

Indicators of Social, Economic, and Cultural Cumulative Effects
Resulting from Petroleum Development in Alaska:
A Review

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Purpose of Report

This report is intended to inform the development of approaches to predicting and monitoring cumulative social, economic, and cultural changes in NWT communities resulting from the Mackenzie Gas Project and associated developments. The report is based on Alaska's experience. As the report describes, this experience has been both positive and negative, offering both model approaches and approaches to be avoided. The report does not focus on the cumulative impacts of petroleum development in Alaska. Rather, the report focuses on the design and implementation of research intended to predict or monitor cumulative social, economic, and cultural changes associated with petroleum development in Alaska.

The title of this report includes the word "indicators", reflecting the interest of the Joint Review Panel in systems of predicting and monitoring cumulative changes. The development and use of indicators of change is usually central to the goal of predicting and monitoring change. Indicators are the operational measures of different aspects of change. Their meaning is constrained by the practicalities of measuring them. An indicator of cultural change, for example, may be the continued use of an aboriginal language. We know, however, that use of an aboriginal language is only a part of culture. Indicators are so central to the goal of predicting and monitoring change that they can be confused with the goal itself. This report attempts to put its discussion of indicators in the context of the broader goal of predicting and monitoring change. Modeling, for example, is important to predicting change. Also important are baseline descriptive studies that identify important aspects of change.

This report was prepared by Jack Kruse, PhD, University of Alaska. The views, conclusions and recommendations expressed herein are solely those of the author and do not represent the views of the Joint Review Panel.

Organization of Report

The main body of the report begins with *Indicator Initiatives in Alaska*. This section explains the programs and smaller scale initiatives producing indicators in Alaska. The second section, *Range of Indicators*, lays out the array of indicators that have been identified as relevant in Alaska. The third section reviews the *Achievements and Limitations of Indicators* that have been, or could be, used to help predict and monitor the cumulative effects of petroleum development. The report has two concluding sections: *Constraints to Indicator Use in Cumulative Development Assessment*, and *Opportunities for Improvements in Indicator Use in Cumulative Development Assessment*.

Indicator Initiatives in Alaska

Overview

The major focus of this report is on social research contracted under the US federal government Minerals Management Service Environmental Studies Program¹. The Minerals Management Service is responsible for development of petroleum resources in federal offshore waters, including the coastal waters of Alaska. As part of its responsibility the agency prepares environmental impact statements prior to leasing and other major development decisions. The Minerals Management Service received funding from Congress in the early 1980's to implement a program of research to assist the agency in preparing environmental impact statements and managing development impacts. Since 1983 the Minerals Management Service has spent almost 50 million in current dollars on social science research, resulting in over 200 scientific reports². I return to a more comprehensive description of the Minerals Management Service Environmental Studies Program after identifying the other indicator initiatives in Alaska.

Alaska's experience in social research relevant to predicting and monitoring the cumulative effects of petroleum development in Alaska extends beyond that of the Minerals Management Service Environmental Studies Program. Also of interest is the experience resulting from the discovery and development of petroleum resources on the North Slope of Alaska. The story of North Slope petroleum development is fascinating, but beyond the scope of this report. For a succinct account, see *Issues in Alaska Development*³. For our purposes here, it is important to know that in 1973 the US Congress declared that the intent of the National Environmental Policy Act had been met and that, "the early development and delivery of oil and gas from Alaska's North Slope to domestic markets is in the national interest because of growing domestic shortages and increasing dependence upon insecure foreign sources⁴." The decision by Congress curtailed further examination of the potential environmental impacts of the pipeline and associated development at Prudhoe Bay. There were, however, many provisions in the Trans-Alaska Pipeline Operating Agreements for monitoring environmental effects. The single provision directly relevant to the social effects of petroleum development in the Trans-Alaska Pipeline Operating Agreements concerned Native employment: "permittees shall furnish such information and reports concerning Alaska Native employment as the Authorized Officer shall require from time to time⁵." The provisions of the Operating Agreements relevant to social indicators were not changed in their recent renewal to 2034⁶.

Prudhoe Bay and the Trans-Alaska Pipeline were, however, the impetus for a much more comprehensive series of social research projects on the effects of energy development in Alaska. The principal research funding agency in the United States, the National Science Foundation, sponsored the *Man-in-the-Arctic Program* during the early 1970's to the early 1980's. The *Man-in-the-Arctic Program*, or MAP, developed statewide and regional models of population and economic change, and examined the distribution of social impacts among Alaska's diverse populations⁷. More recently, the National Science Foundation has sponsored research that expands our understanding of indicators of social, economic, and cultural change in Alaska, funding about \$25 million in social science research between 1995 and 2004⁸. Among the studies funded by the National Science Foundation are the *Sustainability of Arctic Communities* project⁹, a collaboration of Canadian and US researchers, and the *Survey of Living Conditions in the Arctic* study¹⁰, a collaboration of people from eight countries.

While large government programs may first come to mind when thinking of predicting and monitoring the effects of development, community-based initiatives can also be important. Another direct result of the Trans-Alaska Pipeline was the creation in 1974 of the Fairbanks North Star Borough Community Impact Information Center. The Center's first director, Mim Dixon, published a synthesis of its work in 1978: *What Happened to Fairbanks? The Effects of the Trans-Alaska Oil Pipeline on the Community of Fairbanks, Alaska*¹¹. The Center exists today as the Community Information Center¹². Sue Fison, the second director of the Fairbanks center, later established an indicator program in Anchorage that was kept current until 2000, *Anchorage Indicators*¹³. Another Anchorage-based indicator program, *Healthy Anchorage Indicators* was also kept current until 2000¹⁴.

Not as directly related to petroleum development activities in Alaska is the research undertaken by the Subsistence Division of the Alaska Department of Fish and Game¹⁵. The major impetus for this research was the *Alaska National Interest Lands Conservation Act* passed in 1980¹⁶. The resulting contribution of 260 technical reports covering 180 Alaska communities is highly relevant to the question of approaches to predicting and monitoring the cumulative effects of petroleum development.

Another piece of federal legislation, the *Alaska Native Claims Settlement Act*¹⁷, directed the Secretary of Interior to report on the status of Alaska Natives. Related to the ongoing implementation of this section of the Act is the design of the long-form sampling program of the decennial census. This design enables the Bureau of the Census to report decennial census sample data by place and Native region with special tabulations for Alaska Natives¹⁸.

As should be evident from the above enumeration of initiatives that have produced relevant indicators of change in Alaska, the body of indicators is the product of many sources, each with its own mandates. The Alaska Department of Labor, for example, produces *Alaska Economic Trends*, with special issues on regional economic development, cost of living, population, and other topics¹⁹. The Alaska Department of Commerce and Economic Development maintains the *Online Community Database*, focusing on population, economic, and financial data²⁰. The Alaska Department of Education publishes in its *Report Card to the Public* place and district level data on, for example, graduation rates and the percentage of students taught by highly qualified teachers²¹. The decentralized nature of indicators in Alaska is, as we discuss further below, both a benefit and a constraint to predicting and monitoring the cumulative social effects of petroleum development. It is a strength because the data are being reported by the agencies who know the most about them, and who are best able to keep them current. It is a constraint because the effort required to bring together data from diverse sources can prove to be prohibitive.

Finally, I should mention two initiatives that, while not directly responsible for producing indicators of cumulative effects, were commissioned with the intention of improving our ability to predict and monitor the cumulative effects of petroleum development in Alaska. Both initiatives were undertaken by the National Research Council, a part of the US National Academies of Sciences, Engineering and Medicine²². The Council provides state of the art scientific review of existing research in response to requests funded by federal agencies. In the early 1990s, the Minerals Management Service requested that the National Research Council review the environmental information used by the agency, including information about the human environment. The resulting *Environmental Information for Outer Continental Shelf Oil and Gas Decisions in Alaska*, published in 1994, contains recommendations for further development of social indicators²³. The federal Environmental Protection Agency commissioned the National Research Council to produce the comprehensive review, *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*, published in 2003²⁴.

The Environmental Studies Program of the Minerals Management Service

We now return to provide a more comprehensive description of the principal initiative to produce indicators to assist in predicting and monitoring the cumulative effects of petroleum development in Alaska. It was in the context of skyrocketing world oil prices in the early 1970s that the US federal government accelerated its actions to develop offshore petroleum resources. By the late 1970s, government mandates for assessing the potential impacts of its actions included the following:

Section 256.82 of Title 30 in the Code of Federal Regulations integrated the mandates of the *National Environmental Policy Act of 1969*, and amendments to the *Outer Continental Shelf Lands Act* first passed in 1978 to define the responsibilities of the MMS:

“(a) The Director shall conduct a study of any area or region included in any lease sale in order to establish information needed for assessment and management of impact on the human, marine and coastal environments which may be affected by OCS oil and gas activities in such area or region”

“(d) After the leasing and developing of any area or region, the Director shall conduct such studies as are deemed necessary to establish additional information and shall monitor the human, marine and coastal environments of such area or region in a manner which can be compared with the results of studies conducted prior to OCS oil and gas development. This shall be done to identify any significant changes in the quality and productivity of such environments, to establish trends in the areas studies, and to design experiments identifying the causes of such changes. Findings from such studies shall be used to recommend modifications in practices which are employed to mitigate the effects of OCS activities and to enhance the data/information base for predicting impacts which might result from a single lease sale or cumulative OCS activities.”

The Code of Federal Regulations (CFR) contains two additional directives relevant to the social component of the MMS program:

“Section 251.2 (r) "Human environment" means the physical, social, and economic components, conditions, and factors which interactively determine the state, condition, and quality of living conditions, employment, and health of those affected, directly or indirectly, by activities occurring on the OCS.”

“Section 256.82 (e) Information available or collected by the studies program shall, to the extent practicable, be provided in a form and in a time frame that can be used in the decision-making process associated with a specific leasing action or with longer term OCS minerals management responsibilities.”

To support the above responsibilities, the federal government established the Environmental Studies Program in 1973 and, at the urging of the State of Alaska, added a human dimension component to the Environmental Studies Program in Alaska in 1976. Virtually all social research under the Environmental Studies Program is conducted by contractors (e.g. private consultants, university-based researchers) and other government agencies (e.g. the Alaska Department of Fish and Game). Research priorities are driven by: (1) the region in which lease sales or other major actions are planned; (2) a program research design (described below) that has evolved over time; (3) advice and direction from federal Office of Management and Budget and the General Accounting Office; the National Academy of Sciences, the national OCS Scientific Committee; and many organizations such as the North Slope Borough and the Alaska Eskimo Whaling Commission.

The social science component of the Environmental Studies Program has been staffed in most years by five people, although staff levels have dropped to as low as two. Staff generally have a masters or Ph.D. in one of the social sciences, usually anthropology. They assist in preparation of Annual Studies Plans and serve as the Contracting Officer's Technical Representative on individual research projects. Each research project results in one or more technical reports. Projects generally last for several years. As a rough guide to the scale of the social science program, over 200 reports have been published over the past 20 years.

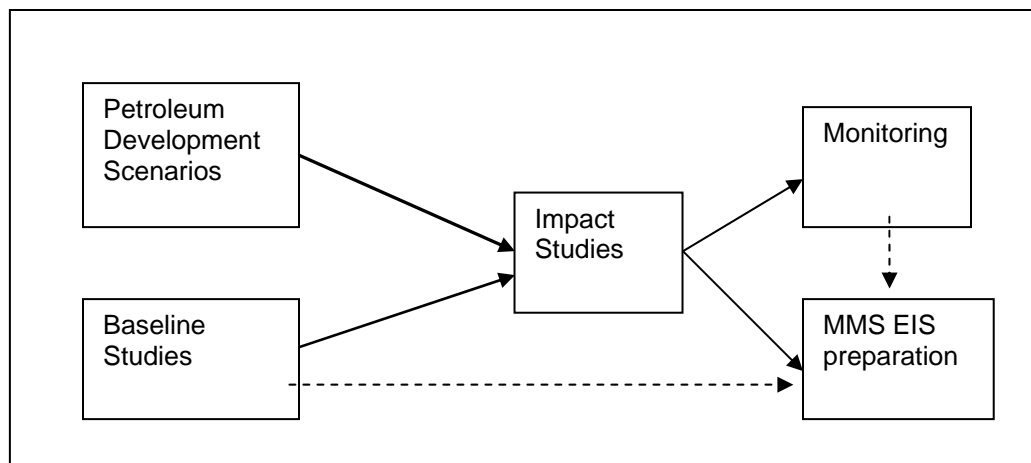
The initial design of the social research program emerged from a workshop of scientists held in 1975, followed by a request for proposals to manage the program. The consulting firm of Peat, Marwick and Mitchell managed the program until 1982 when the Minerals Management Service assumed direct responsibility for managing the program.

Early technical reports established planning regions; reviewed the existing literature; refined an existing statewide model of population and employment (initial development was funded by the

National Science Foundation); and developed a community model of population and employment. Early reports also included a review of offshore developments elsewhere and case studies of the Trans-Alaska Pipeline, including the rural community of Copper Center along the pipeline route, Fairbanks and Valdez.

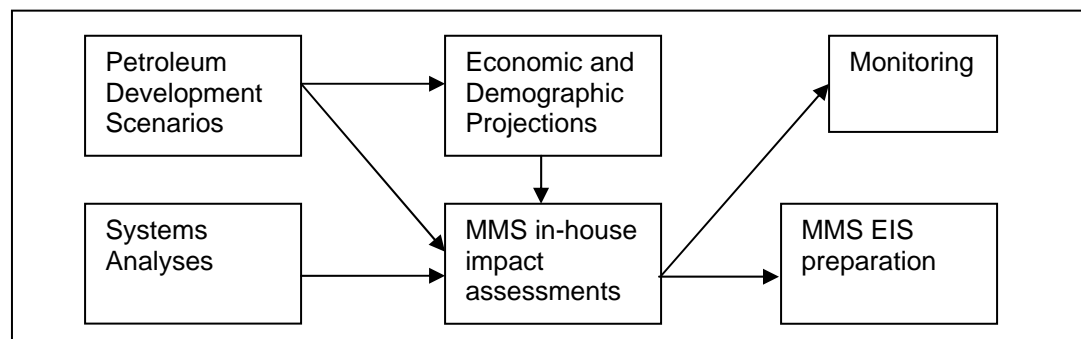
Figure 1 illustrates the initial design of the social component of the Environmental Studies Program. *Petroleum Development Scenarios* provided estimates of employment by year for the life of the field, likely locations and value of infrastructure, and field production estimates. Separate *Baseline Studies* were prepared for transportation systems, the man-made environment, socioeconomic, sociocultural systems, governance and the natural environment. A parallel series of separate *Impact Studies* were prepared for transportation, the man-made environment, socioeconomic, sociocultural systems, and statewide and regional economic and demographic impacts. *Monitoring Studies* initially focused on documenting petroleum development activities.

Figure 1: Initial Design of the Social Component of the Environmental Studies Program



Note that Minerals Management Service staff did the actual writing of the environmental impact statements. The intent was that contractors producing impact studies would draw directly on the results of the petroleum development scenario and baseline studies. MMS staff would assess the significance of projected impacts and incorporate these assessments in the environmental impact statement. In practice, ongoing shifts in assumptions in the petroleum development scenarios made it difficult for impact study researchers to draw directly on the scenario results for their analysis. The result was the following modified core study research design.

Figure 2: Modified Core Study Research Design

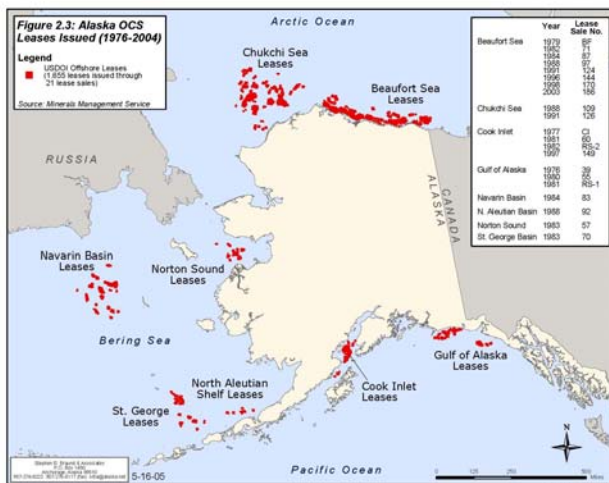


Researchers responsible for economic and demographic projections continued to rely directly on the results of the petroleum development scenarios. These researchers predicted changes in population and employment likely to result from petroleum development (and as discussed later, differentiating these changes from those expected from other activities). Researchers responsible for understanding the broader range of socioeconomic and sociocultural change, in contrast, no longer were asked to estimate impacts of petroleum development. The National Research Council concluded in its 1994 review of the Environmental Studies Program in Alaska:

Although the demographic and economic effects of development-phase activities have received a good deal of competent attention, the SESP [social component of the Environmental Studies Program] does not appear to have dealt as successfully with assessing likely social and cultural impacts from development-phase activities or with identifying the steps that might be taken to manage or mitigate them. Partly as a result, not enough is yet known to permit the adequate assessment and management of the socioeconomic impacts that would be likely to result from development activities.

National Research Council
Committee to Review Alaskan
Outer Continental Shelf Environmental Information
1994, p.148

Had the full range of social science researchers been charged with deriving impact projections from baseline descriptions and scenarios the National Resource Council’s conclusion might have been different.



The core studies design was predicated on an ambitious plan of lease sales. The Minerals Management Service has conducted 21 lease sales, resulting in a total of 1,655 offshore leases covering 8.9 million acres²⁵. Ninety percent of the leases were issued before 1990. During the past 15 years special studies have assumed more importance. These include an examination of the effects of the Exxon Valdez oil spill (a product of marine transportation of oil produced onshore), quantitative subsistence studies, social indicator studies, and studies responding to community concerns.

Range of Indicators

To assess indicators developed in Alaska we need to first come up with a comprehensive list of indicators that can be used as a standard for comparison. This section builds on Minerals Management Service research to present a comprehensive list of indicators.

Contribution of Qualitative Studies

Researchers and government agencies in Alaska agree that cultural change must be added to the traditional social research categories of social and economic change. It is no small matter,

however, to go beyond this three part categorization to operational measurements, "indicators", of change. The most difficult challenge has been to identify cultural indicators of change.

Anthropologists using ethnographic methods are responsible for much of the progress from the point of identifying the general category of cultural change as important toward the goal of identifying indicators of cultural change. The range of topics addressed in these ethnographic reports has expanded over time, with a 1990 ethnography covering 14 topics: life history, economics and income, subsistence, demography, inter-community comparisons, formal institutions and leadership, social organization, social control, kinship, socialization, religious beliefs and ceremonies, language, socio-cultural change, and traditional values²⁶. These researchers noted, "It became obvious in the process of this project that it was not possible... for the same researcher to combine the collection of life histories with the collection of other information, at least not on the North Slope"²⁷.



Part of the challenge facing the ethnographers was the fact that there are nine major Native cultural groups (Iñupiat, Yup'ik, Aleut, Athabascan, Alutiq, Eyak, Tlingit, Tsimshian, and Haida) residing in more than 200 coastal villages in Alaska. Residents of these villages not only differ culturally, they also access different combinations of traditional food resources.

Ethnographies had to be place specific to be accurate. As a result, much of the research effort went into the initial in-depth descriptions of life in each place. Some 150 places have been described by ethnographers under contract to the Minerals Management Service in Alaska²⁸.

There are two key findings of qualitative studies relevant to identifying the full range of indicators. First is the widespread finding across different studies of the fundamental importance to the sociocultural organization of communities of continued harvesting of natural resources. Second is the finding that institutional developments such as the North Slope Borough and the Alaska Eskimo Whaling Commission must be monitored to understand cumulative change.

Design of a Social Indicator System for Alaska

Beginning in the early 1980's, the Minerals Management Service initiated studies to develop a social indicators system. The first study applied a combination of an ethnographic approach and a review of existing data to measure community well-being over time²⁹. This work

complemented that of the ethnographic baseline studies. The Minerals Management Service issued a request for proposals for a second phase of social indicator development. Another group of researchers, including the author of this report, proposed an approach to identifying social indicators that differed from the initial study. The Minerals Management Service sponsored a second study that implemented this different approach, which is predicated on the idea that people can identify goals that they hold for themselves, their families, and their community³⁰. This second study, *A Social Indicators System for OCS Impact Monitoring*, designed a social indicator system based on existing data and a federally approved questionnaire. The Minerals Management Service chose a third research team to implement the social indicators system for Alaska³¹. The system implemented by the third team reflects a different scientific paradigm than that applied in *A Social Indicators System for OCS Impact Monitoring* and a return to the paradigm of the first study team. The third team's paradigm assumes that the meaning of indicators emerges from a combination of ethnography and statistical clustering of data rather than from the goals stated by residents. On reviewing the social indicators system developed for the Minerals Management Service, the National Research Council concluded:

The basic logic of the study of social indicators is most often expressed by analogy to economic indicators. Just as some economic statistics—such as the rate of inflation or the measures of productivity—can be seen as "indicating" the overall health of the economy, social indicators are intended to provide documentation on the overall level of sociocultural health in a community or region. MMS began its social indicators studies in 1987, and the effort has since received a significant fraction of the overall funding for socioeconomic studies in the Alaska region.

Given the special requirements of the Alaska region, SESP had to modify the methods and goals that are standard in other social indicators studies. In many ways, the modifications resulted in studies that complement MMS's economic modeling effort. The social indicators studies display a keen awareness of the special nature of the Alaskan context, particularly with respect to Inupiat villages. The studies produced rigorous estimates, for example, of the degree and kind of sharing of subsistence take, producing information that could provide a useful baseline against which future changes could be compared. At the same time, the studies do not appear to have provided the detail or kinds of information that would normally be expected in a state-of-the-art social indicators study. There appear to be gaps in the kinds of data gathered from government bodies (on physical and mental health and on "social pathology" indicators, such as crime and violence, drug and alcohol abuse) and in the kinds of data normally gathered through standard survey techniques, such as individual assessments of well-being, community stability, and quality of life.

National Research Council
Committee to Review Alaskan
Outer Continental Shelf Environmental Information
1994, p.145

In retrospect, it appears that the Alaska social indicators system would have been more successful had it not followed the third paradigm of meeting both qualitative and quantitative goals. It would have been more successful had it focused on the goal of quantitatively describing a coherent set of living conditions. This is not to say qualitative goals are not invaluable as a component of a system intended to monitor and predict cumulative impacts. Qualitative studies are best suited for identifying the domains important to describing living conditions and for understanding the processes by which living conditions change. Returning to

the question of designing a quantitative social indicators system,, it is worth returning to the design completed in 1985 but never fully implemented. The authors of the 1985 study refer to the design as the *Alaska OCS Social Indicators System*.

The intent of the *Alaska OCS Social Indicators System* was for researchers under contract to the federal government to produce hard, basic data on the human environment that could be compared over time, yielding cumulative assessments of change. It was designed with the following principles in mind:

- **Comprehensive**, in the sense that it intends to cover all important aspects of well-being.
- **Limited**, in the sense that the system relies on a small set of indicators for each aspect of well-being.
- **Coherent**, in the sense that the organization of data makes intuitive sense.
- **Directly Measures Well-Being**, in the sense that a high value on an indicator clearly means a high level of well-being.
- **Reports Average Levels and Distributions** of Well-being.
- Includes **Objective and Subjective Measures**

In order to address the goals of predicting and monitoring change specifically due to the effects of petroleum development, the system was designed to produce a set of baseline measures that analysts could use to express projections in terms of degrees of change. As an ongoing monitoring system, it would produce measures of actual change, again in terms of degrees of change. Because it would be implemented across coastal Alaska and offshore development would be unlikely to occur in all regions at the same time, the system could be used to distinguish between the impacts of offshore development and other forces for change. The authors offered an example to clarify the point that measuring degrees of change is important:

A key concern among many residents of Alaska's coastal regions is continued access to hunting and fishing areas. Lacking precise data, analysts may conclude that marine pipeline landfalls and associated onshore pipelines, and coastal supply bases may hamper access to commonly-used hunting or fishing areas. This change may, or may not, be significant. Its significance depends on the degree to which access is reduced. One of the indicators included in AOSIS is "Percent of Local Hunting and Fishing Areas Accessible to Local Residents." Knowledge of the current level of this indicator, coupled with a technical description of the possible OCS activities, can be used by analysts to project a change in the level of the indicator. Analysts and decision-makers would then be in a better position to judge whether or not the projected change is significant.

Braund, Kruse & Andrews
Technical Report 116
1985, p. 5

The design of the *Alaska OCS Social Indicators System* is predicated on the idea that people can identify what is important to their own well-being. In the 1970s about 30 countries, mainly from the developed West, but including Brazil, Greece, Japan, Turkey, Venezuela, and Yugoslavia collaborated on identifying the following list of "social concerns" (see Table 1)³².

Table 1: List of Concerns of 30 Countries

<p>A. HEALTH</p> <ul style="list-style-type: none">A-1 The probability of a healthy life through all stages of the life cycle.A-2 The impact of health impairments on individuals. <p>B. INDIVIDUAL DEVELOPMENT THROUGH LEARNING</p> <ul style="list-style-type: none">B-1 The acquisition by children of the basic knowledge, skills and values necessary for their individual development and their successful functioning as citizens in their society.B-2 The availability of opportunities for continuing self -development and the propensity of individuals to use them.B-3 The maintenance and development by individuals of the knowledge, skills and flexibility required to fulfill their economic potential and to enable them to integrate themselves in the economic process if they wish to do so.B-4 The individuals satisfaction with the process of individual development through learning, while he is in the process.B-5 The maintenance and development of the cultural heritage relative to its positive contribution to the well-being of the members of various social groups.. <p>C. EMPLOYMENT AND QUALITY OF WORKING LIFE</p> <ul style="list-style-type: none">C-1 The availability of gainful employment for those who desire it.C-2 The quality of working life.C-3 Individual satisfaction with the experience of working life. <p>D. TIME AND LEISURE</p> <ul style="list-style-type: none">D-1 The availability of effective choices for the use of time. <p>E. COMMAND OVER GOODS AND SERVICES</p> <ul style="list-style-type: none">E-1 The personal command over goods and services.E-2 The number of individuals experiencing material deprivation.E-3 The extent of equity in the distribution of command over goods and services.E-4 The quality, range of choice and accessibility of private and public goods andE-5 The protection of individuals and families against economic hazards. <p>F. PHYSICAL ENVIRONMENT</p> <ul style="list-style-type: none">F-1 Housing conditions.F-2 Population exposure to harmful and/or unpleasant pollutants.F-3 The benefit derived by the population from the use and management of the environment. <p>G. PERSONAL SAFETY AND THE ADMINISTRATION OF JUSTICE</p> <ul style="list-style-type: none">G-1 Violence victimization and harassment suffered by individuals.G-2 Fairness and humanity of the administration of justice.G-3 The extent of confidence in the administration of justice. <p>H. SOCIAL OPPORTUNITY AND PARTICIPATION</p> <ul style="list-style-type: none">H-1 The degree of social inequality.H-2 The extent of opportunity for participation in community life, institutions, and decision-making.
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The identification of indicators for the *Alaska OCS Social Indicators System* began with this list of social concerns. Researchers outside the Arctic have been able to test the validity of this list to populations in their countries in statistical analyses. They asked people to assess their overall level of well-being and then asked them to assess dozens of specific aspects of well-being (e.g. income, family). They measured how well different combinations of these specific aspects of well-being account for (explain) variations in overall well-being. The important point here is that, at least for the 30 countries contributing to this work, the above list of concerns appears to account very well for what is most important to people, with the exceptions that statistical analyses show as relatively more important: (1) relationships between people (family, close associates); and, (2) how people see themselves as being able to make their own situation better (personal efficacy)³³.

The next step in the identification of indicators was to identify regionally and culturally specific social goals. The researchers first reviewed the following types of documents in five regions of Alaska:

- Coastal zone management plans (goals and objectives).
- Regional newspapers.
- Regional corporation annual reports.
- Regional planning documents.
- Field notes and interviews in the study team files.
- Newspaper clippings in the study team files.
- Local testimony including elders conferences transcripts, the Alaska Native Review Commission testimony, coastal resource service area testimony, the Alaska Federation of Natives testimony, and OCS scoping meetings testimony.

Based on this review, the researchers concluded:

The differences between regions were found to be more a matter of degree or variation within several broadly defined goals. For example, the continued use of the Native language may be of considerable cultural importance to residents of the NANA region while holding relatively less cultural value for residents of the Aleutians. Therefore, at the end of the pre-field identification of the goals, the study team found that when carefully stated, the goals could be applied to rural Alaska as a whole. Hence, only one set of social goals was developed for the five study areas.

Braund, Kruse & Andrews
Technical Report 116
1985, p. 46

The researchers organized the social goals as a hierarchy, with four goal families and between two and six goals within each goal family. Each goal in turn had several subgoals. Indicators were developed from these subgoals. Appendix A contains the complete list of goals (revised on the basis of field work discussed below), indicators, and data sources. The goal families (prior to field work) were:

- Goal Family One: Continued Existence of Traditional Culture.
- Goal Family Two: Individuals and Families That Are Able to Function Well in Society.
- Goal Family Three: Command Over Goods and Services.
- Goal Family Four: Social Opportunities and Participation.

To validate this list of goals families, goals, and subgoals the researchers interviewed 60 people, including traditional council members, village and regional corporation officers and employees, non-profit corporation board members, local Fish and Game Advisory Committee members, and employees, municipal government council members and employees, coastal resource service area board members, and other knowledgeable individuals. These interviews were a key reality check, revealing an important difference between regions. In rural regions dominated by Native populations the phrase “traditional culture” had great meaning. In rural regions with a more mixed population, many people questioned the use of “traditional”, arguing that people adapt to change and that it is difficult to attach meaning to the word “traditional”. For

this reason, the researchers modified the first goal family to “cultural continuity”. I mention this experience because it points to the importance of field validation.

It is also worth pointing out that, as a social indicators system is implemented, people may react to its outputs by pointing out missing elements. Over a longer period, people’s own sense of goals may change. For these reasons, any system should be designed to let the articulation of goals evolve over time. One obvious way to make the system open to change is to have communities periodically review and comment on system outputs. I was impressed, for example, on how the Arctic Borderlands project used this approach in annual gatherings³⁴.

One also might question whether a focus on goals would make the system too idealistic and not focused on the day-to-day decisions people make. The research team developing the *Alaska OCS Social Indicators System* actually first thought that it should think in terms of current concerns and to translate these into domains for which social indicators should be developed. To their surprise, people in communities stated that they were best able to help identify domains by talking about what motivates them to move or stay in their community, to take a job or not, and a myriad of other life decisions. Talking about goals seemed to fit what motivates them best. In other words, people try to move forward, not just avoid moving backwards.

Now that the researchers had identified and validated a set of goals, they could proceed to identify indicators. They applied the following rules.

1. There must be at least one social indicator for each subgoal. However, the number of indicators included under a single subgoal should be limited to that which is necessary to reliably measure the subgoal.
2. The meaning of each indicator should correspond to the meaning of one, and only one, subgoal.
3. The indicator must directly measure individual well-being.
4. The indicator must accurately reflect reality.
5. The indicator must be sensitive to actual change.
6. Indicators should be expressed both as averages and as distributions of well-being.
7. Where possible, each subgoal should be described by both objective and subjective measures.

To make the *Alaska OCS Social Indicators System* cost effective, researchers first looked to existing data as sources of indicators. They applied the following criteria for selection of indicators:

1. Be available on a subregional or place-by-place basis.
2. Should distinguish between levels of well-being of Natives and non-Natives.
3. Should be collected at least every five years.
4. Should meet the general rules for social indicators.

They applied these rules in a review of 45 potential existing indicators drawn from the following major sources: U.S. Bureau of the Census decennial census long form, U.S. Bureau of Economic Analysis Regional Economic Information System, Indian Health Service Patient Care Information System, Alaska Department of Fish and Game biologists, Alaska Vital Statistics published by Health and Social Services, and Official Returns by Election Precinct published by Division of Elections. Nine of the 45 indicators proved to be acceptable by the above rules. Appendix B contains an assessment of each existing indicator.

Not surprisingly, particularly when the *Alaska OCS Social Indicators System* was designed in the 1980s, few existing indicators met the criteria as useful in predicting and monitoring the effects of petroleum development. Opportunities for use of existing data have increased since that time. I return to this point under the section, *Opportunities for Improvements in Indicator Use in Cumulative Assessments*.

The primary source of indicators in the design of the *Alaska OCS Social Indicators System* are derived from survey questions of randomly sampled residents of rural communities. Fortunately, others have developed and tested questions for many subgoals. A primary source of potential questions came the Directorate for Social Affairs Manpower, and Education of the Organization for Economic Cooperation and Development³⁵. A key source of subsistence and employment questions was a 1977 survey of North Slope Iñupiat conducted as a joint effort by the North Slope Borough and the Institute of Social and Economic Research of the University of Alaska³⁶. The North Slope Borough has continued to use many of these questions in censuses conducted of Borough residents over the past 25 years. The work of Frank Andrews and Stephen Withey at the Institute for Social Research, The University of Michigan provided the principal source of measures of subjective well-being³⁷.

Appendix A contains a complete listing of goal families, goals, subgoals, indicators, and sources (survey versus secondary) of indicators. We should note that a few indicators are framed in the negative (e.g. death by accident rate), contrary to the intent of having each measure be a direct measure of well-being. This reflects the entrenchment of how we think about social problems (i.e. in the negative) and can be confusing when comparing multiple indicators. It is a decision worth revisiting in any future design of a social indicator system.

Relationship of Alaska OCS Social Indicator System to the Canadian Aboriginal Peoples' Survey

Although the *Alaska OCS Social Indicators System* was never fully implemented by the Minerals Management Service, elements of its design informed the design of the *2001 Canadian Aboriginal Peoples' Survey*. The connection between these two efforts is an international project, the *Survey of Living Conditions in the Arctic*³⁸. In Canada, the *Survey of Living Conditions in the Arctic* has been a collaborative effort of an international research team, a Canadian Steering Committee composed of representatives of the four Inuit regions in Canada and ITK, Laval University, and Statistics Canada. Based on the recommendation of the Canadian Steering Committee, Statistics Canada agreed to coordinate the design of the *2001 Aboriginal Peoples Survey* with the design of the international *Survey of Living Conditions in the Arctic*. The international team took the design of the *Alaska OCS Social Indicators System* into account in its design of the *Survey of Living Conditions in the Arctic*. These recommendations were in turn conveyed to Statistics Canada.

The *2001 Canadian Aboriginal Peoples' Survey* is a major step forward in the implementation of a social indicators system in northern Canada that could contribute to the goal of predicting and monitoring the cumulative effects of the Mackenzie Basin Pipeline and its associated developments. The value of *2001 Canadian Aboriginal Peoples' Survey* will be enhanced by the ability to compare living conditions among Inuit living in Arctic regions including Alaska, Greenland, and Chukotka Russia. I return to the potential use of the *Aboriginal Peoples' Survey* in the concluding section, *Opportunities for Improvements of Indicator Use*.

Conclusions on the Range of Indicators

The purpose of the *Range of Indicators* section of the report is to identify a full range of indicators against which we can assess the achievements and limitations of indicator development and use in Alaska. The primary systematic effort to identify a full range of indicators for Alaska was the *Alaska OCS Social Indicators System*. We can express the full range of indicators as the list of subgoals developed in the *Alaska OCS Social Indicators System*, since the design called for one or more indicators by subgoal. It is important to keep in mind, however, that the *Alaska OCS Social Indicators System* focused on individual well-being, and through groups of individuals to community and regional well-being. We therefore need to add the key finding of qualitative studies that institutional development is critically important to understanding the cumulative effects of petroleum development. Two institutional subgoals are added: (1) ability of local institutions to capture revenues and in-kind resources; and, (2) ability of local institutions to manage risks. The following, then is a suggested comprehensive range of indicators, expressed as the range of subgoals (see Table 2).

Table 2: Comprehensive List of Subgoals Against Which We Can Measure Indicator Use

<p style="text-align: center;">GOAL FAMILY ONE CULTURAL CONTINUITY</p> <p><u>SUBGOAL</u></p> <p>GOAL ONE: CONTINUED HARVEST OF RENEWABLE RESOURCES</p> <p>111 HEALTHY WILDLIFE POPULATION</p> <p>112 UNRESTRICTED ACCESS TO TRAD. HUNTING & FISHING AREAS</p> <p>113 PRESENCE OF WILDLIFE POP/ TRADIL HUNTING & FISHING AREAS</p> <p>114 INTEREST IN AND USE OF RENEWABLE RESOURCES</p> <p>GOAL TWO: CONTINUED TRADITIONAL SOCIAL RELATIONSHIPS</p> <p>121 CONTINUED COOPERATIVE ACTIVITIES</p> <p>122 CONTINUED SHARING/RENEWABLE RESOURCE PRODUCTS & EQUIP.</p> <p>123 CONTINUED EXTENDED FAMILY RELATIONSHIPS</p> <p>124 CONTINUED RESPECT FOR ELDERS</p> <p>125 INTERVILLAGE SOCIAL RELATIONSHIPS</p> <p>GOAL THREE: CONTINUED CULTURAL SUPPORTS</p> <p>131 CONTINUED USE OF NATIVE LANGUAGE</p> <p>132 CONTINUED ORAL HISTORY TRADITION</p> <p>133 CONTINUED PRODUCTION OF ARTS & CRAFTS</p> <p style="text-align: center;">GOAL FAMILY TWO INDIVIDUALS & FAMILIES THAT ARE ABLE TO FUNCTION WELL IN SOCIETY</p> <p>GOAL ONE: HEALTHY INDIVIDUALS</p> <p>211 PHYSICALLY HEALTHY INDIVIDUALS</p> <p>212 MENTALLY HEALTHY INDIVIDUALS</p>

GOAL TWO: INDIVIDUALS WHO ARE SAFE FROM HARM

221 INDIVIDUALS WHO ARE SAFE FROM HARM BY OTHERS

222 INDIVIDUALS WHO ARE SAFE FROM HARM CAUSED BY THEIR OWN ACTIONS

GOAL THREE: AN EDUCATED & SKILLED POPULATION

231 INDIVIDUALS HAVE RECEIVED A BASIC EDUCATION

232 ADULTS HAVE THE EDUCATION AND SKILLS NECESSARY TO OBTAIN EMPLOYMENT

GOAL FOUR: FAMILIES THAT FUNCTION WELL IN SOCIETY

241 PREVALENCE OF FAMILIES AS THE PRIMARY SOCIAL UNIT

242 HEALTHY SOCIAL RELATIONSHIPS WITHIN FAMILIES

GOAL FIVE: ADEQUATE LEISURE OPPORTUNITIES

251 ADEQUATE OPPORT. TO INTERACT INFORMALLY W/ FRIENDS, FAMILY

252 ADEQUATE OPPORTUNITIES TO PARTICIPATE IN RECR. ACTIVITIES

**GOAL FAMILY THREE
COMMAND OVER GOODS AND SERVICES**

GOAL ONE: SUFFICIENT INCOME & EQUITABLE INCOME DISTRIBUTION

311 ALL HH RECEIVING MIN. INCOME REQ. TO MEET BASIC NEEDS

312 MOST HOUSEHOLDS EXPERIENCING REAL INCOME GROWTH

GOAL TWO: SUFFICIENT OPPORTUNITIES FOR EMPLOYMENT

321 SUFFICIENT NUMBER OF LOCAL JOBS

322 SUFFICIENT OPPORTUNITIES FOR PREFERRED JOBS

GOAL THREE: SUFFICIENT HOUSING

331 AFFORDABLE HOUSING OPPORTUNITIES

332 SATISFACTORY PHYSICAL LIVING SPACE

GOAL FOUR: SUFFICIENT FOOD

341 SUFFICIENT FOOD AVAILABLE

342 AFFORDABLE FOOD

GOAL FIVE: SUFFICIENT PERSONAL GOODS & SERVICES

351 SUFFICIENT AVAILABILITY OF GOODS AND SERVICES

352 AFFORDABLE PRICE FOR GOODS AND SERVICES

GOAL SIX: SATISFACTORY COMMUNITY ENVIRONMENT

361 SATISFACTORY PUBLIC SERVICES AND FACILITIES

362 SATISFACTORY PHYSICAL ENVIRONMENT

**GOAL FAMILY FOUR
SOCIAL OPPORTUNITIES AND PARTICIPATION**

GOAL ONE: ADEQUATE LOCAL CONTROL

411 SENSE OF LOCAL CONTROL

412 CONFIDENCE IN INSTITUTIONS AND LEADERS

GOAL TWO: ADEQUATE PARTICIPATION

421 PARTICIPATION IN ROUTINE PROCESSES OF GOVT

GOAL THREE: DEVELOPMENT OF LOCAL INSTITUTIONS

431 ABILITY OF LOCAL INSTITUTIONS TO CAPTURE REVENUES AND IN-KIND RESOURCES

432 ABILITY OF LOCAL INSTITUTIONS TO MANAGE RISKS

Achievements and Limitations in Indicators

We now turn to a review of the achievements and limitations of indicators developed in Alaska. *Cultural Continuity* is the goal family that is most uniquely northern and therefore requiring the most effort to predict and monitor. *Command Over Goods and Services*, in contrast, is the goal family most common to other regions and also the one most developed in terms of prediction and monitoring. It is useful to start our review by examining the most developed indicators; they set the standard.

Command Over Goods and Services

In the ideal world, there are enough job opportunities for everyone who wants to work and is able to do so. The jobs available involve the type of work that people want to do. Household members earn enough to meet the households basic needs and the household's income grows in purchasing power over time. Housing is affordable and functional. Households can obtain the food and household goods they need at affordable prices. Community services like water, and electricity are also available at affordable prices, and the community itself is a pleasant place to live. People feel satisfied in all these areas. That, in a nutshell, is what we mean by command over goods and services.

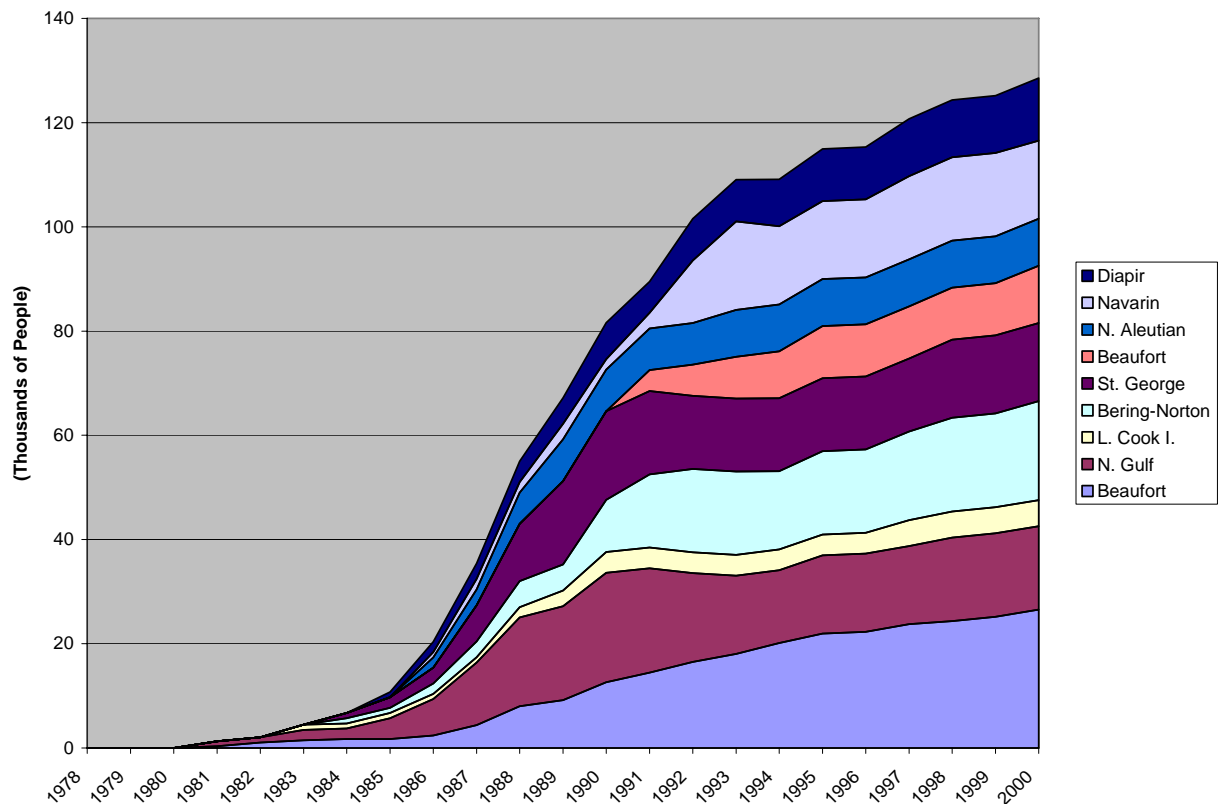
When the federal government began its program of social research to predict and monitor the effects of offshore development in 1976, unemployment, poor housing, low incomes, unsafe water, and unreliable electricity were all common problems in most Alaska communities. The State of Alaska was beginning to reap hundreds of millions of dollars in revenues from onshore oil development. Clearly the situation in rural communities in Alaska was poised for change. How could one expect to predict the effects of offshore development during this turbulent period?

Fortunately the US National Science Foundation and the scientific community thought the broad question, "What are the effects of energy development on Alaska's people?" warranted study. The Foundation funded a group of researchers to model Alaska's population and economy at a statewide and regional level³⁹. The equations that made up the models (together referred to as the MAP model) were based on statistical analyses of relationships using historical data. Researchers started with a theoretical understanding of regional economic relationships (for example between industries and between migration and job availability). They tested this theoretical understanding against how the Alaska economy actually behaved over the historical period over which data were available. Based on this empirical validation of their theoretical model, they developed equations to represent these relationships in a predictive model. They then tested the ability of this model to "predict" economic changes over the historic period. They used these results to further refine the model for use in predicting changes based on hypothetical scenarios of future change. Three economists and a demographer spent most of their time over the course of several years developing the initial models.

It is unlikely that sufficient funding for the initial development of the MAP Model could have been found through the social component of the federal government's Environmental Studies Program. When program staff issued a request for proposals to predict population and economic changes resulting from a prospective offshore lease sale in the Beaufort Sea, the researchers who were already heavily invested in developing the MAP Model could offer the model as a foundation upon which they could build a tool to predict the cumulative population and employment effects of offshore petroleum development.

Critical to the use of the MAP Model as a prediction tool was its ability to compare futures under different development scenarios. Predictions of the effects of offshore developments were made in the context of other likely development activities. Also critical to the use of the MAP Model was its ability to handle different public spending policies. It turned out, in fact, that the major driver of population and economic change in Alaska has been the State of Alaska itself. Figure 3 illustrates the capability of the MAP Model to project cumulative impacts⁴⁰.

Figure 3: Cumulative Population Changes Under Moderate Development Scenarios



Shown are the potential population impacts of nine separate lease sales. These population impacts assumed that the moderate development scenario in each lease sale would be realized, meaning that commercial discoveries of petroleum would be developed. In fact, however, none of these lease sales resulted in offshore production. The key point for our purposes here is that using the MAP Model it was possible to quantitatively estimate incremental and cumulative changes in both statewide and regional population, employment and income. The National Research Council 1994 review concluded, “The projections from the MMS [economic growth] models appear to be consistent with the general state of practice in other locations⁴¹.”

A major investment of research funds was required to develop the MAP Model. Another critical ingredient was the availability of time series data on employment, births, deaths, and other variables critical to modeling the state’s economy.

The MAP Model was not designed to project changes at the community level. A capacity to project changes in community population and employment was seen by the federal government as critical to the Environmental Studies Program. They funded a group of researchers to review existing impact models and to develop a community impact model⁴². The *Rural Alaska Model* (RAM Model) is fundamentally an accounting system for population and employment change

that is driven by a set of parameters (i.e. assumptions) that connect employment opportunities with local employment and migration. The parameters (e.g. labor force participation) are easy to see and to change. The model actually resides on a series of spreadsheets and is thus accessible to anyone wishing to delve into the details. The Rural Alaska Model has been refined and used to project community population and employment in dozens of impact analyses. One of its strong points is the ease at which it is possible to review and change the assumptions that drive the model (e.g. labor force participation). The National Research Council concluded in its 1994 review:

We concur with previous reviews that the rural Alaska model is well documented, replicable, and scientifically defensible. The economic impact model is adequate in terms of generic professional standards. However, the model is not well adapted for particular circumstances on the North Slope. Additionally, some concern has been expressed about whether the model adequately explains human migration patterns, particularly those of Alaska Natives.

Recommendation 6: Economic growth models should be better adapted to the specific situation of the North Slope to measure cash flow to the local communities under various scenarios for development and for expenditure of resulting property revenues.

National Research Council
Committee to Review Alaskan
Outer Continental Shelf Environmental Information
1994, p.152

The National Research Council note of concern about the applicability of the Rural Alaska Model to circumstances on the North Slope points to the challenge of modeling the decisions of the North Slope Borough. The major driver of change in North Slope communities has been borough expenditures derived from property taxes paid on petroleum facilities. These expenditures account for most employment in North Slope villages as well as changes in physical infrastructure such as health clinics, housing, airstrips, water systems, and power systems.

The Minerals Management Service has funded studies to address the unique nature of the North Slope⁴³. Researchers have worked with North Slope Borough staff to monitor revenues, expenditures and employment⁴⁴. The North Slope Borough itself has sponsored censuses of its population repeatedly over the past 25 years.

The *Map Model* and the *Rural Alaska Model* have proven to be useful tools in cumulative impact assessment. They have also informed policy discussions. Both the State of Alaska and the North Slope Borough have commissioned modeling efforts to help them refine revenue and expenditure policies. Together they set a standard against which we can assess the achievements and limitations of other types of indicators.

Neither the *MAP Model* nor the *Rural Alaska Model* attempt to project changes in community infrastructure and cost of living. As mentioned earlier, early on in the history of the Environmental Studies Program researchers were no longer asked to project impacts beyond population and employment. Socioeconomic studies were largely assessments of current and recent conditions. While researchers in different studies tended to choose to examine similar indicators, these data were collected by agencies for reasons other than assessing the impacts

of petroleum development. For example, the University of Alaska Cooperative Extension Service has run a simple, yet effective program for monitoring food costs in rural Alaska. As Table 3 shows, the communities monitored over time have not included Barrow or any of the smaller villages located within the North Slope Borough⁴⁵: These data therefore cannot be used to differentiate between the effects of petroleum development on the cost of living from other forces for change.

Table 3: Illustration of Cost-of-Living Data

6 Weekly Food Cost for Eight Alaska Cities, 1978-2004

Costs for a Family of four with elementary school-age children

Year	Anch.	Fbks.	Pct. of Anch.	Juneau	Pct. of Anch.	Bethel	Pct. of Anch.	Nome	Pct. of Anch.	Kodiak	Pct. of Anch.	Kenai/Soldotna	Pct. of Anch.	Tok	Pct. of Anch.
1978	\$76.67	\$84.15	110%	\$73.72	96%	\$114.05	149%	\$118.85	155%	-	-	\$82.48	108%	-	-
1979	82.18	89.39	109	74.88	91	129.16	157	128.67	157	-	-	100.41	122	-	-
1980	88.44	90.54	102	85.92	97	130.87	148	131.14	148	\$99.42	112%	120.84	137	\$108.82	123%
1981	86.69	98.47	114	93.95	108	138.66	160	150.27	173	-	-	-	-	114.80	132
1982	77.30	92.09	119	99.98	129	125.50	162	149.04	193	-	-	-	-	-	-
1983	81.66	83.79	103	88.62	109	128.30	157	130.14	159	104.94	129	86.98	107	-	-
1984	84.22	91.26	108	91.66	109	136.54	162	142.07	169	115.97	138	87.97	104	121.66	144
1985	89.06	90.08	101	106.61	120	138.13	155	152.41	171	108.17	121	91.47	103	116.19	130
1986	87.25	90.61	104	87.65	100	137.96	158	142.04	163	105.49	121	92.78	106	124.18	142
1987	88.90	85.12	96	88.24	99	140.81	158	147.96	166	104.39	117	96.95	109	117.51	132
1988	90.99	94.74	104	92.95	102	137.57	151	147.69	162	116.68	128	95.53	105	119.69	132
1989	93.80	94.33	101	96.73	103	140.65	150	-	-	124.61	133	104.20	111	139.43	149
1990	98.73	103.49	105	100.86	102	146.92	149	155.48	157	154.55	157	103.21	105	131.03	133
1991	102.84	114.65	111	104.21	101	152.49	148	150.29	146	127.96	124	111.88	109	143.45	139
1992	100.46	92.31	92	102.62	102	142.51	142	158.08	157	124.61	124	109.60	109	132.94	132
1993	97.89	93.42	95	103.70	106	147.84	151	145.94	149	125.19	128	111.61	114	136.96	140
1994	91.32	94.96	104	104.09	114	133.47	146	140.22	154	123.99	136	105.51	116	140.78	154
1995	89.30	93.26	104	99.38	111	140.68	158	148.55	166	123.04	138	102.48	115	122.89	138
1996	101.43	96.65	95	96.93	96	148.70	147	162.61	160	125.71	124	105.01	104	142.46	140
1997	96.57	97.73	101	98.89	102	150.42	156	-	-	123.92	128	104.87	109	-	-
1998	98.74	98.35	100	103.08	104	155.24	157	174.27	176	130.04	132	104.13	105	144.67	147
1999	99.87	98.52	99	104.45	105	163.11	163	155.29	155	143.81	144	109.58	110	132.61	133
2000	100.89	100.63	100	104.55	104	162.63	161	157.40	156	133.89	133	112.01	111	139.31	138
2001	106.43	103.61	97	112.53	106	180.89	170	176.56	166	140.23	132	119.55	112	141.73	133
2002	100.61	100.80	100	110.52	110	187.96	187	179.76	179	143.36	142	119.12	118	126.92	126
2003	105.54	112.77	107	117.78	112	186.07	176	177.38	168	144.13	137	122.39	116	126.37	120
2004	117.33	118.73	101	122.48	104	198.33	169	183.46	156	140.70	120	127.38	109	120.85	103

Note: Sales tax included in food prices.

Source: "Cost of Food at Home for a Week," September 1978 to September 2004. University of Alaska Cooperative Extension Service, U.S. Dept of Agriculture and SEA Grant Cooperating. Website: <http://extension.uaf.edu/ace/fcs/fcs.html>

We can see, then, that there is a huge gap between the ability to assess impacts of population and employment on the one hand, and impacts on other elements of the goal family *Command Over Goods and Services*. Not only is there an inability to make scenario-based projections of impacts for such elements as housing and cost of living, there often is a fundamental lack of current and historical data.

Before leaving the topic of *Command Over Goods and Services*, I should mention the special case of the *Trans-Alaska Pipeline System Native Utilization Agreement*⁴⁶. The intent of this agreement has been to achieve 20 percent Native employment. Alyeska Pipeline Service Company has yet to achieve this goal, but it is monitoring its progress and funding a training program (see Table 4)⁴⁷.

Table 4: Native Employment Related to the Trans-Alaska Pipeline System

<i>2001 Workforce Status</i>					
<i>Alyeska Employees*</i>	1997	1998	1999	2000	2001
Total Workforce	879	832	864	906	1041
Alaska Native People	77	79	112	132	182
Managers/Supervisors	5	4	7	11	13
Professional	25	26	42	50	79
Technicians	34	42	47	52	58
Clerical	13	7	16	19	32
Percentage	8.7%	9.4%	13%	14.5%	17.5%
<i>*Snapshot of APSC employees on 12-31-01</i>					

Source: <http://www.alyeska-pipe.com/Employment/AK%20Native%20Program/2001%20ANP%20Annual%20Report.pdf>

Cultural Continuity

Extending our ideal world to include cultural continuity, we would expect to find healthy wildlife populations accessible to hunters and fishers in their traditional harvest areas. There would be a continued interest in hunting and fishing and people would have the time and equipment to hunt, fish, and gather. Largely as a result of continued harvest of renewable resources, people would continue to engage in cooperative activities, to share resources, to spend time with – and learn from – their extended family and elders in the community. They would extend this pattern of activities to other communities. They would be able to share knowledge in their traditional language, continuing a rich tradition in oral history, arts, and crafts.

As described in the section *Indicator Initiatives in Alaska*, with the exception of its earliest studies, the Minerals Management Service Environmental Studies Program did not ask researchers to predict cultural change that might result from offshore petroleum development. Most sociocultural research conducted under the Program focused on baseline descriptions. Yet the attention of residents in the regions most likely to be affected was on the future, not the present. Perhaps a personal story will highlight this point. Under one Minerals Management Service baseline study, I visited Kaktovik in the early 1980s to meet with the village council. I had just been awarded a contract from the Minerals Management Service to prepare a socioeconomic overview of the North Slope⁴⁸. The council voiced its opinion that the study design I brought to Kaktovik did not address their concerns. They said that they had been speaking about what they knew about the likely effects of development on their lives for over a decade. They admonished me to review what they had said, and then (maybe) come back and talk with them.

With the concurrence of the Minerals Management Service, my colleagues and I decided to focus a major part of our efforts on a compilation and analysis of public testimony given by North Slope residents since the discovery of oil at Prudhoe Bay. We found 34 sources of public testimony. We attached to extracts of verbatim testimony the name of the person testifying, home community, purpose of the hearing, issue of concern, and any species involved. We

followed up with 19 interviews of testifiers. Table 5 provides a distribution of subjects raised concerning petroleum development.

Table 5 North Slope Public Testimony About the Effects of Petroleum Development

Subject	Testimony on Offshore Development	All Testimony			
	Entire North Slope	Barrow	Nuiqsut	Kaktovik	Entire North Slope
Damage to Subsistence Species	37%	33%	30%	39%	34%
Disruption of Subsistence Migration	19%	14%	18%	14%	15%
Sea or Ice Hazards to Development	16%	9%	10%	11%	9%
Loss of Native Subsistence Foods	11%	10%	12%	22%	13%
Loss of Local Control	6%	14%	4%	3%	9%
Cultural and Value Changes	4%	5%	7%	3%	5%
Loss of Cultural Resource Landmarks	3%	4%	6%	2%	4%
Social Impacts	2%	5%	8%	2%	5%
Opinion on Development	2%	4%	4%	3%	3%
	100%	100%	100%	100%	100%
Number of Records	522	461	155	189	923

Most striking is the fact that a substantial proportion of the testimony had directly to do with continued harvest of traditional (i.e. country) foods. They tied their culture’s future to continued harvests:

I cannot fulfill the role of an Iñupiat hunter that I have been taught to do...that I must always share what I hunt with poor people who cannot hunt. Already the hunting is getting so difficult that it is hard for me to continue the sharing I want and need to do to be a true Iñupiat hunter.

H. Ahsogak
Public Testimony
In: Technical Report 85:234

The National Research Council wrote in its 2003 report, *Cumulative Environmental Effects of Oil and Gas Activities on the North Slope*: “The observation that Kruse and colleagues [Kruse et al. 1983. Technical Report 85], that ‘Native Alaskans’ fears that offshore development will inevitably harm subsistence resources are both intense and widespread and themselves constitute an impact of development,’ is still true. The committee was repeatedly told that this is *the issue for the Iñupiat*⁴⁹.”

In a real sense then, the most relevant indicators of cultural continuity are the perceptions and expectations of community residents. Today it is possible to develop and maintain a digital database of local knowledge, and to use this to inform research priorities and mitigation plans. For an Alaska example related to climate change, see “Native Concerns” on the *Traditional*

Knowledge and Native Foods Project website⁵⁰. It is important to distinguish here between “local” knowledge and “traditional” knowledge. In a sense, there is always “local” knowledge. The extent to which there is “traditional” knowledge may change over time, as may happen, for example, if fewer hunters go out on multi-night trips or come to rely on GPS for navigation. It is also important to distinguish between summaries of undigested hearing comments and a systematic review and analysis of such over time.

Staying within the scope of the goal of *Cultural Continuity* I now turn to the subject of surveys intended to quantify subsistence harvests. Canada has a great deal of experience in the design and implementation of harvest surveys. There may be little new knowledge that the Alaska experience can provide. We can point, however, to the inadvertent effect of an agency’s response to a little-known federal regulation on its ability to predict and monitor the effects of development. In an effort to keep in check the paperwork burden placed on its citizens, the US Congress passed the *Paperwork Reduction Act* in 1980⁵¹. This act required federal management agencies to submit a detailed proposal and obtain approval from the federal Office of Management and Budget for any action in which 10 or more people would be asked the same questions. This discouraged management agencies from considering structured surveys as they feared it would delay the fulfillment of their primary mission and would increase the cost of research. During the first decade of the *Environmental Studies Program*, the Minerals Management Service prohibited researchers from including in their proposals research designs that involved methods that required Office of Management and Budget Approval. Taken at face value, the effect of this policy was to prohibit survey research, the principal form of social indicator primary data collection.

The policy shaped the research conducted under the *Environmental Studies Program*. Ethnographic methods were most widely used for primary data collection. These methods yielded rich insights about communities; however, they could not produce quantitative estimates at the community and regional levels.

The first harvest studies sponsored by the Minerals Management Service were started in the late 1980s⁵². These studies used repeat contacts with a stratified random sample of households in Barrow and Wainwright to document annual harvests and harvest sites over a two and three year period respectively.

Fortunately, in the early 1980s the Alaska Department of Fish and Game Subsistence Division embarked on an ambitious program of community studies, a core component of which was a community survey of household harvests for a twelve month period. Harvest data now exist for over 180 Alaska communities. The Division maintains a statewide harvest profile database into which the studies sponsored by the Minerals Management Service have been incorporated⁵³.

Following the Exxon Valdez oil spill in 1989, the Alaska Department of Fish and Game Subsistence Division was the only agency possessing subsistence harvest data for any of the affected communities in Prince William Sound. The agency conducted post-spill surveys in 15 communities. Table 6 provides an example of results⁵⁴.

Table 6: Changes in Subsistence Harvests Following the Exxon Valdez Oil Spill

Characteristic Region	Pre-Spill Average	Post-Spill Year	Change
<i>Per Capita harvests (pounds)</i>			
Prince William Sound	436.5	188.3	-56.9%
Lower Cook Inlet	254.3	131.4	-48.3%
Kodiak Island Borough	392.1	196.3	-49.9%
Alaska Peninsula (AKP)	287.0	346.4	20.7%
All Regions	352.0	218.2	-38.0%
All Regions, except AKP	370.5	181.1	-51.1%

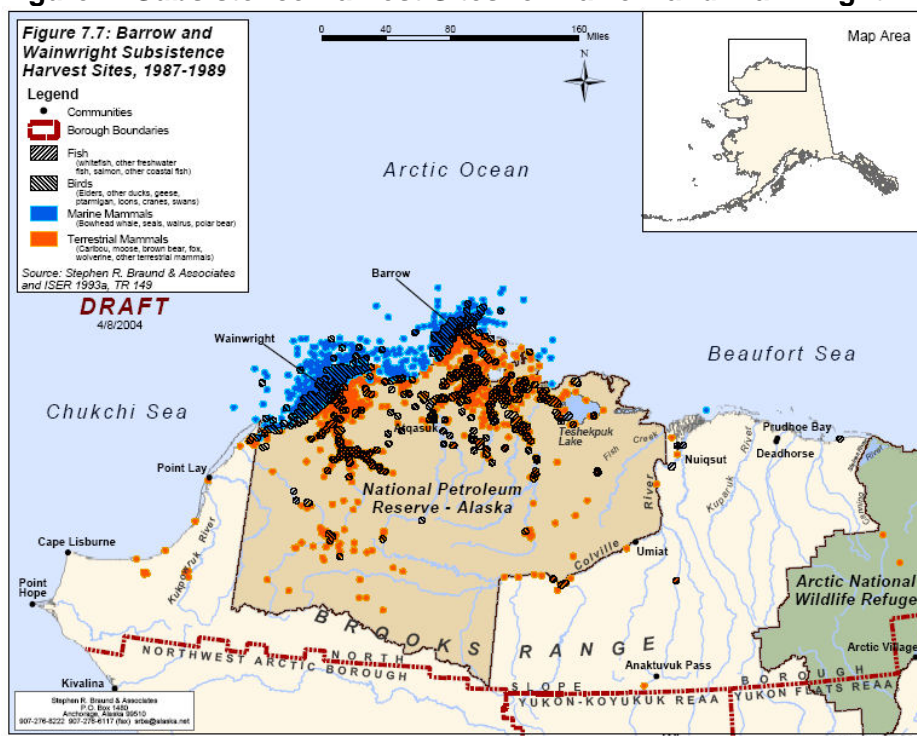
Source: James Fall, Alaska Department of Fish and Game, Division of Subsistence

The Minerals Management Service and the Alaska Department of Fish and Game Subsistence Division entered into a cooperative agreement to extend post-spill research. Their collaboration produced an rigorous quantification of changes in harvest levels over time.

The Exxon Valdez oil spill was 50 times larger than the largest spill considered in offshore oil development scenarios. Even if the Minerals Management Service had funded harvest studies and modeling to predict impacts, the results could not be expected to be comparable to the Exxon Valdez oil spill. The results did, however, point to the unanticipated importance of fears about resource contamination.

Harvest data can be a lagging indicator of change. Hunters and fishers can adjust their effort to compensate for changing conditions, minimizing the impact on harvest quantities. Spatially specific data on subsistence harvests can help to identify conflicts in land use and measure impacts. The Braund subsistence harvest studies in Barrow and Wainwright produced maps showing kill sites by species (see Figure 4)⁵⁵. Braund and his colleagues learned from the

Figure 4: Subsistence Harvest Sites for Barrow and Wainwright



Barrow and Wainwright harvest study experience that harvest sites alone are not sufficient to assess land use conflicts. Braund has continued to refine his subsistence harvest study methods, and currently has a contract with the Minerals Management Service in collaboration with the North Slope Borough to collect primary data and develop a subsistence geographical information database for the North Slope⁵⁶.

Closely associated with subsistence harvests, and part of the goal of *Cultural Continuity*, are continued social relationships. As early as 1978, Worl Associates observed the following in their Technical Report to the Minerals Management Service: “The tenacity of Iñupiat cultural survival has been attributed to their continued relationship to the land and their environment and the continuation of their traditional social organization in the family and community⁵⁷.” The principal challenge has been how to measure changes in traditional social organization. Table 7 illustrates the indicators of traditional social organization most widely used: percentage of households receiving subsistence foods from other households and percentage of households giving subsistence foods to other households⁵⁸. These measures, however, are quite crude.

Table7: Percentage of Households Sharing of Subsistence Foods by North Slope Community

	Point Lay ¹ 1988	Barrow ² 1988	Wainwright ³ 1988	Nuiqsut ⁴ 1988	Nuiqsut ⁴ 1993	Kaktovik ⁵ 1988	Kaktovik ⁵ 1993	Point Hope 1988	Anaktuvuk Pass 1988	Atkasuk 1988
Received subsistence foods from other households	76%	74%	65%	72%	98%	82%	92%	78%	80%	53%
Gave subsistence foods to other households	91%	61%	72%	84%	92%	71%	83%	86%	71%	63%

Sources: North Slope Borough 1988; Pedersen 1995a and b, TR160.

Recent work by Jim Magdanz of the Alaska Department of Fish and Game Subsistence Division shows promise in a much more in-depth documentation of social networks⁵⁹. Magdanz’s approach is based on in-depth household interviews documenting social networks associated with information and decision-making, labor, support, harvests, and distribution. As is the case with all other indicators, the approach would have to be repeated over time to measure change.

The final goal under the goal family of *Cultural Continuity* is *Continued Cultural Supports*. Use of aboriginal language is identified as an indicator and has been measured in comparable form in the *Survey of Living Conditions in the Arctic* and in the *Canadian Aboriginal Peoples Survey*⁶⁰.

Important to keep in mind when considering *Cultural Continuity* is the fact that none of the Alaska experience reviewed above includes the use of indicators to project the cumulative impacts of petroleum development. As mentioned earlier, the design of the Minerals Management Service Environmental Studies Program did not call for those doing socio-cultural research to project incremental and cumulative impacts. Canadian and U.S. researchers have collaborated on a modeling study that does attempt to project at least one indicator of cultural continuity: time on the land⁶¹. The *Sustainability of Arctic Communities* project related changes in climate, petroleum development, tourism, and government spending to an array of indicators including time on the land measured as the number of households in a community taking at least one overnight hunting or fishing trip per year. Intermediate variables important to modeling this relationship included time spent working for pay, income, availability of resources, and community sharing. Results from the Synthesis Model suggest that climate warming will increase vegetation biomass within the summer range of the Porcupine Caribou Herd. However,

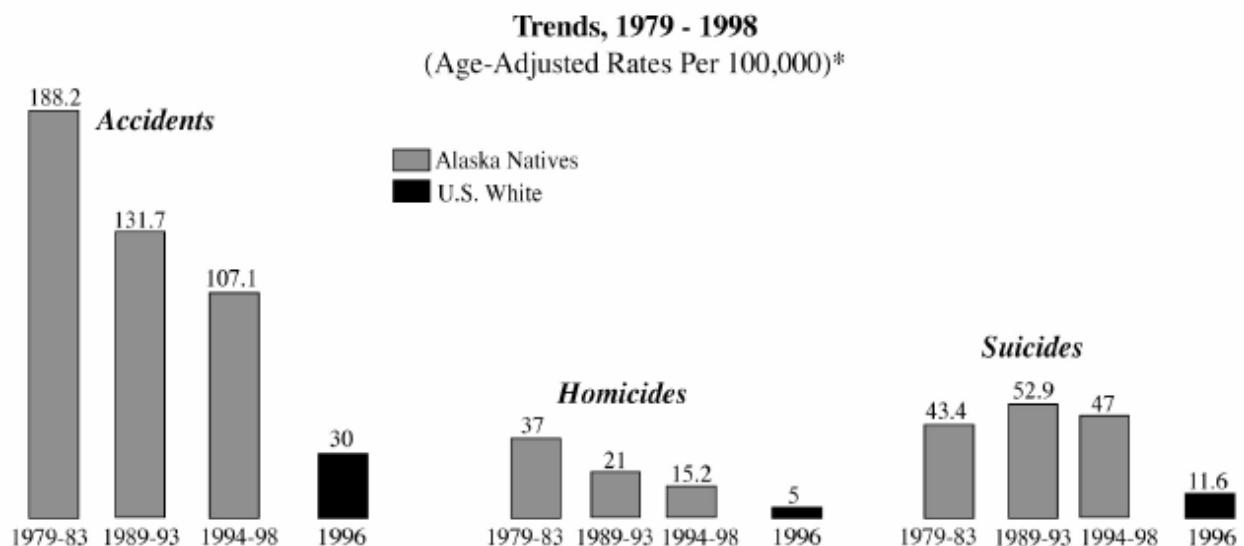
even with increasing forage, the herd was projected as likely to decline with a warming climate, due to increased insect harassment in the summer and potentially greater snow depths in the winter. There was a strong negative correlation between hypothetical, development-induced displacement of cows and calves from utilized calving grounds and calf survival during June. The Synthesis Model suggested that climate warming coupled with petroleum development would cause a decline in caribou harvest by local communities⁶².

Individuals and Families that are Able to Function Well in Society

Thus far we have reviewed indicator development relevant to the goal families of *Command Over Goods and Services*, and *Cultural Continuity*. A third goal family is *Individuals and Families that are Able to Function Well in Society*. Ideally people are physically healthy, live long lives, think well of themselves and others, are safe from harm and have the traditional and western education needed to take advantage of hunting, fishing, and job opportunities.

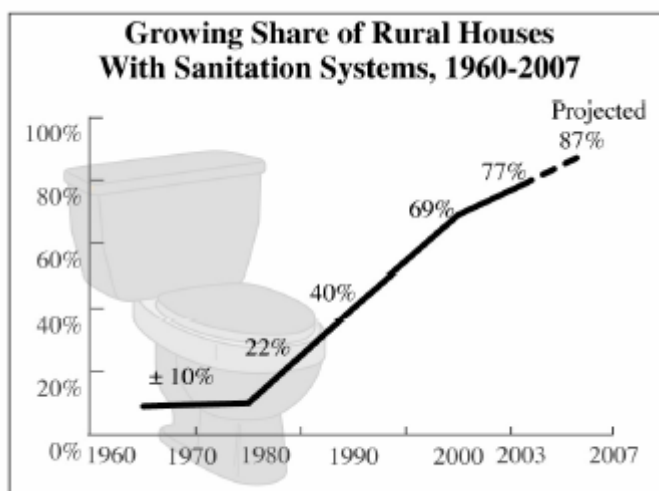
The most comprehensive review of Alaska indicators relevant to the health, safety, and education of Alaska Natives is the *Status of Alaska Natives Report 2004*⁶³. Figure 5 illustrates

Figure 5 Violent Deaths Among Alaska Natives and U.S. White Population



* Adjusted with 1940 U.S. standard population.

the type of data generated by combining administrative data (e.g. reported accidents) with



primary data (e.g. census data) to generate rates that can be compared over time and across populations. A number of challenges exist. First, data reporting can vary over time. Reports of child abuse, for example, increased in Anchorage during a time of increased program intervention, apparently because more people were aware of the general problem and were motivated to make reports. Second, the basis for calculating

statistics is not necessarily stable. In Alaska, for example, the way race is reported in the decennial census changed between 1990 and 2000, making it difficult to compare rates based on census data. Third, major changes other than petroleum development are underway that may account for changes in health. Community infrastructure is one example as Figure 6 illustrates. It is likely that major infrastructure and societal changes account for changes in many indicators of health and safety. Also important are changes in local policies, as a study on local alcohol option laws by Berman and Hull⁶⁴. One might make the case that increased petroleum revenues to the state and regional governments have resulted in major changes in infrastructure, and perhaps – as in the case of installing earth stations bringing the outside world (e.g. the Superbowl) to each village – promoting societal changes as well. But this argument ignores the key fact that it has been Alaskans (and North Slope residents) through their elected representatives, governor (and mayor) who have essentially made the expenditure decisions.

Many indicators of health and safety derived from existing data sources pertain to relatively small proportions of the population that experience a social problem. There are two problems associated with these measures. First, measures involving small proportions of the population are often unstable when the populations being considered are also small, such as the residents of small villages. Second, framing indicators in negative terms (e.g. suicides, victims of abuse) can arouse strong feelings among the people being described. A more productive approach has been to frame indicators in terms of well-being. While indicators of well-being can be derived from existing data (e.g. infant survival rate), most require primary data collection. The *Aboriginal Peoples Survey* and the international *Survey of Living Conditions in the Arctic*, for example, ask respondents to rate their physical health and their emotional state⁶⁵. Both studies also ask respondents about their subjective well-being regarding the amount of fish and game available locally, job opportunities in your community, how satisfied you are with this job, quality of education in your community, quality of health services in your community, recreational facilities in your community, public safety (police services) in your community, courts in your community, and your life as a whole⁶⁶.

Indicators of family relationships have been used in the *Survey of Living Conditions in the Arctic* and in the *Canadian Aboriginal Peoples Survey*. Indicators in these studies include an index based on seven-items concerning availability of different types of support⁶⁷.

Both traditional and western education are components of the goal family *Individuals and Families that are Able to Function Well in Society*. As mentioned earlier, the Alaska Department of Education publishes in its *Report Card to the Public* place and district level data that can be used to make comparisons over time and across regions⁶⁸. Also important are measures of traditional education. Not included in the *Aboriginal Peoples Survey* but relevant as indicators of continued cultural supports are the percentage of people who have received education in traditional activities. The approach taken in the *Survey of Living Conditions in the Arctic* has been for each region to develop a list of the most important traditional skills and to ask respondents if they received training in these skills⁶⁹.

Social Opportunities and Participation

Referring again to ideal living conditions as reflected in the goals related to social opportunities and participation, residents of Arctic coastal Alaska would be able to influence the management of wildlife resources, education, development, and other policies affecting their lives. They would think of their governments as effective. They would choose to participate in elections, public meetings, and other civic activities.

The National Academy of Sciences Committee on Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope concluded in 2003:

Without the North Slope petroleum discoveries and development, the North Slope Borough, the Alaska Native Claims Settlement Act, and the Arctic Slope Regional Corporation would not exist. The emergence of those structures has caused major, significant, and probably unalterable changes to the way of life in North Slope communities. The primary vehicle of change is revenue that has flowed into communities from NSB property taxes on petroleum infrastructure. Oil development has resulted in assets for North Slope residents that exceed \$1 million per capita. Assessed value per capita, excluding petroleum structures, exceeds \$100,000. Many North Slope residents view the changes positively. However, social and cultural changes of this magnitude are not without costs in terms of social and individual pathology.

Committee on Cumulative Environmental Effects
of Oil and Gas Activities on Alaska's North Slope
2003, p. 148.

Both the *Aboriginal Peoples Survey* and the *Survey of Living Conditions in the Arctic* contain measures relevant to *Social Opportunities and Participation*. Common measures include voting, and participation in civic activities⁷⁰. In our preliminary analyses of a combined Alaska and Canada Survey of Living Conditions in the Arctic dataset we have seen that the ideal is not a current reality and that there is significant variation in civic participation by region. More analysis is required to understand the relationship between civic participation and perceived influence. The *Survey of Living Conditions in the Arctic* in addition contains indicators of people's perceptions of the influence they have over key aspects of their lives: management of natural resources like fish and caribou, management of natural resources like oil, gas, and minerals, and reducing environmental problems in their area⁷¹. Table 8 illustrates the use of indicators based on perceptions. The conclusions of National Academy of Sciences Committee on Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope cited above lead to two contrasting hypotheses: (1) the growth of Iñupiat institutions on the North Slope is associated with relatively strong perceptions of influence by North Slope residents; and, (2) the associated social and cultural changes associated with rapid change on the North Slope is associated with relatively weak perceptions of influence by North Slope residents.

Table 8: Percentage of Iñupiat residents who are very satisfied with the influence they have over three aspects of natural resources and the environment.

	North Slope Region	Northwest Arctic Region	Bering Straits Region	Total
How satisfied with influence Iñupiat have on management of natural resources like fish and caribou	56%	43%	17%	35%
How satisfied with influence Iñupiat have on management of natural resources like oil, gas and minerals	26%	20%	13%	18%
How satisfied with influence Iñupiat have to reduce environmental problems in your area	21%	19%	19%	19%

Source: *Survey of Living Conditions in the Arctic, unpublished data.*

The data do not support the hypothesis that the associated social and cultural changes associated with rapid change on the North Slope is associated with relatively weak perceptions

of influence by North Slope residents. North Slope Iñupiat are significantly more likely to be very satisfied than their Iñupiat neighbors in the influence that they have on the management of natural resources like fish and caribou. The North Slope Borough staffs and funds the activities of the North Slope Wildlife Management Committee that includes representatives from each community. The perceptions of North Slope and Northwest Arctic Iñupiat on the influence that they have on the management of natural resources like oil, gas, and minerals do not significantly differ from each other, but are more positive than the perceptions of Bering Straits Iñupiat. Interestingly, the North Slope (e.g. Prudhoe Bay) and the Northwest Arctic (e.g. Red Dog Mine) have more development activity than the Bering Straits region. But it is also true that only about one-in-four Iñupiat living on the North Slope or in the Northwest Arctic are very satisfied with the influence they have on the management of natural resources like oil, gas and minerals, or with reducing environmental problems in their area. The main point here, however, is that perceptions of influence can provide valuable insights into the cumulative effects of development.

Early on in the Minerals Management Service Environmental Studies Program researchers pointed to the importance of institutional development in shaping social, economic, and cultural change⁷². A recent comparison of community institutional development and petroleum development brings together 15 years of research⁷³. The study compares Nuiqsut's experience with development of the Alpine field and Villano, Ecuador's experience with a comparable development. Key explanatory variables for differences between the two community experiences are, "well-defined property rights for all affected parties, strong local institutions with unambiguous authority for collective decision making, mechanisms for adjudication of disputes, experienced political leadership, and the services of professional staff and counsel⁷⁴.

Avoidable Constraints to Indicator Development and Use

Constraints to indicator development and use in Alaska have included include a lack of mandates, a lack of realized development, the organization of the science, and limitations on selection of research methods. Some of these constraints may be sufficiently unique to Alaska that they are not relevant to the goal of developing approaches to predicting and monitoring cumulative social, economic, and cultural changes in NWT communities resulting from the Mackenzie Gas Project and associated developments. I have not attempted a systematic comparison of the situation in Canada with that in Alaska. It is my hope that the reader more familiar with the Canadian situation will be able to glean relevant material from the following discussion.

Lack of Mandates

The contrast in mandated consideration of the cumulative social, economic, and cultural effects of onshore developments in the Prudhoe Bay area and offshore developments in Alaska is striking. The US Minerals Management Service has a specific mandate to do the research necessary to assess and manage impacts. In the case of Prudhoe Bay, a environmental impact statement of the past and potential cumulative impacts of development has never been prepared, much less has there been a program of sponsored research to support such an assessment. The US Congress has appropriated over \$50 million to support the Minerals Management Service research program. Mandates clearly matter.

Lack of Realized Development

Research on the cumulative effects of offshore petroleum development has been constrained by a lack of realized development. The first oil production from Alaska's outer continental shelf started in 2001, some 30 years after assessments of the potential effects of such production

begin. Research conducted under the Minerals Management Service Environmental Studies Program suffered through no fault of its own from the fact that projections of impacts could not be measured against actual impacts. Had offshore development occurred, the design of the Environmental Studies Program would likely have evolved substantially, enhancing the ability to predict and monitor the cumulative effects of development.

The lack of realized offshore development is not an avoidable constraint to the development of approaches to predicting and monitoring social impacts, at least in the case of Alaska. Exploration has simply not yielded commercially viable development prospects. Yet there is an important dimension of cumulative social impacts that warrants consideration even in the circumstance that the construction and operation of petroleum facilities does not take place. The National Academy of Sciences Committee on Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope concluded in 2003:

Offshore exploration and development and the announcement of offshore sales have resulted in perceived risks to Inupiaq culture that are widespread, intense, and themselves are accumulating effects...

Research should identify the specific benefits and threats that North Slope residents believe are posed to their ways of life by oil and gas development.

Committee on Cumulative Environmental Effects
of Oil and Gas Activities on Alaska's North Slope
2003, p.148, 149

Organization of the Science

The science of cumulative social impact assessment in Alaska has virtually all been the work of private consultants, university researchers, and state government researchers – not federal employees. In the case of the Minerals Management Service Environmental Studies Program, individuals, firms, and organizations responded to requests for proposals issued by the federal government. In the case of the National Science Foundation, researchers have submitted proposals in response to more general announcements of opportunity, framing their own research questions, subject to the review of peers.

There are, of course other organizational models. Research conducted by the Subsistence Division of the Alaska Department of Fish and Game is performed by Division staff. In the earliest days of the federal environmental studies program, the staff of a private firm (Peat, Marwick, and Mitchell) both managed the research program and performed some of the research itself. The University of Alaska's Institute of Social and Economic Research competed with Peat, Marwick, and Mitchell and other organizations proposing to manage the early program. Had the university group been awarded the contract, likely even more of the research itself would have been performed "in-house".

The chief benefit of the Minerals Management Service organization of the science has been the coordination of studies to meet a common goal: predicting the effects of development. Unfortunately, the organization of the science did not extend to its logical conclusion: commissioned studies did not include the projection of socio-cultural impacts, nor even of socio-economic impacts beyond employment and migration. Had these additional tasks been included in the overall organization of the science, there would have been more pressure on the science to come up with ways of measuring the cumulative social impacts of development.

Limitation on Selection of Research Methods

Perhaps least relevant to Canada is the Alaska constraint of a prohibition of survey research during the first decade of the Minerals Management Service Environmental Studies Program. Yet this prohibition had such a profound impact on the development of Alaska's capability to predict and monitor cumulative social, economic, and cultural impacts it is worth mentioning in case some analogous circumstance pertains in Canada.

Imagine yourself to be a social scientist reading in a Request for Proposals issued by the Minerals Management Service, "Formal interviews requiring Office of Management and Budget approval of the questionnaire are specifically forbidden." A quick review of Office of Management and Budget regulations would tell you that if you proposed to ask ten or more people the same question, your method would require the approval of the Office of Management and Budget.

As our review of existing data as a source potential indicators demonstrated (see Appendix A), most indicators of social, economic, and cultural change in Alaska coastal communities must come from primary, that is new, data collection efforts. To be able to measure change over time, these indicators must be based on questions that have quantitative response categories. And since individuals are likely to differ in their impact experience, the indicators must be based on samples that are representative of the populations of concern. These requirements – primary data, questions structured to have quantitative response categories, and statistical sampling of populations – are the essence of survey research methods in the social sciences.

The prohibition of survey research meant that researchers could not, at least in a straightforward way, develop much of the quantitative data necessary to project and monitor cumulative change. I don't think that the Minerals Management Service understood the implications of its prohibition. In retrospect, the research community was at fault for not bringing the issue to the attention of the Minerals Management Service⁷⁵. The important point here is that the successful development of approaches to projecting and monitoring the cumulative social, economic, and cultural impacts of petroleum development depends on the availability of a full array of social science research methods. Both ethnographic and survey research methods are indispensable, as is modeling and compilations of existing data.

Opportunities for Improvements in Indicator Development and Use

Two major opportunities for improving our ability to predict and monitor the cumulative social, economic, and cultural impacts of petroleum development have to do with: (1) the organization of the assessment process; and, (2) the use of state-of-the-art methods.

Organization of the Assessment Process

The National Academy of Sciences Committee on Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope concluded in 2003:

Research on the North Slope, regardless of its subject matter, needs to occur as a cooperative endeavor with local communities. Traditional and local knowledge and language involves, rich, detailed information about the physical environment, the biota, and the human communities of the North Slope. That information should be incorporated into research – from identification of topics and study design through interpretation and presentation of results.

Committee on Cumulative Environmental Effects
of Oil and Gas Activities on Alaska's North Slope
2003, p.149

In the Mackenzie Basin region, with its experience in co-management and its system of regional organizations, there are rich opportunities for implementing an assessment system that is a cooperative endeavor with communities. Such a system could enable communities to better manage risks and to more equitably capture benefits.

Based on the Alaska experience, it is also important not to lose sight of the importance of the Canadian Social Science and Humanities Research Council. The contribution of its US analog, the National Science Foundation, to the goal of predicting and monitoring the cumulative effects of development has been substantial. As a result of Foundation funding, we are able to systematically analyze the economic and demographic effects of different scenarios, taking account different responses, such as in state and local spending policies. As a result of Foundation funding, we have been able to examine social and economic change in an area subject to major petroleum development over more than 20 years⁷⁶.

Use of State of the Art Methods

Perhaps the greatest step forward in social science impact assessment is the availability of tools to bring diverse sources of data together in support of multivariate analyses. We know that social change is usually multidimensional. If employment opportunities change, domestic production systems (e.g. childcare) change. If the availability of a subsistence resource is disrupted, opportunities for the transmission of local knowledge may also be disrupted. We also know that social change has multiple causes. The effects of petroleum development are masked by the effects of changes in government spending, demographic changes in the population and a myriad of other social processes. Multivariate analyses can be used to ferret out the relationships among changes. But multivariate analyses require data of many different types (e.g. health, housing, education, subsistence) that are linked to the same individuals and places. Simple but powerful tools like relational databases and the ability to easily transfer data from one application to another make such multivariate data bases more within reach.

The *Aboriginal Peoples Survey* is a multivariate database in itself, albeit pertaining to one point in time. It contains data for a large representative sample of individuals on a broad range of measures relevant to understanding changes in well-being. To be useful for multivariate analyses, it is necessary to access the microdata file; that is, the individual records that link the data together. Statistics Canada will be producing a public use microdata file in the next year. To protect the confidentiality of respondents, however, this file will contain no geographic identifiers within the Canadian Arctic. Research questions could be designed to access the Arctic Analytic Master File containing full geographic information through arrangements with Statistics Canada and the Social Science and Humanities Research Council. I should mention that I have been working with the Arctic Analytic Master File derived from the Aboriginal Peoples Survey within the Statistics Canada Research Data Centre Program. I have therefore had an opportunity to evaluate the usefulness of the data set. In general, the data are certainly of

sufficient quality to be useful as a basis for monitoring living conditions. The principal challenge is whether the data can be made available at a useful geographic scale. Under guidelines for use of the APS database, Statistics Canada requires that the minimum cell size in any table released for publication is 10 unweighted cases. Depending on the indicator being considered, this may preclude the publication of results by place. We have found, however, that it is possible to group communities where necessary and still produce useful results. The sampling rate in APS was very high compared to many sample surveys.

Over time, it is possible to build a place-based multivariate data base. Caution should be used here, however, as apparent relationships among variables at the place level (e.g. places showing higher employment also showing lower harvest of country foods) can be interpreted as applying at the individual level (i.e. people who are employed harvest less) when something more complicated is going on.

Another important technical advance is the ease of use of geographic information system tools. These tools are now available on PC's and can be easily linked to relational databases. Maps provide an excellent vehicle for tracking local knowledge about environmental changes and the possible causes of these changes.

Finally, modeling serves as a productive tool for interdisciplinary research. Models need not be computationally intensive; simple quantitative representations of key biological, social, economic, and cultural relationships can be used to identify research gaps and examine the sensitivity of components of the system to disruption.

¹ See: <http://www.mms.gov/alaska/>

² Williams, Dee. Forthcoming. Preface in *Synthesis: Three Decades of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska*, Stephen R. Braund, Jack Kruse (editors).

³ Kresge, Morehouse, and Rogers. 1977. *Issues in Alaska Development*. pp.84-86.

⁴ *Ibid.* p.84.

⁵ United States Government et al. Agreement and Grant of Right-of-Way for Trans-Alaska Pipeline between The United States of America and Amerada Hess Pipeline Corporation, BP Pipelines (Alaska) Inc., Exxon Mobil Pipeline Company, Phillips Transportation Alaska, Inc., Unocal Pipeline Company, and Williams Alaska Pipeline Company, L.L.C. See:

<http://tapseis.anl.gov/documents/docs/feis/volume5/AppendixB.pdf> , p.23.

⁶ See the Record of Decision: http://tapseis.anl.gov/documents/docs/rod/Final_TAPS_ROD.pdf

⁷ MAP-related publications are included in the publication list of the Institute of Social and Economic Research, University of Alaska. See: <http://www.iser.uaa.alaska.edu/Publications/main.htm> and browse publications between 1971 and 1984.

⁸ Personal communication, Anna Kerttula, National Science Foundation, 2005. See two relevant programs of research: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13425&org=ARC (Arctic Social Sciences Program) and http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13426&org=ARC (Arctic System Science Program).

⁹ For information on the Sustainability of Arctic Communities project, see: <http://www.taiga.net/sustain/> .

¹⁰ For information on the Survey of Living Conditions in the Arctic project, see

www.arcticlivingconditions.org

¹¹ Dixon, Mim. 1978. *What Happened to Fairbanks? The Effects of the Trans-Alaska Oil Pipeline on the Community of Fairbanks, Alaska*. Social Impact Assessment Series, No.1, Boulder, CO: Westview Press.

¹² See: <http://www.co.fairbanks.ak.us/CommunityPlanning/CRC/defaultMission.htm>

¹³ See: http://www.muni.org/Planning/pub_Indicators.cfm

¹⁴ See: <http://www.indicators.ak.org/hai.htm>

¹⁵ See publications of the Subsistence Division through their home page:

<http://www.subsistence.adfg.state.ak.us/> . Also see a recent synthesis of the Division's research by Robert Wolfe. 2004. *Local Traditions and Subsistence: A Synopsis from Twenty-Five Years of Research by the State of Alaska*, Technical Paper No. 184:

<http://www.subsistence.adfg.state.ak.us/TechPap/tp284Twentyfiveyears.pdf>

¹⁶ See: <http://www.r7.fws.gov/asm/anicatoc.html>

¹⁷ This is not an official site, but appears to have a wealth of ANCSA-related material:

<http://www.lbbllawyers.com/ancsa.htm>

¹⁸ For a recent largely census-based publication, see **ID# 1067** *The Status of Alaska Natives Report 2004 Volumes I – III* Scott Goldsmith, Jane Angvik, Lance Howe, Lexi Hill and Linda Leask with Brian Saylor and David Marshall May 2004:

<http://www.iser.uaa.alaska.edu/Home/ResearchAreas/statusaknatives.htm>

¹⁹ See: <http://almis.labor.state.ak.us/>

²⁰ See: http://www.commerce.state.ak.us/dca/commdb/CF_COMDB.htm

²¹ See: <http://www.eed.state.ak.us/stats/>

²² See: <http://www.nationalacademies.org/nrc/>

²³ See: <http://books.nap.edu/catalog/2353.html>

²⁴ See: <http://books.nap.edu/catalog/10639.html>

²⁵ Braund and Kruse. Forthcoming. Figure 2.3 in: *Synthesis: Three Decades of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska*, Stephen R. Braund, Jack Kruse (editors).

²⁶ Impact Assessment Inc. 1990. *Point Lay Case Study*. Technical Report 139. Minerals Management Service.

²⁷ Impact Assessment, Inc. Point Lay Biographies. 1989. Technical Report 140. Minerals Management Service, p.v.

²⁸ Braund and Kruse. Forthcoming. Figure 5.1 in: *Synthesis: Three Decades of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska*, Stephen R. Braund, Jack Kruse (editors).

- ²⁹ Louis Berger & Associates. 1983. Technical Report 77, Minerals Management Service.
- ³⁰ Stephen R. Braund & Associates, John Kruse, Frank Andrews. 1985. Technical Report 116, Minerals Management Service.
- ³¹ Human Relations Area Files, Inc. 1992a Technical Report 151; 1992b Technical Report 152; 1993 Technical Report 153; 1994 Technical Report 154.
- ³² Organization for Economic Cooperation and Development. List of Social Concerns Common to Most OECD Countries. Paris: OECD, 1973.
- ³³ Stephen R. Braund & Associates, John Kruse, Frank Andrews. 1985. Technical Report 116, Minerals Management Service, p. 28.
- ³⁴ See www.taiga.net
- ³⁵ Organization for Economic Cooperation and Development. Unpublished Final Draft Questionnaire Developed by the Directorate for Social Affairs, Manpower, and Education, 1979.
- ³⁶ Kruse, John, Judith Kleinfeld, Robert Travis. 1981. Energy Development on Alaska's North Slope: Effects on the Iñupiat Population. *Human Organization* 41:97-109.
- ³⁷ Andrews Frank, Stephen Withey. 1976. *Social Indicators of Well-Being: Americans' Perceptions of Life Quality*. New York, Plenum.
- ³⁸ See: www.arcticlivingconditions.org
- ³⁹ Kresge, David, Daniel Seiver, Oliver Goldsmith, Michael Scott. 1984. *Regions and Resources: Strategies for Development*. MIT Press, Cambridge Massachusetts.
- ⁴⁰ Goldsmith, Kruse and Larsen. Forthcoming. Figure 3.2 in: *Synthesis: Three Decades of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska*, Stephen R. Braund, Jack Kruse (editors).
- ⁴¹ National Research Council. 1994. *Environmental Information for Outer Continental Shelf Oil and Gas Decisions in Alaska*. p.142.
- ⁴² Huskey, Lee. Will Nebesky, Ted Volin. 1979. *Design of a Population Distribution Model*. Institute of Social and Economic Research. U.S. Department of Interior, Minerals Management Service. Technical Report No. 24.
- ⁴³ Northern Economics (forthcoming), *North Slope Economy: 1965 to the Present*. Minerals Management Service.
- ⁴⁴ Knapp, Gunnar, Tom Morehouse. 1991. Alaska's North Slope Revisited. *Polar Record* 27(163).
- ⁴⁵ Reproduced from the Alaska Cooperative Extension Service website:
<http://www.labor.state.ak.us/research/col/col.pdf>
- ⁴⁶ See: <http://www.alyeska-pipe.com/Employment/2004%20ANUA%20.pdf>
- ⁴⁷ See : <http://www.alyeska-pipe.com/Employment/AK%20Native%20Program/2001%20ANP%20Annual%20Report.pdf>
- ⁴⁸ Kruse, Jack, Michael Baring-Gould, William Schneider, Joe Gross, Gunnar Knapp, George Sherrod. A Description of the Socioeconomics of the North Slope Borough. Institute of Social and Economic Research. Minerals Management Service, Technical Report 85.
- ⁴⁹ National Research Council. 2003. Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope. P.134).
- ⁵⁰ See: www.nativeknowledge.org and choose "Use the Database" and "Native Concerns".
- ⁵¹ For current regulations, see: <http://www.whitehouse.gov/omb/fedreg/gpea2.html>
- ⁵² Stephen R. Braund & Associates and ISER. 1993. *North Slope Subsistence Study*, Minerals Management Service Technical Reports 147 and 149. The protocols used in the research identified categories of information to be provided by respondents.
- ⁵³ See: <http://www.subsistence.adfg.state.ak.us/geninfo/publctns/cpdb.cfm> . For an online searchable form of the database (current as of 2000), see: www.nativeknowledge.org and select "Look for Information in the Database", then select a place, and then select a resource category.
- ⁵⁴ Fall, James (forthcoming). Long-Term Consequences of the Exxon Valdez Oil Spill for Subsistence User of Fish and Wildlife. *The Human Dimension: A Synthesis of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska* Stephen R. Braund, Jack Kruse (editors).
- ⁵⁵ Pedersen, Sverre, Jack Kruse, Stephen Braund (forthcoming). Subsistence Harvest Patterns and Oil Development on Alaska's North Slope. In: *The Human Dimension: A Synthesis of Research on Socioeconomic Effects Related to Offshore Petroleum Development in Coastal Alaska* Stephen R. Braund, Jack Kruse (editors).
- ⁵⁶ Braund, Stephen R & Associates, North Slope Borough Department of Wildlife Management, ESRI-Northwest, Encompass Data & Mapping, Jack Kruse, Jeffrey Johnson. (forthcoming) *Subsistence*

Mapping of Nuiqsut, Kaktovik, and Barrow. Minerals Management Service. For further information, contact Steve Braund at srba@alaska.net

⁵⁷ Worl Associates. 1978b Sociocultural Systems Impacts of the Beaufort Sea Petroleum Development Scenarios. U.S. Department of the Interior, Bureau of Land Management, Alaska OCS Region Social and Economic Studies Technical Report No. 22. (A06/PB291919), p.11.

⁵⁸ Derived from data published in North Slope Borough. 1988. North Slope Borough Household Census. North Slope Borough, Department of Planning and Community Services. Barrow, Alaska; and, Pedersen, S. 1995a. Kaktovik. Pp. XXI-1 to XXI-30 in *An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska, Volume V. Alaska Peninsula and Arctic* (J.A Fall and C.J. Utermohle, eds.). U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region Social and Economic Studies Technical Report No. 160. Submitted by the Alaska Department of Fish and Game, Division of Subsistence. (MMS 95-0014); and, Pedersen S. 1995b. Nuiqsut. Pp. XXII-1 to XXII-61 in *An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska* (J.A Fall and C.J. Utermohle, eds.). U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region Social and Economic Studies Technical Report No. 160. Submitted by the Alaska Department of Fish and Game, Division of Subsistence. (MMS 95-0014).

⁵⁹ www.subsistence.adfg.state.ak.us/TechPap/tp259.pdf

⁶⁰ See the APS variables B03UNSTR, B04SPKR, B05READR, B06WRITR, B07HHLDR, B07WORKR, B07SKOLR, B07OTHR.

⁶¹ Kruse, J.A., White, R.G., Epstein, H.E., Archie, B., Berman, M.D., Braund, S.R., Chapin III, F.S., Charlie Sr., J., Daniel, C.J., Eamer, J., Flanders, N., Griffith, B., Haley, S., Huskey, L., James, S., Joseph, B., Klein, D., Kofinas, G.P., Martin, S., Murphy, S.M., Nebesky, W., Nicolson, C., Peter, K., Russell, D.E., Tetlich, J., Tussing, A., Walker, M.D., Young, O.R. 2004. Modeling sustainability of arctic communities: an interdisciplinary collaboration of researchers and local knowledge holders. *Ecosystems* 7(8):815-828.

See also www.taiga.net/sustain

⁶² *Ibid.*

⁶³ Goldsmith, Scott, Jane Angvik, Lance Howe, Lexi Hill and Linda Leask. 2004. *The Status of Alaska Natives Report 2004 Volumes I – III*

<http://www.iser.uaa.alaska.edu/Home/ResearchAreas/statusaknatives.htm>

⁶⁴ Berman, Matthew and Teresa Hull. 1997. *Community Control of Alcohol in Alaska*. Alaska Review of Social and Economic Conditions Vol.31, No.1. see

www.iser.uaa.alaska.edu/publications/formal/arsecs/arsec31.pdf

⁶⁵ See APS variables E01HLTHR, J01ANERVR, J01BCALMR, J01CBLUER, J01DHAPYR, J01DOWNR

⁶⁶ See APS variables K09FOOD, K01OPP, K02JOB, K03ED, K04HLTH, K07REC, K11POLI, K12CORT, K13LIFE

⁶⁷ See the APS variables E37LSTNR, E37COUNTR, E37LOVER, E37GTIMER, E37CONFDR, E37TOGTHR, E37ENJOYR.

⁶⁸ See: <http://www.eed.state.ak.us/stats/>

⁶⁹ See: www.arcticlivingconditions.org and choose “Toward International Reporting & Data Sharing”, then “Questionnaire development”, and finally “Final International Core Questionnaire”. Relevant item numbers in this case are b19a-b19t, b20, and b22.

⁷⁰ See the APS variables K26VOTMR, K28VOTER, K27VOTPR, K25AVLNTR, K25BWORKR, and K25CCMTR.

⁷¹ See SliCA items h7, h9, and h13a at www.arcticlivingconditions.org international core questionnaire under the section: Toward International Reporting and Data Sharing.

⁷² See, for example, Worl Associates. 1978a. Beaufort Sea Region Sociocultural Systems. U.S. Department of the Interior, Bureau of Land Management, Alaska OCS Region Social and Economic Studies Technical Report No. 9. (A13/PB 281634/AS)

⁷³ Haley, Sharman. 2004. Institutional Assets for Negotiating the Terms of Development: Indigenous Collective Action and Oil in Ecuador and Alaska. *Economic Development and Cultural Change*. Vol. 53, No. 1. See: www.iser.uaa.alaska.edu/iser/people/Sharman/Ecuador_AK%20Oil.pdf

⁷⁴ *Ibid.* p.18.

⁷⁵ In the early 1980s a team responding to an MMS Request for Proposals submitted to proposals, one conforming to the prohibition of survey research, and one assuming responsibility for obtaining Office of Management and Budget approval of a formal survey research project. The Minerals Management Service ultimately approved the team’s proposal to obtain OMB approval. The team obtained OMB

approval. See: Stephen R. Braund & Associates, John Kruse, Frank Andrews. 1985. Technical Report 116, Minerals Management Service.

⁷⁶ See, for example, Kruse, J.A. 1991 Alaska Iñupiat Subsistence and Wage Employment Patterns: Understanding Individual Choice. *Human Organization*, Vol. 50, No.4, 317-326.

APPENDIX A: GOALS, INDICATORS, AND SOURCES IDENTIFIED IN THE ALASKA OCS SOCIAL INDICATORS SYSTEM

GOAL FAMILY ONE CULTURAL CONTINUITY

<u>SUBGOAL SOCIAL INDICATOR</u>	<u>SOURCE</u>
GOAL ONE: CONTINUED HARVEST OF RENEWABLE RESOURCES	
111 HEALTHY WILDLIFE POPULATION size key wildlife pop as % max size in last 20 yrs % satis w/ amt. of wildlife there is to harvest % perceive amt. wildlife is same/more than 5 yrs. ago % perceive amt. wildlife will be same/more 5 yrs. hence	SECONDARY SURVEY SURVEY SURVEY
112 UNRESTRICTED ACCESS TO TRAD. HUNTING & FISHING AREAS % tradll hunting areas accessible to local resid	KEY INF
113 PRESENCE OF WILDLIFE POP/ TRADIL HUNTING & FISHING AREAS % recent historic max wildlife pop present in area	SECONDARY
114 INTEREST IN AND USE OF RENEWABLE RESOURCES % engaging in 50%+ local hunting/fishing activities months during which engaged in some activ.rel.to H&F % eating 2+ meals of fish & game in last 2 days % HH meat derived from harvested wildlife % satis. w/ amount hunting/fishing do personally	SURVEY SURVEY SURVEY SURVEY SURVEY
GOAL TWO: CONTINUED TRADITIONAL SOCIAL RELATIONSHIPS	
121 CONTINUED COOPERATIVE ACTIVITIES % engaging in activities cooperatively % satis. w/ cooperative activ. do personally	SURVEY SURVEY
122 CONTINUED SHARING/RENEWABLE RESOURCE PRODUCTS & EQUIP. % eating 1+ meal w/ shared food in last 2 days % satis. with amount share with others	SURVEY SURVEY
123 CONTINUED EXTENDED FAMILY RELATIONSHIPS % engaging in 1+ H/F act w/non-nuclear rel. % pop eating 1+ meal w/non-nucl.rel.in last 2 days % satis. with time spent w/non-nucl. relatives	SURVEY SURVEY SURVEY

SUBGOAL SOCIAL INDICATOR

SOURCE

124 CONTINUED RESPECT FOR ELDERS	
% pop seeking advice from elder in last month	SURVEY
% satis. w/ extent seek advice of elders personally	SURVEY
% perceive elders get same/more respect as 5 yrs ago	SURVEY
125 INTERVILLAGE SOCIAL RELATIONSHIPS	
% adults born in same region of residence	SURVEY
% satis. w/ social ties to other communities	SURVEY
no. times left community to visit relatives/friends	SURVEY

GOAL THREE: CONTINUED CULTURAL SUPPORTS

131 CONTINUED USE OF NATIVE LANGUAGE	
% speaking Native language at home	SECONDARY
% speaking Native language at home at least sometimes	SURVEY
% satis. with ability to speak Native language	SURVEY
132 CONTINUED ORAL HISTORY TRADITION	
% adults hearing tradl story from elder last week	SURVEY
% satis. amt. time spent listening to tradl. stories	SURVEY
133 CONTINUED PRODUCTION OF ARTS & CRAFTS	
% engaging in arts & crafts activities in last yr.	SURVEY
% satis. w/ arts and crafts do personally	SURVEY

**GOAL FAMILY TWO
INDIVIDUALS & FAMILIES THAT ARE ABLE TO FUNCTION WELL IN SOCIETY**

GOAL ONE: HEALTHY INDIVIDUALS

211 PHYSICALLY HEALTHY INDIVIDUALS	
infant survival rate	SECONDARY
death rate by cause	SECONDARY
% pop. treated for selected medical problems	SECONDARY
% perceive general health to be at least good	SURVEY
% perceive health as good as should be	SURVEY
% suffer longstand effects/illness-injury-disabltly	SURVEY
% can see faces clearly on other side of room	SURVEY
% can hear normal conversation w/at least 2 people	SURVEY
% can run 300 feet	SURVEY
% can carry object of 25 pounds 30 feet easily	SURVEY

SUBGOAL SOCIAL INDICATOR

SOURCE

211	PHY-SICALLY HEALTHY INDIVIDUALS (Con't)	
	% bite and chew on hard foods	SURVEY
	% had daily activ.interrupted for illness in last wk.	SURVEY
	% satis. with health and physical condition	SURVEY
212	MENTALLY HEALTHY INDIVIDUALS	
	% pop. treated for selected mental health problems	SECONDARY
	% satis. with way handle problems that come up in life	SURVEY
	% satis. with what accomplishing in life	SURVEY
	% satis. with amount respect get from others	SURVEY
	% satis. with self	SURVEY

GOAL TWO: INDIVIDUALS WHO ARE SAFE FROM HARM

221	INDIVIDUALS WHO ARE SAFE FROM HARM BY OTHERS	
	death by homicide rate	SECONDARY
	% pop. physically harmed by someone else in last yr.	SURVEY
	% satis. how safe feel in community	SURVEY
222	INDIVIDUALS WHO ARE SAFE FROM HARM CAUSED BY THEIR OWN ACTIONS	
	death by suicide rate	SECONDARY
	death rate by alcoholism	SECONDARY
	death by accident rate	SECONDARY
	% consuming alcohol on 4+ days in last week	SURVEY
	% who smoke 20+ cigarettes per day	SURVEY

GOAL THREE: AN EDUCATED & SKILLED POPULATION

231	INDIVIDUALS HAVE RECEIVED A BASIC EDUCATION	
	%completing eighth grade	SECONDARY
	%completing eighth grade	SURVEY
	%18-24 year olds who have not dropped out of school	SURVEY
	%rating ability to read magazine easily	SURVEY
	%rating ability to add 15 prices easily	SURVEY
	%rating ability to solve 583/17 easily	SURVEY
	%satis. w/ usefulness of educ. children getting	SURVEY
232	ADULTS HAVE THE EDUCATION AND SKILLS NECESSARY TO OB.EMPL	
	% completing high school	SECONDARY
	% completing high school	SURVEY
	% satis. w/ usefulness of educ-. personally	SURVEY

SUBGOAL SOCIAL INDICATOR

SOURCE

GOAL FOUR: FAMILIES THAT FUNCTION WELL IN SOCIETY

241	PREVALENCE OF FAMILIES AS THE PRIMARY SOCIAL UNIT	
	% of total households which contain 2+ related indiv.	SECONDARY
	% adults married	SECONDARY
	% population in family households	SURVEY
	% adults married	SURVEY
242	HEALTHY SOCIAL RELATIONSHIPS WITHIN FAMILIES	
	% adults who have ever married but never divorced	SECONDARY
	% households w/ children having two adults present	SECONDARY
	% adults who have ever married but never div./sep.	SURVEY
	% households w/ children having two adults present	SURVEY
	% satis. with how well family gets a.long	SURVEY

GOAL FIVE: ADEQUATE LEISURE OPPORTUNITIES

251	ADEQUATE OPPORT. TO INTERACT INFORMALLY W/ FRIENDS,FAMILY	
	no. days in last week went to visit friends/relatives	SURVEY
	% satis. with amount of visiting do personally	SURVEY
252	ADEQUATE OPPORTUNITIES TO PARTICIPATE IN RECR. ACTIVITIES	
	no. days/last week spent .5 hr. on recr. act.exc. TV	SURVEY
	no. hrs/last wk. sat down to watch TV	SURVEY
	% satis. w/ how much fun having these days	SURVEY

**GOAL FAMILY THREE
COMMAND OVER GOODS AND SERVICES**

GOAL ONE: SUFFICIENT INCOME & EQUITABLE INCOME DISTRIBUTION

311	ALL HH RECEIVING MIN. INCOME REQ. TO MEET BASIC NEEDS	
	% households (families) below income threshold	SECONDARY
	% of households receiving public assist	SECONDARY
	ratio of income percvd neces to actual income	SURVEY
	% below 200% pov level adj for incr cost of living	SURVEY
	% satis. with standard of living	SURVEY
312	MOST HOUSEHOLDS EXPERIENCING REAL INCOME GROWTH	
	median per capita income	SECONDARY
	median per capita income	SURVEY
	real median household income	SURVEY
	% perceive financial situation has impr.in last 3yrs	SURVEY
	% expect financial situation to impr. in next 3yrs	SURVEY
	% satis. w/ income	SURVEY

GOAL TWO: SUFFICIENT OPPORTUNITIES FOR EMPLOYMENT

321 SUFFICIENT NUMBER OF LOCAL JOBS	
% employed who are in labor force	SECONDARY
% full time workers who worked 38 weeks or more	SECONDARY
% employed who are in labor force	SURVEY
ratio months worked to months unemployed	SURVEY
ratio mo. worked in comm. to mo. wkd. outside comm.	SURVEY
% satis. with local job opportunities	SURVEY
322 SUFFICIENT OPPORTUNITIES FOR PREFERRED JOBS	
% men holding professional, technical, crafts jobs	SECONDARY
% women holding professional, tech., managerial jobs	SECONDARY
% men holding job type perceived to be preferred	SURVEY
% women holding job type perceived to be preferred	SURVEY
mean mos.some time spnt H&F actvs among 9+mo.empl.	SURVEY
% reporting could do most or all H&F wanted to do	SURVEY
% satis. with job	SURVEY
% satis. with people work with	SURVEY
% satis. with work do on job	SURVEY
% satis. w/ time have to hunt, fish & pursue rel.act.	SURVEY

GOAL THREE: SUFFICIENT HOUSING

331 AFFORDABLE HOUSING OPPORTUNITIES	
gross rent as % of income	SECONDARY
selctd mo owner costs as % of income	SECONDARY
housing costs as % of income	SURVEY
% satis. with opport. to get affordable housing	SURVEY
332 SATISFACTORY PHYSICAL LIVING SPACE	
persons per room	SECONDARY
% households with running water	SECONDARY
# of rooms	SURVEY
persons per room	SURVEY
% households w/no difficulty getting enough dr. water	SURVEY
% households with gray water piped away	SURVEY
% households with flush or chemical toilets that wk.	SURVEY
% households perceived warm on cold, windy days	SURVEY
% satis. with housing	SURVEY
% satis. with water have to drink	SURVEY

GOAL FOUR: SUFFICIENT FOOD

341 SUFFICIENT FOOD AVAILABLE	
% satis. w/ food have to eat	SURVEY
342 AFFORDABLE FOOD	
price standard mkt bskt as propr. of median income	KEY INF

GOAL FIVE: SUFFICIENT PERSONAL GOODS & SERVICES

351 SUFFICIENT AVAILABILITY OF GOODS AND SERVICES availability of plywood, dining table, stove in vill. % satis. with goods & services can get in vill.	KEY INF SURVEY
352 AFFORDABLE PRICE FOR GOODS AND SERVICES cost of 3 selected items as % of median income	KEY INF

GOAL SIX: SATISFACTORY COMMUNITY ENVIRONMENT

361 SATISFACTORY PUBLIC SERVICES AND FACILITIES water treatment, main power facil. present & working	KEY INF
362 SATISFACTORY PHYSICAL ENVIRONMENT % satis. w/ land & buildings in village % satis. w/ land & water near village	SURVEY SURVEY

**GOAL FAMILY FOUR
SOCIAL OPPORTUNITIES AND PARTICIPATION**

GOAL ONE: ADEQUATE LOCAL CONTROL

411 SENSE OF LOCAL CONTROL % population residing in community for 5+ yrs. % population residing in community for 3+ yrs. % perceive opinion makes at least some difference % satis. w/amt. influence over harvest of wildlife % satis. w/amt. influence over local education % satis. w/amt. influence over development % satis. w/amt. personal infl. over local affairs	SECONDARY SURVEY SURVEY SURVEY SURVEY SURVEY SURVEY
412 CONFIDENCE IN INSITITUTIONS AND LEADERS % perceive local govts. as very effective % perceive regional govts. as very effective	SURVEY SURVEY

GOAL TWO: ADEQUATE PARTICIPATION

421 PARTICIPATION IN ROUTINE PROCESSES OF GOVT % adults voting in statewide elections % adults registered to vote % voting in last local election % voting in last statewide election % attending one or more public meetings in last mo.	SECONDARY SECONDARY SURVEY SURVEY SURVEY
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APPENDIX B: ALASKA OCS SOCIAL INDICATORS SYSTEM POTENTIAL SECONDARY INDICATORS

Goal Type	Name	Acceptability	Region Quality	Relevance	Type Measure*	Sub-Regional	Race	Source
CULTURAL CONTINUITY								
111	size key wildlife pop as % max size in last 20 yrs	Yes	Unknown	Very Good	Output	Yes	NA	ADF&G
113	% recent historic max wildlife pop present in area	Yes	Unknown	Very Good	Output	Yes	NA	ADF&G
131	% speaking Native language at home	Marginal	Good	Very Good	Output	Yes	Yes	Census
INDIVIDUALS AND FAMILIES THAT FUNCTION WELL IN SOCIETY								
211	birth rates	Yes	Fair	Limited	Output	Yes	Yes	ADHSS
	infant survival rate	Yes	Fair	Very Good	Output	Yes	Yes	ADHSS
	death rate by cause	Yes	Fair	Very Good	Output	Yes	Yes	ADHSS
	% pop. treated for selected medical problems	Marginal	Fair	Limited	Int-Out	Yes	No	IHS
221	death by homicide rate	Yes	Fair	Very Good	Output	No	Yes	ADHSS
	f of arrests by type	No	Poor	Limited	Input	Yes	?	ADPS
222	death by suicide rate	Yes	Fair	Very Good	Output	No	Yes	ADHSS
	death rate by alcoholism	Yes	Fair	Very Good	Output	No	Yes	ADHSS
	death rate by accident rate	Yes	Fair	Very Good	Output	No	Yes	ADHSS
231	% completing eighth grade	Marginal	Good	Good	Int-Out	Yes	Yes	Census
232	% completing high school	Marginal	Good	Good	Int-Out	Yes	Yes	Census
241	% of total households which contain 2+ relatives	Marginal	Good	Very Good	Output	Yes	Yes	Census
	% adults married	Marginal	Fair	Very Good	Int-Out	Yes	Yes	Census
242	% adults ever married but never divorced	Marginal	Good	Very Good	Output	Yes	Yes	Census
	% households w/children having 2 adults present	Marginal	Good	Very Good	Output	Yes	Yes	Census

Goal Type	Name	Acceptability	Region Quality	Relevance	Type Measure	Sub-Regional	Race	Source
COMMAND OVER GOODS AND SERVICES								
311	% households (families) below income threshold	Marginal	Good	Very Good	Output	Yes	Yes	Census
	% of households receiving public assistance	Marginal	Good	Limited	Flow	Yes	No	ADHSS
	total earnings by place of work	No	Good	Poor	Output	No	No	BEA
	total payroll for covered employment by industry	No	Good	Poor	Output	No	No	DOL
312	median per capita income	Marginal	Fair	Good	Output	No	No	BEA
321	% of labor force who are employed	Marginal	Good	Good	Int-Out	Yes	Yes	Census
	% full-time workers who worked 38 weeks or more nonagricultural employment (total)	Marginal	Good	Good	Int-Out	Yes	Yes	Census
	unearned proportion of income (54)	No	Fair	Poor	Output	No	No	ADOL
	number (or pounds) of salmon by species	No	Poor	Limited	Int-Out	No	No	BEA
	commercial fishing licenses	No	Fair	Poor	Int-Out	No	NA	ADF&G
	chum salmon aerial survey escapement	No	Good	Good	Input	No	No	ADF&G
	commercial fishing periods (hours per week)	No	Fair	Good	Input	No	NA	ADF&G
	labor force status of persons 16+	No	Good	Limited	Input	No	NA	ADF&G
	hours worked per week by f of weeks worked	Marginal	Good	Good	Flow	Yes	Yes	Census
		Marginal	Good	Good	Int-Out	Yes	Yes	Census
322	% men holding professional, technical, craft jobs	Marginal	Good	Good	Output	Yes	Yes	Census
322	% women holding professional, technical, managerial jobs	Marginal	Good	Good	Output	Yes	Yes	Census
	nonagricultural employment by industry	No	Good	Poor	Output	No	No	ADL
	average monthly wage by industry	No	Good	Poor	Output	No	No	ADL
331	gross rent as percentage of income	Marginal	Good	Very Good	Output	Yes	Yes	Census
	selected monthly owner costs as % of income	Marginal	Good	Very Good	Output	Yes	Yes	Census
332	persons per room	Marginal	Good	Good	Int-Out	Yes	Yes	Census
	% households with running water	Marginal	Good	Good	Output	Yes	Yes	Census
SOCIAL OPPORTUNITIES AND PARTICIPATION								
411	% population residing in community for 5+ years	Marginal	Good	Good	Int-Out	Yes	Yes	Census
	existence of local jurisdiction w/ plan-zone powers	No	Good	Very Good	Input	Yes	NA	ADCRA
421	% adults voting in statewide elections	Marginal	Fair	Very Good	Output	Yes	No	ADE
	registered voters as % adult population	Marginal	Fair	Good	Output	Yes	No	ADE

Meaning of terms in column "Type of Measure":

Output – A direct measure of well-being

Input – A resource for improving well-being (e.g. education)

Int-Out – An intermediate output, as in persons per room is a condition likely to be indirectly associated with well-being

Flow – A measure of activity (e.g. number in the labor force) that could indirectly contribute to well-being

Sources: BEA = U.S. Department of Commerce, Bureau of Economic Analysis.

Census = U.S. Department of Commerce, Bureau of the Census.

IHS = U.S. Department of Health and Human Services, Indian Health Service
ADCRA = Alaska Department of
Community and Regional Affairs

ADE = Alaska Division of Elections

ADF&G = Alaska Department of Fish and Game

ADHSS = Alaska Department of Health and Social Services

ADL Alaska Department of Labor

ADPS Alaska Department of Public Safety

NA not applicable.