 to 25 people in the four villages, supplemented if necessary with interviews in other Chugach Region communities. All participation will be voluntary. Local project assistants for each community will be hired. Training will also be provided in the use of the products in each study community.

Task 6. Geographic Information Systems

In this task, a geographic information system (GIS) database will be prepared that will support the development of the ethnographies and the final report. This system will be based on existing information. No new mapping interviews will be conducted.

Task 7. Final Report

This task will produce the final project report — a comprehensive, comparative analysis drawing upon all the project's quantitative and qualitative information.

Products

In summary, the project will result in the following products:

- A household-level database of subsistence, demographic, and economic information
- A quantitative analysis of this database
- A literature review
- Five "stand alone" ethnographies
- A set of Project Jukebox CD-ROMs that contain oral history information for Chugach Region communities
- A GIS database
- A final, integrative report

Schedule

October 1995	Project Startup
December 1995, January 1996	Workshops for planning Project Jukebox
March 1996	Database preparation complete
May 1996	Project Jukebox work plan complete; begin field work
June 1996	Literature review complete; begin time-series analysis and ethnographies
December 1996	Time-series data analysis complete; workshop to review findings
September 1997	Submit draft ethnographies for review
September/October 1997	Complete Oral History CD-ROMs and distribute to communities
May 1998	Submission of draft final report; Submission of final report; end of project

Personnel

For ADF&G, principal investigators for this project are Robert Wolfe (research director), Charles Utermohle (research analyst), and James Fall (regional program manager). Other ADF&G staff include Louis Brown, Jim Magdanz, Rita Miraglia, Craig Mishler, Amy Paige, Sverre Pedersen, Lisa Scarbrough, Cheryl Scott, Bill Simeone, Sandy Skaggs, and Ron Stanek. Personnel from the University of Alaska Fairbanks will assist with the oral histories (Project Jukebox). Under subcontracts, Dr. Douglas Levine of Wake Forest University will conduct quantitative data analysis, and Dr. Joanna Endter-Wada of Utah State University will assist with the literature review and the ethnographies.

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Discussion and Recommendations

DISCUSSION AND RECOMMENDATIONS

PAST USE OF SOCIAL INDICATOR DATA

During the past two days we have had the opportunity to review the MMS Social Indicators studies that were initiated during the mid 1980s.

These indicators were put to use during the *Exxon Valdez* oil spill and demonstrated that the database was sufficient to characterize the effect of the spill on the local Native communities. Over time, additional data from more recent sociological studies and surveys have been added to the database, and the process continues today. It is an evolutionary process.

The question we are faced with is: How do we incorporate that information into our overall decision making process?

When we examined how we have used social indicators in the environmental impact statement (EIS) process, the conclusion was, "They are not used." Generally, sale-specific EISs and five year program EISs are prepared; and to date, the social indicators information has not been utilized extensively.

Within the format of an EIS there is an environmental setting section. The intent of this section is to provide a current description of the "affected environment." It is perhaps unique to the Alaska OCS Region EISs that they have a social-systems section and a subsistence-harvest patterns subsection. To generate a description of the affected environment, ethnographies with the greatest portion of the data from the Alaska Department of Fish and Game (ADF&G) information are used. MMS also uses the Community Profile Database and what has been referred to as "MMS II" which was generated by ADF&G.

Normally all of these data are used to describe the current sociocultural systems and the subsistence harvest patterns.

In addition to sale-specific and five year EISs, the potential effects of specific exploration, development, or production activities are analyzed.

Unfortunately, the social indicators data have not been utilized extensively in the EIS process. The most likely reasons are:

1. That the social indicators information is too technical, and that staff do not understand it, and
2. That it represents a theoretical monitoring program, and not information that can be used to predict effects.

HISTORY OF THE SOCIAL INDICATORS DATABASE

Social indicators have been evolving at MMS's Alaska OCS Region for the last 13 or 14 years, and have influenced how MMS relates as an agency to the social sciences. The Gulf of Mexico Region is just beginning to do social science, even though oil development and production have been on-going in the region for many years.

Alaska is unique. It is one of the few places in the world where there is an abundance of small unique communities that have a strong historical relationship with subsistence — communities that have not atrophied or been destroyed by outside influences.

The original MMS "social indicators" concept began in the Alaska OCS Region in 1983. It is expensive to collect field data and do research, so alternative methodologies were explored. At that time a number of public agencies (local, State and Federal) were collecting and archiving data for a variety of reasons — data that could provide a significant database if assembled into a usable format. These data could potentially provide indicators of social change in communities resulting from oil and gas exploration and development, and in particular the effects associated with the "boom-bust" changes.

The available data were assembled and analyzed to find parameters or measures that were sensitive to change. These initial attempts were complicated by the size and complexity of the database, and the statistical tools required to conduct the analyses. Additionally there were questions as to the quality of the data collected by other agencies for purposes other than that intended by MMS, and the superimposition of other influences and changes (such as the OCS Lands Act) on Native and nonnative rural communities that were occurring concurrently. The influences of offshore oil and gas development were only a small portion of the change to which people and communities were adjusting.

The Kruse-Braund study in 1985 (MMS 85-0079, TR 116) evolved from the shortcomings of the prior studies. New formats in the participant questionnaires were developed to focus on correlating measures of well-being with the activities of the Federal agencies.

In 1986 the Jorgensen-Yale study was initiated by MMS with a more complex, but improved questionnaire. Shortly thereafter, the ADF&G Division of Subsistence initiated their own study. The combined effect was a cooperative effort and commitment to assemble more detailed information on subsistence.

POTENTIAL USE OF DATA IN THE EIS PROCESS

The major emphasis should be on assimilation, making the material more accessible and more useable for the EIS writer and the public.

The question has been asked: Where do we go from here? Perhaps that can be expanded to: Where can we go from here? It has been stated that "social science doesn't forecast, it is an historical science that has never been successful at forecasting." During the

Exxon Valdez oil spill however, certain sociological events in the Native communities were predicted successfully, based on the assumption that the future would be like the past.

We have assembled a great deal of information and generalizations that could be integrated into the EIS, perhaps in what is called "baseline" part of Section III on the Affected Environment, and specifically in subsection C on the social systems. According to the National Environmental Policy Act (NEPA) guidance, this does not have to be a static description, but an explanation of the environmental status without the proposed project that is being considered. Therefore it is imperative to have some understanding of the dynamics in, and between, communities. Similarly, the social systems impacts have to be addressed under Section IV on the Environmental Consequences. However, it is difficult to integrate the social indicators information here since the social projections are based on economics. The impacts are driven by employment, by how many people will be moving into the community, by how many children will be enrolled in school, by how much will local business increase, etc. Such data generally lend themselves to credible projections, and the social or cultural impacts represent a small portion of the total impact. However in the Alaska OCS Region, this "Social Systems" section of the EIS has been expanded into a substantial part of the document. This is to be expected: social effects are what people are concerned about and EISs are supposed to address what people are concerned about.

The social indicators data contains hypotheses and findings that could be synthesized into information useful for making projections. However, extracting and synthesizing the information for an EIS that deals with complex societies requires a good grounding in the social sciences.

INTEGRATION OF MONITORING DATA

There is a possibility of initiating a monitoring program that would utilize those parameters (indicators) that have been determined to be credible predictors in the past. Some agencies that had contributed to the social indicators database have spent 14 or 15 years looking at the concept of monitoring, trying to develop a system. We have the basis for a monitoring program that, when combined with other active databases, could be structured and enlarged to include more parameters, then pared down to the elements or variables that have been demonstrated to be valid and reliable. Funding for such studies has been radically reduced in recent years so that it would be a matter of necessity to focus any future efforts on variables that have shown the strongest correlations and that are easiest to measure. Such a program was successfully implemented during the *Exxon Valdez* oil spill, with the number of sampled variables reduced to no more than 20.

There may be trade-offs to reductions in the number of variables to lower the cost of such monitoring efforts. Transportation and support for field sampling teams is the major source of cost. The incremental cost of an added variable is usually relatively minor since it primarily affects just the analysis. Perhaps alternatives such as telephone interviews, or having local persons conduct the sampling, could result in a more cost-effective effort without compromising the statistical integrity of the data.

The MMS is encouraged to formulate cooperative research agreements with Native organizations to assist in the formulation of local panels of informants, and the conduct of the field surveys. It not only is more cost effective but would provide more efficient and effective access to the community. It would require some training and exchange of information, similar in scope to the very successful program at the initiation of the 1983 social indicators surveys. At present, the ADF&G estimates the cost of each survey at about \$30,000. Since a significant portion of the expense is transportation and per diem, the use of local personnel could reduce the cost considerably.

The issue may not be the number of variables, but rather the selection of "key indicator villages," based on the social indicators database and experience. Since many villages may be affected by a variety of events, both natural and man-induced, it would be desirable to have a number of key indicator villages.

Additionally it is possible to reduce the frequency of sampling. For example it may be possible to develop a sampling strategy that would allow alternate villages to be sampled in alternate years. This would have the advantage of reducing costs, and the burden on the persons and communities being surveyed. If six Native villages and six Hub villages were selected, and one each sampled every year, it would be possible to reduce monitoring effort significantly. There is considerable information for a number of villages. It has been demonstrated repeatedly that Hub villages are similar and Native villages are similar. If one contrasts Natives from nonnatives, Natives are similar and nonnatives are similar. We know how villages differ. We know how the Natives and nonnatives differ. And by that fortuity of the *Exxon Valdez* oil spill, we found how they happened to respond during a normal crisis event.

Utilizing the social indicators database already assembled by MMS to provide a baseline, an effective monitoring program can be designed. The social indicators data comes directly from the villages; it comes from individuals, the primary source of information. Those data are then returned to undergo scientific analysis. Perhaps the indicators can be used as a "trigger," calling for a mitigation response if an effect is detected.

POTENTIAL ADDITIONS TO MONITORING PROGRAMS

While we have an excellent database there are questions that remain to be answered and perhaps questions that have not been asked. In some cases the answer may reside within the existing data and has yet to be discovered, and in other cases the answer may require the collection of additional data.

Such examples are the effects on culture of governmental agencies in general, and on subsistence specifically. How do we identify these governmental effects and how do we monitor them? It is not a subject that has received much attention and one that has most certainly not been monitored.

How do we measure changes in levels of subsistence? Sharing of subsistence food items is a dominant characteristic of the Native community; however, the frequency and number of shared things make it difficult to track. The data are within the database, as well

as documentation of the changes in those sharing patterns during the *Exxon Valdez* oil spill. It would be valuable to look at long-term changes and variability to determine the degree of flexibility.

How do we measure cultural strength — not necessarily cultural integrity, in the sense of always doing the same thing — but the ability of cultures to adapt to new or changing situations? Is there an ability to maintain that structure, a degree of durability? Can we measure that? The answer is "yes." It was demonstrated in monitored parameters during the *Exxon Valdez* oil spill. Basically, there was more sharing, accentuating the Native ethic as described in the Social Indicators studies. If the Native communities feel the need for additional parameters to document this resilience, or describe other important features of their life, they could be easily incorporated.

The MMS is charged with mitigating the effects of the offshore leasing program and exploration and development operations. The primary reason for the monitoring is to determine the effects of the program. Experience with the *Exxon Valdez*, an oil transportation accident, indicates that short-term effects can be mitigated, but not long-term ones.

RECOMMENDATIONS

1. The Social Indicators materials should be made more useable. The data should be reformatted and synthesized to make the information more accessible and readable for EIS writers and readers. It is imperative to have some explanation of the dynamics in, and between, communities.
2. The social indicators data should be utilized more effectively in EISs. It comes from the primary source of information. It represents the collective knowledge and input of 41 villages, and is scientifically sound.
3. A monitoring program to maintain the database should be initiated. It would be reduced in scope but focused on the most demonstrably sensitive and reliable of the social indicators.
4. The reduction in scope should be directed at the frequency of sampling, the number of variables, and interview procedures. Perhaps telephone interviews could result in a more cost-effective effort without compromising the statistical integrity of the data. If possible, the number of villages sampled should remain the same to maintain the vigor of the sampling program.
5. It is recommended that MMS enter into cooperative agreements with Native groups to involve the local community and help reduce the cost of field surveys.
6. Funding alternatives should be sought to maintain the database and to provide greater dissemination.

Appendix A
Attendee List

MMS - Alaska OCS Region
Social Indicators Monitoring Study Peer Review Workshop
June 18 and 19, 1996

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