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Proceedings of the Fisheries Management Studies Working Group Workshop on the Objectives-Based Fisheries Management Pilot for Bay of Fundy Scallops

15-16 April 2003
1980 Robie Street
Halifax, Nova Scotia

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Compte rendu de l'atelier du Groupe de travail et d'étude sur la gestion des pêches (GTEGP) au sujet du projet pilote de gestion des pêches par objectifs visant les pétoncles de la baie de Fundy

du 15 au 16 avril 2003
1980, rue Robie
Halifax (Nouvelle-Écosse)

Peter Koeller[1] (président, GTEGP)
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FOREWORD

The purpose of these proceedings is to archive the activities and discussions of the meeting, including research recommendations, uncertainties, and to provide a place to formally archive official minority opinions. As such, interpretations and opinions presented in this report may be factually incorrect or mis-leading, but are included to record as faithfully as possible what transpired at the meeting. No statements are to be taken as reflecting the consensus of the meeting unless they are clearly identified as such. Moreover, additional information and further review may result in a change of decision where tentative agreement had been reached.

AVANT-PROPOS

Le présent compte rendu fait état des activités et des discussions qui ont eu lieu à la réunion, notamment en ce qui concerne les recommandations de recherche et les incertitudes; il sert aussi à consigner en bonne et due forme les opinions minoritaires officielles. Les interprétations et opinions qui y sont présentées peuvent être incorrectes sur le plan des faits ou trompeuses, mais elles sont intégrées au document pour que celui-ci reflète le plus fidèlement possible ce qui s’est dit à la réunion. Aucune déclaration ne doit être considérée comme une expression du consensus des participants, sauf s’il est clairement indiqué qu’elle l’est effectivement. En outre, des renseignements supplémentaires et un plus ample examen peuvent avoir pour effet de modifier une décision qui avait fait l'objet d'un accord préliminaire.

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Table of Contents

ABSTRACT

A workshop on Objectives Based Fisheries Management (OBFM) was held at the Holiday Inn Select, Halifax, April 15-16, 2003. Thirty-one participants represented stakeholders of the inshore scallop resource including fishermen, federal and provincial governments, aboriginal communities and NGOs. OBFM is a joint DFO Science/ Fisheries Management initiative and the workshop was co-chaired by Jim Jamieson (Fisheries Management Branch) and Peter Koeller (Science Branch). The Bay of Fundy scallop fishery is one of two regional pilot projects in Scotia-Fundy designed to implement the OBFM concept on a trial basis. Essentially, OBFM is the first nationally coordinated attempt to implement a risk management approach to Canadian fisheries. It incorporates concepts defined internationally and nationally within the Rio Declaration, the FAO Code of Conduct for Responsible Fisheries, the Oceans Act, and elsewhere. In a nutshell, OBFM consists of setting measurable objectives, developing strategies designed to meet them, and defining unacceptable outcomes (reference points) which are mitigated by pre-agreed corrective actions (control rules), all within an atmosphere of co-management and transparency of process. Risk analysis is to be formally incorporated into the decision making process and due consideration must be given to socio-economic and ecosystem issues within the overriding objective of conservation. Finally, the system's performance must be monitored to determine if objectives are being met. The workshop's main purpose was to disseminate information on OBFM to scallop fishery stakeholders, and begin the definition of objectives for this fishery as the first step toward the production of an OBFM-based management plan.

RÉSUMÉ

Un atelier sur la gestion des pêches par objectifs (GPO) a eu lieu au Holiday Inn Select d'Halifax, les 15 et 16 avril 2003. Trente et un intervenants du secteur de la pêche côtière du pétoncle, notamment des pêcheurs, des fonctionnaires fédéraux et provinciaux, des représentants des communautés Autochtones et des ONG, y ont pris part. La GPO étant une initiative de gestion commune des Sciences et de la Gestion des pêches, l'atelier était coprésidé par Jim Jamieson (Direction de la gestion des pêches) et par Peter Koeller (Direction des sciences). La pêche du pétoncle dans la baie de Fundy fait l'objet d'un des deux projets pilotes régionaux de mise en œuvre expérimentale de la GPO dans Scotia-Fundy. La gestion des pêches par objectifs est essentiellement la première tentative, coordonnée à l'échelle nationale, d'application d'une méthode de gestion des risques aux pêches canadiennes. Elle intègre des notions qui ont été définies par les instances internationales ou nationales dans la Déclaration de Rio, dans le Code de conduite pour une pêche responsable de la FAO, dans la Loi sur les océans et ailleurs. En bref, la GPO consiste à fixer des objectifs mesurables, à élaborer des stratégies pour les atteindre et à définir des résultats inacceptables (points de référence), qui sont contrés par des mesures correctives convenues d'avance (règles de contrôle), le tout dans un cadre de cogestion et de transparence. L'analyse des risques doit être intégrée en bonne et due forme au processus décisionnel et les considérations socio-économiques et écosystémiques doivent être prises en compte dans l'objectif suprême de conservation. Enfin, il faut surveiller les résultats produits par le système pour déterminer si les objectifs sont atteints. L'atelier avait principalement pour but de diffuser de l'information sur la GPO aux intervenants du secteur de la pêche du pétoncle et à commencer à définir les objectifs de cette pêche, première étape de la production d'un plan de gestion fondée sur la GPO.

INTRODUCTION

The Scotia-Fundy Region's RAP Fisheries Management Studies Working Group (FMSWG) provides a forum where fisheries managers, science personnel and others can discuss issues of mutual interest pertaining to fisheries management. Topics considered in the past have included a review of Integrated Fisheries Management Plans, development of the Traffic Light approach to stock assessment, and the implementation of the precautionary approach to regional fisheries. As a joint initiative of DFO Fisheries Management and Science Branches, Objective Based Fisheries Management (OBFM) is an important current topic well suited for FMSWG consideration. Specifically, the regional OBFM pilot on Bay of Fundy scallops provides a project with a potentially useful end-product i.e. an OBFM-based management plan that could improve the management of this fishery as well as help evaluate the concepts and refine the process outlined in "Guidelines for Developing a Fisheries Management Plan" (Annex 1) developed under the OBFM initiative. The scallop pilot also provides an opportunity to shift the working group's focus onto invertebrate fisheries management concerns. Accordingly, the chair of the FMSWG (P. Koeller) and the manager of the inshore scallop fishery (J. Jamieson) organized a workshop whose purpose was to introduce the OBFM concept to stakeholders of the resource and, if acceptable to participants (Annex 2), begin to define objectives for this fishery.

The terms of reference and agenda for the workshop (Annex 3) provided for an initial day of information exchange in which stakeholders presented their views on the challenges facing the inshore scallop fishery. The intention for the second day was to work towards draft objectives, however, it quickly became apparent that conflicting viewpoints between stakeholders made this premature. Consequently, the second day was used to continue the process of information exchange which would then form the basis for conceptual objectives to be drafted after the meeting. An example set of objectives for this fishery is included in Annex 4 for discussion purposes only. A final set of objectives and the OBFM management plan, which follow from them, would be produced by a DFO-industry working group.

SUMMARY OF PRESENTATIONS

Microsoft Powerpoint presentations given at the workshop are available for viewing at a DFO web site. Please send a request to Koellerp@mar.dfo-mpo.gc.ca and you will be sent the web address and password to this site.

DFO Presentations

Peter Koeller outlined the workshop objectives as follows:

- provide information on the OBFM initiative
- present stakeholders' objectives
- attempt to refine, reconcile and consolidate objectives
- evaluate the OBFM process and its applicability/usefulness in managing the inshore scallop fishery
- determine the next step for the scallop pilot.

OBFM was characterized as the first coordinated attempt to implement the precautionary approach to Canadian fisheries. As such it is a distillation of concepts initially developed at international fora including the United Nations Fisheries Agreement (1982), the Rio

Declaration (1992) and the FAO Code of Conduct for Responsible Fisheries (1995). These were confirmed and refined to various degrees for Canadian consumption within the Oceans Act (1997), the Canadian Code of Conduct for Responsible Fishing Operations (1998), and numerous discussion documents, policy statements and workshops. These concepts continue to be highlighted in current initiatives such as the Atlantic Fisheries Policy Review. They include:

- the overarching importance of conservation
- setting measurable objectives for a fishery
- strategies specifically designed to meet the objectives
- defining unacceptable outcomes (limit reference points) with pre-agreed corrective action if they are reached (control rules)
- formal treatment of uncertainty and risk in stock assessment and management action
- importance of socio-economic considerations in setting objectives
- ecosystem considerations to become increasingly important in management plans of the future
- co-management and transparency of process are of fundamental importance
- system performance must be monitored to gauge effectiveness of the management system

In considering objectives for the Bay of Fundy scallop fishery it is worth bearing in mind the major events which led to the development of OBFM. Figure 1 shows the total catch trajectories for finfish, invertebrates and scallops (round weight) by Canadian fisheries in the Northwest Atlantic since 1970 (FAO statistics). Finfish catches are characterized by a precipitous drop in landings (mostly attributed to cod) during the early 1990s, at least in part due to overfishing. Invertebrate catches increased concurrently due to the displacement of finfish effort, and increased abundance caused by a combination of decreased finfish predation and favorable environmental conditions. These two events more than any other have driven the development of precautionary risk management approaches like OBFM in Canada and the unanswered questions associated with them continue to preoccupy scientists, managers and industry alike i.e. what happened to the groundfish fishery, and why has it not recovered? What is going to happen to the invertebrate fisheries and how do we prevent what happened to groundfish from happening to them? How have we altered the ecosystem by fishing and how can we restore it, or prevent additional damage? These questions are not necessarily the main preoccupation of stakeholders in the inshore scallop fishery, and perhaps they should not be, at least not to the same extent. During the same period (1970-present) Canadian scallop landings experienced three significant declines and recoveries. Inshore scallop catches are only a small part of the total shown in Figure 1, but Figure 2 shows that they essentially follow the same pattern as the larger area, presumably because of large-scale environmental influences on recruitment. Questions more relevant to the inshore scallop fishery might therefore be: How do we get the most out of what will happen anyway?"; to what extent does the fishery exacerbate this apparently natural boom and bust cycle?; and, can the fishery be managed in such a way as to increase long term biological and economic stability?

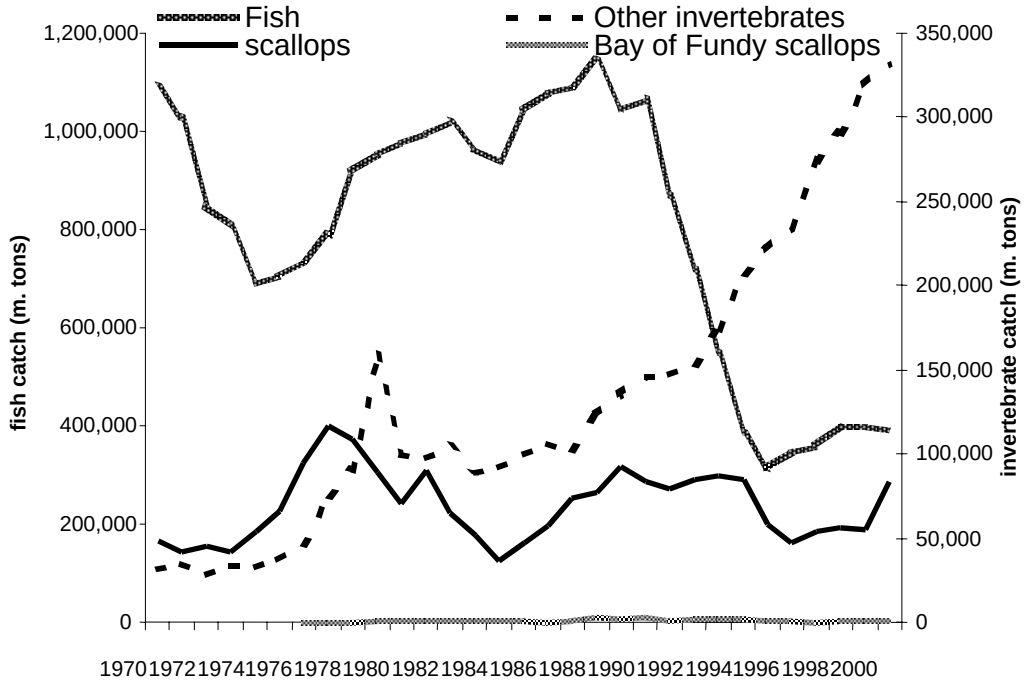


Figure 1. Canadian finfish, scallop (round weight) and other invertebrate catches in the NW Atlantic.

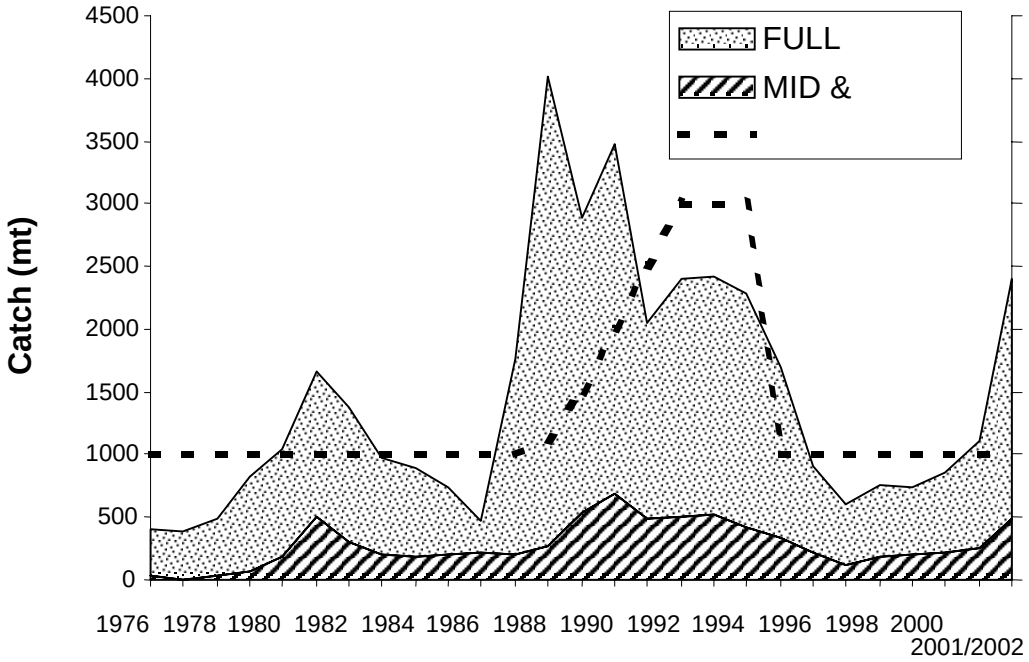


Figure 2. Inshore scallop catches (meats) and hypothetical catch (dotted line) under a long term management plan.

Figure 2 also gives catches of a hypothetical scallop fishery (dotted line) which delays effort during a boom until most scallops from the boom cohort(s) have grown to a minimum size.

Because scallops are allowed to grow larger, the catch from this cohort is of higher value for any given TAC than if it had been fished hard from the beginning. Because fewer scallops are in the catch for any given TAC, more scallops are left on the grounds as broodstock. This results in increased larval production and survival during unfavorable environmental conditions. Consequently, the stock biomass and catches do not decrease to the low levels previously seen. Such a fishery could average landings of equal or higher value than the status quo "boom and bust fishery" with the added benefit of increased biological stability and robustness against collapse. It may, however, require monitoring for catastrophic mortality events and allow for adjustments to harvesting plans according to monitoring results.

Helen Kerr provided an in depth description of the OBFM process, also outlined in the guidelines document which was distributed. The process is an iterative one. In many respects it is similar to current practice, but it was emphasized that OBFM introduces structure and rigor to the management process, rather than the *ad hoc* and reactive approaches of the past. As such, the guidelines are really a codification of common sense and follow management principles that apply to any worthwhile endeavor. Clearly, goals must first be defined before strategies to achieve them can be developed, and progress in their achievement must be monitored and reviewed in order to gauge success and identify improvements. The steps in the process follow each other logically as outlined in Figure 3. A key in this chain of events is the translation of objectives into strategies, the main approaches used to achieve the stated objectives. For example TACs or seasons, or both are possible strategies designed to achieve the hypothetical objectives of economic and\or biological stability. Strategies are linked to controls, the actions taken to facilitate compliance to the conservation limits, by identifying the hazards to the implementation of the strategies. Examples of various strategies and the controls used to manage the hazards associated with them are given in Figure 4, using a crab trap fishery as an example.

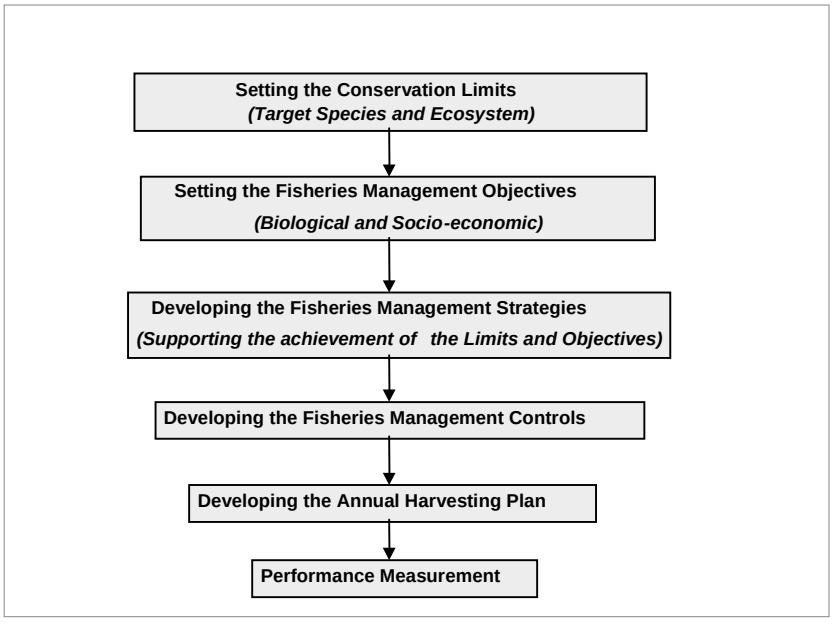


Figure 3. Major steps of Objective-Based Fisheries Management.

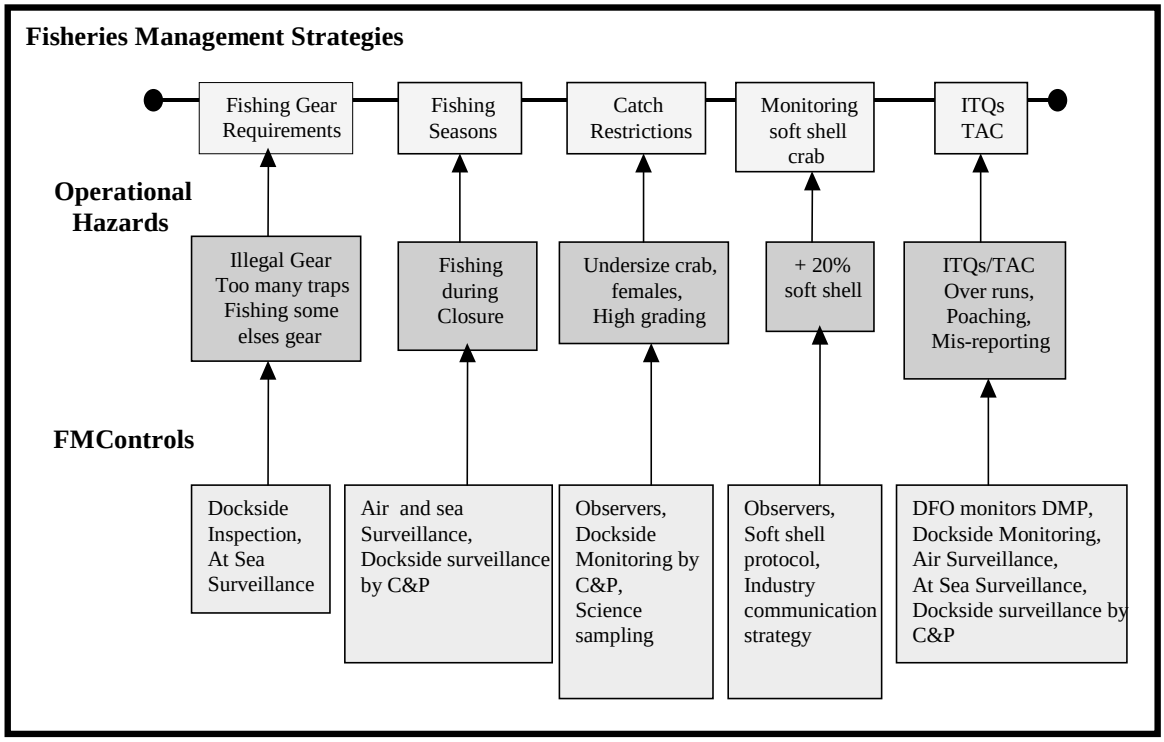


Figure 4. Example strategies, hazards and controls from a hypothetical snow crab fishery.

The role of the resource users is of pivotal importance in this process: they provide data and participate in management decisions and the performance review throughout the cycle.

Jorgen Hansen provided a summary of progress with the regional groundfish OBFM pilot. This project was initiated 2 years ago and a working group has produced a draft Groundfish Management Plan which is currently in limited printing. The issues associated with the groundfish fishery are complex and a draft plan is most efficiently developed by an internal DFO working group which consults with resource users periodically. It is considered a work in progress and is not expected to be completed for another 3-4 years. A key subproject is the development of performance indicators and the necessary timely management of relevant data using state-of-the-art data handling, accessing and analysis methods.

The plan includes a draft "objectives hierarchy" which summarizes management strategies in relation to conceptual objectives according to OBFM guidelines. This table is given in Figure 5 for illustrative purposes and is used as the template for the draft scallop objectives given in annex 4.

TABLE 2. Objectives Hierarchy for Management of the Scotia-Fundy Groundfish Fishery

General Objectives	Strategies	Management Measures
1. *Conservation of the ecosystem by:*		
1.1 Maintaining community diversity by protecting benthic communities susceptible to disturbance	Protect high diversity coral beds	Close area in Fundian Channel
	Protect benthic communities in the Gully	Establish The Gully as a Marine Protected Area
1.2 Maintaining species diversity	Keep stock size of target species above established limits	Control fishing mortality (F)
	Minimize incidental mortalities on non-target species, particularly species at risk	Restrict directed catches and impose caps on bycatches
1.3 Maintaining population diversity	Maintain spawning components of target species	Define management areas that correspond to stock distributions
1.4 Maintaining trophic structure	(Insufficient knowledge at this time to establish strategies)	
1.5 Maintaining productivity of populations by managing exploitation of target species	Keep exploitation rates at moderate levels	Control fishing mortality (F) through annual TACs and bycatch rules
	Avoid wastage by managing size and species selection during fishing	- Specify aspects of gear construction, principally mesh size - Implement temporary and permanent closures of areas of small fish concentration - Restrict small-mesh groundfish fisheries to specified areas - Establish minimum fish size limits
	Prevent disturbance of fish during spawning	Prohibit fishing for haddock during the spawning season in spawning areas on Browns and Georges banks
2. *Manage the groundfish resource in a manner consistent with:*		
2.1 Meeting aboriginal treat rights	Make provision for food, social and ceremonial fisheries	Issue communal licences
	Increase participation in the commercial fishery	Acquire and transfer licences, quotas, boats and gear to First Nations
2.2 Making provision for recreational fishing	Implement national recreational fisheries policy	Introduce licensing and catch reporting requirements
2.3 Creating conditions for economic self-reliance in the commercial fishery	Balance fleet capacity with resource availability by managing access and supporting resource sharing arrangements that allow resource users to meet their economic objectives	- Limit entry through licensing - Improve options for transferability of shares and quotas - Resolve disagreements over historical shares - Include all directed fisheries into existing ITQ/EA system - Review performance of Community Management boards
3. *Co-management*	Implement Code of Conduct	(To be established when appropriate)
	Undertake co-operative DFO/Industry projects	Devise policy framework for screening proposals
	Build industry management capacity	(To be established when appropriate)

Figure 5. Objectives for management of the Scotia-Fundy groundfish fishery from the draft management plan.

Stephen Smith outlined science (conservation) objectives by identifying *sustainability* as the primary biological objective of Canadian fisheries, by policy. Sustainability was defined in terms of *persistence*, *resilience* and *health* which are protected by minimizing damage to

habits, not impairing the population's ability to recover from disasters (mortality), and maintaining genetic diversity.

Reference points are a key element of the precautionary approach and OBFM. They are the points beyond which sustainability is believed to be jeopardized. These points can be defined in terms of growth overfishing and recruitment overfishing, although growth overfishing reference points have usually been set for economic rather than conservation purposes. Fishing below a growth overfishing reference point makes economic sense because it increases the yield, in weight, per recruit. Fewer numbers of animals will be caught for the same weight (or TAC) because the average size of animals on the beds is larger, making the catch more valuable per unit weight. However, for scallops growth overfishing reference points also make sense from a conservation standpoint because more animals remain on the grounds, increasing population fecundity, survival and eventually biomass. A complication in setting more precise growth overfishing reference points for inshore scallops is the highly variable growth rates between areas. The current "interim" reference point for scallop production area 4 (a biomass of 2400mt below which the population should not be allowed to fall) was developed from growth overfishing considerations based on yield-per-recruit analyses of the entire inshore area, and average recruitment during the non-peak periods. Ideally, advice would be given for each growth zone within the entire area. In such a scheme, the slow growth areas would be fished harder than the fast growth ones, which is contrary to current fishing practice.

Reference points for recruitment overfishing of inshore scallops are even more difficult to set than growth overfishing because there appears to be no discernable and direct stock–recruitment relationship that would allow us, for example, to set a minimum biomass based on the number of recruits any spawning biomass is likely to produce. In fact, for inshore scallops the strongest year classes were produced by the lowest spawning biomasses as shown in the figure below (i.e. 1984, 1985 and 1998). However, these low biomasses consisted of animals that were much larger, and together actually produced more eggs than the years with the largest spawning biomasses (1988 and 1989, Figure 6). Two mechanisms could be working in concert here. There could be an inverse density dependant component to larval settling i.e., very high adult scallop densities can inhibit larval settling. Low adult densities are usually comprised of larger scallops and can produce relatively large numbers of larvae if the conditions are favourable. In turn, these larvae may have higher settlement success because of the low adult densities. Additional information is required on egg production, larval dispersal, fertilization processes and larval settlement in relation to environmental changes before recruitment overfishing reference points can be determined. However, results to date do indicate that the interim strategy of setting growth overfishing reference points will also serve to meet the objectives addressed by recruitment overfishing reference points — they tend to increase the densities of large animals, which produce more eggs. More eggs in the water could mean more sustainable recruitment over a wider range of environmental conditions.

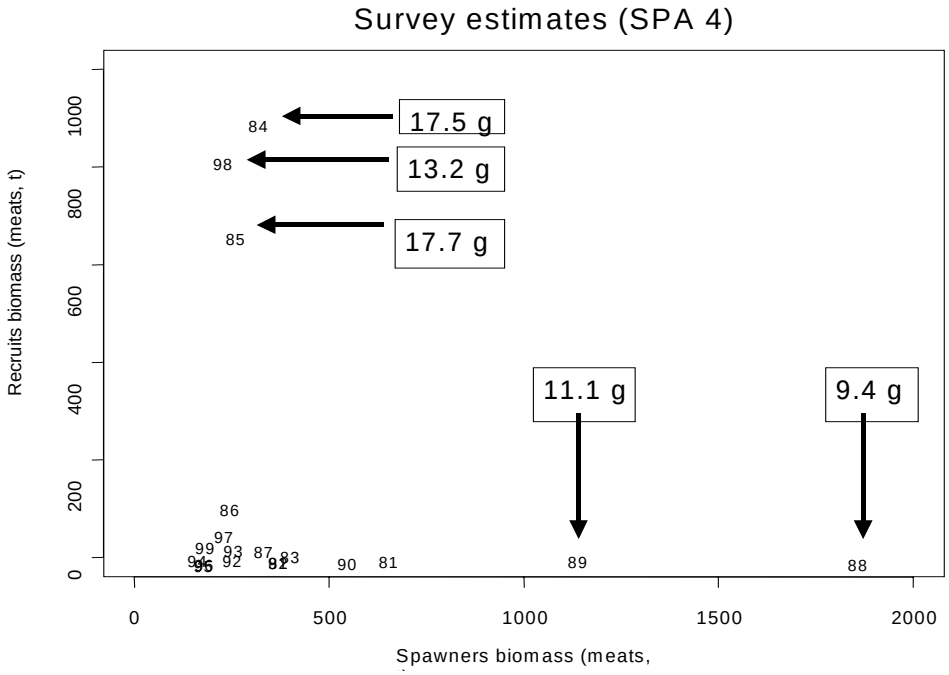


Figure 6. Inshore spawner biomasses and the biomasses of the recruits they produced.

Science advice for the inshore scallop fishery currently incorporates two key elements of the precautionary approach and OBFM i.e. a reference point as described above; and the consideration of uncertainty, based on risk analyses, in management advice. The later is achieved by incorporating the uncertainties (variability) associated with survey estimates, recruitment, and projection of the survey biomass to the fishing year for which the advice is being provided, in a table giving the probability of the biomass going below the reference point for a given TAC.

Bob O'Boyle provided background on continuing work designed to bring ecosystem considerations into fisheries management. DFO's National Policy Committee has accepted a suite of broad conservation objectives that would be used in operational planning of various ocean sectors utilizing the resources in a given area. The broad conservation objectives at the ecosystem level include the conservation of 1) *biodiversity* (ecosystem components such as communities, species, populations, etc. to maintain the natural resilience of the ecosystem); 2) *productivity* of these components so that each can play its historical role in the food web, and; 3) the physical and chemical properties of the ecosystem in which its components reside.

The process, termed 'unpacking', whereby conceptual objectives are translated into operational ones was described. This process applies equally well to objectives for single species management plans like inshore scallops as it does for integrated plans for ecosystems. In an open and transparent process, objectives are defined at increasing levels of specificity until a measurable indicator and reference point can be identified. At this point, an operational objective is established The table described under the groundfish pilot above is the result of such an exercise conducted during a workshop in 2002. Although an unpacking has not been undertaken for the inshore scallop fishery, draft objectives are provided as a starting point for discussion in Annex 4.

What We Desire			*What We Can Measure*
Conceptual Objectives		**Operational Objective**	**Indicators**
Objective Š objective Š …	Maintain Productivity Š Trophic Transfers Š Forage Species Š Target Escapement Š (Maintain)Biomass	Consists of a Verb, Indicator and Reference Point e.g., MaintainBiomass > 50,000 t	 Indicator

Peter Koeller described the main ecosystem issues associated with inshore scallops that should be addressed in an OBFM plan. These issues all fell under the heading of bycatch, and include bycatch of lobsters, other species, and "rocks", the latter representing tangible evidence of habitat disturbance.

The lobster bycatch issue was raised by lobster fishers when new scallop effort proposed for SFA 29 was perceived to be potentially damaging to lobster habitat and result in high lobster bycatch. This issue was addressed in 2001-2002 with a comprehensive observer and habitat-mapping program (multi-beam sonar) largely funded by the scallop industry. Results indicated that lobster bycatch in SFA 29 was insignificant when compared to removals by the lobster fishery, and concentrated in one area which was subsequently closed to scallop draggers. Plots of scallop and lobster effort superimposed on multibeam plots showed that lobster bycatch probably differed by area because of differences in the distribution and relative amounts of scallop versus lobster habitat. SFA 29C had the lowest incidence of lobster bycatch, and was characterized by relatively large areas of scallop habitat (deeper water, smoother, gravel bottom) surrounded by smaller areas of lobster habitat (shallower, rocky outcrops). In this area lobsters must travel relatively long distances between patches of preferred habitat and appear to remain mainly within them. In SFA 29AB relatively small areas of scallop habitat are scattered within a large area of lobster habitat. Considerable lobster movement may occur here across small areas of scallop habitat, making them vulnerable to scallop gear. Good scallop grounds are more difficult to find in this area. Consequently, lobster bottom is more likely to be trawled, and more lobsters will be caught , during a developing scallop fishery. Continued observer coverage would be beneficial in determining if the multibeam information available to the fishery will result in increased avoidance of lobster habitat and decreased lobster bycatch.

The bycatch of species other than lobsters was characterized using observer data. It was noted that most data for the inshore area is from the recent observer activity in SFA 29. However, based on the limited data available from other inshore areas SFA 29 bycatch appears to represent the inshore area reasonably well. In contrast to bycatch from the offshore (Georges Bank), inshore bycatch as represented by SFA 29 has significantly less finfish and more invertebrates such as sponges and starfish. Bycatch is often variable and specific to area – for example bycatches in the northwestern part of SFA 29 were significantly higher than in the rest of this area. Survey data has provided information on bycatches over much of the inshore, but only for a limited number of species. This and commercial effort distribution data showed that bycatch for some species like monkfish and lobsters will vary greatly depending on annual changes in the distribution of scallop effort. Monkfish bycatches, for example, appear to have decreased recently as less effort has occurred in the areas where they concentrate (off St. Mary's Bay). Complete bycatch information from surveys would be useful in characterizing scallop bycatch over wider areas in the inshore. In general, however it can be stated that bycatch in the inshore scallop fishery is relatively small

(often <5% by weight) and comparable to fisheries which actively avoid bycatch with exclusion devices e.g. northern shrimp. This is not to say that further improvement is not warranted or possible.

Jim Jamieson outlined the recent history of the inshore scallop fishery. This began in 1986 when the permanent line separating the inshore and offshore fleets was established. Inshore grounds were experiencing record high catches which peaked in 1989. Catches subsequently dropped drastically. In 1995 science indicated that management measures had been insufficient to prevent recruitment and growth overfishing and recommended decreasing meat counts, outright closures for large parts of the Bay of Fundy, and rotational closures for the remainder. Industry agreed to decrease meat counts and 1-year closures to key beds, however catches continued to fall. By 1996 DFO science believed that the fishery should be closed on biological grounds. Although some grounds were closed, many remained open. The department began discussions with industry on fleet self-rationalization, including a fishing plan that included specific conservation measures. A number of these were implemented beginning in 1997, most notably TACs, ITQs, reduced meat counts and closed seasons. However, misreporting and illegal fishing continued into 1997. More recently 100% at sea "black box" and dockside monitoring have presumably made these measures more effective and enforceable for the Full Bay fleet component, which accounts for the majority (85%) of the catch, but their effectiveness is yet to be determined. The minimum meat weight guideline continues to be conducted on a voluntary basis and its effectiveness, especially during the current recruitment event, is still unknown. An important result of the ITQ system has been the reduction of active Full Bay vessels from about 100 to about 60.

The remainder of the talk focused on current efforts within DFO Fisheries Management, particularly the rationalization\prioritization exercise involving all fisheries. Effort is focusing on Monitoring-Control-Surveillance (MCS) programs, especially the integration and management of data. A large amount of data is being collected, but it cannot always be analyzed and applied to enforcement situations in a timely and efficient manner. Accessibility of data is also essential to the performance review aspect of an OBFM plan. Finally, the necessity of a team approach, including all DFO branches and industry in the development of fishing plans was emphasized. It was noted that some progress has been made within the fleets to organize themselves and provide effective representation at co-management meetings such as regular advisory meetings, and special projects such as habitat mapping in SFA 29 and this workshop. Consensus is still a problem, however, especially for the mid and upper bay components, despite the formation of management boards in 2001.

Industry Perspective

Vance Hazelton and **Dick Stewart** represented the interests of the **Full Bay fleet**. It was noted that the DFO presentations gave too much information in too short a time – provision of information beforehand could have given people a chance to study any new proposals. There was considerable misunderstanding as to the intention of the workshop – some fishers apparently thought that "everything was on the table" and that ITQs were somehow subject to review, which was not the case.

Some participants resented the implication in one of the presentations that the "rock bycatch" is somehow damaging habitat. Concerns were expressed about implementation of the Species at Risk Act (SARA) and its effect on the fishery. DFO should be more concerned

about activities which are really damaging habitat, such as aquaculture. Fear of "being shut down by conservationists" was voiced by one participant, notwithstanding industry funded, conservation oriented programs such as the habitat mapping and observer programs in SFA 29.

It was pointed out that the Full Bay fleet has come a long way in a short time, from an essentially unregulated fishery before 1997 to one with a TAC and ITQs. The overall TAC is an essential part of a rational fishery and it is considered an irritant by this fleet sector that other fleets (i.e. Mid and Upper Bay) continue to want to do away with them, in a situation where significant latent fishing capacity exists. It was felt that accountability is not evenly shared between groups, as Mid Bay and Upper Bay do not have the same requirements for VMS, observers or DMP, yet other groups obtain benefits from the Full Bay contribution to science and management.

It was stated that the Full Bay fleet would not tolerate any system that did not include an overall TAC for all three fleets. This is a fundamental conflict with Mid Bay interests. It was suggested that these viewpoints stem from a basic difference in approach – Full Bay fishers fish for "dollars" i.e. try to make the most money for the weight caught, while others fish for weight alone.

The industry now has considerable input, especially into the science, however there is skepticism about the co-management concept, which appears to it to be more of a mechanism to collect money than true co-management. There is a lot of money paid for collection of data, but the benefits are not always clear. The industry needs to have true co-management and transparency, to be real and not just paper partners. This includes participation in the rationalization of the observer program, dockside monitoring, sharing formulas, license fees, methods for collecting funds, etc.

Greg Thompson and **Klaus Sonnenburg** represented the interests of the Mid Bay fleet. The OBFM exercise was welcomed as an opportunity to look at things in a new way, but others viewed the initiative with suspicion, indicating a lack of consensus on this issue.

Some members took particular exception to the possibility of "evening out" catches over a longer term through management as suggested by one DFO presentation. It was felt that scallops cannot be "fished out", as evidenced by the present recruitment event in the Bay of Fundy following an historical low, and that management measures are unnecessary for conservation purposes. The fishery is inherently sustainable and resilient. Similar views were also expressed by Full Bay members although their stance on this issue was more conservation-oriented on the second day of the workshop.

The "safety at sea" issue, which is highlighted in the OBFM guidelines as one which must be considered when setting objectives was identified as one which this sector would not tolerate outside involvement. It is assumed that this does not include DFO Coast Guard search and rescue operations.

Concerns about ecosystem initiatives (e.g. SARA) expressed by the Full Bay fleet were reiterated - "where does one draw the line?" was a phrase used repeatedly. Duck Island sound was put forward as an example where long term aquaculture operations have had a detrimental affect on scallop production. However, the closed area (to scallop draggers) off Grand Manan to decrease lobster bycatch was given as evidence that ecosystem concerns have nevertheless been addressed.

It was noted that it is much more difficult for small boat operators to absorb management costs being diverted to industry from budget cuts within DFO. In addition they felt that they have little negotiating power. Their fleet takes only a small part of the catch and feels it does not have the power to do serious damage to the stock – they stop fishing when it is uneconomical to continue, long before damage has occurred. Consequently, they feel they need less management, and the associated lower costs should be passed along as lower access fees, contributions to science, etc.. The community approach to management was considered an important and useful development in management of inshore fisheries. Education, especially on scientific issues should also be a priority.

Management measures of any kind are viewed by the Mid Bay with suspicion, as evidenced by criticisms of the VMS and the ITQ system. Mid Bay fishers are more traditionally oriented and any measures are considered restrictions on their way of life. For them a season within which they can do what they do best, i.e. fish competitively, would be ideal. The phrase "control fishermen, not the fish" was used to describe this approach, however, it was not clear to all why controlling fishermen (i.e. season) would be less of a restriction on their way of life (especially if the length of the season were to be adjusted annually as is done for many seasonal fisheries).

WORKSHOP SUMMARY

Despite progress in the management of the inshore scallop fishery, problems remain. These include: differences in philosophies and objectives of fishermen's groups and other stakeholders; difficulties in obtaining representation of fishermen's views; perceived or real inequities in treatment of fishermen's groups by DFO; no clear consensus on conservation objectives and measures; lack of transparency in the management process, including lack of a published management plan; sharing problems in terms of weight (quotas), space (management lines), and time (seasons); distrust of current DFO initiatives, especially ecosystem based management, SARA, etc.; significant latent fishing effort, which restricts management options; inability of DFO Science to provide quality advice for all areas (limited survey coverage due to funding constraints); and, inadequate protection of small scallops. There was a general recognition among participants that OBFM could be helpful in finding solutions to these problems, or at least providing structure and focus to work already in progress. Indeed, it was felt that much of what is currently being done fits well within the OBFM. It was agreed that the initiative should move forward in a similar manner to the groundfish pilot, including an internal DFO working group which periodically consults with resource users. A first task for this working group would be the refinement of the draft objectives given in Annex 4, and drafting of a management plan for discussion purposes. There was discussion and general approval of an experimental management approach to answer questions pertaining to the effects of fishing on recruitment (e.g. closed areas), to be pursued independently by science and interested groups.

The chairs thank participants for the interesting and useful discussions.

Annex 1. Guidelines for Developing a Fisheries Management Plan.

GUIDELINES FOR DEVELOPING A FISHERIES MANAGEMENT PLAN

(as described under the Objectives-based Fisheries Management initiative)

DRAFT 5
JUNE, 2002

Table of Contents

DEFINITIONS

Annual Harvesting Plan - a series of documents that outline the fisheries controls and actions to facilitate the implementation of the fisheries management strategy, achievement of the fisheries management objectives, and compliance with the conservation limits.

Biological Objectives – any management goal for a fishery that is defined in terms of biological characteristics of a stock or ecosystem.

Conservation Limits – Target Species – biological characteristics of fishery resources that, based on the best scientific information available, represent benchmarks for ensuring conservation. If the values of the stock fall outside the conservation limits the long term production of the stock is at an unacceptable risk of being adversely impacted. These are the basis for setting limit reference points.

Conservation Limits - Ecosystems – predetermined thresholds, based on the best scientific information available, that define specific values for ecosystem structures and processes that, if perturbed further, will result in unacceptable risk of ecosystem changes that are difficult or impossible to reverse.

Control Measures – any action performed to facilitate compliance to the conservation limits, the achievement of fisheries management objectives or to eliminate a hazard or reduce it to an acceptable level.

Corrective Action – a set of pre-determined measures to restrict operation of fisheries in specific ways and that are taken when monitoring indicates that a trigger point has been exceeded.

Fisheries Management Controls - specific actions that are taken to ensure the execution of the Fisheries Management Strategies. The development of the Fisheries Management Controls involves identifying, analyzing and controlling hazards related to the implementation of the fisheries management strategy.

Fisheries Management Objectives - Clear and measurable goals that articulate the purpose and intention of a fishery in terms of the biological and socio-economic values and target reference points set comfortably above the conservation limits.

Fisheries Management Strategies – a plan of action implemented to achieve the fisheries management objectives.

Hazard Identification – the systematic use of information to identify the implementation hazards.

Implementation Hazard – Any situation, event or activity that may have a negative impact upon the implementation of the fisheries management strategy.

Monitoring Procedure – the process of checking or examining specific elements of the fishery, or properties of the target species or ecosystem to determine if the control measures are effective.

Precautionary Approach or Principle - a sub-set of risk management that is invoked when there is; a need to make a decision, a risk of serious or irreversible harm and significant scientific uncertainty.

Performance Indicators – provides information (either qualitative or quantitative) on the extent to which a strategy, control measure or procedure is achieving its outcomes.

Risk Management - a systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues.

Shared Stewardship — creating participatory decision-making processes and structures involving resource users, including Aboriginal groups and the fishing industry, as well as with other stakeholders.

Socio-economic Objectives – any management goal for a fishery that is defined in terms of societal or economic benefits to Canadians.

1. INTRODUCTION

The mandate of the Fisheries Management Sector of Fisheries and Oceans Canada (DFO) is to conserve Canada's fisheries resources and to promote sustainable utilization. We are working closely with clients and co-managers to develop a viable and self-reliant fishery, involving shared stewardship with user groups (commercial, recreational and Aboriginal) to maintain biologically sustainable fisheries resources, and to secure a shared commitment to conservation.

Fisheries Management programs are highly operational and decentralized. The majority of staff - fisheries managers, fishery officers, hatchery workers, licensing personnel and ships' crews - provide direct delivery of programs and services to clients through regional, area and local offices. Our operating strategy is based on regional implementation, with national coordination provided from Ottawa. These guidelines are national in scope and inform Fisheries Management staff (and the staff of other DFO sectors) with a national yet flexible approach, recognizing the differences between fisheries, to developing fisheries management plans under the concepts of Objectives-based Fisheries Management.

The Objectives-based Fisheries Management initiative was launched approximately 2 years ago, in part, to respond to the 1997 Report on Atlantic Groundfish and the 1999 Report on Shellfish of the Auditor General. These reports recommended that the Department clarify its fisheries management objectives and develop a sustainable fisheries framework that incorporates the biological, economic and social factors that affect the fishery. Also driving change in the way the Department manages its fisheries are several new International, Governmental and Departmental initiatives including the Precautionary Approach, risk management, ecosystem-based management, the passage of the Oceans Act and development of the new Species at Risk Act. Under the Objectives-based Fisheries Management initiative DFO has developed a structured, systematic and inclusive approach to fisheries management that will address the recommendations of the Auditor General and incorporate the principles of the initiatives identified above.

Fisheries management plans of the future will apply the principles of risk management and the precautionary approach in defining the conservation limits, establishing objectives and developing the fisheries management strategies and controls. The scope of the plans will expand and take an ecosystem-based view of the fisheries and will address, not only the conservation and sustainability of the target species, but also, the impact of fisheries on the non-target species, ecosystem and species at risk. The fisheries management plans will be aligned with broader environmental objectives of specified freshwater and ocean management areas in which they operate and will be capable of being integrated with management plans of other aquatic resource users. Fisheries management plans will be developed incorporating the principles of performance management.

The Objectives-based Fisheries Management concept depends on teamwork. The development of sound and integrated fisheries management plans requires a team effort from several DFO functions (Resource Management, Science, Conservation and Protection, Aboriginal Affairs and Oceans) and the resource users. By working as a team the different participants will gain a better understanding of the challenges of developing the various components of a Fisheries Management Plan and will be able to contribute different and valuable perspectives during the development of each component of the Plan. Although Science plays the key role in establishing the conservation limits and biological objectives, they can also provide valuable insight in determining the appropriate management strategies

to support compliance to these limits and achievement of the objectives. By participating as a team member from the start of the development of a plan, Conservation and Protection will better understand the fisheries management objectives and how they are linked to strategies and control measures. With this knowledge they will be better able to develop practical management strategies and control measures that can be delivered at-sea and onshore. A team approach requires an investment of time at the beginning of plan development. However, the time invested at the start of the development of a plan should result in effective and efficient implementation.

The team must also include representatives from aquatic resource users. Through participation in the development of the plan, fishers and other resource users will gain a better understanding of fisheries management issues and challenges in developing a workable Plan. Resource users will have opportunities to input their traditional knowledge and influence the decision making process. In the case of some Aboriginal land claim agreements, wildlife co-management boards will make decisions. The fisheries management objectives will, in part, (or in whole in the case of some Aboriginal land claims) be determined through input of resource users. In certain cases the fisheries management control measures will be delivered by resource users themselves and verified by DFO. The team approach will increase the understanding of Fisheries Management Plans by all parties and should generate greater support for compliance with the plan. Aboriginal treaties provide varying roles for the co-management boards in the development, approval and implementation of fisheries management plans and will be respected in carrying out these guidelines.

The purpose of these guidelines is to provide a clear and logical process to guide the development of Fisheries Management Plans that facilitates a team approach and incorporates principles of these emerging initiatives into the planning and implementation process.

The process can be divided into the following steps:

1. Defining the Conservation Limits for the target species and ecosystem properties,
2. Establishing the Fisheries Management Objectives based on the biological and socio-economic aspects of the fishery,
3. Developing the Fisheries Management Strategies to facilitate compliance with the Conservation Limits and achievement of the Fisheries Management Objectives.
4. Identifying the Performance Management indicators.
5. Developing the Fisheries Management Operational Plan.

The development of Fisheries Management Plans will occur under the existing governance structures and will respect:

- the Department's obligation to ensure that the conservation requirements of species and ecosystems are met,
- international obligations,
- measures responding to Aboriginal fishing rights,
- existing regulatory, policy and licensing frameworks for fisheries management,
- existing fundamental processes for access and allocation , and
- Oceans Management ecosystem policies and plans, as they are developed.

2. BACKGROUND

2.1 Description of the Fishery

Provide a brief description of the fishery by identifying the participants, access and allocations, gear types, the geographical location, and the season. Include a brief description of issues or events that may or will significantly impact the fisheries management plan.

2.2 Stock Status Synopsis

Provide a brief synopsis of the status of the stock indicating the trend of the stock (increasing, decreasing, maintaining, ageing etc.). This section should be based on the stock status reports and refer to these reports for persons looking for more detailed information.

2.3 Legal Authorities

Identify the sections of the regulations that support the control measures used in the fisheries management plan.

3. CONSERVATION LIMITS

3.1 Purpose

The establishment of clear and measurable Conservation Limits for target species and ecosystems is a mechanism to facilitate conservation so that stocks and ecosystems are not put at risk. Once specified the limits will identify rigid reference points that will, with high probability, protect the target species and elements of the ecosystem from harm that is serious or difficult to reverse. The conservation limits and the management targets will together provide a focus for Fisheries Management, Science and Ocean activities pertaining to stock assessment and ecosystem studies.

The setting of Conservation Limits for target species and ecosystems will be led by technical specialists, within and outside of DFO, and based on science with consideration, where appropriate and where available, of traditional knowledge from resource users. However, because these are the limits that ensure the Department delivers its responsibilities for conservation, in the end, the decisions lie with the Minister, based on advice from DFO staff.

3.2 Defining the Conservation Limits for Target Species

Science technical specialists will lead the setting of Conservation Limits via the Science review and advisory mechanisms. When done Regionally, the Regional Advisory Process office will coordinate it. When consistency of Conservation Limits across stocks is important, the work may be coordinated Zonally or Nationally.

Science technical specialists will present scientific data primarily in the form of stock assessment reports, working papers, and biological risk assessments.

Undesirable outcomes and states of the species will be explicitly stated, and supporting evidence will be documented.

Conservation limits will be set based upon the review and analysis of the data tabled, including, wherever possible full risk analyses.

3.3 Defining the Conservation Limits for Ecosystem

This process will be lead by the Science peer review and advisory process as well, at the geographic scale appropriate to the particular ecosystem property.

Science technical specialists will present scientific and technical information on the potential impacts of fishing on the ecosystem. Resource users will be able to provide input based on their experiences and traditional knowledge.

Undesirable outcomes and states of the ecosystem will be explicitly stated, and supporting evidence will be documented.

Conservation limits for the ecosystem will be set based on upon the review and analysis of the data tabled, including risk analyses where possible, and focus on mitigating the direct and negative impacts of fishing on the ecosystem (benthic damage, non-target species, species at risk). Indirect impacts of fisheries on ecosystems will be considered, where the documentation warrants.

Examples of Conservation Limits for species

- *Biomass limit reference points – stock spawning biomass not to go below specified limit. – The limit is an SSB below which the probability of poor recruitment increases markedly.*

- *Fishing mortality reference point – not to be exceeded. – The limit is a mortality rate above which continued stock decline is expected.*

Examples of Conservation Limits for Ecosystems

- *Biomass limit on prey species (e.g. capelin) that ensures sufficient food for predators.*

- *Maximum by-catch limit for a species that ensures the bycatch mortality suffered by the species is sustainable .*

4. FISHERIES MANAGEMENT OBJECTIVES

4.1 Purpose

Establishing clear and measurable fisheries management objectives that address the biological (target species and direct ecosystem impacts of fishing) and socio-economic aspects of the fishery and respect any externalities arising from Integrated Management planning. Hence, to provide direction in the management of the fishery. The setting of Fisheries Management Objectives for a Fisheries Management Plan must involve those stakeholders that are directly impacted by the outcome. This is normally done through advisory processes coordinated by DFO. In the cases where Aboriginal co-management boards are involved DFO is obliged to develop plans cooperatively with the boards.

4.2 Establishing the Objectives

Through analysis, evaluation, discussion, and consensus, participants must identify the fisheries management opportunities and challenges and set clear and measurable fisheries management objectives to address these opportunities and challenges. The suite of fisheries management objectives will be a combination of socio-economic objectives and compatible biological objectives. The scope of the socio-economic objectives will be limited to aspects of the fishery that can be controlled through fish harvesting rules. The biological objectives will focus on the targeted species and where appropriate the impacts of the fishery on non-targeted species and the habitat.

The following outlines the steps that may be followed in setting the Fisheries Management Objectives:

1. Representatives of the resource users sectors outline their ideas on what the opportunities and challenges are to better management of the fisheries and fulfillment of their own goals in the fishery. Although the goals of resource users are often financial and cultural, such as maximizing profit or maintaining family or community traditions, such goals are subject to many factors outside the possible provisions of a fisheries management [or harvesting] plan. The goals may also be constrained by provisions of the Integrated Management plan. Nonetheless, it should be possible to identify components of those larger goals that can be addressed in fisheries management [or harvesting] plans, such as factors affecting fish prices and quality, time spent at sea, orderly conduct of fisheries, and safety at sea.

2. Translate the contributed ideas into conceptual objectives for social and economic outcomes of the fishery.

3. DFO identify complementary biological objectives related to the socio-economic objectives identified by the resource users and the ecosystem considerations that must be addressed. Some biological objectives may be properties of the stock or ecosystem necessary to facilitate achieving the socio-economic objectives, others may be desirable properties of stocks or ecosystem from a conservation perspective.

4. Reconcile any incompatibilities among the various individual conceptual objectives, and reach agreement on the compatible suite of conceptual objectives.

5. Translate the conceptual objectives into measurable objectives. These measurable objectives will define target reference points for the fishery needed to maintain the desired state of the resource and supporting ecosystem. In certain circumstances the stocks and or the habitat may require multi-year rebuilding or rehabilitation to reach their desired states or the achievement of the socio-economic objectives will require a staged approach. In these cases it will be necessary to identify long, medium and short-term objectives.

6. Verify that the biological objectives are compatible with the socio-economic objectives. When they appear incompatible it may be necessary to adjust all three types of objectives (social, economic, and biological) or only some of them. However, the preset Conservation Limits cannot be compromised.

EXAMPLES OF POSSIBLE FISHERIES MANAGEMENT OBJECTIVES

Conceptual Objectives

- *Maintain adequate spawning biomass to ensure reasonable probability of good recruitment through the full range of environmental conditions. (Biological – 1)*
- *Manage fishery to minimize bycatch of endangered species. (Biological - 2)*
- *Leave adequate biomass of exploited forage species to ensure predators have adequate feeding opportunity (Biological – 3)*
- *Maximize profits in fishing operations (Socio-economic – 1)*
- *Stabilize TAC over years (Socio-economic – 2)*
- *Manage fishery to increase safety at sea. (Socio-economic – 3)*

Some of the conceptual objectives translate directly into measurable, operational objectives in the long, medium and/or short term. Some of the others do not. For example:

- Socio-economic 1 (maximize profit) cannot be done within the provisions of a management plan. However, components which contribute to maximized profits can be included in management plans, such as measures which improve fish quality (and therefore price), and measures which reduce harvesting costs.
- Socio-economic 2 (Stabilizing TAC) actually is achieved largely through a factor that is usually considered a biological trait – a stable, large biomass resulting from low to moderate fishing mortality of the target species. Hence some *conceptual* socio-economic objectives may pursued through *measurable* objectives which address the biology of the target species or ecosystem

In the illustrative list which follows, the measurable objectives which must be pursued to achieve the corresponding conceptual objectives will be identified as Socio-economic 1a,b,c etc and Socio-economic 2. This makes clear the linkage with the original conceptual objectives that are the rationales for the measurable ones.

Measurable Objectives

Long-term Objectives (generally 10-20 years; 15 years chosen arbitrarily)

- *Rebuild SSB above 50,000 t (with % certainty) in no more than 15 years. (B-1)*
- *Have bycatch mortality inflicted in endangered non-target species < 0.01 within 15 years (with x% certainty). (B-2)*
- *Have annual escapement of forage species exceed 200,000 t (total biomass – all ages) in every year (with x% certainty). (B-3)*
- *90% of fish landed as top quality grade within 15 years. (S-e-1a)*
- *Decrease days fishing for constant amount of catch by 20% in 15 years. (S-e – 1b)*
- *Bring harvesting rate to 80% of $F_{0.1}$ within 15 years (S-e – 2)*
- *Reduce accidents at sea to < 2 per 1000 sea-days within 15 years (S-e – 3)*

In making the objectives progressively more specific, it may be noted that several objectives can be advanced by common actions. For example achievement of medium term objectives

to improve quality grade and reduce time at sea could both be helped by shorter trips with better ability to handle the catch as it was brought on board. These opportunities could be attempted through additional short term objectives, as in S-e 1+2 below.

Measurable Objectives

Medium-term objectives (3-5 years)

- *Have annual rate of increase in SSB average at least 10% per year over 5 years. (B –1)*
- *Have annual bycatch mortality of endangered species < 0.05 within 5 years (B –2)*
- *Have annual escapement of forage species rebuild to above 150,000 tonnes within 5 years (B –3)*
- *To improve prices, have more than 80% of fish landed in top quality grade within 5 years. (S-e – 1a)*
- *To reduce costs, have days at sea reduced by 10% within 5 years. (S-e – 1b)*
- *Reduce exploitation rate by 25%, to no greater 0.2, within 5 years. (S-e – 2)*
- *Reduce accidents at sea by 30% within 5 years (S-e – 3)*

Measurable Objectives

Short-term Objectives (one year)

- *Ensure that catches do not exceed level that gives 90% probability of 10% increase in SSB in 2001. (B1)*
- *Reduce by-catch of endangered species by at least 50 individuals in 2001. (B2)*
- *Ensure total removals of forage species give at least 90% probability of escapement in 2001 at least 110% of 2000 escapement. (B3)*
- *Have average trip length not exceed 3 days in 2001, and no more than 10% of trips longer than 7 days. (S-e 1+2)*
- *Have 100% of retained catch gutted and bled within 90 minutes of being brought on board (S-e 1a).*
- *Reduce the number of days that fishing vessels are at sea in gale or storm conditions by 25% in 2001 (S-e 2+3).*

NOTE – These objectives are to be considered illustrations of the logical sequence from conceptual objectives to annual measurable ones. They are not intended to reflect conditions in any particular fishery, nor should they be considered the best, or only options for even hypothetical conditions.

5. FISHERIES MANAGEMENT STRATEGIES

5.1 Purpose

This section outlines the process for developing the fisheries management strategies based on the conservation limits for species and ecosystems and that will facilitate the achievement of the fisheries management objectives. The development of the strategies involves 2 steps;

1. Identifying the key challenges and threats impacting on the likelihood of complying with the conservation limits, and achieving the fisheries management objectives.

2. Developing a fisheries management strategy to overcome the challenges and mitigate the threats.

5.2 Identifying the Key Challenges & Threats

This step is a formal identification of the key challenges and threats that have a negative impact upon meeting the limits and management objectives. In many cases, these challenges and threats will be already well documented. The added value of the formal exercise by advisory committees of codifying these factors are:

- to focus the development of fisheries management strategies on the challenges and threats,
- to provide a forum for building better understanding and consensus on the sources of the challenges and threats, and
- to take the first steps towards shared stewardship.

DFO Science and other technical sources can provide valuable data and information pertaining to the conservation and ecosystem limits and the biological based objectives. Brainstorming by the advisory committee can be useful in identifying challenges and threats related to the socio-economic based objectives, which often put pressure on fish stocks and the ecosystem.

5.3 Developing the Fisheries Management Strategy

Once the challenges and threats have been identified a series of management options will be developed. The advisory committee will discuss the options and propose the most appropriate options to form the overall fisheries management strategies encompassing the biological and socio-economic considerations.

Table 1 – Development of Fisheries Management Strategies

Fisheries Management Objectives	Threats/Challenges	Strategies
Ensure that catches do not exceed level that gives 90% probability of 10% increase in SSB in 2001. (B1)	Inaccuracies in assessment estimates Over run of exploitation level Over capacity of gear	Risk adverse setting of TAC from assessment results. Compliance to TAC X Tons Pooling Guidelines Gear restrictions
Reduce by-catch of endangered species by at least 50 individuals in 2001. (B2)	High catchability and mortality of endangered species in fishing gear. Co-occurrence of target species and bycatch species spatially during the fishery Accurate quantification of bycatch; with a corresponding strategy of scientific observers.	By-catch controls - Selective Gear - Endangered species by-catch Protocol
Have average trip length not exceed 3 days in 2001, and no more than 10% of trips longer than 7 days. (S-e 1+2)	Creating an environment where reduced trip time is not a disadvantage. Monitoring Trips	Introduce ITQ Management Monitor trip time as part of DMP
Have 100% of retained catch gutted and bled within 90 minutes of being brought on board (S-e 1a).	Obtaining higher price for higher quality fish.	Harvesters/buyers establish their own marketing group/scheme.

NOTE – These objectives, threats/challenges and strategies are to be considered illustrations of the logical sequence in developing strategies to support the achievement of the objectives. They are not intended to reflect conditions in any particular fishery, nor should they be considered the best, or only options for even hypothetical conditions.

6. FISHERIES MANAGEMENT CONTROLS

6.1 Purpose

The development of the Fisheries Management Controls involves identifying, analyzing and controlling hazards related to the implementation of the fisheries management strategy. Applying hazard analysis principles provides a systematic and proactive approach to address potential failures that are faced in effectively implementing the strategies of the Fisheries Management Plans. The guidelines aid in identifying what can go wrong and analysing those hazards to determine the best control options. Developing the Fisheries Management Controls involves the following steps:

1. Identifying and Analysing the Hazards
2. Establishing the Hazard Controls
3. Developing the Annual Harvesting Plan

6.2 Identifying and Analyzing the Hazards

The identification of the hazards is a comprehensive consideration of the known sources, activities, events, or future states of nature that may have a negative impact upon the implementation of the fishery management strategy. Brainstorming by the participants and bringing all of their expertise and experience to focus on potential hazards is an effective method of identifying the hazards. The science community has a role in identifying hazards associated with future states of nature and often can contribute to discussions of harvesting activities that may be hazards.

In most cases the hazards to implementing fisheries plans are already known and controls have been implemented to mitigate potential problems. The exercise of formally identifying, documenting and analyzing the hazards provides structure to the plans and a basis to rank hazards by priority and magnitude of negative effects. It will also contribute to the development of an improved conservation ethic among resource users as a clearer link between their activities and resource health is made.

The advisory body asks the basic question "What can possibly go wrong?" DFO Science will provide valuable data and information on the impacts of hazards (problems) such as recruitment over-fishing, growth over-fishing or atypical environmental conditions. Resource users and Fisheries Management will provide valuable information and knowledge related to hazards such as discarding, poaching, mis-reporting, over-fishing etc. Examples of possible hazards are given in Table 2 below.

Table 2 - Hazards related to the Fisheries Management Strategy

Fisheries Management Strategy	**Identified Hazards**
- Respect TAC of X tons..	- Quota over run - Poaching - Inaccurate reporting of catches. - Non-catch mortality
- Implementation of ITQ Fishery.	- Quota concentration - Cost of dockside monitoring program that is required to curtail over-harvesting and mis-reporting

- By-catch controls
  - Selective Gear
  - By-Catch Protocols
	- Gear not used
	- Gear used improperly
	- Mis-reporting of by-catch
	- Dumping at sea

NOTE – These strategies and related hazards are to be considered illustrations. They are not intended to reflect conditions in any particular fishery, nor should they be considered the best, or only options for even hypothetical conditions.

6.3 Establishing the Hazard Controls

For each of the hazards identified the advisory committee establishes controls to prevent, eliminate or reduce the hazard to acceptable levels. Establishing the controls consists of 4 steps:

1. Developing the control measures. In many cases the harvest rules, and regulatory and procedural mechanisms may already be developed to control the hazard. In these cases the advisory committee validates the controls to ensure they are linked to the Fisheries Management Objectives and Strategies, and evaluate the controls as to their effectiveness. If the control measures are validated and still practical and effective then thresholds are set that will initiate corrective action.

   Control measures will also include proactive activities such as training and education in areas such as stewardship and the Code of Practice for Fishers and consultation with resource users on opportunities for co-management. Examples of possible control measures are given in Table 2 below.

Table 3 - Examples of Possible Hazards and Corresponding Control Measures

Hazard	Control Measure
- Inaccurate reporting of catches and logbooks	- Dockside Monitoring Program and DFO Audit - Observers at sea - Inspection of Logbooks - Surveillance at sea
- Selective Gear used improperly	- Observers at sea - Surveillance at sea - Dockside Monitoring Program and Audit - Logbook inspection and verification with landings - Training on use - Design improvements to make failure harder

NOTE – These control measures are to be considered illustrations. They are not intended to reflect conditions in any particular fishery, nor should they be considered the best, or only options for even hypothetical conditions.

2. Determining thresholds for the control measures. For each of the control measures that are contingent on performance aspects of the fishery or the species, thresholds should be defined. The thresholds are measurable attributes or characteristics that signal unacceptable risk of moving from acceptable to unacceptable outcomes. Once a threshold has been reached corrective action must be implemented immediately. Where the control measures are in the form of regulations on fishing operations, a zero tolerance will be set.

3. Developing the appropriate the monitoring procedures. For each control measure, monitoring procedures should be established to monitor a property of the fishery or species that is sensitive to whether or not the control measure is effectively applied. The

monitoring procedures describe what is monitored, the frequency, what is documented, how it is done and who does it.

4. Predetermining the corrective actions. For each control measure corrective action measures must be predetermined for cases where the critical limits or trigger points are exceeded. The corrective actions should be ones that are based on the best information, are likely to reduce the risk of failure to comply with conservation limits or achieve the objectives.

6.4 Developing the Annual Harvesting Plan

As part of the multi-year Fisheries Management Plan an annual harvesting plan will be developed and will describe the operational rules that will be applied in implementing specific control measures. The annual harvesting plan will take into account typical biological fluctuations of the target species, other impacted species and the ecosystem from year to year. There may also be adjustments in the Fisheries Management Plan based on the yearly Performance Review which will be reflected in the harvesting plan.

7. VESSEL SAFETY

Provide a description of the measures established to heighten vessel safety such as consulting weather forecasts prior to opening a fishery, training of participants and promoting adequate equipment onboard vessels and the results of consultations with fishers and Coast Guard on strategies to reduce fishing accidents at sea.

8. PERFORMANCE REVIEW

The Performance Review is a comprehensive evaluation of the execution and results of the Fisheries Management Plan. It focuses on the effectiveness of the Fisheries Management Controls and Strategies in meeting the Fisheries Management Objectives and respecting the Conservation Limits. The purpose of the Performance Review is to determine “what works and what does not” and provides the basis for continuous improvement of the plan. Some of the performance indicators will be measured throughout the fishing season while others that rely on the compilation of data gathered during the fishing season will be evaluated at season’s end.

The Performance Review entails three levels of evaluation:

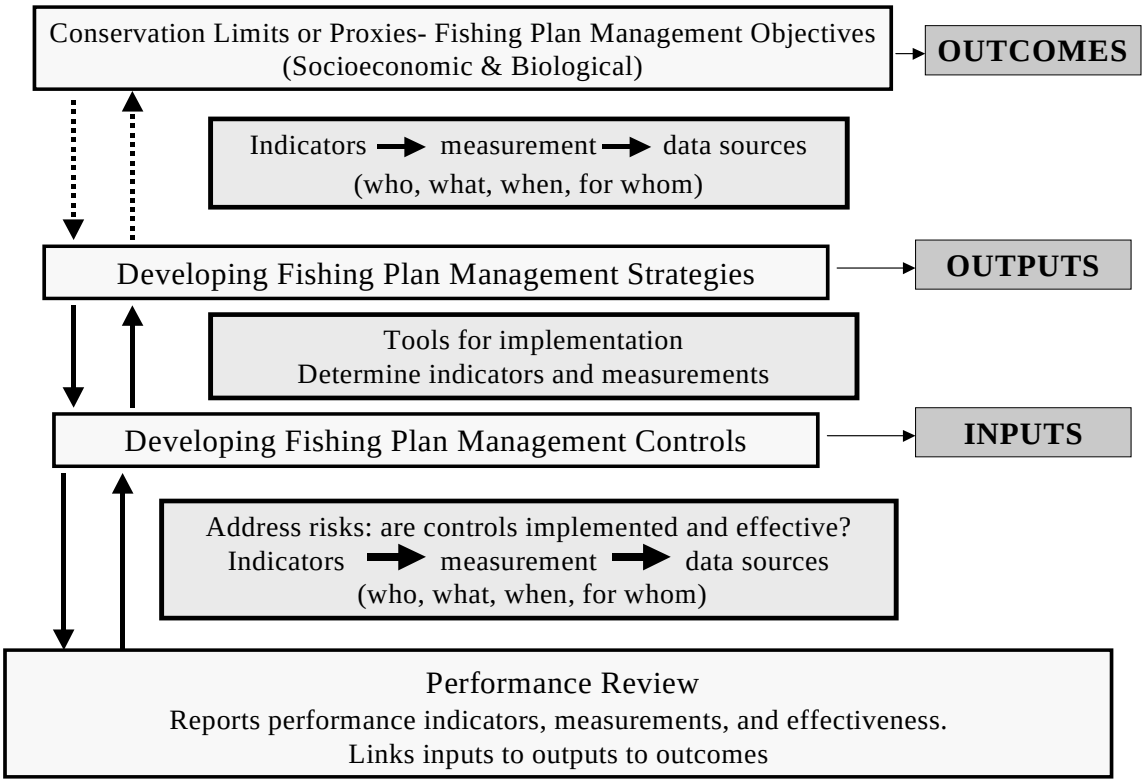
1. The evaluation of the application and effectiveness of the fisheries management controls. This will require the identification of a series of indicators to determine if the controls were applied as directed in the plan and if applied were they effective in delivery of the strategies.

2. The 2nd level of the review concentrates on the achievement of the Fisheries Management Objectives. This is based on the effectiveness of the Fisheries Management Strategies. The question posed is “Did the successful delivery of the strategies result in the realization of the Fisheries Management Objectives?” This is determined by assessing performance indicators related to the achievement of the objectives

If the strategies fail to result in the achievement of the Fisheries Management Objectives further analysis must take place and appropriate refinements will be made to the Fisheries Management Strategies.

3. The 3rd level of review focuses on the success of the Annual Harvesting Plan to comply with the conservation limits. If the Annual Harvesting Plan has failed to comply with the conservation limits further analysis must be carried out to determine the reasons for failure and where the fishery was a factor, determine what implementation hazards were over looked or which control measures failed.

Performance Measurement Model



Outcomes: External consequences attributed to the plan such as compliance to the Conservation Limits and achievement of the Fisheries Management Objectives.

Outputs: Direct products from the activities of a strategy and delivered to a target group (e.g. fisheries management plan)

Inputs: Resources used to carry out activities, produce outputs and accomplish results.

Annex I. Draft Reference Standard for Fisheries Management Plans.

Purpose:

The reference standard may be used, in conjunction with the preceding text of the guidelines, to develop Fisheries Management Plans. The standard will also be used in assessing Fisheries Management Plans to verify that they include all of the required components and information.

Overall:

The Fisheries Management Plan must be developed following a team approach where the roles and responsibilities of all partners are integrated into a cohesive plan.

1. Conservation Limit (Target Species and Ecosystem)

This section of the Fisheries Management Plan must identify the conservation limits for the target species and the ecosystem. . These are always based on the best Science possible, but where the science information is very limited or uncertain proxies are acceptable for the conservation limits for the target species and the ecosystem. This section must also include a brief description of the process followed to identify the conservation limits. The supporting scientific studies and data used in the decision process must be referenced.

2. Fisheries Management Objectives

This section of the Fisheries Management Plan must define the clear and measurable objectives that articulate the purpose and intention of a fishery in terms of biological goals and socio-economic values and targets. The biological and socio-economic objectives must be compatible. A brief description of the processed followed to reach consensus on the fisheries management objectives must be documented and include the different stakeholder groups that participated.

3. Fisheries Management Strategies

This section of the Fisheries Management Plan must describe the specific fisheries management strategies implemented to achieve the fisheries management objectives and ensure compliance with the conservation limits.

4. Fisheries Management Controls

This section of the Fisheries Management Plan must describe the specific control measures implemented to achieve the fisheries management strategies and meet the fisheries management objectives and ensure compliance with the conservation limits. The Annual Harvesting Plan is part of this section.

5. Vessel Safety

This section of the Fisheries Management Plan must describe the vessel safety strategies within the fisheries management plan to reduce accidents at sea.

6. Performance Review

This section of the Fisheries Management Plan must identify the performance review process that will be followed to verify that the Fisheries Management Plan is operating as designed and effective in meeting the fisheries management objectives and complying with the conservation limits. The performance indicators for each component must be identified.

Reference Standard Checklist

	Yes/No	Comments
Overall		
▪ an integrated team approach was followed in development of the plan		
1. Conservation Limits / Proxies:		
▪ for target species are documented		
▪ for ecosystem elements are documented		
▪ each limit is measurable		
▪ process to identify the limits is described		
▪ supporting data is referenced.		
2. Fisheries Management Objectives;		
▪ socio-economic issues are documented and are clear and measurable		
▪ biological elements are documented and are clear and measurable		
▪ socio-economic and biological objectives are compatible		
▪ process to identify the objectives is described		
▪ stakeholders included in process are identified		
3. Fisheries Management Strategies;		
▪ are documented		
▪ are linked to achieving the objectives and respecting the limits		
4. Fisheries Management Controls;		
▪ the control measures are described		
▪ are linked to the strategies, objectives and limits		
▪ include the Annual Harvesting plan		
5. Vessel Safety		
▪ the safety strategies are described		
6. Performance Review		
▪ process of review described		
▪ indicators for each component identified		

Annex 2. List of Participants.

Blair Bernard	Eskasoni
Gerald Cline	Fisheries Management Branch, St. Andrews
John Couture	DFO Fisheries Management Branch, Sydney
Geoffroy d'Entremont	Full Bay Scallop Association
Dave Duggan	DFO Oceans and Coastal Management, BIO
Mike Fraser	Upper Bay scallop fisherman
Joy Fry	Full Bay Scallop Association
Gastien Godin	New Brunswick Dep. Fisheries and Aquaculture
Jeffrey Goodine	DFO Science Branch, BIO
Greg Hamilton	Upper Bay scallop fisherman
Jorgen Hansen	DFO Fisheries Management Branch, Dartmouth
Reg Hazelton	Full Bay Scallop Association
Vance Hazelton	Full Bay Scallop Association
Jim Jamieson	DFO Fisheries Management Branch, Dartmouth
Bob Jenny	Eskasoni
Marc Johnston	New Brunswick Dep. Fisheries and Aquaculture
Helen Kerr	DFO Fisheries Management Branch, Ottawa
Jim Kierkstead	DFO Conservation and Protection, SW New Brunswick
Peter Koeller	DFO Science Branch, BIO
Mark Lundy	DFO Science Branch, BIO
Ian Marshall	DFO Fisheries Management Branch, Yarmouth
Harvey Millar	DFO Conservation and Protection, Digby
Dean Nuttall	New Brunswick Scallop fisher
Terry Nuttall	New Brunswick Scallop fisher
Robert O'Boyle	DFO Science Branch, BIO
Stephen Smith	DFO Science Branch, BIO
Paul Shreenan	Ecology Action Centre and Sierra Club of Canada
Klaus Sonnenberg	Grand Manan Fisherman's Association
Dick Stewart	Full Bay Scallop Association
Greg Thompson	Fundy North Fishermen's Association
Kees Zwanenburg	DFO Science Branch, BIO

Annex 3. Workshop Terms of Reference and Agenda.

DFO's Objective-Based Fisheries Management initiative has provided guidelines for implementing a precautionary approach to managing Canadian fisheries resources. A number of OBFM pilot projects were identified nationally, including inshore scallops in the Maritimes Region.

It is generally agreed that a fisheries management system such as OBFM based on precautionary principles should have the following elements:

- clearly defined *objectives* against which results can be measured
- *strategies* to achieve the objectives
- definitions of unacceptable outcomes (e.g. conservation *limit reference points*)
- pre-agreement on corrective actions if limits are approached (*decision rules*).
- consideration of *socio-economic*s and the *ecosystem* effects of fishing
- *transparency* of process and *co-management*
- system *performance monitoring* (based on indicators) and review

Agreement on management objectives by all resource users is prerequisite to the development of an inclusive and transparent management framework that incorporates the biological, economic and social factors affecting a fishery. This workshop will focus on clarifying management objectives for the inshore scallop resource in the Bay of Fundy and approaches.

Chair: Jim Jamieson

APRIL 15, 2003

1. Introduction.

09:00-09:15 Workshop objectives

Jim Jamieson, Peter Koeller

09:15-09:45 Overview of OBFM

Helen Kerr

09:45-10:15 Progress with the groundfish pilot in the Maritimes Region

Jorgen Hansen

10:15-10:30 *Break*

2. Conservation Objectives

10:30-11:10 Progress to date on LRPs, current research and long-term science objectives for inshore scallops.

Steve Smith

11:10-11:30 Incorporating ecosystem considerations into fisheries management objectives.

Bob O'Boyle

11:30-12:00 Overview of ecosystem issues associated with the inshore scallop fishery.

Peter Koeller

12:00-13:00 *Lunch*

3. DFO Fisheries Management Objectives

13:00: 14:00 *Jim Jamieson, C&P*

4. Stakeholder Objectives

14:00-15:00 Full Bay Fleet

Dick Stewart, Vance Hazelton

15:00-15:30 *Break*

15:30-16:00 Mid Bay Fleet

Greg Thompson

16:00-16:30 Upper Bay Fleet

Mike Fraser, Greg Hamilton

16:30-17:00 Native fishery

Native reps

APRIL 16, 2003

09:00-12:00 Plenary

Annex 4. Example Objectives for the Bay of Fundy Scallop Fishery.

Objectives Hierarchy for Management of the Inner Bay of Fundy Scallop Fishery		
General Objectives	**Strategies**	**Management Measures**
1. *Conservation of the Ecosystem by:*		
1.1 Maintaining community diversity by protecting benthic communities susceptible to disturbance	-	-
1.2 Maintaining species diversity	- minimize incidental mortalities on lobster	- area closures, lobster by-catch restrictions.
1.3 Maintaining diversity of scallop metapopulations in Bay of Fundy and approaches	-maintain minimum spawning stocks of subpopulations	- annual TACs - area closures
1.4 Maintaining trophic role of scallops in food chain	-	-[
1.5 Maintaining productivity of scallop populations by managing the effects of fishing on growth and recruitment	- prevent growth and recruitment overfishing by preventing excessive fishing on small scallops and keeping SSB above interim reference point.	- annual TACs - meat count limits
1.6 Conserving the physical and chemical properties of the ecosystem	-	-
2. Addressing Socio-economic Considerations of the Fishery by:		
2.1 Stabilize or increase longer term average income	- balance fleet capacity with resource availability by managing access and supporting resource sharing arrangements that allow resource users to meet their economic objectives	- limit entry through licensing - improve options for transferability of shares and quotas - resolve disagreements over historical shares
	-stabilize or increase the value of the catch over a 10-15 yr period	- annual TACs - meat count limits - area closures
3. *Facilitating Management of the Fishery by:*		
True co-management, meeting the socio-economic requirements and obligations of stakeholders while minimizing conflicts	- implement Code of Conduct	(To be established when appropriate)
	- increase industry participation in decision making and funding of science surveys, meat weight sampling programs, and accurate reporting of catch, effort and locations	- management plan, including transparent process providing consensus positions on plan modifications having implications both within and between fleet sectors