

**NMFS Operational Guidelines – Fishery Management Process**  
**Appendix 2(g)**

**GUIDELINES FOR ASSESSMENT OF THE SOCIAL IMPACT  
OF FISHERY MANAGEMENT ACTIONS**

**Introduction**

The National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) has provided operational guidance relative to social and community impacts to Regional Fishery Management Councils since 1991. NMFS provides this guidance because it holds that social impact assessment (SIA) is an essential part of the fishery management process and improves fishery conservation and management decision-making. Management decisions regarding appropriate courses of action thus cannot and should not be made without an adequate SIA. Without an SIA, a fishery management plan or amendment will not be considered complete.

Recent changes in environmental and fisheries law have included provisions affecting fishery participants and communities involved with fishery activities. This document revises previous guidance published in 1995, 1997 and 2001. The revised guidance for fisheries SIAs provides information on SIAs and a discussion of the integration of SIA into the interdisciplinary process of fishery management planning and implementation. The following five sections introduce the reader to SIAs, explain the basic science of undertaking SIAs, identify issues in fishing community analyses, discuss methods of social factor analysis, and describe special issues that need to be considered in SIAs.

The purpose of this document is to provide Councils and fishery managers with an understanding of the objectives and techniques of SIAs. This guidance paper also lays out the general process, analytical content and form of SIAs. The treatment of the subject is general, since every fishery has unique characteristics and no SIA will be identical to another.

In developing SIAs for specific fisheries, Councils should employ the services of professional anthropologists or sociologists experienced in social impact assessment. These professional anthropologists or sociologists may be on Council staff or appointed to Council Scientific and Statistical Committees (SSCs) or the Council may engage qualified contractors. Similarly, NMFS Regional Offices or Fisheries Science Centers should use their professional anthropologists or sociologists or engage qualified contractors when undertaking SIAs. Council and NMFS staff should consult with the Social Anthropologist, NMFS Office of Sustainable Fisheries whenever policy or process questions concerning social or community impact assessment arise.

## **SECTION 1**

### **Introduction to Social Impact Assessment (SIA)**

#### **SIA Defined**

SIA is a method of gauging the social and cultural consequences of alternative fishery management actions or policies. The purpose and logic of the SIA are the same as those for the economic and ecological elements of environmental impact analysis and assessment. An impact assessment determines (social/cultural) conditions in areas or (human) populations likely to be affected by the regulatory action or policy; projects future (social/cultural) effects of continuing the status quo; and then estimates (social/cultural) effects, relative to the status quo, that will result on local, regional, and national scales if reasonable fishery management alternatives are implemented.

In the context of marine fisheries conservation and management, SIAs focus on the human environment of the fisheries. That is, SIAs consider the effects of changes in resource availability or fishing practices on fishermen, communities, fishing-related businesses and employment, families and other social institutions, regulations and social norms of behavior, and cultural values. Descriptions of effects should be quantitative probabilities. Although quantification of impacts is preferable, it is not always possible. In these cases it is essential, at a minimum, to convey conclusions and their basis (with associated uncertainties) qualitatively rather than ignore them because they are not easily enumerated or understood.

Two other forms of impact or risk assessment complement the use of SIAs. While SIAs focus on social and cultural values and systems, economic impact assessments focus on market and non-market values and systems. Similarly, biological impact assessments focus on ecosystem changes and values. These three assessments combine to describe the human environment of participants in a fishery.

SIAs can be used to predict the likelihood of future adverse effects or evaluate the likelihood that present status has been caused by discrete changes in resource availability in the past. SIAs that use diachronic modeling are able to compare future or past scenarios with base-line data sets. SIAs are thus a decision-tool for Councils and fishery managers selecting between alternative courses of action. In this respect SIAs are similar to ecological and economic impact assessments.

The SIA process is based on two elements: (a) description of the social characteristics of a fishery and/or community (social factor analysis) and (b) description of effects of social changes (social impact assessment). The social factor analysis provides the conceptual framework for the first two phases in the assessment process: problem identification or “scoping”, and information collection and analysis. The social impact assessment is the third phase of the assessment process, taking the findings of the social factor analysis and assessing alternative management scenarios.

Scoping is a collaborative effort by the fishery managers, those involved in the fishery or other stakeholders, and the professional anthropologist(s) or sociologist(s) undertaking the SIA. In fishery management actions, a Council uses the scoping process to select alternative actions for analysis and assessment. Often a Council will expand or change the list of alternatives after an initial review of results.

While social factor analyses and SIAs have a relatively standardized structure, the collection of information, selection of variables, and analysis is determined by the nature of the conservation and management alternatives available and selected for study. This information collection and analysis phase is the domain of professional anthropologists and/or sociologists in order to provide objective, comprehensive and non-partisan data and analyses. Quantitative data, e.g., from the Bureau of Census population data sets, and qualitative data, e.g., from focus group interviews, are typically used by social science professionals during social factor analyses. Where few quantitative data are available, qualitative data from several different sources are usually used to “triangulate” social facts to ensure accuracy and the ability to replicate results in future studies.

The SIA is completed when the analyst provides the fishery manager or Council with the assessment of impacts of alternative actions in comparison to the status quo or to the baseline case. The assessment should be incorporated in the NEPA document, but can also be in an appropriate part of the FMP or FMP amendment. The fishery manager or Council then uses the combined ecological, economic, and social assessments to select the preferred management alternative. The final SIA should be available as early in the decision process as possible but no later than when the final decision prior to public review is made by the Council, or in the case of Secretarial FMPs, the United States Secretary of Commerce (Secretary), on the FMP or amendment .

### **Legislative Authorities for SIA**

The National Environmental Policy Act (NEPA) requires Federal agencies to consider the impacts of major Federal actions on the human environment. The Council on Environmental Quality (CEQ) has defined “human environment” expansively to “include the natural and physical environment and the relationship of people with that environment” [40 CFR 1508.14]. Thus, when economic or social and natural or physical environmental effects are interrelated, the NEPA analysis should discuss them all.

This analysis and discussion is to be done through the use of "a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences ... in planning and decision-making" [NEPA 102(2)(A)]. Unquantified environmental amenities and values must be considered, and weighed, on par with technical and economic considerations. Unquantified amenities and values include such factors as angler satisfaction, job satisfaction and an independent life-style for commercial fishermen, and the opportunity to see species, such as salmon, in the wild for the non-consumptive user of

marine fishery resources. Technical considerations include the management of fishing gears and enforceability of regulations.

In times when fishery resources are abundant and all human uses can be satisfied without over-exploiting the resource, the NEPA analysis typically describes impacts on the natural environment. As exploitation of the resource approaches maximum sustainable yield and allocation between users becomes necessary, the NEPA analysis must also consider economic and social impacts on the human environment. The NEPA analysis must also address issues of the cumulative effects of past and present fishery management actions [40 CFR 1508.7] and issues of environmental justice [EO 12898].

The CEQ implementing regulations for NEPA define cumulative effects as “the impact on the environment which results from the incremental impact of the action [proposed] when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” [40 CFR 1508.7]. To determine cumulative effects requires the identification and description of the cause and effect relationships between the various actions, and between the actions, fishery resources, habitats, fishermen, and communities involved in fisheries. The identification and description of the relationships of multiple actions permits the fishery manager to analyze the response of the fishery resource to changes in the human environment and to assess the impacts of alternative management proposals on the human environment.

Executive Order (EO) 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” requires Federal agencies to analyze the environmental effects, including human health, economic and social effects, of Federal actions whenever an analysis is required under NEPA. Regardless of the determination of significance under an EA or EIS, the environmental justice assessment must be completed in full if minority or low-income populations are involved. This analysis should address the effects on minority populations, low-income populations, and Indian tribes in particular. Mitigation actions identified under NEPA should, whenever feasible, address significant and adverse impacts on minority populations, low-income populations and Indian tribes. The EO requires NMFS and Councils to provide for effective minority, low-income, and Indian tribal community participation in the NEPA process. In addition EO 12898 requires NMFS and the Councils to collect, maintain and analyze data on minority populations, low-income populations and Indian tribes, particularly in cases in where a fishery management action may affect subsistence consumption patterns of fish, vegetation or wildlife.

In addition to the analytical requirements of NEPA, in managing fisheries NMFS and the Councils must comply with the analytical requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). In its “Purposes” section, the MSA provides for “the preparation and implementation, in accordance with national standards, of fishery management plans which will achieve and maintain, on a continuing basis, the optimum yield from each fishery” [MSA 2(b)(4)]. Further, such plans must “take into account the social and economic needs of the States” [MSA 2(b)(5)].

Where a "system for limiting access to the fishery in order to achieve optimum yield" [MSA 303(b)(6)] is deemed necessary, the MSA requires the Secretary and the Council to consider in depth the economic and social impacts of the system. This provision was amended in 1996 and in 2006; in 1996, "and any affected fishing communities" was added to sub-section (E) while in 2006, sub-section (F), "the fair and equitable distribution of access privileges in the fishery" was added. The 2006 revision to the MSA added §303A, "Limited Access Privilege Programs," which expanded the social science requirements of §303(b)(6) with regard to participation criteria and allocation of privileges.

In 1990, the MSA was amended to require a fishery impact statement. The amendment required that an FMP must assess, specify, and describe the likely effects of conservation and management measures on participants in the affected fishery, and the effects on participants in other fisheries that may be affected directly or indirectly [MSA 303(a)(9)]. The 1996 amendments also added the requirement that fishing communities be considered in the fishery impact statement specified in section 303(a)(9)(A) of the Act. This language was further amended in 2006 to require consideration and analysis of "cumulative conservation, economic, and social impacts". Also in 2006, language was added to the provision requiring analyses of the effects on safety of life at sea [MSA 303(a)(9)(C)]

In the 1996 amendments to the MSA, Congress added provisions directly related to social and economic factors for consideration by Councils and NMFS. National Standard 8 was added to the national standards for fishery conservation and management. This standard stipulates that: "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities" [MSA 301(a)(8)]. The 2006 amendments to MSA clarified this provision by adding, after "to fishing communities" the phrase "by utilizing economic and social data that meet the requirements of [MSA 301(a)] paragraph 2." (National Standard 2 requires the use of the "best scientific information available" [MSA 301(a)(2)].)

"Fishing community" is defined as "a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community" [MSA 3(17)].

The MSA amendments of 1996 also defined "charter fishing" [section 3(3)], "commercial fishing"[section 3(4)], and "recreational fishing" [section 3(37)] and required that each of these sectors be described and considered in fishery management plans [sub-sections 303(a)(5) and (13)]. Further, the Act requires that any "harvest restrictions or recovery benefits [be allocated] fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery" [MSA 303(a)(14); see also National Standard 4, MSA 301(a)(4)]. These requirements expand the need for social and economic data on each sector and for impact analysis of management actions on each sector.

The 2006 amendments to the discretionary provisions of the MSA included requirements related to closure of areas to fishing activities. These requirements include an “assessment... in relation to other management measures... of the benefits and impacts of limiting access to: users of the area, overall fishing activity, ... and fishery and marine conservation” [MSA 303(b)(2)(C)].

In summary, a full range of impact assessments -- ecological, economic, and social -- are necessary to meet MSA and NEPA requirements. NMFS believes that the more comprehensive the information base and analysis, the more objective and defensible will be the decision-making process.

## **SIA Compared With Other Types of Analysis**

### Social versus Economic Impact Analysis

Social impacts are often, erroneously, assumed to be synonymous with economic impacts. Although economic analysis can be considered as one part of social science analysis, economic impact analysis addresses how efficiently investments of capital and other resources are returned in present and future benefits to society (i.e., whether the economic benefits of an action or policy outweigh the costs). Economic impact analysis focuses on resource supply and demand, prices, and jobs. Though social and economic impact assessments overlap and are related, they differ considerably in focus, underlying questions, methods, and approaches. Thus, the same data may be analyzed and interpreted differently depending on whether the analysis is economic or an SIA. For example, an economic analysis of a proposed fishery allocation might suggest an increase in jobs, local trade, and tax bases. The same data subjected to a social factors analysis might indicate community changes and losses due to a shift from year-round to seasonal employment. The social factors analysis might also show decreased opportunities for crew members to become vessel owner/operators, loss of cultural values, and a rise in cultural costs to families and communities as they deal with the social effects of under-employment.

### SIA versus Information from Public Comments

An SIA provides an objective analysis and assessment of known social factors relative to all the stakeholders in the fishery, their communities and the issue at hand. The SIA thus embraces information from a variety of sources in a systematic, scientifically verifiable manner, and presents this information in a form that a fishery manager can use. This holistic approach is necessary to ensure that all stakeholders' interests and needs are systematically considered and incorporated in the analysis.

"Public comment" is the term used to describe the set of information exchanges between NMFS and other agencies and the public related to a fishery management action or policy. Public involvement, through hearings, information meetings, and comments, is a two-way communication process designed to discover people's points of view, ideas,

preferences, concerns, and expectations. Fishery managers can gather useful information through the public comment process, but often such information cannot be used in a predictive or evaluative way in planning or impact assessment. Because public comments are not systematically sought and gathered (e.g., population sampling is not random), they do not necessarily reflect the views of all in the fishery. For example, those satisfied with the status quo in a fishery may not make that point at all or as strongly as those who seek change. However, information gathered from public involvement can be used to infer the social attitudes, beliefs, and values of people taking part in or affected by the fishery under consideration. Public involvement in the scoping process provides social and economic information of great use in narrowing the range of issues that need to be studied.

### SIA versus Social and Economic Overviews

Social and economic overviews, often referred to as community, regional, or fishery profiles, are continually up-dated reference documents. Although they provide much of the baseline data used in the social factors analysis, they are not social impact assessments. Social and economic overviews describe the present and historical social and economic context of a fishery. They describe participation in and dependence on the fishery by fishermen, communities, and regions. The overviews describe problems, opportunities, and conflicts in the fishery and fishing communities. The overviews are excellent reference sources, and are the documents envisaged in the Stock Assessment and Fishery Evaluation (SAFE) Reports required under the Guidelines for Fishery Management Plans [50 CFR 602].

### SIA Defined

In summary, an SIA provides systematic, science-based information concerning the relative social and cultural benefits and costs of maintaining the status quo regulations and of adopting each reasonable management alternative that the fishery manager or Council might use in selecting a preferred management strategy. The SIA is based on a scientific analysis of the baseline case (status quo) and evaluation of probable social impacts of electing to maintain the status quo or selecting any reasonable alternative to it.

### **SIA and NMFS Policy**

SIA came of age with the passage of NEPA and the emphasis in industry and government upon evaluation of the effects on human populations of management policy and actions. Early fishery management actions under the MSA had varying types and forms of social impact assessments, but these were generally less developed than ecological impact assessments.

Economic impact analyses were added to the planning process in the early 1980s in response to the requirements of EO 12291 and the Regulatory Flexibility Act (RFA). EO

12291 (February 17, 1981) required that a regulatory action not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society. (EO 12291 has since been superseded by EO 12866, but the requirement is retained.) To meet these Executive Order requirements, NMFS requires that an economic assessment – the regulatory impact review (RIR) detailing the net benefits and costs of each proposed management action and alternative – be undertaken. Passage of the RFA, in 1982, required consideration of economic impacts on small entities (i.e. small businesses, small organizations, and small governmental jurisdictions). Since most fishing operations and businesses are small, NMFS requires an economic assessment--the regulatory flexibility analysis--detailing the impacts on small entities, and identifying reasonable alternatives to mitigate predicted impacts.

Since the late-1980s, domestic harvesters and processors have been able to take and process virtually all allowable catches in the EEZ. Allocation of catches among competing groups of U.S. fishermen has become a principal fishery management issue. In fact, since 1988, some 80 percent of FMPs and FMP amendments have been allocative in nature. As Councils and NMFS turned to consideration of limited access or quota programs, the need for social factor analysis to meet the requirements of MSA 303(b)(6) was recognized. SIAs, driven by the provisions of the MSA, were carried out for fisheries such as the Northwestern Hawaiian Islands bottomfish and seamount groundfish fishery, the Mid-Atlantic surf clam and ocean quahog fishery, and the North Pacific halibut fishery.

The U.S. District Court of the District of Columbia affirmed the need for a full suite of impact assessments in fishery management in April 1991. The Court dismissed a legal challenge to the individual transferable quota system for the Mid-Atlantic surf clam and ocean quahog fishery. The dismissal of this action was, in part, because the Mid-Atlantic Fishery Management Council (MAFMC) and Secretary of Commerce had explicitly considered and taken into account the social and economic factors specified in MSA 303(b)(6) before approving the limited access scheme [Sea Watch International v. Mosbacher, 762 F.Supp.370 (D.D.C. 1991)]. The MAFMC had commissioned a socio-cultural study of the labor force in the fishery in 1988 and this, together with economic impact analyses, had been considered by the Council and incorporated into the submission and record sent forward for Secretarial approval.

As noted above, the RFA also requires detailed economic analyses of the effects of Federal regulation upon small businesses and small government entities. In recent cases, fishery management actions have been reversed or stayed by Federal District Court order because of the inadequacy of social and economic analyses and impact assessments by Councils and NMFS under the RFA and MSA. These cases include N.C. Fisheries Association et al v. Daley [2:97cv339 (E.D. Va.)] and Southern Offshore Fishing Association v. Daley [97-1134-civ-T-23C (M.D. Fl.)].

Over the years, NMFS has provided SIA guidance to Councils and Regions including the Guidelines for Fishery Management Plans [50 CFR part 600], and through NMFS operational guidance. The interim operational guidance for the use of SIA (March 20, 1991)



responded to requests from Councils and NMFS Regions. After revision, operational guidance to the Councils and Regions for use of SIA was issued in 1995 by NMFS. Further revisions, reflecting changes in the MSA and the development of assessment methods, were made in 1997 and 2001. This document revises those earlier documents and provides further guidance on, and information about, the use of SIA mandated for the fishery management process.

## **SECTION 2**

### **Undertaking Social Factor Analysis**

#### **Introduction**

In NMFS, as in other Federal agencies such as the Forest Service, the term "social factor analysis" is used to indicate the analytical process, while the term "social impact assessment" is used to indicate the product of the analysis. The reason for an SIA is to help fishery managers make better decisions by clarifying the social and cultural, as well as the ecological and economic, effects of the proposed action or policy and its alternatives.

The guiding principle for impact analyses of any kind is that they provide clear, concise information that meets scientific standards. In this section, guidelines for minimum acceptable standards for social factor analysis will be described, so that the work can be carried out systematically and the results can be presented coherently. While the presentation of SIA results can take a number of forms, the use of a matrix of indicators or trend lines for each variable allows easy comparison of social change against the status quo (baseline case) and each reasonable alternative. This approach to presentation of social and cultural benefits and costs also facilitates comparison with the economic benefit and cost analysis developed for the RIR.

This section is written so that NMFS and Council staff and interested members of the public who do not have social science backgrounds will be able to ask the right questions, understand the research issues, and use the work of social science staff and consulting experts. It must be noted that the guidance provided is not exhaustive. Individual fisheries and issues will call for a range of social factor analysis methods and techniques, and selection of these tools will require case-by-case judgement. Social factor analysis is an evolving field in applied social science and creative applications may be found to fit different fisheries and their participants.

#### **Significance of Social Factor Analysis**

A social system is as fragile and as delicately balanced as any other ecological system. Social systems are extremely sensitive to change and any potential regulatory changes must be examined closely, so that their potential social benefits or social costs can be determined and considered. In particular, consideration must be given to the effects of cumulative impacts of relatively small changes made over a number of years in separate regulatory actions. This requires analysis of the status quo whenever the FMP is amended in order to pick up the impacts imposed by past regulatory actions.

Thus, social factor analysis involves identification and analysis of social variables (factors) which describe the fishery, its socio-cultural and community context, and its

participants. Social factor analysis studies the past to provide measures of “social change” which can be used in the projections of future baseline conditions in the social impact assessment. The analysis is diachronic [Burdge; 1995:14]; that is, it is comparative over time. A “baseline” of information about social factors or variables related to the fishery is established. This baseline may use historic data gathered previously, or it may use data from the present if the fishery is relatively new. If historic baseline data is present for the social variables selected for analysis, then present baseline data provides the information for a diachronic analysis. If no historic data is present, then the diachronic analysis will utilize data from a fishery with similar social characteristics and historic and present baseline data. The thrust of this diachronic or comparative analysis is to measure the degree of “social change” which has taken or will take place in the fishery and its communities under existing conditions (“status quo” case) relative to alternative management measures.

The term "social change" includes alterations in social relationships between persons and/or groups directly involved in the fishery, and between individuals and/or groups in the fishery and their community and regional social systems. For example, as a result of a proposed fishery action or policy, will fishermen and/or community members have to change their style, pace, and/or standard of living? Will social cooperation and interaction patterns be changed? Will change be sudden or gradual? How does the proposed action fit with historical trends and participation in the fishery? How does the proposed change fit with the cultural or normative expectations of behavior in the fishery and community? Social factor analysis should provide answers to these and related questions, so that fishery managers and policy makers can reach more informed decisions.

Five categories of social factors, or social variables, should be considered in fishery SIAs. Four of these social factor categories pertain to all SIAs, and a fifth is specifically required by the MSA. Four categories of social factors have been identified by Flynn (1983), the U.S. Forest Service (1984; 1998) and NMFS (1979; 1995) as important to both social factor and economic analyses. These variables are seen as central to understanding the impacts of a natural resource-related management action or policy. First, the size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region. Second, the cultural issues of attitudes, beliefs and values of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding behavior of fishermen on the fishing grounds. Third, the effects of proposed actions on social structure and organization; that is, changes in the fishery’s ability to provide necessary social support and services to families and communities. Fourth, the non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats. In addition to these four variables, one other variable is related to MSA actions. This social factor is the historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights. These five variables reflect the key factors described in MSA 303(a)(9) and 303(b)(6) and will be revisited later in this guidance.

## Planning a Social Factor Analysis

Due to the usual constraints of time and funds for Federal activities, and the need of Councils and NMFS to proceed expeditiously with decision making, social factor analysis in fishery management cannot be a lengthy process taking many months or years to complete. Social factor analyses have to be well planned and focused, and conducted in concert with the ecological and economic analyses. For this to occur, it is assumed that the interdisciplinary plan development teams<sup>1</sup> include economists, anthropologists and/or sociologists, and fishery managers and biologists from the beginning of the action identified by a Council or NMFS.

In selecting the variables for use in the social factor analysis, three principles form a guiding framework [Bryan and Hendee, 1983]. First, focus on the social structures, groups, and social issues revealed in the scoping process. If a Council does not engage in a formal scoping hearing, these concerns and issues can be obtained through discussions with fishery and community leaders. Discussions with fishery managers in NMFS and the state agencies, social scientists, and others knowledgeable about the fishery and region are also effective ways of obtaining information. Knowledge of other fisheries and the actions related to them could also be a useful guide to issues and variables which need to be considered. Other important social issues and structures may be discovered and considered during the analysis, but most anticipated social effects and all groups likely to be affected should be identified during the scoping process to target the analysis and reduce the need for additional exploratory work.

Second, social variables should be sought in an analytic rather than an encyclopedic manner. A social factor analysis is not the excuse to conduct a data-fishing expedition. Collect data on variables that accurately represent the identified issues and concerns. Specific issue-driven variables can be selected from the broad categories of effects to be discussed later.

Third, before collecting new data, all existing databases should be scrutinized and utilized if appropriate. If available data from other analyses--such as coastal zone management program documents, other environmental assessments or fishery management plans, or state regional censuses--are skillfully used, the time and expense of new data collection may be minimized. However, analysts should take care not to let the nature of readily available data drive their analysis. If, for example, Bureau of the Census data offer some information on fishery employment, this should not preclude a special study if the

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<sup>1</sup> NEPA 102(2)(a) requires that an interdisciplinary approach be used to assess impacts on the human environment. Councils (or NMFS, for Secretarial Plans) establish interdisciplinary plan development teams to assess the fishery conservation and management issues and develop analyses and appropriate measures.

Bureau of the Census material does not articulate chosen variables adequately or presents data at state or county level of aggregation rather than for the fishing community.

Analysts and fishery managers should be aware of the often time-consuming process necessary to obtain Office of Management and Budget clearances on questionnaires and other social survey instruments, and thus seek quantitative data from other sources wherever possible. Bureau of the Census, State, and local government data are usually available. Special surveys carried out for state fishery agencies may be available, particularly in Alaska and the Pacific Northwest. Reports of Sea Grant-sponsored research often provide useful information for SIAs. Systematic observation of selected variables during field visits coupled with qualitative information gathered from key informants and community sources provide excellent corroborative data sets. The idea is not to gather as much data as possible, but as little as necessary. By using different sources of information, cross-validation of selected variables provides adequate information for impact assessments.

### **Determining the Level of Analysis**

The fishery manager and social science analyst must select a level of analysis appropriate to the action being considered. At one end of the fishery management scale are actions that are technical in nature; for example, an FMP may be amended to reflect recent changes in the biological nomenclature for the fishery. Such actions may have little, if any, immediate social impact on the fishery and thus any social factor analysis needed will probably be minimal. At the other end of the scale is the fishery management action in which the Council considers limited access as a management alternative. Consideration of limited access as a reasonable alternative to the baseline case requires that the social and economic factors listed in MSA 303(b)(6) and 303A be considered in depth by the Council and the Secretary of Commerce, and a full social factor analysis will be necessary. Judgment should be used in determining the level of social factor analysis; the analysis should be tailored to the scale of the issues and problems identified in the scoping process and subsequent reviews. When significant numbers of fishermen are involved, or a significant impact on a community or some fishermen is likely to occur, scoping and analysis should be undertaken. Where significant public concern about the fishery or a management alternative is expressed, or in a fishery in which conflict between user groups is occurring or likely, then the level (or depth) of analysis should be increased.

### **Considering Cumulative Effects**

A fishery manager should be aware that even small technical changes to FMPs might result in large, cumulative social impacts (Bryan and Hendee, 1983; Burdge, 1995; CEQ, 1997). For the purposes of NEPA analyses, the CEQ defined cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” [40 CFR 1508.7]. Since social effects from fishery management decisions tend to be incremental and cumulative, communities and fishermen adjust, absorb, and adapt to the impacts, thus

causing continual change in baseline data for the next social factor analysis. All five major categories of social factor variables--lifestyles; attitudes, beliefs, and values; social organization and structure; population demographics; dependence on and participation in the fishery--may, in effect, be shielded from change by the incremental nature of fishery management actions. Yet, a rigorous review and/or analysis of longitudinal data may reveal that fishermen and fishing communities have undergone significant social change over time. The anthropologist or sociologist working with a FMP plan development team (PDT) should thus revisit earlier social factor analyses for the fishery before making a final determination on the level of analysis necessary for any particular management proposal.

## **SECTION 3**

### **Communities**

#### **Introduction**

The 1996 amendments to the MSA added a definition of “fishing community” [MSA 3(16)] and required fishing communities to be considered in the fishery impact statement [MSA 303(a)(9)] and any proposal for limited access to a fishery [MSA 303(b)(6)]. Most importantly, the 1996 amendments added National Standard 8 which requires that conservation and management measures in FMPs and any amendments to FMPs “take into account the importance of fishery resources to fishing communities... in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.” [MSA 301(a)(8)]. These requirements have been revised and added to in amendments to the Act in 2006, but the basic thrust remains the same.

The amendments to the Act have the effect of requiring three levels of assessment. First, the most general level is that of the fishery impact statement. This level requires assessment, specification and description of likely effects of conservation and management measures on participants in fisheries and fishing communities affected by the FMP or FMP amendment. If participants in fisheries in adjacent Council areas are also affected by the action, impacts on these participants also have to be assessed and considered [MSA 303(a)(9)]. This level of assessment identifies both those communities involved in fisheries and those which meet the requirements of a “fishing community” under MSA 3(17).

The second level relates to the National Standard 8 consideration of impacts on “fishing communities.” This level of analysis considers issues of long-term sustainability of fishing-dependent communities. MSA 3(17) defines communities found “to be substantially engaged in or substantially dependent on fisheries to meet social and economic needs in order to provide for sustained participation of those communities” as “fishing communities.” These communities are those identified as “fishing communities” during the first level of assessment for the fishery impact statement.

The third level is required for conservation and management measures which consider a limited access program for the fishery and is the most complex. MSA 303(b)(6) and 303A require consideration of historical and present-day participation in and dependence on the fishery, and the cultural and social framework of the fishery and any affected fishing communities.

Implicit in creation of the definition of fishing communities in the MSA is that there are non-fishing communities. For the purposes of the fishery impact statement and assessments of limited access program assessments, communities which are involved in fisheries but are not fishing communities as defined in MSA 3(17) must be considered as participants in a fishery. Thus any effects of the proposed measures in an FMP must be

assessed, specified and described on communities which are involved in a fishery. In practice, this assessment facilitates the identification of “fishing communities”.

### **Participants in a Fishery**

The MSA describes members of fishing communities as including vessel owners, operators, and crew, and does not distinguish between commercial, recreational and subsistence fishermen and vessel owners [MSA 3(17)]. Section 3(17) also recognizes United States fish processors as fishing community members. The Act further specifies that the interests of charter fishing operations and recreational and subsistence fishermen must be considered with those of commercial fishermen in the development of conservation and management measures [MSA 303(a)(2) and (5)]. Indian treaty rights, and those exercising treaty fishing rights, must also be considered.

In addition to the participants in fisheries described above, communities also contain others who are engaged in or dependent on fisheries. The National Standard Guidelines [Federal Register 63(84):24234-24235] describe the need to include “directly-related fishery dependent services and industries” in the analyses relating to communities. These fishery dependent services and industries include boatyards and marinas, ice-houses, tackle shops, fishing guide services, etc. The Guidelines also note that effects of conservation and management measures will impact the families of fishermen and processors, and that these impacts should be considered in the analyses.

Whenever minority populations and/or low-income populations are involved in a fishery, care must be taken to ensure that these participants are identified and fully considered in the social science and economic impact studies and by fishery managers. This is necessary to conform with the provisions of the Executive Order on Environmental Justice and the “fairness and equitable distribution” provisions of the MSA, especially National Standard 4 and 303(b)(6).

### **Fishing Communities**

The MSA definition of a fishing community is of a community with a group of fishing participants “based” in a geographic location [MSA 3(17)]. Because of the activities of the fishery participants, a fishing community is “substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs” of the community. There are thus four elements which must be considered for a community to be a “fishing community”:

- a fishing community occupies a geographic location, and
- a fishing community includes some or all of the groups of participants described above, and
- a fishing community is substantially dependent on harvesting or processing of fishery resources to meet social and economic needs, and/or



- a fishing community is substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs.

Because many geographic communities involved in fisheries are not substantially engaged in or substantially dependent on fishery resources to meet social and economic needs of the community, these cannot be considered fishing communities under the MSA. They will, of course, be considered during the development of the fishery impact statement [MSA 303(a)(9)], but do not receive the special consideration given to fishing communities under National Standard 8 [MSA 301(a)(8)].

In some cities, there is considerable involvement in fish harvesting and/or processing and the fishery-related industrial and services sector. These cities may also provide central services to regional fishing activities. While the number of people engaged in commercial or recreational fishing activities and support services in such a city may be large relative to employment in smaller communities, fishing activities are small relative to the city's total economic activities and employment. Analysis may discover neighborhoods within the city that are substantially dependent on or substantially engaged in fishery-related activities and which would qualify as fishing communities under MSA 3(17).

Since the MSA defines a fishing community as "based" in a geographic place, an occupational or avocational "community" of fishermen dispersed through a region or state cannot be considered a fishing community under the MSA. An avocational community, such as billfish anglers, is not linked to any one geographic place. Nor is an occupational community, such as gillnet fishermen, linked to any one place. Similarly, fishermen who seek a particular species, such as halibut or Atlantic cod, are not linked to any one geographic community. These groups of participants will be described and considered in the fishery impact statement.

## **SECTION 4**

### **The Form of the Social Factor Analysis**

#### **Introduction**

The MSA calls for consideration of relevant social factors in the determination of optimum yield [Section 3(28)]. Section 303(a)(9) of the MSA requires a fishery impact statement that assesses, specifies, and describes the likely effects of a FMP on fishery participants and fishing communities affected by the proposed action. In the case of limited access for a fishery, consideration is required of historical fishing practices and dependence on, present participation in, and the social and cultural framework relevant to the fishery [MSA 303(b)(6)]. The requirements can be embraced in the five broad groups of social variables described previously. These groupings are lifestyles; attitudes, beliefs, and values; social organization and structure; population demographics; dependence on and participation in the fishery.

#### **Establishing the Baseline (Profiling)**

As the first step in any social factor analysis or social impact assessment, a description of the demography, social and cultural framework, and participation in the fishery for region or range of the fishery is essential. The geographical range of the fishery can be established for the social factor analysis by identifying the communities (ports) of landing of vessels returning from the fishing grounds. In fisheries in which there are catcher/processor vessels or vessels with refrigerated holds or holding tanks these communities may be distant from the fishing grounds. The homeports of vessels involved in a directed fishery should also be geographically mapped and considered in any subsequent analyses.

Participation in the commercial fishery can be considered to have three components of harvesting fish, processing or marketing fish, and fishery-related services. Parallel components for recreational fisheries are harvest access and harvest-related services. Commercial harvest participation can be assessed through the numbers and types of vessels operating in the fishery. These vessels should be mapped both by port of landing and by homeport. These communities have direct economic, social, and cultural ties to the fishery through the participation of the vessels. For example, Newport, OR vessels regularly fish in the Gulf of Alaska fisheries from Kodiak; similarly Hobucken and Lowland, NC vessels regularly fish from Wildwood, NJ. Commercial fish processing facilities, ice plants, and vessel services involved directly with the fishery should be identified and mapped by community.

For the recreational fishery, points of access (ports or communities) to the fishery for anglers need to be identified and the services directly related to the fishery or used by the participants similarly identified and mapped. Because marine recreational anglers are drawn from a wide geographic area, their impacts on non-coastal economies and communities tend to be diffuse, and thus the focus of the impact analyses should be on coastal communities or

ports which provide the anglers with access to resources. Data on distribution of marine recreational fishermen in the general population can and should be obtained from the NMFS Marine Recreational Statistical Survey for those states in which the survey operates.

NMFS has three data sets that simplify the identification of participants and communities involved in commercial fisheries. The first is the weigh-out data files, which list commercial landings by port, species, weight, and value. The second data-set is the permits files, which identify the vessels and permit holders in each fishery in the exclusive economic zone. Each set of files yields information on communities and participants involved in fisheries. A third data-set, information provided voluntarily by fish processors, yields information on communities, processing employment, and participation in fisheries. All these data sets can be built into longitudinal studies of communities and participation in the fishery.

The general human population data on the communities and region identified as involved directly with the fishery can be obtained from Bureau of the Census decennial census data [ <http://www.census.gov/geo/www/tiger/glossary.html> ]. For the Censuses of 1980, 1990 and 2000, it has been found that the level of demographic information from the Bureau of the Census that fits best with the MSA definition of fishing communities as a geographic location is that of the “census designated place”(CDP). The Bureau of the Census recognizes two types of places; those that are incorporated municipalities and townships, and those that are CDPs. CDPs are areas that resemble incorporated places in that residents and local officials can identify the area with a name and define clear boundaries, but the CDP has not been incorporated and is thus not a unit of local government. Most rural coastal communities are CDPs. Where a CDP is not shown, but a population involved in fishing resides, data from census tracts and /or block-numbered groups should be used.

Postal zip codes are not often helpful in identifying fishing communities because they represent postal delivery areas, defined by the volume of mail, and often include several rural communities, or in densely populated cities sometimes only a block or two, or a single commercial or government building. The Bureau of Census has sought to link population data with postal zip codes through “zip code tabulation areas” (ZCTAs). A ZCTA is a defined geographic location corresponding to those census blocks and/or tracts which best fits the Post Office’s zip code delivery area. The ZCTA does not include all the postal addresses in a zip code and may cross zip code boundaries.

This Census information will need to be supplemented through State, county and municipal census and employment information to provide population and employment projections. Data on community- and county-wide employment in the fish processing and services sectors can often be obtained from these sources. Initial estimates of employment on vessels in the fishery can be obtained from vessel licenses or logbooks. It must be noted that this information has to be considered as seasonal; few fisheries are year-round and the length of fishing season is an important component in estimating social impacts. For recreational fishermen, participation data can be obtained from State surveys and the MRFSS

survey done by NMFS. Two aspects of recreational participation, which are essential data elements, are angler residence and incidence of participation (avidity).

The social institutions and structures, which support the fishery in each community, need to be identified and described. For example, are fishing or service operations family firms that are socially and economically dependent on participation of kinfolk in the business? Are seasonal workers transients? Has the community invested significantly in the fishery, through construction of fish docks and other forms of infrastructure? The history of the fishery and past experiences, now part of community culture, also needs to be documented as part of the baseline data set.

The regional and community “profiles” developed in the building of the base-line data sets are the comparative reference points for later analysis of impacts. The profiles need to be up-dated regularly, both as a way of tracking the impacts of current management actions and also so that the fishery has current baseline data when needed. A time frame of three to five years between updates is appropriate unless significant regulatory or other changes have occurred. An example of the development of effective social and cultural databases can be found in the community profiles for the North Pacific groundfish fisheries commissioned by the North Pacific Fishery Management Council.

### **The Design of the Social Factor Analysis**

In order to articulate these variables in the analysis, four activities are necessary and are usually undertaken in the order in which they appear below. Since the analysis process is iterative, the sequence is not always neat or well ordered. The first activity, scoping, has been discussed earlier. The second activity is the selection of social variables and their analysis. Thirdly, information on social conditions of the baseline case is collected and described. The description and analysis of the past and present social system of the fishery provides the reference point for the development of a comparison baseline case, and describes the status quo of the fisher. And, finally, the estimated social effects of the various other alternatives are compared in the impact assessment to determine the net social and cultural costs and benefits of each fishery management alternative.

### **Scoping**

Scoping is the preliminary analysis to determine whether social effects are likely to occur as a result of the proposed fishery management action or policy. The anthropologist or sociologist working with the PDT should use the scoping process to identify as many as possible of the user groups and communities that may be affected by the action. The analyst during the scoping process should also identify key social and resource availability issues. The analyst should also identify unquantified social and environmental benefits and values associated with the fishery. The anthropologist or sociologist then selects social variables with which to analyze the effects of continuing the present form of the fishery versus the alternatives proposed.

Clues to the nature and intensity of possible social impacts can be obtained from stakeholders and fishery managers participating in the scoping process. The formation of special interest groups of people affected by the proposed action or policy is another clear indicator of issues and conflicts. The analyst should also consider how the proposed action "fits" with historical trends; and the possible effects of the action on the major categories of human behavior (the way fishermen and fishing communities live; the ways they organize and meet social needs; demographic and sea-use patterns). The duration of effects and the scale of possible changes are also important analytical considerations.

### **Selection of Social Variables for Analysis**

Selection of variables for analysis evolves from the identification of key issues during the scoping process. The development of the variables depends to a large part on the availability and reliability of databases. The anthropologist or sociologist undertaking the analysis will establish standards and criteria for the analysis after reviewing databases and considering the time and effort needed for the analysis.

The goal of variable selection is to select social factors, from those in the baseline studies, that can be measured in a quantifiable way, thus ensuring that the analysis and assessment can easily be replicated and increasing the objectivity and defensibility of the analysis. Qualitative data is normally used to supplement and interpret quantitative databases. In some cases, information will be primarily qualitative supported by one or two quantifiable variables. For example, in the social impact assessment of the Argo Merchant oil spill, it was found in a survey (more than 230 respondents) that public perception of major damage from the spill to the marine environment and fisheries was high. The SIA found that this public perception was not a predictor of actual tourist behavior. Qualitative data that tourist behavior had not been impacted by the oil spill were supported by quantified data on sales tax receipts from hotels and vacation lodgings on Nantucket, Martha's Vineyard, and Cape Cod. Data on passengers carried on the Steamship Authority's vessels for the period prior to and following the spill confirmed the finding that actual behavior had not changed (Fricke and Maiolo, 1978).

Use of selected sub-variables from the principal social variable categories of lifestyles, attitudes and values, social organization, historical trends, and population variables allowed the investigators in the example above to make assessments of the impacts of the oil spill. Though the sample sizes by community, social class, and income and education were small (approximately 30 respondents per matrix cell) they were validated by the use of the quantified data.

Development of matrices of variables, the baseline case (status quo) and alternative scenarios is often the simplest way of showing social change and social impacts. The framework in Table 1 is an example of the way such matrices can be developed.

**Table 1: FRAMEWORK FOR SOCIAL FACTORS ANALYSIS**

<b>Social Factor or Variable</b>	<b>Baseline Case (Profile/Status Quo)</b>	<b>Baseline Projections (w/o change)</b>	<b>Baseline Projections (w/change)</b>	<b>Social Impact Assessment</b>
<b>Demographics,</b> e.g. - Population data - Education				
<b>Cultural data related to fishery,</b> e.g. - Norms - Values				
<b>Social Structures and Institutions</b> e.g. - Fishery - Community - Family (kin)				
<b>Cultural data related to community,</b> e.g. - Norms - Values				
<b>Participation in fishery,</b> e.g. - Historic data - Present data				

The selection of the key sub-variables from each general category should meet the following general standards and criteria:

- relevance to the analysis, or how closely the variable relates to the MSA and/or NEPA action or policy;
- significance, or how strong the impact is likely to be;
- availability, or how available data are with which to measure the variable;
- efficiency, or the extent to which the measurement of one variable obviates the need to measure other variables;

- sensitivity, or the degree to which the variable and its measurement clearly register changes from the baseline for each reasonable alternative;
- accuracy, or the degree to which the variable and its measurement yield consistent results; and
- validity, or the reliability of the measure and whether it correctly represents the variable.

In deciding on appropriate measures, the analyst will always consider qualitative information for a variable if it is supported by other variables with quantitative measures, as in the oil spill impact case cited. Wherever possible the analyst should consider longitudinal studies and analysis as the best means of articulating short- and long-term impacts and cumulative effects.

In summary, selection of social variables is one of the most important steps in social factor analysis. Care should be taken in four respects. First, the analyst should ensure that the variables selected actually reflect the potential social effects anticipated in the scoping process. Second, the variables should be issue-driven and, again, reflect issues raised in the scoping process. Third, the variables selected should articulate each aspect of the legal requirements, e.g., the social and economic factors in MSA 303(a)(9) or (b)(6), and the dimensions of the social system (e.g., lifestyle, demography, or values). Fourth, the variables selected should be easily measured and compared.

## **Development of the Baseline Case**

The baseline case, or the status quo in the fishery, is the first required area of analysis. The baseline needs to be described, or profiled, prior to the beginning of the analysis. This description identifies and enumerates the regional and local characteristics of the fishery and its participants. In many fisheries, participants include wide-ranging fishermen, who follow the stock of fish throughout its range, and local fishermen, who fish on a stock when it passes through their fishing area. Different types of gears and vessels are used, and the economic and social investments vary with each mode of production. The support services for the fishery also vary within the range of the fish stock; recreational fishing may cluster around specific fishing areas with specific service sectors, and support and processing sectors for commercial fishing will reflect ease of access to fishing grounds and markets. The social systems associated with support services should be described in the profile document.

The baseline description of participation in each sector of the fishery should include all relevant demographic and community information including income, employment, lifestyle, and cultural value data. Cultural value data includes that on fishery-related job-satisfaction, family and community cultural values related to fishing, and religious and other norms satisfied by fishing activities. Care should be taken to ensure that participation in fisheries other than the one being considered is noted and recorded, and that the annual, or

seasonal, round of activities by participants in the fishery is described. Social systems do not exist in isolation, so general information on population and employment in the region and communities of the fishery should be included.

The information included in the profile document should, at a minimum, include all that is necessary to meet the requirements of MSA 303(a)(9), 303(b)(6) and 303A. This includes description of present and historical participation in the fishery, dependence on the fishery by stakeholders and communities, actual and potential mobility of vessels between fisheries, and the cultural and social framework of the fishery and of fishery dependent communities. In particular, care should be taken to identify and include any subsistence fishing activities and any participation by Native Americans or other indigenous peoples in the fishery in the baseline document. The profile document and databases should be incorporated in the Stock Assessment/Fishery Evaluation (SAFE) document, either by reference or attachment. The regular updating of the SAFE documents with social, community and economic data on the fishery or fisheries provides the longitudinal data sets necessary to discern trends and cumulative effects of conservation and management actions. The information is thus available when the Council determines that it is necessary to develop a regulatory action or policy.

Using the information in the SAFE, collected during the development of the profile, the analyst turns to a projection of the information to see if any social changes are likely to occur without the formulation of new fishery actions or policy. For example, population changes projected by coastal community or state planning departments may be such that changes in the fishery are likely to occur. The baseline case thus is composed of two elements; the baseline document, which records the status quo, and projection of the status quo forward in time to provide an estimation of what is likely to occur in the fishery without the intervention of the fishery manager.

When developing the community profiles or baseline case, the use of mapping techniques, or geographic information systems (GIS), offers a simple way of organizing disparate sets of data. U.S. Bureau of Census data, landings data, vessel and processor permits and data sets can be displayed in tabular and spatial formats relative to any community or region of interest or time period.

### **Time-frame or Period of Analysis**

A general guideline for the period or time-frame covered by the social factor analysis and assessment cannot be specified since fisheries and management issues vary. Councils and analysts will encounter a wide diversity of possible situations and measures from one fishery management action to another. The Council or PDT will normally chose the period or time-frame for the analysis of future impacts and must provide an explanation for the specific period. The social impact assessment must forecast for a period of time (several years) beyond the year in which the conservation goal is attained. For example, if a fish stock is to be rebuilt within seven years a reasonable time-frame for analysis of social impacts would be twelve to fourteen years in order to assess the maximum socio-cultural



costs and benefits to communities and participants. At the least, the period covered by a social impact assessment should be long enough to allow a consideration of all expected social effects. Care should be taken to ensure that the assessment time-frames are the same for the ecological, economic and sociological impact analyses.

### **Estimation of Social Changes for Alternative Actions**

During the scoping process reasonable alternatives to the status quo should have been developed by the PDT. In fisheries, these alternatives are usually couched in conservation terms--the need to reduce fishing mortality to prevent overfishing, for example--or expressed as the need to avoid conflict among user groups through allocation of the available resource. The estimations of social change for the alternatives will be grounded on the baseline information developed for the status quo case and will be assessed with the same suite of variables used to estimate social change in the status quo. For each reasonable alternative a matrix of changes will be developed, with weighting of trends as appropriate. This task typically takes an analyst between three to six months depending on the completeness of the baseline data.

### **The Social Impact Assessment**

The final step in the process is the comparison of the social changes estimated for the status quo case and each reasonable alternative. The time frame of the action, e.g., ten years plus the time-span of one generation of fish stocks being rebuilt, provides the analyst with the period of the assessment. The alternatives for action selected by the Council provide the cases to be measured against the baseline case. The analyst forecasts possible changes in population and other social factors over the time frame of the action, and then compares these, using descriptive and inferential statistics and longitudinal analyses, with the baseline case and a projection of the baseline case for the time frame.

Where a matrix and accompanying analysis discussion document has been used consistently in each social factor analysis, the trends of social benefits and costs for each of the alternatives can be easily compared. It is to this matrix and accompanying analysis document that the decision-maker turns for the comparison of impacts. On occasion the comparison may be expressed in qualitative terms because factors, such as lifestyle change, cannot be expressed in direct numerical terms. However, if the analyst has consistently used variables and information bases, the comparison of trends is appropriate and choice of a preferred fishery management action is possible.

## **SECTION 5**

### **Special Considerations**

#### **Introduction**

This section deals with a number of issues that social scientists and fishery managers will encounter during the SIA process. These issues include availability and collection of data, criteria for verification and documentation, integration of the SIA with economic and biological assessments, identification of important social issues, identification of affected fishermen and fishing areas, and estimation and projection of social impacts. The discussion of each area is, of necessity, general and the reader is advised to consult relevant literature sources for more comprehensive treatments.

#### **Availability and Collection of Data**

##### Literature Surveys

As noted earlier, an SIA is not the appropriate vehicle for a data-fishing expedition. Data collected must be related to the issues and the circumstances of the fishery. Initial information will be collected through the scoping process and through reviews of existing studies and literature. While peer-reviewed literature resources should be sought, information from "gray" literature--conference papers, technical reports, etc.--should also be considered and evaluated. It is important that the literature survey report include an evaluation of all relevant empirical studies, since questions about the scope, methods, and validity of the SIA at hand will be couched in comparative terms.

The literature survey will provide information on social issues and variables relevant to the fishery action or policy being considered; but since each fishery is unique, the survey will need to be supplemented with data specific to that fishery and action or policy. The SIA will need a scientific sampling of information relating to the social factor variables described earlier. These variables are historical participation in, and dependence on, the fishery; lifestyles, employment, and involvement in the fishery; social attitudes, values, and beliefs of fishermen and communities; social organization of the fishery and community; and population dynamics and demographics of the fishery, community, and region.

##### Survey Research

In earlier sections the use of existing databases has been encouraged for reasons of economy and efficiency. However, the scoping process will often reveal gaps in available data and frequently these have to be filled prior to analysis. Two techniques are available to the anthropologist or sociologist undertaking the SIA. The first, involving the development of new surveys, is time consuming. The second is the use of inductive techniques using existing data coupled with qualitative information and observation.

The first technique will require survey research, based on representative samples, using appropriately designed survey instruments. Usually these survey instruments will be questionnaires, but unobtrusive measures can also yield useful social data. For example, researchers in North Carolina developed a method for tracking recreational fishing effort by mapping the movements of boat trailers as part of a creel survey. This technique, using trailer license plate numbers in a manner similar to fish tagging surveys, enabled the researchers to plot the seasonal movement of boat trailers among launching ramps around the North Carolina sounds. The seasonal round of recreational fishermen could thus be mapped and the number of fishing trips made each year estimated [Johnson et al., 1985].

If the survey research requires data collection using questionnaires, care should be taken on three points: asking the right questions, selecting an appropriate sampling strategy, and using appropriate data analysis techniques. The questions should focus on the major social issues at hand; the scoping process should have surfaced these issues. The selection of social variables that will measure the relative importance of the issues will define the questions on the survey instrument. At this point it is necessary to stress the need for clear and bias-free wording of survey questions. The clarity and relevance of questions and the order in which questions are presented can significantly affect the response to a questionnaire and the validity of the analysis. Thus great care should be taken in pre-testing and designing any survey prior to use. In questionnaire surveys carried out by the Councils or NMFS, an OMB clearance of the research design and instrument is required. The clearance process can take six months or more. Surveys using unobtrusive measures, such as the "trailer tagging" survey noted, do not normally require OMB clearance since they do not involve contact between researchers and constituents.

### Analytical Induction

The inductive approach has the advantage of being less expensive in time and other resources than surveys, but has a greater potential for error. Using existing databases supplemented by in-depth interviews and observation data collected systematically from fishermen and communities, the analyst formulates models about potential social impacts in the fishery and communities. Information that does not "fit" or is contradictory to the analyst's models is cause for the revision of the models, if the data in question are found to be sound. Using analytical induction permits the analyst to find the median areas of impact; in simulation models, the Monte Carlo system approaches use of information in much the same way.

### Focus Group and Delphi Research Techniques

Two alternatives to surveys and analytical induction are the use of "focus group" research and Delphi-techniques. Both draw from survey and analytical induction approaches, but provide more scientifically robust data sets than the induction approach. Focus groups may be as small as six persons. The groups are chosen to be representative of all participants in a fishery or community, and through a process of discovery and discussion

issues and impacts are identified and quantified. Use of this technique generally requires special training in research and interview facilitation techniques.

The Delphi approach employs techniques akin to ethnographic research; a sample of respondents is selected and asked a series of questions in a first wave of individual interviews. The social scientist then analyzes the information, and returns to members of the sample and asks them to account for any discrepancies between their account and that of others. This additional round of information normally accounts for most of the differences, and a third wave of interviews usually provides accurate median-data sets that can be used for analysis and assessment. As in focus group work, Delphi interviews require special training and interview skills for the analyst.

### Population Samples

Sampling a population of fishermen is always difficult because they are usually fishing during "normal" working hours. The key to sampling is to frame a balanced sample of fishermen by types of gear fished, role in the fishery, residence and demographic characteristics (e.g., age, gender, and years fishing), and select from the sample. Sampling rules must be followed carefully in order to have a scientifically valid study. Again, knowledge of sampling techniques for SIA generally requires special training and skills.

### Statistical Analyses

The level of measurement (nominal, ordinal, or interval) will determine the forms of statistical measurement. Most social science data are nominal in nature, and thus fairly elementary measures of statistical association and significance are used. Descriptive, rather than inferential, statistics are usual. Where surveys are possible, more sophisticated analyses may be carried out since variables and the levels of measurement are tailored to the issues at hand.

### **Verification and Documentation Standards**

Provisions of the Data Quality Act (P.L. 106-554) apply to information used in fishery management plans. In particular, requirements for peer review of information and analyses have been established by the Office of Management and Budget in 2002 and must be followed in the development of social science data and analyses.

Concerns over lack of data, precision of information, and changes in social systems adapting to new environments, make it important to set standards for verification and documentation of SIA findings. The first standard in any scientific endeavor is to establish factual accuracy; it must be possible to verify all data used in the SIA. The second standard is that of "external validity"; can the results of the SIA be generalized to other similar fisheries and/or communities?

The key to this verification of accuracy and results is the process of cross-validation or determining whether the same results are found across a number of different situations. Cross-validation can be done within the study by comparing results of two or more focus groups, or by analyzing data sets from different sources and comparing the results. In the case of communities, longitudinal data sets can, over time and if consistently up-dated, provide internal checks for validity. If the various analyses reach the same conclusions, the SIA can be said to be cross validated and has been verified.

Documentation of data, methods of research, and research assumptions is a further check upon the accuracy of the SIA. Independent researchers should be able to use the same data sets, methods and assumptions and achieve the same results. Care in documenting the SIA is thus an important element in the validity of the SIA.

### **Integration of the SIA with Economic and Biological Analyses**

Participation of social scientists on PDTs and in the assessment process enhances the interdisciplinary process contemplated by NEPA. Interaction of PDT members and the sharing of data and analyses should result in an FMP or EIS in which biological, economic, and social analyses form a seamless whole. This is a goal that NMFS is striving to attain.

To date, social scientists have rarely been part of a PDT because Councils or NMFS Regions have not usually employed them. In 2000, only the South Atlantic Council and the NMFS northeast region had an anthropologist on staff. In 2007, all NMFS regions have anthropologists or other social scientists (usually working at the Fisheries Science Centers), except for the Southwest Region. Councils are mandated to have an interdisciplinary Scientific and Statistical Committee (SSC) to assist the Council in the development, collection and evaluation of economic, social, and other scientific information [MSA 302(g)]. The social scientist members of SSCs are in an excellent position to provide advice to Councils and PDT during the scoping process, assist with defining the need for SIAs, and to review the work of contractors and/or Council or NMFS employees.

The importance of early involvement of social scientists in the interdisciplinary fishery plan development cannot be over-emphasized. The early identification of social issues can assist the other members of the team in identifying reasonable policy or management alternatives for analysis. Particularly important is the early identification of alternatives that may minimize social and/or cultural impacts or are likely to be accepted by fishermen as "socially appropriate"; that is, alternatives that recognize the significance of the social and cultural values of fishermen, their communities, and fishing practices.

As the development of data sets and information takes place, cooperation among social scientists, economists, fishery biologists, and fishery managers will allow increased sharing of information and results of analysis. While some efficiencies may be achieved in joint economic, social and cultural data collection, the principal benefit will be from the exchanges between analysts as alternatives are described and refined. Council members and fishery managers, in their turn, will receive holistic analyses to inform their selection of

courses of action. Incorporation of economic, demographic and socio-cultural information on fisheries in the SAFE databases maintained by the NMFS Fisheries Science Centers is a necessary step to this integration.

### **Identification of Important Social Issues**

The SIA process is an issue-driven one; thus identification of social issues of importance to successful management of the fishery is essential.

Because special interest groups can dominate hearings and generate mail and contacts out of proportion to their numbers, information gained through public involvement is often one-sided. Nevertheless such information is helpful in defining the bounds of issues to be considered. Information about social issues and concerns of the balance of the fishery can be obtained through systematic contacts with industry, community, and organization leaders. These contacts often form a two-step flow of communication; information about the planning process flows from the PDT and/or Council to leaders who, in turn, pass it on to those with whom they share interests. Similarly, the social scientist obtains information from these constituencies through key informants, which permits the identification of social issues of concern.

Published materials are an excellent source of information about social issues. The social scientist will make use of any and all peer-reviewed reports and articles as a matter of course, but the importance of articles in newspapers and magazines cannot be overlooked. These news items often are more timely and direct than more academic studies.

Expert opinion may be necessary during the scoping of issues. An expert is likely to be aware of special issues that the public has yet to perceive. In particular, experts are likely to be conversant with the impacts of similar management schemes on fisheries, other renewable natural resources, and/or communities in other, distant, locations. Experts are also likely to be more conversant with the issues of cumulative social effects than members of the general public.

Early articulation of social issues, and recognition of these issues by all associated with the planning of a fishery action or policy, can do much to defuse the tendency to polarize an issue and thus avoid creating an adversarial environment. Where the public has been involved in the scoping process and can see that social concerns are being actively considered, there is a better climate of understanding toward the action being proposed and the costs and benefits associated with alternatives. In short, social issue identification and selection is one way of ensuring that all stakeholders in the fishery, and their legitimate concerns, are recognized and considered in the planning process.

## Methods of Projecting Social Impacts

The estimation of future social impacts is perhaps the most difficult aspect of SIA. The identification of issues, discovery and analysis of social data, completion of social and economic profiles of the fishery, documentation and verification of variables frequently occupy all the PDT and analyst's time. However, prediction of social impacts should be the core of the assessment. Choice of a method of estimating impacts depends upon the amount of information available and its quality.

A projection of social impacts is an estimation of past and present social and fishery trends into the future on the basis of some stated assumption, for example that those historically active in the fishery will continue to participate. The projection is not necessarily a forecast; it merely indicates what could happen if the stated assumptions are met. Population estimates are typically simple forms of projection. All techniques of estimating impacts involve forms of projection. The projection should be quantitative, but can be qualitative or a combination of these approaches depending upon the data and analysis available.

A more sophisticated form of projection is that using an "if... then" proposition. The analyst takes information from a projection and identifies and analyzes the important causality variables. This "contingency analysis" examines sequential cause-effect variables but does not normally place these within a time frame. However, the probabilities of the occurrence of future events and changes can be estimated.

The form of projection known as a forecast is the most rigorous and useful but requires detailed information bases. The baseline and alternatives are defined precisely and variables are equally well defined. The forecast uses these measurements to explore ranges of impacts "in the least ambiguous terms possible, specifies and analyzes the salient cause-effect relationships in the greatest feasible detail, fixes potential scheduling of future situations and events as closely as possible and details the estimates of every potential future with the greatest attainable precision" [Miller, D.C. 1981:154]. Miller observes that the strict criteria by which a forecast must be judged are such that few projections ever attain the status of a forecast.

David C. Miller suggests that there are at least 73 methods from which an analyst can choose for estimating societal futures; he has grouped these into three broad categories and twelve principal types of technique [1981:155]. Miller's first category embraces techniques using time series and projections. In this category there are three types of techniques: trend extrapolation; pattern identification; and probabilistic forecasting. These statistical methods use historical or longitudinal time-series data to project values for one or more variables. They can also be used to develop measures of confidence in the projected values.

Miller's second general category includes projection techniques based on models and simulations. These include dynamic models; cross-impact analysis, Monte Carlo or "KSIM" models, input/output analysis, and policy capture models. Miller suggests that static

modeling is of limited use in developing estimates of potential futures, because each component variable is fixed in one single relationship with all other variables. Dynamic models use a number of variables, in which each variable or component can move through a range of values and relationships with all other variables. By examining the results of modeling various changes the analyst can prepare projections for each reasonable management alternative relative to the status quo or baseline case (Miller, D.C. 1981:156).

Qualitative and holistic projection techniques form Miller's third broad category. These methods include scenario development; expert-opinion methods; alternative futures forecasting; and values forecasting. These techniques are used when there are few quantitative data available, and the analyst must rely on techniques such as the Delphi method for developing informed estimates of the future. However, methods of hindcasting used by historians can yield quantifiable information for use in scenario and future modeling.

### **Validity**

Peer review can be used as a final check on the validity of the SIA. Most Councils have at least one social scientist (anthropologist or sociologist) on their SSC. Each Council should rely on the advice of the SSC social scientist(s) to determine whether SSC members can do the peer review or whether other peer review methods should be employed. Peer review should focus on suitability of research design and methods, and suitability of analytical techniques, recognizing assessment time and budget constraints. The purpose of the review is to ensure that the assessment has been done adequately, and is comparable to other, state-of-the-art studies.

### **Summary**

The special considerations outlined in the Section above are such that anyone without SIA training should seek expert guidance and refer to the literature for information on details of issues and methods. However, it is clear from the material presented that SIA requires the same degree of scientific rigor and effort as the biological and economic elements of environmental impact assessment. Done properly, an SIA is as valuable an assessment tool as a good fisheries stock assessment. Without adequate baseline data and careful analysis, an SIA does not provide the decision-maker with assessments which help understand long term impacts. If a professional social scientist with skills in SIA methods undertakes the assessment, the Council has an added assurance that the study is a sound one.



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The guidance provided in 1991 was based on, and closely followed, a similar document prepared by Dr Hobson Bryan for use by USDA Forest Service managers in developing forest management plans. This document builds on that material and the experience gained in applying it. Appendix 2(g) was last revised in October, 2007.

NMFS Operational Guidelines–Fishery Management Process were last completely revised in May, 1997 following the passage of the Sustainable Fisheries Act (1996). Revisions are normally made following amendments to the Magnuson-Stevens Fishery Conservation and Management Act or the National Environmental Policy Act.

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