



A FRAMEWORK FOR SOCIO-ECONOMIC ANALYSIS TO INFORM INTEGRATED FISHERIES MANAGEMENT PLANNING AND FISH HARVEST DECISIONS

POLICY SECTOR

FISHERIES AND OCEANS CANADA

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A FRAMEWORK FOR SOCIO-ECONOMIC ANALYSIS TO INFORM INTEGRATED FISHERIES MANAGEMENT PLANNING AND FISH HARVEST DECISIONS

1.0 INTRODUCTION

This framework presents guidelines and principles for conducting socio-economic analysis to inform the Integrated Fisheries Management Planning process and annual harvest decisions undertaken by Fisheries and Oceans Canada. The purpose is to ensure that fishery management decision-makers are provided sufficient information to consider the economic context and status of the fishery, along with the potential economic consequences of alternative actions. The analyses guided by this framework will therefore respond directly to the priorities and policy questions set forth by Resource Management Sector on behalf of the Minister of Fisheries and Oceans.

The key elements outlined in this document should be considered when conducting a socio-economic analysis, although it may not be possible and/or necessary to undertake each step with the same level of detail. Three potential levels of analysis are presented. Briefly, these are: 1) an economic profile, 2) an assessment of economic viability, and 3) an analysis of alternative management scenarios. The depth of the socio-economic analysis will be guided by Resource Management priorities, which will take into consideration the scale and significance of the fishery in question, and the anticipated level of impacts of the management activity(ies) under consideration. For example, many or all Integrated Fisheries Management Plans may contain a brief economic profile of the fishery (see *Section 5.1*), while all three elements of analysis (5.1 through 5.3) may only be desired when a significant change is considered within a principal fishery for which there exist several options for achieving the conservation objective. The level of analysis will be decided as outlined in *Section 6.0: Process, Timing, and Delivery*.

This document begins with a summary of the context for socio-economic analysis in Decision Memoranda and IFMPs (Section 2) and an overview of the elements to be contained in such an analysis (Section 3). Section 4 provides general principles (4.1) and methodologies (4.2) that are common to much of the socio-economic analysis undertaken within Fisheries and Oceans Canada and elsewhere in government. More detailed guidance on specific components of the analysis is provided in Section 5.

The remaining sections cover processes for coordinating the integration of the economic analysis into IFMPs or Decision Memoranda in a timely and efficient manner (Section 6), and a set of protocols for the review and validation of the analysis (Section 7). As experience is gained, a checklist may be developed to facilitate implementation.

2.0 CONTEXT AND BACKGROUND

The Ocean to Plate approach announced by the Minister of Fisheries and Oceans in April 2007 introduces a strong economic focus to departmental activities. This is a reflection of that which is required today to compete in a global world economy. Indeed, the Ocean to Plate approach aims for an economically viable and internationally competitive industry that can:

- Adapt to changing resource and market conditions;
- Extract optimal value from world markets;
- Provide attractive incomes to industry participants;
- Provide an economic driver for communities in coastal regions; and
- Attract and retain skilled workers.

Pursuing this vision requires the integration of economic analysis into departmental decision making; that is to say, into the design and evaluation of policies and programs. This framework has thus been developed to advance integrated and open decision making that includes the analysis of social, economic, biological, and environmental factors.

Two particularly important vehicles for conveying information pertinent to decisions of resource management are Decision Memoranda for the Minister and Integrated Fisheries Management Plans. Given their prominence, the inclusion of economic and socio-economic considerations in these documents is a productive advance towards the Ocean to Plate vision. Furthermore, IFMPs are the key avenues for documentation and communication with the public regarding DFO's management of a public resource, and as such, are a demonstrable component of the department's accountability process. If socio-economic considerations are to play a role in the Department's decisions, the information should be explicit and open to public scrutiny.

The compilation of this framework was undertaken in concert with Resource Management Sector's development of a new template and guidelines for Integrated Fisheries Management Plans. The process also coincided with an increased demand for economic analysis to support annual Decision Memoranda to the Minister regarding allowable catch in specific fisheries. An analytical approach suitable for both applications was drafted by Policy Sector and was approved at a joint Resource Management - Policy meeting in Toronto in December of 2007, at which representatives from both Sectors in all DFO Regions were present.

This framework more fully develops the analytical approach presented in Toronto, providing details and guidance for consistency across IFMP and Decision Memorandum applications. It draws upon the same principles and guidelines used in other applications by DFO's Policy Sector¹. It is expected that this framework and its guidelines will evolve according to experience and according to the needs and priorities of the Department.

¹ See two related Policy Sector documents: *Framework for Conducting Economic Analysis* and *Framework for Integrating Socio-Economic Analysis in Species at Risk Act Decision Making*.

Finally, the routine use of economic analysis to inform resource management decisions has been missing for some time within Fisheries and Oceans Canada. It is thus important to re-establish the view that economic analysis is a tool to complement the important role of Science in providing advice for the determination and maintenance of conservation goals, this being the Department's primary mandate. Conservation is completely consistent with economic viability; in fact, it is a fundamental requirement for achieving sustainable prosperity in the fishery. It is a primary goal of this framework to encourage a comprehensive economic analysis that, over time, will support a longer view of the impacts on stakeholders, and will broaden the focus beyond short term inter-annual changes.

The Science Advisory Process is well established in DFO. As the process for providing relevant socio-economic information develops, it should draw upon lessons learned in the establishment of the Science process. Parallel standards should be created where appropriate. With better information for decision-makers, it becomes more likely that the common conservation goal will be achieved for the benefit of the resource, the Department's stakeholders, and Canadians everywhere.

3.0 ELEMENTS OF THE ANALYSIS: OVERVIEW

The elements of an overall socio-economic analysis can be sorted into three sections that address somewhat distinct issues. Although the structure presented here is not the only way to organize the analysis, it is convenient for the applications under consideration in this framework. The three main sections are:

- i. Economic profile, indicating the general socio-economic scale and significance of the fishery.

The profile would include a series of standard indicators that paint a picture of the overall and regional significance of a fishery. Commercial, recreational, and aboriginal fisheries should all be included. The profile would also present various representations of the degree to which participants in the fishery (harvesters, processors, recreational charters) depend upon it as a source of income. For recreational or FSC fisheries, the cultural or subsistence importance should also be assessed. Community profiles may be included as supplementary information, as well as any cross-references to Large Ocean Management Areas in order to provide context on the environment in which the fishery is prosecuted.

A detailed compilation of items that could be included in a profile is presented in the guidelines of Section 5.1.

- ii. Assessment of the current economic health/viability of the fishery.

This portion of the analysis would assess the viability of the fleet(s) involved in the fishery, to the extent possible with the available data. Cost and earnings analysis would be ideal, but where this is not possible, simpler indicators could be presented, such as trends in landed value per licence. The economic status of the processing sector should also be discussed.

Significant movements in fish stock projections, prices, exchange rates, costs, or export markets would be discussed here. If there are avenues for value improvement (for example, improved handling procedures, timing of the fishery, improved product mix, *etc.*), these could also be included. The latter information is likely discussed at the regional fishery advisory meetings led by Resource Management, and may best be obtained through direct communication with industry at these fora.

- iii. Economic analysis of management objectives and measures (scenario analysis).

There will be relatively few cases where the analysis will proceed to in-depth scenario analysis; however, it may be associated with some of the more important and high profile decisions taken by the Department and must therefore be well-executed. This component of the analysis will be most like that which is undertaken for regulatory changes, but may be applied to important non-regulatory propositions as well. For example, it could be used to examine the socio-economic

consequences of changes in harvest rules, actions to uphold access and allocation principles, new habitat protection measures, etc.

A baseline management scenario would be compared to several alternatives to estimate the potential net economic gains or losses associated with each. In general, this would require projection of various scenarios (specific management measures and response of the fish stock, including uncertainty) into the future by some number of years. For example, in analyses associated with the *Species at Risk Act* the timeframe is dictated by the life cycle of the species, but for fishery management plans, an appropriate time frame could be determined on a case-by-case basis. Science is currently leading an effort, in consultation with Policy, to develop a sound and defensible approach to these projections².

Within the context of IFMPs and Decision Memoranda, economic scenario analysis will only be undertaken when the Minister and/or senior managers make a request of Resource Management to investigate particular options.

² Shelton *et al.*, 2007. Assessing recovery potential: Long-term projections and their implications for socio-economic analysis. CSAS Research Document 2007/045.

4.0 METHODOLOGICAL APPROACHES AND GENERAL PRINCIPLES

This section provides an overview of the methods that can be applied in a socio-economic analysis (especially the scenario analysis described above), and some general principles used to guide the analyses undertaken by Fisheries and Oceans Canada.

4.1 Overview of Methodological Approaches

There is a wide array of methodological approaches to economic analysis. Benefit-cost analysis is a primary approach used by governments in Canada and abroad to evaluate the efficiency of public policies and programs. Other approaches that are available include cost-effectiveness analysis, multiple account evaluation, and regional economic impact analysis. The validity and usefulness of these approaches depends on the type of issues and decisions being analyzed. The Government of Canada's Cabinet Directive on Streamlining Regulations, for example, requires the use of benefit-cost analysis when analyzing the impacts of regulatory proposals. There is no specific legal requirement for a particular form of analysis in the applications addressed by this framework.

The methodological approaches outlined above are well described in many books, papers and articles. The following are some references for interested readers:

- "Canadian Cost-Benefit Analysis Guide: Regulatory Proposals". Treasury Board of Canada Secretariat. Interim, 2007.
- "Guidelines for Preparing Economic Analyses". United States Environmental Protection Agency. 2000.
- Cost-Benefit Analysis and Regulatory Reform: An Assessment of the Science and the Art. Kopp, Krupnick, and Toman, 1997. Resources for the Future Discussion Paper 97-19.
- Guidelines for Economic Analysis of Fisheries Management Actions. Office of Sustainable Fisheries, U.S. National Marine Fisheries Service, 2000.
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4.2 Principles for Socio-Economic Analysis

Some general principles are applied to all socio-economic analysis undertaken by Fisheries and Oceans Canada. They should be used to guide the scope, presentation, and review of the analysis.

4.2.1. The scope of the economic analysis and resources allocated to it should be commensurate with the expected level of risk and with the current and anticipated socio-economic importance of the issue.

The level of economic analysis conducted is to be proportional to the anticipated impact on stakeholders of either proposed management actions or exogenous economic events. For example, minor amendments to an existing fisheries management plan would not likely require new economic analysis. On the other

hand, major impacts may be expected whenever there are significant changes to fisheries in access, allocation, or management approaches; large shifts in important markets; major habitat conservation initiatives; restrictions to development; or large investments in infrastructure. Such events would require that social and economic indicators be considered in detail, and a more extensive analysis will be necessary.

Judgment should be used in determining the level of analysis, and the analysis should be customized to the scale of the issues and problems identified. In cases where significant concern about potential scenarios are expressed by Aboriginal peoples, provinces/territories, stakeholders, industry, etc., or where there may be conflict between various user groups, then the level (or depth) of analysis should be increased. Ultimately, the availability of data may determine the limits of analysis, but appropriate efforts should be undertaken to obtain necessary information. When quantitative data are not available, a qualitative analysis could ensure that all impacts are covered.

4.2.2. The analysis should be defensible, understandable to our stakeholders, and practical.

Economic analyses are intended to support decision making with respect to departmental initiatives. They accomplish this goal by outlining the socio-economic impacts of an action or event, making tradeoffs transparent, and aiding in the prioritization of alternatives. It is for this reason that economic analysis must be coherent and defensible, as well as understandable.

Cabinet Ministers, Central Agencies, departmental officials, senior managers, and the public at large are among the main stakeholders and users of economic analyses. It is therefore important that economic analysis and its communication be tailored to these audiences.

The following are recommendations for making economic analysis more defensible and understandable:

- Make the analysis as clear and simple as possible;
- Assumptions should be explicit and well documented;
- Data sources should be identified, subject to privacy concerns;
- Methodology must be replicable;
- Proprietary information employed in the analysis should be identified as such;
- Results must be sensible, reasonable;
- The analysis should be presented using clear language, avoiding jargon and acronyms.
- Discussion of results should not be overly theoretical.

4.2.3 The socio-economic analysis should draw upon the expertise of all relevant DFO sectors.

The analysis should be reviewed by DFO sectors and regions to ensure it is relevant and accurate in reflecting the full range of potential impacts. For scenario analysis related to management alternatives, Fisheries Management and Science will be key players, providing the specific management scenarios and biological outcomes for the economist to analyse. Oceans sector should be consulted whenever there could be broad implications of a scenario beyond the fishery, and Policy sector should also provide analysis of any inter-governmental implications, both domestic and international. Economists should work closely with these sectors at an early stage of the analysis.

4.2.4. The analytical process should be open and inclusive. Wherever appropriate, the document should be reviewed and revised based upon:

- a) inter-sectoral review within DFO;*
- b) provincial/territorial, aboriginal and stakeholder review;*
- c) professional peer review.*

A transparent approach to decision making requires that Aboriginal peoples, interested stakeholders and provincial governments have the opportunity to review and provide comments regarding DFO economic analyses.

Where significant assumptions are employed and/or there is debate about methodological aspects of the analysis, academic review should be considered. Feedback received from the stakeholder review and peer review is to be addressed in the development of the final analysis.

5.0 SPECIFIC ANALYTICAL GUIDELINES

The guidance provided here is not meant to be rigid, neither with respect to content nor format. Not all elements listed will be significant or even relevant for every fishery. However, the analyst should at least consider the importance of each item, and exercise judgement regarding the ultimate scope of the analysis. Judgement should take into account the main factors of interest for decision-makers in the fishery in question, as well as timelines and the resources available for the analysis.

Over time, it may be desirable to standardize the presentation of certain types of data, to facilitate quick and easy interpretation by decisionmakers. After experience is gained with both producing (and interpreting) these analyses, the framework can be revised to include standard presentation methods.

5.1 Socio-Economic Fishery Profiles

Profiles should include commercial harvest, recreational harvest, aboriginal fisheries, and the processing sector. The profile should provide a good picture of the socio-economic scale and significance of the fishery. Indicators which may be included are :

- TAC, Landings, Landed Value (over recent time series, and possibly by season or month)
- number of active and inactive licences, by gear type
- number of licence holders and crew participating in the fishery
- fleet organization and description, number of vessels by size
- description of income, by Fisher Identification Number (FIN) and by vessels (or if possible, by enterprises), including income from this fishery as a component of total fishing income
- economic relationship of this fishery with other fisheries
 - general degree of dependence of harvesters
 - access to alternative fisheries
 - bycatch of this species in other fisheries, other species caught as bycatch in this fishery
- geographic concentration of participants and main communities/ports affected
 - if the fishery is large and activity is particularly concentrated, it may be desirable to include profiles of two or three representative communities
- value/size of recreational fishery (quantitative where data are available, qualitative where not)
- number of aboriginal licences, and allocations
- number of processors, jobs and product value
- special considerations that affect overall economic significance
 - e.g. history and allocation issues

5.2 Industry Viability and Market Assessments

The assessment of fleet viability should present some basic indicators of the profitability of the fishery for its participants, and a discussion of the major issues with respect to prosperity and efficiency. The discussion of viability should be linked to its implications

for conservation and sustainability. If few data are available, the analysis may be largely a qualitative discussion.

Elements to consider for inclusion:

- assessment of fleet viability
 - where possible, use cost and earnings data
 - where cost and earnings data are not available, develop simple indicators (landed value/licence, etc.)
 - trends in fuel costs, exchange rates, labour costs
 - where capacity is an important issue, develop simple indicators of capacity (# vessels, # active licences) to monitor over time
 - where a large portion of enterprises participate in multiple fisheries, discuss status/health of these alternative fisheries
- assessment of the fishery as an income and employment provider
 - relationship of the fishery with other fisheries (focusing on the combined effects of trends in the individual fisheries on enterprise viability)
 - relationship of the fisheries' labour force with other industries and sources of income (including Employment Insurance)
- trends in processing
 - capacity relative to landings
 - imports and exports of raw materials (trends and prices):
 - imported raw materials for processing in Canada
 - export of domestically-harvested materials for processing abroad
- markets and prices
 - domestic export of products (quantity, price, destination) and trends
 - U.S. and world trade prices and trends
- examine economic problems and possible value improvements, whether in harvesting or processing. For example:
 - economic concerns of stakeholders (from consultations?)
 - variations in quality/price that can be exploited through improved timing of fishery (eg. tuna) or handling (eg. shrimp, turbot)
 - possibilities for improved product mix

5.3 Scenario Analysis for Specific Management Objectives and Measures

Resource Management may request an economic analysis of specific management activities, especially when a significant change from the *status quo* is under consideration. For these kind of questions, scenario analysis is often desirable. Scenarios can be used to compare several hypothetical alternatives in an "all else equal" background. As such, scenarios are not forecasts of the future, but are instead a decision tool to assess the relative merits of options *given the information set available at the time of the analysis*.

Alternatively, the Department may foresee exogenous events that could affect a fishery, and may wish to know the possible range of economic impacts even before formulating policy alternatives. Scenario analysis could also serve this function.

Scenario analysis can be as simple or complex as desired, and should be guided by the scope of the question under examination. The important elements to be included in

scenarios should be carefully determined early in the analysis, preferably through communication with the relevant sectors within DFO and all affected parties (Provinces, Industry, NGOs, etc.). However, pragmatic concerns such as data availability, timing, etc., may dictate the scope of the analysis.

The following steps may provide guidance in carrying out socio-economic scenario analysis. The process is not purely linear. For example, after the alternative scenarios are clearly defined (step iv below), it may be necessary to revisit the list of impacts that will be measured, should additional concerns arise or become more clear :

- i. Select the analytical approach (net economic value, multiple accounts, cost-effectiveness, etc.). Some other decisions may be made simultaneously, as these decisions may affect one another :
 - a. scope of analysis
 - who has standing (stakeholder groups, sectors, geographic regions)
 - what measures of impacts will be included?
 - initially all possible benefits and costs should be considered - include market *and* non-market goods and services
 - b. can all relevant measures be monetized? are the resources available to do the required valuation studies?
- ii. Determine the time horizon over which effects will be estimated.
 - a. horizon should be long enough to capture major impacts, but the further distant in time, the more uncertainty will exist in projections
 - b. choose an appropriate discount rate for monetized indicators
- iii. Characterize the baseline in terms of the measures established in (i), and over the time horizon from (ii).
 - a. Will the baseline start from a single year (often the most current year for which complete data are available) or a "typical" year determined as, say, the average over the life of the most recent management plan? This may be important in the case of multi-year plans with carryover TACs (a single year may not be a good representation).
 - b. Science projects the biological trajectory under *status quo* management conditions. Form of the projection will depend upon the data and model available. These projections may or may not be required if, for example, the alternatives under consideration do not affect the species' biology (for example, pure re-allocations).
 - c. Policy-Economics estimates and assesses socio-economic conditions over the established time horizon, given *status quo* management, biological projections, and the economic environment.
- iv. Characterize the alternative scenarios to be examined.
 - a. Basic scenarios (in terms of changes from the *status quo* in management or other controls) will be provided to Policy-Economics by Resource Management (developed with Science input where required, and possibly other sectors such as C&P, Policy, Aboriginal Affairs, etc.). Scenarios must be detailed in terms of the specific actions or controls that will be put in place.

- b. Science projects the biological consequences for each scenario, in a form which can be compared to the baseline (in cases where projections are required).
 - c. Economists estimate and assess socio-economic conditions over the established time horizon, given management actions and biological response.
- v. Summarize differences between alternatives and baseline, either in a single monetary metric or in multiple accounts (as determined in step 1). The summary should also include a verbal description of the results, and differences that cannot be monetized should be discussed qualitatively.
- vi. Identify and describe the major assumptions, and the major sources of uncertainty and risk in the analysis. Where possible, determine a method for quantification of potential variability.
 - a. Sensitivity analysis can be used to examine the effect of specific assumptions.
 - b. May assume a full distribution for assumed parameters, or may test a simple upper and lower range of values for parameters of interest.

6.0 Process, Timing, and Delivery

6.1 Process and Timing

- Resource Management will provide Policy with a list of priority fisheries for analysis in the coming year, both for IFMPs and for Decision Memoranda. Requests for analysis will include timeframes and rankings of relative importance. In each case, the desired level of analysis will be specified by Resource Management (or jointly decided in consultation with Policy). Responses from Policy-Economics will be determined in part based upon available resources.
- When scenario analysis is sought, Resource Management (with input from Policy-Economics) will submit a formal *Request for Advice* to Science Sector whenever it is required. It is important that Policy be involved and informed at an early stage, as there may be significant data collection and workload planning required for the socio-economic scenario analysis.
- Policy Sector will designate a lead (Regional or NHQ) for each of the analyses.
 - the lead may request assistance from other Regions involved in the fishery
 - the lead will prepare a draft analysis and circulate it for comments and input from all affected Regions
 - DFO Regions may consult informally with Provinces wherever such consultation is deemed appropriate
- Whenever economic analysis is to be included in a fishery management plan or harvest decision memorandum, Policy-Economics should consider attending the regional advisory processes and consultations normally undertaken by Science and Resource Management. Where possible, a preliminary analysis should be available for presentation to industry and other stakeholders.
- Peer review should be factored into the timeline for delivery of the analysis. If it is determined that the analysis is of a level of complexity to require academic review, Resource Management and Science should be consulted on the level of sensitivity of the information and thus the appropriate timing of the academic review. Some analyses may not be suitable for public release before they are presented to the Minister, and external review will not be possible prior to a public announcement of a decision.
- Any formal consultation to be undertaken on these analyses will be determined by Resource Management, and will be undertaken along with consultation on the entire Fisheries Management Plan (or decision process).

6.2 Delivery

- The form in which the economic analysis is delivered to Resource Management will depend upon the depth of the economic analysis, as well as the preferences of the analysts and their managers.
- For brief profiles, a short note may be transmitted informally to Resource Management for direct inclusion into the Memorandum or IFMP.

- For more extensive analyses involving market analysis or scenarios, a standalone document may be warranted, from which a summary may be drawn. The main document can be cited and made available for those who wish to obtain additional information.
- Whenever the economic analysis is not included in full (as received from Policy), Resource Management should provide Policy-Economics the opportunity to comment upon the final document (IFMP or Memorandum) regarding the choice of materials for inclusion.
- Documents should be made available to the public after appropriate review, at a centralized web location (somewhat analogous to the CSAS web site). Such a site, and the document review procedures to be associated with it, is under development in the National Capital Region.

7.0 Review and Consultation

Guidelines under development. To be addressed:

- *what level of review is required for each level of analysis?*
- *what level of consultation is required for each level of analysis?*
- *when will Resource Management lead on the review (along with review of entire IFMP) and when will separate review be pursued by Economics?*
- *what will be the process for review, and for acceptance/approval?*