

Responsible Fisheries in the Marine Ecosystem

Jointly organised by the Government of Iceland and the Food and Agriculture Organisation of the United Nations with the Government of Norway

Háskólabio, Reykjavík 30 September – 4 October 2001

Over 400 delegates attended the Conference on Responsible fisheries in the Marine Ecosystems organised by Iceland and FAO, and co-sponsored by Norway. National delegates from 75 countries and over 30 IGOs and NGOs in addition to scientists and industry leaders were present. The conference is seen as preparation for the Rio + 10 World Summit on Environment and Development in Johannesburg, September 2002.

The conference was in two parts. The conference itself in plenary resulting in the declaration from the meeting, and a scientific symposium.

The conference was at the opening of the meeting, in the presence of the President of Iceland, addressed by the Director General of FAO Dr. Jacques Diouf, the Minister of Foreign Affairs of Iceland, Mr. Halldór Ásgrímson, the Minister of Fisheries of Norway, Mr. Otto Gregussen and the Minister of Fisheries of Iceland, Árni Mathiesen who was elected chair of the conference. There were 5 presentations to the plenary, setting the scene. They are listed with abstracts in Annex I.

Information about the conference can be found at the website: <http://www.refisheries2001.org> and a summary of the whole conference is found at the website <http://www.iisd.ca/linkages/sd/sdice/sdvol61num1.html>

The Reykjavík declaration

Based on the interventions and discussions during the meeting the conference adopted the Reykjavík Declarations (Annex II). The operational parts of the declaration are given below:

1. Our determination to continue effective implementation of the FAO Code of Conduct, which is our common and agreed guide in strengthening and building fisheries management systems, as well as the International Plans of Action as formulated in accordance with the Code, and the Kyoto Declaration on the Contribution of Fisheries to Food Security.
2. There is a clear need to introduce immediately effective management plans with incentives that encourage responsible fisheries and sustainable use of marine ecosystems, including mechanisms for reducing excessive fishing efforts to sustainable levels.
3. It is important to strengthen, improve, and where appropriate establish, regional and international fisheries management organizations and incorporate in their work ecosystem considerations and improve cooperation between those bodies and regional bodies in charge of managing and conserving the marine environment.

4. Prevention of adverse effects of non-fisheries activities on the marine ecosystems and fisheries requires action by relevant authorities and other stakeholders.

5. While it is necessary to take immediate action to address particularly urgent problems on the basis of the precautionary approach, it is important to advance the scientific basis for incorporating ecosystem considerations, building on existing and future available scientific knowledge. Towards this end we will undertake to:

The scientific symposium:

Chairs: Dr. Michael Sinclair and Dr. Jóhann Sigurjónsson

The symposium addressed the state of the present management of fish stocks around the world in a number of very informative and succinct presentations. They illustrated very well the problems involved in managing fish stocks and offered suggestions, how present management could be improved. They also explored to which extent ecosystem concerns could be taken into account with our present knowledge

The discussion after the first session of the scientific meeting made abundantly clear that the main problem in fisheries is overcapacity. With the present large, global overcapacity regulatory systems of any type face huge problems. Estimating present fishing mortality levels and calculating TACs, which match the level of fishing mortality aimed at, is very difficult, if not impossible. Major impacts on marine ecosystems are also an effect of overcapacity. The overwhelmingly biological focus in the advisory process has not been effective in directly addressing the capacity problem.

There was consensus that we do not have multi-species models or models that can simulate the impact of fisheries or other activities on the ecosystems in detail, but we have enough knowledge to include concerns for parts of the ecosystems which could be added on to the concerns for the target fish species. The lack of models should not prevent managers from beginning to include ecosystem concerns, at the same time undertaking the necessary research to increase our understanding of the marine ecosystems and allowing more precise estimates of factors affecting them.

Summary of presentations

The summaries made by the conference secretariat are given below. The power point presentations at the conference will also be made available on the net. The following website address will give you access to abstracts of overview and scientific papers and the full scientific papers in English in Arabic, Chinese, English, French and Spanish. <ftp://ftp.fao.org/fi/document/reykjavik/default.htm> .

DYNAMICS OF MARINE ECOSYSTEMS: Symposium Co-Chair Michael Sinclair introduced this session on Monday afternoon. Noting the challenges of

increasing fish stock levels and incorporating broader ecosystem issues into fisheries management, he raised the question: how do we move from our present management systems to an EBFM approach? He said the Symposium would provide the scientific context for making this transition and introduced the speakers for the session.

Presentations: Daniel Pauly, Professor at the University of British Columbia's Fisheries Center, examined ecological geography as a framework for a transition toward responsible fishing. He highlighted the use of maps as devices to reflect some of the many dimensions of the fisheries in complex marine ecosystems. Using biomass and catch maps, he highlighted concerns about a steep decline in predatory fish biomass in the North Atlantic. He also suggested that, contrary to the widely-held view that fish supply per person has held relatively constant during the past decade, global marine catch has in fact been declining, although the decline had been masked by over-reporting on catches from China and of Peruvian anchoveta.

In his presentation, Philippe Cury, IRD Research Associate at the University of Cape Town, considered the functioning of the marine ecosystem. He drew attention to evidence that environmental variability significantly influences and controls the abundance and distribution of marine populations, and that fisheries affect the way ecosystems function. He considered the question of what controls marine ecosystems and examined three possible types of energy flow: bottom-up controls, in which primary producers play the dominant role in determining the abundance of the various marine populations, while removal of large predators does not have a significant impact on other species; top-down control, in which predators have the greatest impact; and "wasp-waist" control, in which the state of the dominant species – small pelagic "prey" fishes – controls the abundance of predators and primary producers.

Although the question of who is controlling whom in marine food webs is still being evaluated, and no general theory can be applied to marine ecosystem functioning, Cury drew the tentative conclusion that bottom-up control is predominant in most areas. Noting the complexity of the marine ecosystem, he said major steps are urgently needed to define an ecological framework for dealing with responsible fisheries in marine ecosystems. He encouraged comparative studies between marine ecosystems to support the development of new generalizations, as well as the need to define new indicators to help assess the impact of fisheries on ecosystems. This in turn would assist in developing a new framework for fisheries management.

Andrew Trites, Director of the Marine Mammal Unit at the University of British Columbia, described general patterns in marine food webs and explained that information on the diets of marine organisms was compiled through stomach and scat sampling and fatty acid and stable isotopic analysis, through examining contents of blubber, tusks and bones. In highlighting the complexity of food web studies, he illustrated the example of declining Steller sea lion populations in the Bering Sea, observing that the situation was more complex than commercial fishing simply having decreased the sea lions' food sources. He noted that environmental changes might have brought about population shifts in different fish species in the Bering Sea, which possibly caused a change in the diet of Steller sea lions from fatty pelagic fish in the 1950s to benthic fish with lower fat content in the 1990s. This lower quality of food is seen to be a factor in Steller sea lion decline in that region.

In his presentation, Tsutomu Tamura, a research scientist with the Institute of Cetacean Research in Japan, focused on the competition for fish between cetaceans and commercial fisheries. In illustrating cetacean dietary habits, he noted that in the North Pacific, North Atlantic and southern hemisphere, cetaceans consumed three to five times more fish than the worldwide marine fishery catch. Tsutomu provided examples of direct and indirect competition for fish between cetaceans and the fisheries industry, highlighting the competition between minke whales and fishing fleets for Pacific saury. He concluded by stressing the need for more data of stomach contents in cetaceans and arguing that, to promote a realistic approach to fisheries management, multi-species management that includes cetaceans should be developed.

Gunnar Stefansson, a researcher with the Marine Research Institute in Iceland, described the attributes and limitations of existing ecological models. He noted the great uncertainty involved in using models, and advised a precautionary approach. In describing current fish stock control mechanisms, he mentioned the benefits and challenges of using closed areas and total allowable catch (TAC), and of regulating fishing effort and mesh sizes, noting that no one solution would suffice, and that the problem of overcapacity affected all these control systems and needed to be included as a factor in models. Stefansson pointed out that the real problem was one of fleet size and criticized the failure to address this problem. He challenged the current perspective on managing marine resources and supported harvesting marine resources using the smallest fleet size possible at a minimum level of fishing mortality that does not lead to serious long-term catch loss.

Discussion: In the subsequent discussion, one participant asked whether the three control systems outlined by Philippe Cury reflected the real-life complexity of the situation, suggesting that in-depth data were needed on specific ecosystems. Cury said it was important to try and trace some patterns that can be applied and tested in the light of actual case studies. Responding to a question on whether marine systems are relatively resilient, Cury cautioned that they may not be as resilient as had been previously imagined.

One delegate underscored Daniel Pauly's findings that massive overfishing and vast removals of biomass has taken place. Reacting to another participant's comment on the need to focus on reducing fishing, Pauly agreed, indicating that there had been a dramatic reduction in biomass even in recent years. In response to a comment on fisheries problems in the southern hemisphere, Pauly said the problems of overfishing driven by overcapacity are the same in both hemispheres, and politicians in all regions seem equally unable to deal with the problem. He suggested that small-scale fisheries are often more economically efficient and environmentally sustainable.

One delegate questioned a proposal for more models, suggesting that this would be less useful than having simpler models, and stressing the more urgent need to address the immediate problem of fishing overcapacity. Responding to a question on the impact of the removal of marine mammals on fish stocks, Tsutomu Tamura noted the need for more specific data on fish species consumption by marine mammals.

THE ROLE OF MAN IN MARINE ECOSYSTEMS: Participants considered the role of man in marine ecosystems on Monday afternoon, 1 October and Tuesday

morning, 2 October in sessions chaired by Johann Sigurjónsson, who introduced the issue and the keynote speakers.

Presentations: Andrew Rosenberg, Dean of Life Sciences and Agriculture at the University of New Hampshire, gave an overview of the multiple sources of impacts on fisheries and described three classes of impacts: direct, indirect and complex. Direct impacts, which affect fish mortality rates, are caused by activities such as exploitation, conservation, toxic pollution and fishing, which has the largest direct effect on fish populations. Indirect impacts, which affect growth and reproductive rates, are induced by habitat loss, new competition for resources, chronic contamination and disturbance. Complex effects, which entail multiple, interactive factors, could be caused by any combination of high exploitation rates and habitat loss, acute and chronic toxic effects. Rosenberg illustrated the spatial and temporal variations in all levels of effects, noting that generally near-shore ecosystems experienced greater impacts than off-shore habitats, and that direct effects tended to be acute, short-term and less complex, while indirect effects tended to be long-term and highly complex.

Michel Kaiser, Senior Lecturer on Marine Benthic Ecology at the University of Wales, explored the ecological significance of fishing on marine benthic environments against the background noise of natural perturbations to the habitat. He mentioned that some disturbances can cause an increase in biodiversity, but that the ecological significance of the effects of towed bottom fishing gear has not yet been determined. He explained that disturbing the benthic environment generally causes a species reduction in the short term, but noted that what was more critical was the capacity of the system to recover, and illustrated the great variation in recovery times of different benthic environments. Kaiser highlighted the possibility of incorporating both fisheries and habitat conservation aims, using the example of how restricted fishing in the North Atlantic resulted in increased scallop populations. He concluded by advocating a combination of several approaches to fisheries management, including restricting towed bottom fishing gears and introducing seasonal or rotational closures of fishing areas.

Robin Cook, Marine Fisheries Advisor at FRS Marine Laboratory, examined the magnitude and impact of by-catch mortality by fishing gear. Noting that most fisheries operations trap organisms that are not their primary target, he said such by-catch includes non-intended catch that may still have economic value, and also species that have no value and are discarded. He said discarded catch was a major problem representing about a quarter of the total world catch. He also noted that for most species, the survival rate among discarded catch is very low, adding that some by-catch species are currently threatened or endangered. He suggested that, while it is not deliberate, regulations such as minimum landing sizes and catch restrictions can actually encourage discarding. Identifying solutions to the by-catch problem, he said technical conservation measures such as modified fishing gear and practices can reduce by-catch, adding that the short-term economic costs associated with such changes would need to be addressed for such measures to be successfully introduced and implemented. Preventing fishing in areas where juvenile fish are concentrated is another option. However, he stressed that by-catch is just one factor affecting the total mortality of species that are affected by fishing, meaning that the broader problem of excessive exploitation needs to be tackled.

Ellen Kenchington, Research Scientist with the Bedford Institute of Oceanography, considered how fishing affects marine genetic resources at three levels: species, population and within populations. She emphasized that because marine genetic resources are not yet well understood and because genetic loss is irreversible, precaution is critical. In addition to showing that fishing directly removes genetic resources at the fish species and population levels, she also illustrated how it indirectly affects other species, citing the potential extinction of Hector's dolphin populations by fishing gear entanglement. She stressed that considering population size alone was not sufficient to ensure species fitness or "robustness," emphasizing the importance of maintaining variability of genetic material within populations, and noting that fishing, which often selects for size, sex and time of spawning, has been proven to cause heritable differences in life history traits within fish populations.

Henrik Gislason, a Fisheries Biology Professor at the University of Copenhagen, elaborated on how fishing affects marine ecosystems through changing species interactions, altering marine habitats, adding discards to the marine food web, and reducing abundance of slow-growing, late-maturing species. He showed how overfishing of capelin in the Barents Sea affected population characteristics of their natural predators, cod and herring. Using examples from Northwestern Australia and the Caribbean, he demonstrated how trawling directly impacts species richness and how heavy fishing indirectly causes a decline in coral reefs. As a further example, he cited evidence that discards increased scavenger seabird populations in the North Sea. Gislason concluded that marine ecosystems differed in their responses to fishing, noting that the most sensitive systems were ones where energy flowed through a few key species, or where biota provided structural habitats, as is the case with coral reefs.

Katherine Richardson, Professor at the Department of Marine Ecology, University of Aarhus, described how anthropogenically-induced changes in the environment affect fisheries. She examined various non-fishing human activities affecting fish and fisheries, including: land-use change; the introduction of non-indigenous species; conservation measures for other species, such as fish predators, that interact with fish; other human uses of the ocean, including oil extraction; and nutrients and contaminants introduced by humans that affect fish. Stating that freshwater fisheries are more obviously impacted by human-induced changes to aquatic environments, she noted that humans also clearly influence marine environments, including fish stocks. Although these influences are difficult to quantify, both biologically and economically, she suggested that efforts to establish "responsible fisheries" are likely to imply less fishing in some areas. Richardson also highlighted growing concerns about chemical contamination of fish and the marine ecosystem, and supported further research on this matter.

Discussion: During the ensuing discussion, several participants raised issues relating to by-catch and discards. One delegate drew attention to work in the US on reducing by-catch associated with shrimp fisheries. Responding to a suggestion that shrimp fisheries by-catch could be addressed through closed areas and monitoring, Andrew Rosenberg agreed that such systems can work if the right incentives are provided. He said incentives should be built into management programmes. In this regard, another participant drew attention to incentives established for a by-catch limit in the North Pacific.

Replying to a participant's comment about different perceptions guiding policy making for marine as compared to terrestrial areas, Katherine Richardson agreed, noting that land is segregated for agricultural, conservation and other uses, with consequent implications for species in those areas. She said this does not happen in the same way for oceans, although she suggested that "we're getting close" to the stage where marine area enclosure or protection might become common, while fishing continues in other areas. Andrew Rosenberg said one reason for this different approach is that marine areas are considered in terms of populations and ecosystems, while terrestrial systems are thought of in spatial terms.

In response to a comment on the need to consider recreational fishing activities, which can have significant impacts, such as by-catch problems, Rosenberg agreed that all fishing had an impact on fish species, and said recreational activities were not excluded from these discussions.

INCORPORATING ECOSYSTEM CONSIDERATIONS IN FISHERIES

MANAGEMENT: On Tuesday afternoon, 2 October, participants heard presentations and engaged in discussions on incorporating ecosystem considerations in fisheries management.

Presentations: Jon Sutinen, Professor of Economics at the University of Rhode Island, elaborated on the performance of different fisheries management systems in the context of the ecological challenge. Drawing from an extensive study by the Organization for Economic Cooperation and Development (OECD), he explained how most common control measures, such as TAC, limited licenses, area closures and controls on fish size and sex, were found to be ineffective in ensuring conservation. He said only Individual Fishing Quotas (IFQs), which are rights-based and provide incentives to mitigate the competitive "race-to-fish" between companies, have been found to be a potent and valuable tool for fisheries management. In this regard, he cited the community harvesting cooperatives in the US and Canada as successful examples of the IFQ approach. Sutinen emphasized that the real problem in fisheries management lies primarily in its governance structure and in the alliance of short-term interests between elected officials and fishermen and the fishing industry. He questioned the effectiveness of EBFM in improving the fisheries situation if nothing was done to improve fisheries governance. He concluded by advocating careful planning in applying ecosystem-based approaches.

Douglas Butterworth, Professor in Mathematics and Applied Mathematics at the University of Cape Town, described how the Operational Management Procedure (OMP) can successfully unify harvest control laws, risk, uncertainty, and the precautionary principle in fisheries management. He explained that the OMP, unlike traditional fisheries management approaches, takes explicit account of scientific uncertainties, applies the precautionary principle and performs comprehensive simulation testing to derive TACs, and also shows decision-makers the trade-off between catch levels and the risk of resource depletion. In outlining applications of OMP in multi-species scenarios, he explained that OMP has been successfully used in operational (by-catch) interactions, as demonstrated in its ability to calculate company trade-offs between annual catches of sardines and anchovies in South Africa. However, it has not been successfully applied in biological interactions, such as

competition and predator-prey relationships, due to a lack of data and understanding in predation and competition interactions.

John Willy Valdemarsen, Chief of FAO's Fishing Technology Service, examined how modifying fishing gear can achieve ecosystem objectives. He outlined examples of gear modifications that have reduced unwanted by-catch, including the turtle excluder device for shrimp trawls, the Nordmøre grid for separating shrimp and fish, modified tuna purse seines to reduce dolphin mortality, and a bird-scaring line to limit seabird capture during longline fishing. He then reviewed the development of gears and practices to reduce the impact of fishing on benthic communities and their habitats. In spite of these innovations, he said it was unlikely that gear modifications will eliminate all adverse impacts, and outlined a combination of measures, including avoidance of specified areas, technological improvement, and other management actions. He cautioned that gear modifications and techniques that increase costs and reduce catch and earnings will not be accepted by the fishing community, but said recent experiences suggest that modifications reducing the impact on non-target species and habitats can be implemented without significantly damaging fishing industry profits. He said economic rewards should be offered for the creation of new types of gear and modifications.

In his presentation, Keith Sainsbury, Senior Principle Research Scientist at the Commonwealth Scientific and Industrial Research Organization (CSIRO), spoke about incorporating ecosystem objectives into management of sustainable marine fisheries, including using "best practice" reference points and MPAs. Noting the broadening of fisheries management to include a range of high-level ecosystem-related objectives and considerations, he outlined three steps to incorporate such objectives into marine fisheries management systems at an operational level: reporting and assessing the whole management system, rather than just individual parts; using reference points, indicators and performance measures for ecosystem objectives; and making better use of management tools that are inherently precautionary, such as MPAs. He suggested that the use of reference points represents a possible "best practice" in operationalizing ecosystem goals.

In his presentation, Michael Sissenwine, Director of the Northeast Fisheries Science Center at Woods Hole, outlined an ecosystem approach to governance for responsible fisheries. Outlining six key elements to such an approach, he noted that sustainability is an important element in achieving responsible fisheries. Among the key elements presented were that EBFM should define clear goals and constraints, be precautionary, protect the ecosystem, have a participatory and transparent decision-making process, and have management support that includes scientific information, compliance and enforcement. He remarked that conventional single-species management is critical in ecosystem protection and that it is its implementation, rather than the conventional approach itself, that has failed. He stressed the need to replace the "race-for-fish" with rights-based allocation, and in examining how to determine the basis of these rights, noted that the sum of all allocations must not result in overfishing. Sissenwine concluded by expressing concern that scientists are less likely to take professional risks in making strong recommendations given the growing atmosphere of public scrutiny, criticism and potential litigation.

Discussion: During the ensuing discussion, several participants raised issues relating to Individual Fishing Quotas (IFQs). In response to a question on whether quota transferability made a difference to IFQs, Jon Sutinen said it makes a difference because it can generate further profits, but that non-transferable IFQs also perform well. One participant expressed concern that the FAO, World Bank and a number of scientists have been promulgating the use of IFQs. He indicated that his own research finds that IFQs are not precautionary, that they focus on a single species, are irreversible and socially inequitable. Sutinen responded that evidence demonstrates that IFQs work better than other alternatives, adding that the OECD study does address some of the problems of IFQs. He suggested that IFQs can always be discontinued through setting the TAC at zero and shutting down a fishery. Another delegate noted that the FAO's official position was that it advocated rights-based systems in general, which included IFQs, but that did not mean they were the only option.

In response to a question regarding what happens to OMP when the system deviates from the model's predictions, Douglas Butterworth noted that in an ideal world we would find one permanent formula, and asserted that OMP's automated process saved time and gave a better long-term focus than traditional approaches. Keith Sainsbury reminded participants that models are not meant to predict the future, but to produce robust strategies that deal with complex situations.

One delegate observed that while one presenter had advocated fleet reduction, another had supported modifying fishing gear, and asked for further perspectives on whether policy makers would be best advised to adopt one policy over the other. Michael Sissenwine recommended using both approaches, as the different measures tackle separate issues of by-catch and overcapacity.

INDUSTRY PERSPECTIVES: On Tuesday afternoon, participants heard presentations and engaged in discussions on industry perspectives on fisheries management and ecosystem considerations. Opening the session, Symposium Co-Chair Johann Sigurjónsson presented four questions for industry speakers to consider in making their presentations: how will industry react to increasing demands regarding sensible use of marine resources; how does industry see ecosystem based management being implemented; should industry be more visible in the debate about resource management; and how can industry become more involved?

Presentations: Michael O'Connor, High Liner Foods Inc., outlined his company's current situation and practices, noting an eightfold decline in fleet capacity since the late 1980s, and attributing this reduction to Canada's system of property rights that reduced company allocations. He provided examples of the company's conservation ethic, its use of various modified fishing gears to reduce by-catch, and its monitoring and research programmes. He pointed out that although these controls have increased harvesting costs, the property rights regime has allowed the company to integrate its planning in such a way that the benefits ultimately outweigh the costs. With respect to applying an EBFM approach to fisheries, he expressed concern that management restrictions and complexities would increase, and said a timeline allowing industry to build capacity to meet the new challenges ought to be considered.

Kristján Thorarinnsson, Population Ecologist for the Federation of Icelandic Fishing Vessel Owners, responded to the question of how industry will react to demands of sensible use of marine resources by explaining that his industry was making those demands itself, which he attributed to Iceland's rights-based system. He stated that although EBFM would most likely be implemented gradually, the fishing industry in Iceland was already moving in that direction, because of the nation's high dependence on fishing. He lamented that the industry was not more visible in debates over resource management and underscored the need for more communication and understanding between all key stakeholders.

Ross Tocker, General Manager of Operations at Sealord Group, discussed the impact of the fisheries system used in New Zealand, where a property-rights quota system exists. He said this system had helped establish sustainability as a key corporate objective, resulting in voluntary industry initiatives, such as a code of practice to avoid catching fur seals. He urged the eradication of incentives for vessel overcapitalization.

Volker Kuntzsch, Buying Director of Frozen Fish International, said this Unilever-owned company is a processing business that has established sustainability as an objective, and has set itself the goal of buying all its fish from sustainable sources by 2005. He said this goal would be difficult given fish stock declines, and advocated an ecosystem approach to tackle such declines. He expressed concern that some policy makers and other stakeholders remain unaware of the fish stock crisis, and questioned the value of subsidies for this sector. Supporting a multi-stakeholder approach, he called for action rather than further expressions of concern or consensus on the problem.

Discussion: In the ensuing discussion, one participant said timely action is necessary in tackling fish stock problems before they reach a crisis stage, and urged that such action take into account the socio-economic implications for fishing communities. In response to a question on the rights-based approach, Ross Tocker said allocating property rights ensures that sustainability becomes a priority for the owner of the right – namely the company – as well as for government. If there is no property right, then individual businesses simply compete for fish with other companies.

Other presentations: Participants attending the Scientific Symposium also heard brief presentations from several speakers outlining their respective organization's or agency's involvement in EBFM. Jonathan Peacy of New Zealand's Ministry of Fisheries described the country's rights-based policies for managing fisheries. Noting that New Zealand has only recently started to develop an ecosystem based approach, he emphasized that it is built on strong foundations, including the fact that major fish stocks are at target levels or rebuilding towards these levels, that there is only minimal overcapacity, and that there is strong monitoring, control and surveillance. He stated that there are no subsidies for industry, and outlined a number of by-catch mitigation measures that have been introduced.

Duncan Leadbitter, International Fisheries Director for the Marine Stewardship Council, outlined the Council's activities as the non-profit, standard-setting body set-up to evaluate fisheries that are sufficiently sustainable to carry an eco-label. He said the certification process is science-based, non-discriminatory and transparent, and

noted that the Council has recently undergone a review to improve its governance structures, and is improving its assessment process.

Malcolm Windsor, Secretary of the North Atlantic Salmon Conservation Organization (NASCO), outlined this international body's work in contributing to the conservation and rational management of a single species, including its action plan taking a precautionary approach.

CONCLUDING REMARKS FROM THE SYMPOSIUM: The Scientific Symposium officially concluded its work late Tuesday afternoon. Co-Chair Michael Sinclair thanked the translators and the FAO Secretariat, and praised the Icelandic organizing team for their efficiency. He also thanked the Governments of Iceland and Norway and the speakers for their significant work addressing the issue of responsible fisheries, noting that their papers will contribute toward this conference's Reykjavik Declaration and to the World Summit on Sustainable Development in 2002.

On Wednesday morning, 3 October, Co-Chair Sinclair presented the Co-Chairs' conclusions from the Symposium prior to a Plenary session of the Reykjavik Conference, as he had been unable to present their conclusions the previous day due to time constraints. Co-Chair Sinclair said the Symposium had: summarized current understanding of the structure and functions of marine ecosystems and our ability to model them; synthesized the impacts of human activities on marine ecosystems; and addressed how ecosystem considerations can be incorporated into fisheries management. He noted that industry representatives were receptive to applying EBFM to marine resources, but concerned about the time-scale and costs involved in incorporating this approach. He highlighted participants' concerns about overfishing driven by fishing fleet overcapacity, and their expressions of support for rights-based fishing. He noted that although no formal definition of EBFM had been agreed to, there was consensus that an EBFM approach contained the following features: integrated management of multiple fisheries and other ocean uses within a geographic context; incorporation of a broader set of objectives than currently exists; and direct management of human activities, rather than the ecosystem itself. Although additional knowledge on marine ecosystems was needed, he drew attention to agreement among speakers that the introduction and development of EBFM should start now and that it could be initiated in both developed and developing countries. Co-Chair Sinclair noted a lack of consensus on the geographical boundaries within which regulatory plans for marine resource uses would be evaluated in the context of ecosystem objectives, and noted that management capacity would have to be increased to meet new governance requirements. He concluded that EBFM would probably be implemented through an evolutionary, not revolutionary, process and that the precautionary principle was an integral component in the EBFM approach.

ANNEX I FIRST PLENARY SESSION – SETTING THE STAGE

Serge Garcia, Director of the FAO's Fishery Resources Division, presented a global overview of marine capture fisheries. He said the sustainability of the current fisheries system is being examined in light of the serious concerns about overexploitation of fisheries resources. He drew attention to an increase in reported global production of marine capture fisheries from 19 million tonnes in 1950 to over 80 million tonnes today. Observing that this amount has remained relatively unchanged during the past decade, he suggested that achievable limits for marine fisheries catch have now been reached. He also identified regional differences in fishery resources, citing a recent FAO assessment that found around half of the world's fisheries resources to be "fully exploited," one-quarter overexploited, and the remaining quarter apparently able to support higher rates of exploitation.

Serge Garcia stated that fisheries face several significant challenges, including: overfishing, which results in a collapse in marine resources and an increase in endangered species; fishing fleet overcapacity, which is connected to the use of subsidies; and environmental impacts. In spite of an improvement in fisheries management through a range of global, regional and national initiatives, he noted problems in effective enforcement of management measures and the need for improved governance. Supporting the need to improve the quality of data to better assess fisheries management, he also suggested that the available information points to a definite increase in overfishing internationally. He concluded by highlighting the value of shifting to an EBFM approach, adding that the status quo is "not an option" if sustainable fishing is to be achieved.

William Edison, Senior Legal Officer, FAO, delivered a presentation on behalf of Transform Aqorau, Legal Counsel of the South Pacific Forum Fisheries Agency, on the obligations to protect marine ecosystems under international conventions and other legal instruments. He listed a number of conventions and instruments that impose obligations for management activities regulating use of the oceans, noting that not all are binding or have entered into force. He highlighted the 1982 UN Convention on the Law of the Sea (UNCLOS) and the 1992 Convention on Biological Diversity as major agreements for marine fisheries. Another relevant treaty is the 1995 UN Fish Stocks Agreement, which refers explicitly to the ecosystem approach, but has yet to enter into force. Anderson also discussed the voluntary 1995 FAO Code of Conduct for Responsible Fisheries, which provides a comprehensive, multi-stakeholder instrument on fisheries management. While international instruments rightly seek to establish a global framework for EBFM, Anderson drew attention to a number of weaknesses, including the fact that many States are not party to these instruments, thus limiting their application. In addition, provisions in these instruments are often ambiguous or unclear on environmental protection, and many countries are unable to provide the resources to implement the measures outlined in these instruments.

Bernt Bodal, Chair and CEO of American Seafoods Group, presented a large-scale industry perspective on incorporating ecosystem considerations in fisheries management. He underscored the importance of economies of scale in providing cost effective food-sources. Focusing on the success of the large-scale fishing industry in the US North Pacific, he noted that nearly 30 years of commercial fishing has not caused overfishing of the 63 species of groundfish in the area, and attributed this achievement to the industry's application of the precautionary principle in calculating quotas and to its close monitoring of harvests. He expressed a willingness on the part

of large-scale industry to support research and blamed poor governance where fisheries have collapsed. He highlighted the superiority of harvesting cooperatives as a means of managing large-scale fisheries. These cooperatives voluntarily assign quotas and thus increase the accountability of individual companies, unlike the more commonly practiced "Olympic-style" commercial fishing, where vessels compete against each other for catch.

Sebastian Mathew, Executive Secretary of the International Collective in Support of Fishworkers, presented a small-scale fisheries perspective on an EBFM approach, particularly from a developing country's perspective. Highlighting the fishery sector's role in employing and feeding people and in alleviating poverty, he characterized small-scale, artisanal fisheries as traditionally non-mechanized and highly diverse, and expressed concerns that increased motorization of artisanal fisheries is expanding fishing capacity and creating overfishing pressures in coastal communities. In this respect, he stressed the need to focus on small-scale fisheries in marine resource management, noting that current institutional mechanisms are inadequate and that governments lack the confidence to invest in small-scale fisheries management regimes. He called for new initiatives in small-scale fisheries management, urging industrialized nations to stop using their excess fishing capacity in other regions and suggesting that they facilitate a temporary migration of the surplus labor force from areas in the South that have an overcapacity of fisheries workers to those in the North with labor shortages.

Tundi Agardy, Executive Director of Sound Seas, presented an environmentalist's perspective on responsible fisheries. She indicated that environmentalists' aims include synthesizing and disseminating information, promoting the precautionary principle, shifting the burden of proof in determining impacts of new or emerging fisheries from NGOs to the fishing industry, and removing disincentives to conservation. In efforts to achieve these objectives, she advocated a holistic approach recognizing the interconnections between: target stocks and ecosystems; fish harvests and the production chain, particularly the need to recognize the impacts of distribution and packaging in certification schemes; and the relationship between humans and the natural world. She also recommended the creation of marine protected areas (MPAs), noting their ability to integrate development and conservation objectives.

ANNEX II

Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem

Having met at the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem from 1 to 4 October 2001,

Appreciating the initiative taken by the Government of Iceland and the Food and Agriculture Organization of the United Nations (FAO) to organize the Conference with the co-sponsorship of the Government of Norway,

Recalling that this initiative was endorsed at the Twenty-fourth Session of the FAO Committee on Fisheries (26 February - 2 March 2001) and at the One Hundred and Twentieth Session of the FAO Council (June 2001),

Reaffirming that the 1982 United Nations Convention on the Law of the Sea (the Convention) sets out the rights and duties of States with respect to the use and conservation of the ocean and its resources, including the conservation and management of living marine resources,

Recalling that in recent years the world community has agreed on several additional legal and political commitments that supplement the provisions of the Convention, including the Rio Declaration on Environment and Development and Agenda 21 (Chapter 17),

Reaffirming the principles of the FAO Code of Conduct for Responsible Fisheries,

Recalling further the four International Plans of Action formulated in accordance with the Code of Conduct, namely for the Management of Fishing Capacity, for the Conservation and Management of Sharks, for Reducing Incidental Catch of Seabirds in Longline Fisheries, and to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing,

Reaffirming that the FAO Council during its One Hundred and Twentieth Session recommended that ecosystem-based fisheries management studies to be conducted by FAO as agreed in paragraph 39 of the Report at the Twenty-fourth Session of the FAO Committee on Fisheries should be balanced and holistic in approach,

Welcoming and taking into account the discussion in the scientific symposium of the Conference,

Recognising that sustainable fisheries management incorporating ecosystem considerations entails taking into account the impacts of fisheries on the marine ecosystem and the impacts of the marine ecosystem on fisheries,

Confirming that the objective of including ecosystem considerations in fisheries management is to contribute to long-term food security and to human development and to assure the effective conservation and sustainable use of the ecosystem and its resources,

Appreciating that the Conference represented an important opportunity for all fisheries stakeholders to jointly assess the means for including ecosystem considerations in fisheries management,

Aware that the sustainable use of living marine resources contributes substantially to human food security, as well as dietary variety, provides for the livelihood of millions of people and is a central pillar of many national economies, especially low-income food-deficit countries and small island developing States,

Recognising the complex inter-relationship between fisheries and other components of the marine ecosystems,

Convinced that including ecosystem considerations in fisheries management provides a framework within which States and fisheries management organizations would enhance management performance,

Affirming that incorporation of ecosystem considerations implies more effective conservation of the ecosystem and sustainable use and an increased attention to interactions, such as predator-prey relationships, among different stocks and species of living marine resources; furthermore that it entails an understanding of the impact of human activities on the ecosystem, including the possible structural distortions they can cause in the ecosystem,

Recognising the need to strengthen and sustain management capacity, including scientific, legal and institutional frameworks with the aim of incorporating among other things ecosystem considerations,

Emphasising that the scientific basis for including ecosystem considerations in fisheries management needs further development and that there is incomplete scientific knowledge about the structure, functioning, components and properties of the ecosystem as well as about the ecological impact of fishing,

Recognising that certain non-fishery activities have an impact on the marine ecosystem and have consequences for management. These include land-based and sea-based activities which affect habitat, water quality, fisheries productivity, and food quality and safety,

Recognising also that the majority of developing countries face major challenges in incorporating ecosystem considerations into fisheries management and that international cooperation and support are necessary,

Declare that, in an effort to reinforce responsible and sustainable fisheries in the marine ecosystem, we will individually and collectively work on incorporating ecosystem considerations into that management to that aim.

Towards this end, we further declare:

1. Our determination to continue effective implementation of the FAO Code of Conduct, which is our common and agreed guide in strengthening and building fisheries management systems, as well as the International Plans of Action as

formulated in accordance with the Code, and the Kyoto Declaration on the Contribution of Fisheries to Food Security.

2. There is a clear need to introduce immediately effective management plans with incentives that encourage responsible fisheries and sustainable use of marine ecosystems, including mechanisms for reducing excessive fishing efforts to sustainable levels.
3. It is important to strengthen, improve, and where appropriate establish, regional and international fisheries management organizations and incorporate in their work ecosystem considerations and improve cooperation between those bodies and regional bodies in charge of managing and conserving the marine environment.
4. Prevention of adverse effects of non-fisheries activities on the marine ecosystems and fisheries requires action by relevant authorities and other stakeholders.
5. While it is necessary to take immediate action to address particularly urgent problems on the basis of the precautionary approach, it is important to advance the scientific basis for incorporating ecosystem considerations, building on existing and future available scientific knowledge. Towards this end we will undertake to:
 - (a) advance the scientific basis for developing and implementing management strategies that incorporate ecosystem considerations and which will ensure sustainable yields while conserving stocks and maintaining the integrity of ecosystems and habitats on which they depend;
 - (b) identify and describe the structure, components and functioning of relevant marine ecosystems, diet composition and food webs, species interactions and predator-prey relationships, the role of habitat and the biological, physical and oceanographic factors affecting ecosystem stability and resilience;
 - (c) build or enhance systematic monitoring of natural variability and its relations to ecosystem productivity;
 - (d) improve the monitoring of by-catch and discards in all fisheries to obtain better knowledge of the amount of fish actually taken;
 - (e) support research and technology developments of fishing gear and practices to improve gear selectivity and reduce adverse impacts of fishing practices on habitat and biological diversity;
 - (f) assess adverse human impacts of non-fisheries activities on the marine environment as well as the consequences of these impacts for sustainable use.
6. The interaction between aquaculture development in the marine environment and capture fisheries should be monitored through relevant institutional and regulatory arrangements.
7. Our determination to strengthen international cooperation with the aim of supporting developing countries in incorporating ecosystem considerations into

fisheries management, in particular in building their expertise through education and training for collecting and processing the biological, oceanographic, ecological and fisheries data needed for designing, implementing and upgrading management strategies.

8. We resolve to improve the enabling environment by encouraging technology transfer contributing to sustainable management where appropriate, introducing sound regulatory frameworks, examining and where necessary removing trade distortions, and promoting transparency.

9. We urge relevant technical and financial international organisations and the FAO to cooperate in providing States with access to technical advice and information about effective management regimes and about the experience from such arrangements, and other support, devoting special attention to developing countries.

10. We would encourage FAO to work with scientific and technical experts from all different regions to develop technical guidelines for best practices with regard to introducing ecosystem considerations into fisheries management. These technical guidelines should be presented at the next session of the FAO Committee on Fisheries.

AND REQUEST that the Government of Iceland convey this Declaration to the Secretary-General of the United Nations, the Director-General of the Food and Agriculture Organization of the United Nations, the Chairman of the World Summit on Sustainable Development to be held in Johannesburg in September 2002 and relevant fisheries management organizations for their consideration.