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**TECHNICAL CONSULTATION ON INTERNATIONAL GUIDELINES
FOR THE MANAGEMENT OF DEEP-SEA FISHERIES IN THE HIGH
SEAS**

Rome (Italy), 4-8 February 2008

**DRAFT INTERNATIONAL GUIDELINES ON FOR THE MANAGEMENT
OF DEEP-SEA FISHERIES IN THE HIGH SEAS**

**As adopted by the Expert Consultation on International Guidelines for
the Management of Deep-sea Fisheries in the High Seas (Bangkok, Thailand,
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Acronyms

COFI	FAO Committee on Fisheries
CBD	Convention on Biological Diversity
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
Compliance Agreement	FAO Compliance Agreement
DSF	Deep sea fisheries (as defined by paragraph 6)
EAF	Ecosystem Approach to Fisheries
FAO	Food and Agriculture Organization of the United Nations
IPOA	FAO International Plan of Action
IUCN	The World Conservation Union
IUU	Illegal, unreported and unregulated fishing
MCS	Monitoring, control and surveillance
MPA	Marine protected area
RFMOs/As	Regional fisheries management organizations and arrangements
The Code	1995 FAO Code of Conduct for Responsible Fisheries
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNGA	United Nations General Assembly
VME	Vulnerable marine ecosystem
VMS	Vessel monitoring systems
1982 UN Convention	1982 United Nations Convention on the Law of the Sea
1995 UN Fish Stocks Agreement	The 1995 UN Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks

SECTION 1 - PREAMBLE

1. These International Guidelines for the Management of Deep-sea Fisheries in the High Seas were developed at the request of the FAO Committee on Fisheries (COFI) at its twenty-seventh session in order to help States and Regional Fisheries Management Organizations and Arrangements (RFMOs/As) to sustainably manage deep-sea fisheries and to implement the United Nations General Assembly (UNGA) Resolution 61/105 with respect to the protection of vulnerable marine ecosystems (see Annex 2). The COFI first discussed deep-sea fisheries at its twenty-fifth session in 2003. The COFI noted and supported the intended initiative of the Governments of New Zealand and Australia to host an international conference on the governance and management of deep-sea fisheries (DEEP SEA 2003). The COFI also requested a report on the outcome of the conference for COFI's twenty-sixth session. The management of deep-sea fisheries in the high seas has also been a major source of concern at the UNGA during the last few years. The most recent UNGA Resolution on sustainable fisheries (61/105) called on, "States to take action immediately, individually and through regional fisheries management organizations and arrangements, and consistent with the precautionary approach and ecosystem approaches, to sustainably manage fish stocks and protect vulnerable marine ecosystem..." The vulnerability of deep-sea ecosystems and present management challenges in the high seas have been discussed not only in the context of global forums, but also at many international, regional and national institutions and non-governmental organizations that have been working to bring this issue to international attention.

2. The 27th session of COFI requested that the international guidelines include standards and criteria for identifying vulnerable marine ecosystems in areas beyond national jurisdiction and identify the potential impacts of fishing activities on such ecosystems, in order to facilitate the adoption and the implementation of conservation and management measures by RFMO/As and flag States (pursuant to paragraphs 83 and 86 of the Resolution).

3. Following the convening of an Expert Consultation on Deep-sea Fisheries in the High Seas (Bangkok, 21-23 November 2006) the FAO Fisheries and Aquaculture Department proceeded with the development of the guidelines in the following manner: (i) an Expert Consultation (Bangkok, September 11-14, 2007) provided the initial forum for the technical review of a first draft of the guidelines, (ii) a Technical Consultation in early 2008 will discuss the guidelines from a policy perspective and finalize the document, and (iii) the guidelines will be submitted to the 28th Session of COFI for discussion and endorsement.

4. The first draft of the International Guidelines prepared by FAO was revised by the 2007 Bangkok Expert Consultation. A Workshop on Vulnerable Marine Ecosystems and Destructive Fishing (26-29 June 2007) provided insight on important issues. An additional workshop on Knowledge and Data on Deep-sea Fisheries in the High Seas (Rome, Italy 5-7 November, 2007), will undertake a global review of deepwater fisheries in the high seas and comment on reporting obligations.

5. The role of the guidelines is to provide a toolbox of ideas and solutions and direction on their application to guide RFMOs and States towards sustainable use of marine living resources, the prevention of significant adverse impacts to vulnerable marine ecosystems and the protection of marine biodiversity.

SECTION 2 - SCOPE AND PRINCIPLES

6. These Guidelines have been developed for fisheries which have three characteristics:
- a) species with life histories that can sustain only low exploitation rates, (tending to be long lived, slow-growing, late maturing, etc.) are represented in the total catch (everything brought up by the gear) and/or suffer incidental mortality;
 - b) there is a likelihood that the fishing gear will contact the seafloor; typically demersal and benthic fisheries; and

- c) the fisheries occur in areas beyond national jurisdiction.
7. For the purpose of these guidelines, the fisheries described above shall be referred to as “deep sea fisheries” (DSF).
8. Management of other fisheries which show a majority of these characteristics should take these Guidelines into account, even if they do not have all the characteristics.
9. Recognizing the immense importance and value of deep-sea ecosystems and the biodiversity they contain, the higher order objectives of management of DSF are to:
- a) ensure the long term sustainability of deep-sea living resources;
 - b) prevent significant adverse impacts on vulnerable marine ecosystems (VMEs); and
 - c) protect biodiversity in the marine environment.
10. In order to achieve the objectives stated in paragraph 9 it will be necessary, on a case-by-case basis to:
- a) adopt and implement measures in accordance with the precautionary approach, the ecosystem approach and international law;
 - b) identify areas where VMEs are known or likely to occur; and
 - c) take action using the best information available, including through the closure of areas to bottom fishing.
11. The management of DSF should be consistent with the 1982 United Nations Convention on the Law of the Sea (1982 UN Convention) and the 1995 UN Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (The 1995 UN Fish Stocks Agreement), the FAO Compliance Agreement (Compliance Agreement), the 1995 FAO Code of Conduct for Responsible Fisheries (The Code), the Convention on Biological Diversity (CBD) and other relevant international instruments. Annex 2 contains relevant resolutions from COFI and from UNGA for immediate reference.

SECTION 3 - CHALLENGES OF DEEP-SEA FISHERIES

12. Management of DSF will require as much effort as that required for management of fisheries on continental shelves and within national jurisdictions, applying all the provisions of relevant agreements specified in the Scope and Principles. However, a number of features of the governance of DSF, of the marine living resources targeted by these fisheries, and of the ecosystems in which they occur, require that even greater effort and vigilance is necessary to ensure sustainable use of the marine living resources they exploit, the prevention of significant adverse impacts on VMEs and the protection of marine biodiversity.

3.A Governance

13. Major challenges in management of DSF are the gaps and shortcoming in the current legal and institutional regimes. Inadequate systems of management and administration of many DSF and the absence of RFMOs/As in many of the world’s oceans have contributed to overfishing and adverse impacts on marine ecosystems. These issues are also impediments to implementing many types of incentives to promote sustainability, including secure and exclusive fishing entitlements.

14. Few data are available for many DSF. The problem of deficient and unavailable data has been exacerbated by insufficient flag State control, deficiencies in reporting of activities of their fleets and the lack of appropriate incentives including secure and exclusive fishing entitlements.

15. The number of users of non-fish marine resources in the high seas impacting VMEs is significant and increasing. Another distinct feature of DSF governance is that in areas beyond national jurisdiction there is a lack of mechanisms for communication, cooperation, and coordination among international organizations, such as RFMOs/As, Regional Oceans Management Organizations, the International Seabed Authority, and among and within States. There is a need for reciprocal reporting of activities that affect fisheries and VMEs, among RFMOs/As, and other competent management agencies.

3.B Sustainable Use of the Exploited Marine Living Resources

16. Many of the problems associated with the conservation and management of DSF are common to the management of coastal fisheries. In addition, many but not all marine living resources exploited by DSF have biological characteristics that make management problematic. These include:

- a) maturation at relatively old ages;
- b) slow growth;
- c) long life expectancies;
- d) low natural mortality rates;
- e) intermittent recruitment of successful year classes;
- f) adults may not spawn every year.

17. As a result, deep-sea marine living resources generally have low productivity and they are able to sustain only very low exploitation rates. Also, when these resources are depleted, recovery is expected to be long and not assured.

18. The great depths at which marine living resources are caught by DSF pose additional scientific and technical challenges in providing scientific support for management. These include:

- a) the cost and logistical difficulties of conducting highly technical research and monitoring of DSF;
- b) the high temporal and spatial variability in the distribution and behaviour of some species poses difficulties for representative sampling;
- c) the absence of basic biological knowledge for many species;
- d) the difficulties in applying some conventional fisheries research techniques in deep waters;
- e) the lack of time series of population estimates and surveys for most marine living resources exploited by DSF.

19. Together these factors mean that assessment and management have greater uncertainty and higher costs to fill the gaps.

20. The nature of DSF often includes characteristics that make it harder for management to achieve sustainable use. These include:

- a) many stocks caught by DSF aggregate in high densities; this leads to high initial catch rates but depletion may be rapid;
- b) with greater uncertainty about stock size and very low sustainable harvest rates, errors in population estimates, even small ones which are very hard to detect, can lead to unreliable estimates of sustainable harvests;

- c) with low target exploitation rates, weak compliance or unexpectedly high catch rates can rapidly result in serious overharvesting; and
- d) governance difficulties discussed in 3A often make it difficult to implement incentive measures that promote responsible harvesting.

21. As a result DSF may require special management approaches in addition to very low target exploitation rates.

3.C Protection of Vulnerable Marine Ecosystems and Marine Biodiversity

22. The problems listed in Section 3B with regard to sustainable use of the marine living resources targeted by DSF also apply to the protection of VMEs and marine biodiversity, and are often even greater. Particular concerns include:

- a) the sensitivity and vulnerability of some species, communities and habitats to direct and indirect impacts of fishing (easily perturbed);
- b) the extreme longevity (100s to >1 000 years) of individuals of some types of organisms (e.g. octocorals) or the long times over which some habitats develop - up to >8,000 years for cold water coral reefs (slow recovery);
- c) the low resilience of species, communities and habitats as a result of low productivity, great longevity, unpredictable and usually low recruitment, and low growth rates (unpredictable recovery);
- d) a high proportion of species encountered within some deep-sea ecosystems are endemic, and are found nowhere else (high risk of loss of biodiversity, including extinctions);
- e) some vulnerable seafloor communities are distributed as spatially discrete units often within a small area relative to the overall area of the seabed (small perturbations may have significant consequences);
- f) the connectivity between populations within geographic regions may be critical to the long-term sustainability of biodiversity (fragmentation and risk of loss of source populations);
- g) current knowledge of the ecosystem components and their relationships is generally poorly known and the gaps more difficult to fill (managing under greater uncertainty).

23. These differences identified in Section 3 between DSF and other types of fisheries are the basis for the Guidelines that follow.

SECTION 4 - DESCRIPTIONS OF KEY CONCEPTS

4.A Bottom Fishing

24. Depending on how they are used, all gears could contact the bottom or benthic communities, intended or not. Managers need to consider the potential for such contact and their impacts in all DSF. Table 1 illustrates the major types of gears currently used in DSF and some of the species exploited with these gears. Table 1 is not to be taken as an exhaustive list of bottom gears and species.

4.B Vulnerable Marine Ecosystems

25. Vulnerability includes considerations of both the likelihood that a population, community, or habitat will experience substantial alteration from short-term or chronic disturbance, and the length of

time required to recover to its prior state, after a disturbance. The most vulnerable marine ecosystems are ones that are both easily disturbed and are very slow to recover, or may never recover. Vulnerable ecosystem features may be physically fragile, but some may be functionally fragile even if physically robust.

26. The vulnerabilities of populations, communities and habitats must be assessed relative to specific threats. Some features, particularly ones that are physically fragile or inherently rare may be vulnerable to most forms of disturbance, but the vulnerability of some populations, communities and habitats may be quite different to different types of fishing gears or other types of disturbances. Table 2 illustrates examples of the types of habitats and ecosystems that have a high potential to be vulnerable. Table 2 is not to be taken as an exhaustive list of vulnerable habitats and ecosystems.

4.C Significant Adverse Impacts

27. Adverse impacts caused by fishing gears or other anthropogenic disturbances are impacts on populations, communities, or habitats that are more than minimal and not temporary in nature. If the consequences of an impact spread more widely in space or through ecosystem interactions and are not temporary, the impact is adverse even if the ecosystem feature impacted directly shows rapid recovery.

28. Taking into account Principle 15 of the United Nations Conference on Environment and Development (UNCED) Rio Declaration on Environment and Development¹, adverse impacts become significant when the harm is serious or irreversible. Impacts that are likely to take several generations² or decades (whichever is shorter) to reverse are considered irreversible. Impacts that are likely to reduce the productivity of any population impacted by the fishery (whether intentional or accidental), or the productivity, species richness, or resilience of an impacted community or ecosystem, or the structural complexity of a habitat are considered serious. In this context productivity is intended to mean all aspects of a population's capacity to maintain itself. In circumstances of limited information the assumption should be that impacts will be difficult to reverse or likely to affect productivity or resilience unless there is evidence to the contrary.

SECTION 5 - MANAGEMENT AND CONSERVATION FRAMEWORK

5.A General management considerations

29. The management of DSF should be consistent with articles 5 and 6 of the 1995 UN Fish Stocks Agreement as well as the following general principles and actions from agreed international instruments which recognise the need to: (the following should not to be taken as an exhaustive list)

- a) base the management of DSF on the best information available, taking into account fisher's knowledge, where appropriate;
- b) ensure transparency, public dissemination of information and enable participation of all relevant stakeholders in management;
- c) develop data collection and research programmes to assess the impact of fishing on non-target and associated or dependent species and their environment, on the known and likely locations of VMEs;
- d) identify areas where VMEs are known to likely to occur and the location of fisheries in relation to VMEs or features likely to contain such ecosystems;

¹ The full text of Principle 15 reads; In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

² Generations of the impacted marine living resource, not human generations.

- e) to adopt plans which are necessary to ensure the conservation of non-target and associated or dependent species, the prevention of significant adverse impacts on VMEs and the protection of marine biodiversity;
- f) use the most selective fishing methods possible recognizing the difficulties of managing mixed species fisheries and high bycatch;
- g) eliminate subsidies that contribute to illegal, unreported and unregulated (IUU) fishing and to over-capacity;
- h) implement and enforce conservation and management measures through effective monitoring, control and surveillance (MCS).

30. Consistent with UNGA Resolution 61/105 paragraph 83, DSF should be rigorously managed throughout all the stages of their development: (i) new, (ii) exploratory, and (iii) established fisheries (refer to 2006 Bangkok report, Annex 1.A). This staged approach should be implemented in light of the vulnerability of deep sea resources and ecosystems to ensure that while knowledge is low, harvest rates and risk are kept very low and harvests only increase as knowledge, management capacity, and MCS grow. Additional provisions should be developed for pre-existing, lapsed and closed fisheries.

31. Implementation of the precautionary approach is required as a precondition for sustainable management of DSF, for the prevention of significant adverse impacts on VMEs and for the protection of marine biodiversity. Strategies that have been applied to manage DSF need to be evaluated in light of their poor performance to date, particularly for low-productivity species. Annex II of the 1995 UN Fish Stocks Agreement, specifies that the “fishing mortality rate which generates maximum sustainable yield should be regarded as a minimum standard for limit reference points” (Annex II, article 7). However, reference points for the management of DSF need to be more precautionary and set conservatively taking into account the ecosystem approach to fisheries (EAF).

5.B Governance framework

32. States acting in their capacity as flag States, port States, market States and by exercising jurisdiction over their nationals, should contribute to the attainment of the objectives in paragraph 9, especially given the abovementioned gaps in the global and regional frameworks.

33. States should ensure that the activities of vessels or nationals under their jurisdiction or control do not cause damage to the marine environment of other States or areas beyond the limits of national jurisdiction.

34. States should establish and implement national legal and institutional frameworks for the effective management of DSF and their impacts on VMEs.

35. States should strengthen the capacity of existing RFMOs/As with the competence to manage DSF and urgently cooperate in the establishment of new RFMOs/As with the competence to regulate bottom fisheries and the impacts of fishing on VMEs where no such relevant organization or arrangement exists.

36. RFMOs/As, should develop mechanisms for communication, cooperation, and coordination among international organizations, such as the International Seabed Authority, other relevant regional and international organizations, such as the United Nations Environment Programme's (UNEP) regional seas programmes, other regional marine environmental protection organizations and relevant scientific bodies with expertise on deep-sea ecology. In addition, RFMOs/As should cooperate with industry and non-governmental organizations (NGOs).

SECTION 6 - MANAGEMENT AND CONSERVATION STEPS

6.A Data, reporting and assessment

37. Exploratory fishing needs to be carried out in a way that provides appropriate data to inform subsequent stock assessments and the requirements of adopting EAF.

38. The main components of stock assessment for DSF are generally the same as for other marine fisheries. Information required includes understanding the stock structure of the harvested resources, their abundances and their productivities.

39. A wide range of information and data are required to develop stock assessments for deep-sea species:

- a) Biomass estimation is difficult for many, if not most, deep-sea species. Given the limited resources likely to be available in offshore fisheries, and the urgent need for immediate management, fishery dependent techniques (e.g. fine-scale catch per unit of effort), and/or techniques able to be applied on commercial vessels (e.g. acoustic surveys) may need to be implemented;
- b) Stock structure identification is essential to ensure that management is occurring on an appropriate spatial scale that reflects the distribution of the populations and ecosystem, which requires biological information;
- c) Age/growth determination is necessary for productivity estimation;
- d) Catch information: An accurate catch history of all species caught in the fishery is needed to evaluate community structure and changes in stock characteristics over time. Knowledge of the past distribution of fishing and catches is critical to reliable assessment of the current status of deep-sea stocks. Data are required on historical fishing locations, fishing effort, gear type, and catches;
- e) Bycatch information: Bycatch data are needed to aid assessing likely impacts of fishing on dependent and related species (bycatch of commercial species, information on the catch of discarded species and benthic invertebrates (e.g. coral, sponges, seastars, crabs) and on the ecosystem as a whole.

40. Current and future fishery data reporting systems need to ensure detailed, accurate and complete information is obtained from fishing operations.

41. Research is needed on all aspects of the biology and ecology of VMEs and deep-sea marine species, habitats, and ecosystems; on the capacity of deep-sea marine living resources, habitats and communities to recover from perturbations; on the ecosystem effects of fisheries and the effectiveness of conservation and management measures. This research should be pooled and reviewed periodically.

Data collection

42. Data collection plans, which meet all the requirements for the orderly development of current and planned DSF, should be developed and implemented. Such plans should include not only commonly used fishery statistics and fishery biology data but also incorporate collection of other data required subject to the stage of fishery development, e.g. new, exploratory or established fishery. In addition, further information or data may need to be collected, on a case-by-case basis, in order to take into account specific ecosystem protection requirements.

43. A fully comprehensive data collection system is required to enable full assessment of deep-sea fisheries ecosystems. An example of a fishery data collection plan is given in Annex 1.

44. Data recording needs to include detailed location, time and depth data, and information on gear type, and fishing duration. Because deep-sea marine living resources and VMEs may have localized distributions (in some cases, on a single seamount or ridge feature) the spatial precision of reporting is important. Data should be provided at the level of individual operations. In addition to the catch of target and bycatch commercial species, information on the catch of discarded species and benthic invertebrates (e.g. coral, sponges, seastars, crabs) is required. Environmental variables (e.g., bottom temperature) should also be recorded because fish availability/abundance may vary with changing environmental conditions.

45. Standardised and consistent data collection procedures are required. Standard logbook formats (separate catch-effort and biological data forms) should be produced and adopted across all DSF. This will require cooperation and coordination between RFMOs/As and national agencies to standardize forms where appropriate. Electronic data collection and reporting systems such as electronic logbooks should be considered.

46. Methods of collecting deep-sea sea floor and benthic habitat information in the course of normal fishing operations should be developed that can estimate the likely distribution of faunal groups or vulnerable habitats. Collection of oceanographic data (physical, chemical, geological and biological) would be useful to enable predictive analyses in the future. Bathymetric data (e.g. from multibeam mapping) collected by fishing vessels should be provided to management agencies to aid assessing likely impacts of fishing on the ecosystem.

47. To improve the information available for identifying VMEs it is necessary to conduct surveys to gather information on bathymetry, seabed features, and benthic and demersal communities, using survey methods that would not damage VMEs that might be present.

Data quality

48. The presence of trained observers on vessels would help ensure reliable data are collected. The observer coverage on vessels engaged in new and exploratory stages of fishery development should be 100 percent.

49. National or international training programmes for fishers and scientific observers are necessary to improve catch identification and biological data collection in offshore areas where different species to those in national waters may be encountered. Such programmes should be approved to a certain standard. They may need to be implemented and coordinated by FAO in some regions, especially where capacity building in developing countries is needed.

Data reporting

50. The timely provision of data to the appropriate RFMOs/As is important to ensure regular analysis and monitoring of fisheries. The frequency of this will depend upon the duration of high-seas fishing trips, which can be variable, but often over several months. Data should be centralized in a single database on a regional basis. This facilitates monitoring adequacy of data and ease of analysis. Access to data, data sharing, and confidentiality of data are issues to be resolved by the regional bodies, arrangements, and national authorities.

51. Vessel registry data are required to identify changes in the fishery composition, fishing power, and gear types to help interpret changes in fishery performance.

52. Some of the stocks occurring in areas beyond national jurisdiction may extend inside boundaries of national jurisdiction. In this case cooperation is required between coastal States and RFMOs/As to collect data and assess the stock.

53. The list of data that RFMOs/As and flag States require fishing vessels to report should give particular attention to the features likely to be associated with VMEs that are likely to occur in the region.

54. In areas where VMEs are known or suspected to occur and fishing is authorised to proceed, mechanisms have to be in place for reporting the activities of fisheries relative to the prevention of significant adverse impacts on VMEs.

55. In places not covered by paragraph 54, mechanisms have to be in place so that unexpected encounters with VMEs or features likely to be associated with VMEs can be reported.

56. The prevention of significant adverse impacts on VMEs will require adaptive management, and RFMOs/As and States should specify and address the information needs for such management relative to known or expected VMEs.

57. Data on the vessel, gear, and fishing practices relevant to assessing or identifying potential impacts on VMEs should be reported. In situations where fishing activities occur in proximity of VMEs, information on gear location and tow tracks are necessary to identify the location of the VME. The location of lost and damaged gear should also be reported.

58. Flag States, in collaboration with RFMOs/As where they exist, should monitor and report the location and activities of fishing vessels on as close to real-time as possible.

59. Bathymetry at the location of each fishing event, and other oceanographic information considered relevant to the VME should be collected during the fishing.

6.B Stock Assessment

60. For many deep-sea stocks it is difficult to provide robust assessments due primarily to data limitations. Lower cost or innovative methods based on simpler forms of monitoring and evaluation may need to be developed. Appropriate assessment techniques are also needed when the harvested species possess the characteristics described in paragraph 16.

61. Appropriate biological reference points for stock assessment and management need to be determined on a case-by-case basis, as these will vary with target species, fishery characteristics, and the state of knowledge about the species and fishery. For low productivity species, fishing mortality should not exceed natural mortality of the target or main bycatch species.

6.C Identifying Vulnerable Marine Ecosystems and Assessing Significant Adverse Impacts

62. To identify VMEs, RFMOs/As and flag States should assemble and analyse all relevant information on areas where fisheries under their jurisdiction or competence are currently operating or where new or expanded fisheries are contemplated.

63. The level of precaution applied in management should reflect the quantity and quality of data available. Improved data allows decision-making under less uncertainty.

64. VMEs should be designated if areas exhibit one or more of the following characteristics:

- a) Contain unique or intrinsically rare species, communities or habitats – An area or ecosystem that is unique or that contains rare species should be considered vulnerable, since its loss could not be compensated for by other areas.
- b) Contain habitats that support endemic species – An area or ecosystem that has significant rates of endemism should be considered vulnerable.
- c) Support the presence of depleted, threatened, or endangered species – Areas that contain depleted, threatened or endangered species for all or part of their life histories should be considered vulnerable.
- d) Contain important habitat for populations and for which alternative habitats are not known to exist or are uncommon – A discrete area or habitat that may be essential for the survival, spawning/reproduction, or recovery of a species (target or non-target species) should be considered vulnerable, whether or not the actual functional relationship between species and habitats are known.
- e) Are fragile – An area that contains populations, communities, or habitats that are easily damaged by anthropogenic activities, including fishing, should be considered vulnerable, particularly if the features that are damaged have long recovery times or where recovery may not be to the former pre-impact state. Many organisms that structure biogenic habitats (e.g., corals, sponges, and bryozoans) are relatively fragile and highly susceptible to physical impacts.
- f) Are structurally complex – An area or habitat that is characterized by complex physical structures created by biotic features (e.g., corals, sponges, bryozoans) or by abiotic features (e.g. boulder fields, clay levees). In these areas, ecological processes are usually highly dependent on these structured systems. Further, such ecosystems often have high diversity, which is dependent on the structuring organisms or physical features. Such areas have been shown to be vulnerable to physical disturbance.
- g) Support species whose life-history traits make recovery long or unlikely if impacted – Areas that support species with one or more of the characteristics in 3B (paragraph 16) are vulnerable.

65. Additional criteria may need to be developed as experience and knowledge accumulates, or to address particular local or regional needs.

66. States should conduct assessments to establish if fishing activities are likely to produce significant adverse impacts. The assessments should follow the guidelines in Section 6I and should address, *inter alia*:

- a) the type(s) of fishing conducted or being contemplated for the area;
- b) non-fishing activities that occur or are likely to occur in the area, on what scales and their cumulative effects;
- c) the population, communities and habitats that are present or are considered likely to be or to have been present in the area;
- d) the risk that the area being impacted by fishing contains VMEs;
- e) the proportion of the populations, communities, and habitats at risk of being impacted by the fishing;
- f) whether the activities involved in fishing will affect the properties that make the area a VME; and
- g) the measures to avoid the impacts, or reduce them to a level where they do not result in significant adverse impacts, and what they are.

67. States should take all feasible measures to make information available to the competent RFMOs/As. Fishing industries should cooperate fully in this exercise. (Annex 3 - technical annex on potential sources).

68. RFMOs/As and States should consider all the information addressed in paragraph 44 in developing management plans, but normally will augment this information with relevant information from similar or related fisheries, species, and ecosystems.

69. RFMOs/As and States should evaluate, and where necessary, increase their capacity to acquire and interpret information relevant to assessing the impact of DSF on VMEs and marine biodiversity.

70. Identification of VMEs should use direct ecological criteria such as:

- a) the presence of known types of vulnerable species, communities, or habitats (see Table 2);
- b) the presence of structurally complex and fragile habitats or species;
- c) the presence of species of concern that perform important life history functions at discrete sites determined to be or likely to be sensitive to adverse impacts.

71. Where site-specific information is lacking to apply direct ecological criteria, then information that may allow the potential presence of such species, communities or habitats to be inferred should be used (e.g., areas of steep topography that may be the basis to infer presence of suspension feeding communities dominated by corals, sponges, etc.).

72. These assessments should be repeated on time frames appropriate to the nature of the fishery and the ecosystem, even if the initial assessment concluded that VMEs were not present or that there was not a high likelihood of significant adverse impacts.

73. The assessments should also be repeated when there have been changes to the fishery that could modify its impact on VMEs, or other activities in the area, or when characteristics of VMEs are encountered in the process of fishing, or when natural processes are thought to have undergone large changes.

74. Assessments for the presence of VMEs should be conducted, and plans to ensure their protection from significant adverse impacts should be developed and implemented, according to the guidelines in Section 6d and 6e.

6.D Characteristics of Management Tools

75. A range of tools and options are available, but management must be implemented on a case-by-case basis, taking a precautionary approach and an ecosystem approach consistent with paragraph 10. The tools and options for management presented in this section are not intended to be prescriptive or exhaustive.

Gear controls

76. Gear may be modified, deployed differently, or a different gear may be used in order to better manage the impact of a fishery, on both the harvested marine living resources and the ecosystem. Current vessel monitoring systems (VMS) are better at monitoring the use of some gear (trawl) than others (long-line, static nets and traps). Controls on mesh size (selectivity) are more difficult or costly to enforce in trawl fisheries than in the other gears. Trawlers involved in DSF are capable of using both bottom trawls and mid-water trawls during the same fishing trip.

Effort controls

77. There are many variants of effort control systems. Effort management has been effective in contributing to the objectives of the fisheries management plan when the operations of the fishery were consistent across a fleet and over time, and there was some form of effective MCS.

78. Effort management is less effective when the fleet can modify fishing operations to increase efficiency of effort, or when there are opportunities to fish without the effort being counted in the management system. Effort management also requires a biological basis for determining the amount of effort to be allowed, either through a precautionary and restrictive approach to prevent rapid expansion of new fisheries, or through a reliable history of effort, catches and stock status for mature fisheries, so that the effort that is sustainable can be determined.

79. Effort controls may play a key role in managing DSF, but need to be combined with other measures to manage the impact of the fishery on VMEs and on marine biodiversity.

80. In managing new, exploratory and expanding fisheries, effort should be kept very low until sufficient information is collected to provide a basis to manage the impact of the fisheries on VMEs and marine biodiversity.

Catch controls

81. Catch controls come in many variants. To be successful catch controls require a sound basis for setting the limits and high compliance which requires either strong MCS programmes or a strong ethic of co-management and stewardship. The benefits of catch controls can be increased if combined with catch documentation schemes, which ensure markets can discriminate against fish harvested outside or in contravention of the management system.

82. The preconditions for catch controls to provide for the sustainability of fisheries as well as for the conservation of target species will rarely be met for mixed DSF, particularly during the early years in which they are being conducted in a new area, or when flag State or RFMOs/As control of the fisheries is inadequate. Catch controls need to be combined with other measures to manage the impact of the fishery on VMEs and marine biodiversity.

Spatial and temporal management

83. Fishing can affect the population structure and genetic diversity of exploited populations, even if the biomass of the target species is maintained. Both population structure and genetic diversity may be difficult to protect using non-spatial management means. Spatial and temporal management could be helpful in these conditions.

84. The lack of knowledge about many deep-sea species or their ecological role can make their conservation and protection difficult compared to situations where there is more information and thus less uncertainty. As a part of EAF, spatial and temporal management tools, including marine protected areas (MPAs), may be particularly useful in data-poor situations such as those encountered in DSF. These tools could contribute to precautionary management and, if appropriately implemented, provide some protection for biodiversity, habitats and targeted species.

85. Long-term protected areas may also serve as scientific reference sites to assist in distinguishing between the effects of harvesting and other causes of ecosystem changes, and provide opportunities for understanding marine ecosystems not directly subject to human interference.

86. Enforcement of spatial and temporal controls may be less costly and more effective than other management measures when coupled with tools such as VMS. But to achieve compliance with the regulations, effective follow-up and effective sanctions are required.

Incentives

87. Measures based on incentives can strengthen the effectiveness of management and conservation measures. Secure and exclusive fishing entitlements provide such incentives and preferential allocation of fishing entitlement may be used to encourage research, resource assessment, data provision and data gathering. The highly spatially-targeted nature DSF make fisheries data commercially sensitive, in the absence of secure and exclusive fishing entitlements. Use of secure and exclusive entitlements as a management tool for DSF should be consistent with international law and involve existing RFMOs/As. Market based measures (ecolabeling, certification programs) encourage improved fishery management. Disincentives (e.g. taxes; fines) could also be introduced. The selection of incentives/disincentives requires a case-by-case approach.

Mapping of the footprints

88. Mapping existing fishing areas is basic to the management of DSF. States involved in DSF should proceed to such mapping exercises for all fishing gear before the end of 2008 at the latest. Because trawling (benthic and benthic-pelagic trawling) is expected to have potentially greater impact on VMEs, mapping trawl footprints is considered a priority.

89. Mapping should be based on haul-by-haul information and expressed at an appropriate spatial and temporal resolution (e.g. as grid blocks with 'fished' blocks being defined over a reference period in relation to trawl tracks/tows for trawling and in relation to days fished for other gear). Comprehensive footprint maps should be compiled by RFMOs/As. For areas not covered by RFMOs/As, each flag State should develop such footprint maps, further noting that the States concerned may also collaborate and develop joint maps for some of the areas concerned.

6.E Effectiveness of Management Tools

Target species

90. Differing gears have different potential effects on target species. Size selectivity could be higher in long-line, gillnet/tangle and trap fisheries than in trawl fisheries. This would lead to higher discard rates of undersize target species in trawl fisheries. The potential catch per fishing operation is higher in trawl fisheries than with the other gears; it would thus be easier to deplete limited concentrations of target species with trawls. A disadvantage of both long-lines and static nets is a high rate of catch being affected by sea bed scavengers, leading to deterioration of fish that have been caught but not yet hauled onto deck, thus potentially affecting the economic viability of the fishery. Gill nets are easily damaged and lost when used in deep water on rough grounds and they will kill target and non-target species by ghost fishing.

91. Effort controls may make a valuable contribution to achieving sustainable use and protection of target species if effort is kept low until sufficient information has been collected on the productivity of the target and bycatch species, as well as the spatial distribution of vulnerable habitat and biodiversity features. Some form of effective and restrictive effort control is almost essential, particularly for new, exploratory and expanding fisheries, to ensure that the fishery does not expand so rapidly that sustainable exploitation rates are exceeded, and the target species depleted.

92. Catch controls can promote sustainable use and protect target species even if they form very dense aggregations but only if there is sufficient information to estimate stock status and productivity, if the limits are precautionary and account for uncertainties, and if there is effective compliance.

93. Spatial and temporal measures are especially effective in protecting target species of low mobility, aggregations of the target species at spawning times, feeding or nursery grounds, and potentially enhancing the recovery of target species.

Non-target species taken by the fishery

94. Gears differ in their take of non-target species dependent partly on the area fished and fishing practices. Species selectivity of trawls is low relative to other gear types and in (shallower) slope fisheries, albatrosses and petrels (in their range of distribution) may collide lethally with trawl warps and net lines. Long-lines may be particularly damaging to seabird populations due to bycatch (see current and proposed revision of FAO International Plan of Action [IPOA]-seabirds). Gillnets are easily damaged and lost when used in deep water on rough grounds and they will kill target and non-target species by ghost fishing.

95. Effort controls can be expected to contribute to protection of non-target species of the fishery whenever the biological productivity of the non-target species is similar to or higher than the target species in the fishery, but effort limits are not sufficient to protect non-target species of lower productivity than the target species. Both generalizations depend on the relative catchability of the target and non-target species, including the spatial overlap of their distributions and aggregation behaviour.

96. Catch controls can be expected to contribute to the protection of non-target species if “bycatch quotas” are used to restrict fisheries, and closures implemented when the bycatch allocation are fully taken, even if quotas of the target species remain uncaught. Catch controls are expected to provide some protection to non-target species taken in fisheries, if bycatch quotas are set.

97. Spatial and temporal management measures (closures) also protect bycatch species and can provide further protection when bycatch species are more vulnerable to overexploitation than the target species or are poorly known.

Habitats

98. Trawl gears can have a relatively high sea bed impact. Due to gear damage, trawlers may attempt to avoid fishing in habitats with many structural features such as reefs and boulders. Long-line and traps may be deployed in areas where trawling cannot take place and have a lesser impact on the sea bed. However, repeated operation of these gears in habitats with low recoverability (e.g. coral reefs) will lead to degradation over time.

99. Effort and catch controls provide no direct protection to habitat features, beyond restricting the total amount of fishing that will occur in an area.

100. Spatial management tools can protect habitats by excluding fishing or specific gear types in areas they affect including important and vulnerable features of benthic habitats, but they may displace fishing effort to other areas.

Biodiversity

101. Gear and effort limitation can provide some protection to those biodiversity components that are as productive as or more productive than the target species, but by themselves do not ensure that structural and functional properties of ecosystems are protected, particularly when key trophic roles such as dominant predators are occupied by species of low productivity and high catchability.

102. Except for special cases such as those described in paragraphs 95 and 96, effort and catch controls provide no direct protection to general biodiversity, beyond restricting the total amount of fishing that will occur in an area.

103. Spatial management tools can protect components of ecosystems: areas that are closed to fishing will gain from protection of species abundance and richness, population structure, and genetic and habitat diversity. Given the paucity of species-specific information for most deep-seas fishery habitats, spatial management measures may be necessary to protect all biodiversity in a region.

6.F Monitoring, Control and Surveillance; enforcement and compliance

104. Flag States are responsible for the enforcement and compliance of their vessels engaged in DSF. Well-developed and implemented national MCS frameworks are vital components for global, regional and national conservation and management regimes. States should cooperate, through RFMOs/As where they exist, in order to establish effective MCS regimes. States should also participate in the International Monitoring, Control and Surveillance Network for Fisheries Related Activities.

105. Successful management requires high compliance with the management measures, which in turn requires either strong MCS programmes, including independent on-board observers, or a strong ethic of co-management and stewardship.

106. Satellite-based VMS provide information on the location of fishing vessels. In combination with catch reporting, they can be effective for DSF if integrated into the overall MCS framework and used in association with the establishment of temporal and spatial management measures, including MPAs. VMS could, if further developed, provide a good tool to assess fishing effort by gear, better ensure compliance with closed area regulations and provide sufficient evidence to detect infractions particularly in relation to spatial management measures, thus assisting in compliance with regulations. Such tools are particularly cost effective on the high seas where vessel based control schemes are expensive.

107. Measures such as catch certification and trade documentation schemes enhance the ability of port and market States to identify vessels and their catches harvested outside or in contravention of the management system.

108. Sufficient national or international observer or cooperative programmes should be implemented for DSF. One hundred percent coverage should be implemented for new and exploratory stages of a fishery's development and in the areas where there is no RFMO/A or regulatory regime.

109. For monitoring the fisheries, vessel registry data should be regularly updated to identify changes in the fishery composition, fishing power, and gear types to help interpret changes in fishery performance.

110. States should make publicly available, through the FAO a list of those vessels flying their flag authorized to conduct DSF, and the measures they have adopted to regulate such vessels.

111. Port States should adopt and implement national legislation that will serve to prevent, deter and eliminate IUU fishing for deep-sea species. In particular, port States and RFMOs/As should cooperate in efforts to address IUU fishing activities, and on action against vessels on IUU vessel lists. Port States should implement the FAO Port State Model Scheme.

112. Market States should implement and/or participate in catch documentation schemes, market-related measures and deny market access to products from IUU fishing, consistent with international trade law, to support multilaterally agreed conservation and management measures for DSF.

6.G Application of management and conservation tools

113. Application of specific management measures depend on the properties of the measure and their effectiveness in managing impacts on ecosystem components. The following guidance on application of the measures applies to all DSF irrespective of whether a RFMO/A exists or not. Additional measures are required when a functioning and effective regulatory framework has not yet been developed.

114. Where a functioning regulatory framework has not yet been developed, there should be, at a minimum, no expansion of existing fishing areas (i.e. freezing the footprint), and closing areas where VMEs occur or are likely to occur until conservation and management measures have been adopted to prevent significant adverse impacts. Action to manage existing fisheries in such context might involve: (i) freezing the current effort in terms of vessels and areas exploited; (ii) reducing the current effort to the nominal levels needed to provide information for assessing the fishery and obtaining relevant habitat and ecosystem information, and (iii) closing a specific fishery if the risk of significant adverse impact on unique habitat, ecosystem or species is assessed as high given available information.

115. A functioning regulatory framework should include an appropriate set of rules and regulations for the management of existing fisheries, as well as for the opening of new areas to exploratory fishing consistent with these and other relevant Guidelines. Such frameworks should also include basic regulations to protect vulnerable and ecologically or biologically significant areas and ecosystems.

116. Highly restrictive catch and effort controls are essential during the exploratory phases of DSF, and should be a major component of the management of “mature” DSF. However, they are generally not sufficient to ensure conservation of all important ecosystem components and habitat, and often even the target species, if not accompanied by additional measures to manage the impact of the fishery on low productivity species and sensitive habitat features. It is essential for flag States to exercise full control over the operation of their vessels involved in DSF, and exercise precaution in allowing their vessels to expand operations into new areas or for new target species.

117. Flag States should establish legal pre-requisites for entry into a DSF or conditions applicable to participants in a DSF after entry subject to the guidelines of Sections 6A, 6D and 6F.

118. Participants in existing DSF should consider, as an interim measure, to cap fishing effort within the existing footprint area until 2010 or until a full environmental assessment is carried out, whichever is the later. For areas not covered by RFMOs/As, participants in DSF should similarly not fish outside of the flag state footprint maps or the joint maps mentioned in paragraph 88 and 89 above.

119. When deciding if a VME is present:

- a) the criteria in paragraph 64 should be applied as the starting point for the decision, but the decision should include all the information available, whether directly applicable to the criteria or complementary to them;
- b) it should be concluded that an area contains a VME if even one of the criterion is met; and

- c) in data-poor situations, it may not be possible to have an evidence-based application of the criteria. In such situations the best information available should be used as a basis for the decision, and consistent with the Precautionary Approach, if the information leaves substantial uncertainty about the presence of a VME, it should be concluded that a VME is present until there is sufficient information to change that decision.

120. When deciding if fishing will cause significant adverse impacts, the same process as in paragraph 119 should be followed, applying the standards in paragraphs 27 and 28.

121. The spatial scale at which these decisions will be made needs to be established on a case-by-case basis, to be appropriate for the fishery and the likely scale of the VMEs.

122. Decision-making to identify VMEs using the criteria in Section 6C should be precautionary. Annex 4 illustrates an appropriate approach to management decision-making.

123. When a vessel unexpectedly encounters features likely to be associated with VMEs, fishing should cease at the site and the encounter should be recorded and immediately reported.

124. RFMOs/As and flag States should have an appropriate protocol identified in advance for how vessels in DSF should respond to unexpected encounters with a VME or features associated with a VME, ensuring as a minimum that the provision 83d of the UNGA resolution 61/105 is met.

125. When an encounter of a vessel with a VME or features likely to be associated with a VME is reported, the RFMO/A or flag State should consider the report, and adapt management of fisheries in that area appropriately to ensure the necessary protection of the VME.

126. For VMEs that have been designated on the basis of features of the seabed, habitat, non-utilized species, or community properties, effort controls and catch controls are not likely to provide the necessary protection. They may have an important role in managing DSF, but will need to be accompanied by additional measures to protect VMEs.

127. The right mix of measures has to be developed on a case-by-case basis, and be targeted at the reasons why the area is considered a VME. The list of measures below is illustrative of measures that may contribute to protection of VMEs. Often several measures will need to be used in combination to achieve the desired protection. However, depending on the specific features of a VME, some of the measures in the list may not contribute to reduction of impacts of fishing on the VME.

128. Measures that should be considered on a case-by-case basis would include:

- a) closed areas;
- b) closed areas to bottom-contact fisheries or other specific gears;
- c) temporal restrictions or closures (only for protection of species that are migratory);
- d) changes in gear design and/or deployment to prevent or reduce adverse impacts, including:
 - i) eliminate or minimize the contact between the fishing gear and the sea bed;
 - ii) full use of effective bycatch reduction devices appropriate for the features of the VME;
 - iii) full use of technical measures to eliminate or minimize ghost fishing.
- e) operational measures, including:
 - i) master and skipper certification for responsible and skilful fishing in deep seas, particularly for aimed trawler fisheries;
 - ii) electronic mensuration equipment for gear and vessel positioning;
 - iii) appropriate horsepower and winch control systems for DSF;

- iv) modern echosounders and technologies for collecting required bathymetric and habitat information;
- v) accurate charts and habitat maps of the area being fished;
- vi) presence on the fishing vessels of individuals trained to collect biological information on catch and bycatch.

6.H Processes for the Application of Management Tools

Environmental assessment and harvesting plan

129. States should exercise effective jurisdiction and control over their flagged vessels and only authorize them to engage in DSF after conducting an impact assessment in accordance with Section 6C and paragraph 66 of these guidelines. If the result of such assessment indicates that the activities are likely to produce significant adverse impacts, or adversely impact the long-term sustainability of marine living resources, authorizations should not be issued.

130. RFMOs/As should establish processes to regularly review the implementation by States of these guidelines. Such review should also take into account the cumulative impact of fishing by all States in the RFMOs/As area of competence.

131. For areas not regulated by an RFMO/A, States should submit their benthic assessments and fishing plans to FAO on an annual basis. With appropriate financial support from those States, FAO should organize an annual meeting of an independent working group to review these plans and make recommendations accordingly, also taking into account the cumulative effects of all fishing activities concerned in each region. Flag States should act on those recommendations for amending their plans.

132. The information regarding these processes should be made publicly available for public comment and should include the following elements:

- a) mapping and a description of proposed fishing areas;
- b) an evaluation of expected interactions with VMEs and ecosystem impacts;
- c) information on the status of stocks to be fished;
- d) proposed management measures aimed at preventing significant adverse impact on VMEs and the long-term sustainability of targeted marine living resources;
- e) monitoring system to be used;
- f) MCS, compliance and enforcement measures; and
- g) an overall environment impact assessment.

Fishery management plans

133. The establishment of fishery management plans should be considered, as it allows the adoption of a comprehensive set of measures with defined long-term/multi-annual management objectives. They should be designed as a function of the requirement of specific DSF, making use of relevant management tools consistent with these guidelines and with the objectives stated in paragraph 9.

134. In developing and revising fishery management plans, an appropriate procedure should be put in place to verify that the fishery management plans meet the minimum requirements for sustainable DSF and that these minimum requirements are in fact sufficient to achieve sustainable fisheries and to protect VMEs and marine biodiversity. Fishery management plans should promote the use of low impact fishing technology and fishing practices.

135. Fisheries management plans should be adopted on the basis of a transparent process. Interested parties should be afforded the opportunity to contribute by making publicly available information on the intended management objectives and the integration of operational elements of the proposed plan, and by inviting comments. In adopting the plans, due account should be taken of the comments received and feedback provided to contributors through publicly available information.

136. Fishery management plans should be reviewed at regular published intervals and, if appropriate, revised following such reviews. The revision process should also be based on a transparent, participatory process.

6.1 Assessment and Review of Effectiveness of Measures/Adjustment of Measures

137. States and RFMOs/As should establish a system for monitoring the implementation of conservation and management measures and the operation of fisheries on a continual basis. On the basis of data and information obtained from the monitoring system, the effectiveness of the measures should be reviewed and assessed for the purpose of making adjustments, when necessary, to the conservation and management measures. This adaptive feedback system should form an integral part of the management plan for DSF.

138. Data and information to be collected according to paragraphs 42 to 47 through the monitoring system should include those necessary for the assessment of harvested marine living resources, VMEs and state of the ecosystem. States and RFMOs/As should work to develop rules-based management approaches based on selected indicators and benchmarks.

139. States and RFMOs/As should regularly review the best scientific information available on the known or likely locations of VMEs and the impacts of bottom fishing on VMEs and marine biodiversity, and revise conservation and management measures accordingly.

SECTION 7 - ADDITIONAL CONSIDERATIONS ON IMPLEMENTATION

140. In accordance with Article 5 of the Code and in view of the special conditions applying to developing countries and countries in transition, States and relevant intergovernmental and non-governmental organizations and financial institutions should collaborate in providing these countries with the assistance required to develop and maintain appropriate arrangements for the management of their DSF.

141. States and regional fisheries management organizations should collaborate through FAO, CBD and other relevant organizations to address common issues such as the development of compatible standards, tools and information aimed at facilitating the implementation of these guidelines.

142. Pursuant to UNGA Resolutions 61/105 and the Twenty-seventh session of COFI, States should provide appropriate support for FAO to develop a global database on VMEs in areas beyond national jurisdiction, in cooperation with other relevant organization such as the World Conservation Union – IUCN.

143. States and RFMOs/As should report every two years to FAO and CBD on progress made in the implementation of these guidelines.

TABLE 1 - EXAMPLES OF DEEP-SEA FISHERIES IN THE HIGH SEAS: GEAR TYPES AND TARGET SPECIES

Species		Gear type	Region
Alfonsino	<i>Beryx splendens</i>	Bottom, and midwater trawl, some longline	North Atlantic, North Pacific, Indian Ocean, South Atlantic, South Pacific
Blue ling	<i>Molva dypterygia</i>	Bottom trawl, longline	North Atlantic
Black scabbardfish	<i>Aphanopus carbo</i>	Line, bottom, and midwater trawl	North Atlantic
Sablefish	<i>Anoplopoma fimbria</i>	Bottom trawl, longline	
Armourhead, boarfish	<i>Pseudopentaceros wheeleri, P.richardsoni</i>	Bottom and midwater trawl	North Pacific, Indian Ocean
Orange roughy	<i>Hoplostethus atlanticus</i>	Bottom trawl	North Atlantic, South Atlantic, Indian Ocean, South Pacific Ocean
Deepwater Shrimp	<i>Aristeus spp., Aristaeomorpha spp.</i>	Bottom trawl	North Atlantic, South Atlantic, Mediterranean
Hake	<i>Merluccius spp.</i>	Bottom trawl	South Atlantic, North Atlantic
Redfish	<i>Sebastes spp (S. marinus, S. mentella, S. fasciatus, S. proriger)</i>	Bottom and midwater trawl	North Atlantic, North Pacific
Roundnose grenadier	<i>Coryphaenoides rupestris</i>	Bottom and midwater trawl	North Atlantic
Toothfish	<i>Dissostichus spp</i>	Bottom trawl, longline	South Atlantic, Indian Ocean, CCAMLR region
Deepwater sharks	<i>Centroscymnus spp, Centrophorus spp.</i>	Bottom Longline, Deepwater gill nets, bottom trawl	North Atlantic, South Atlantic, Indian Ocean, South Pacific
Rock lobster	<i>Jasus tristani, J. lalandi</i>	Pot/trap	South Atlantic, Indian Ocean
Deep-water crabs	<i>Chaceon spp.</i>	Pot/trap	South Atlantic, North Atlantic

TABLE 2 - EXAMPLES OF POTENTIAL VULNERABLE SPECIES AND, HABITATS AND FEATURES**Examples of vulnerable species and habitats forming species that are documented or considered sensitive and potentially vulnerable to deep-sea fisheries in the high-seas:**

- a. coldwater corals of various types e.g., reef builders and coral forest including: stony corals (scleractinia), alcyonaceans and gorgonians (octocorallia), black corals (antipatharia), and hydrocorals (stylasteridae),
- b. sponge grounds (e.g., sponge dominated communities),
- c. communities composed of dense emergent fauna where large sessile protozoans (xenophyphores) and invertebrates (e.g., hydroids and bryozoans) form an important structural component of habitat, and
- d. seep and vent communities comprised of invertebrate and microbial species found nowhere else (i.e., endemic).

Examples of areas (mega-habitats) which are topographical, hydrophysical or geological features (including fragile geologic structures) known to support vulnerable species, communities, or habitats as above:

- a. edges and slopes of oceanic islands and continental shelves (e.g., corals and sponges),
- b. summits and flanks of seamounts, guyots, banks, knolls, and hills (e.g., corals, sponges, xenophyphores),
- c. canyons and trenches (e.g., burrowed clay outcrops, corals),
- d. hydrothermal vents (e.g., microbial communities and endemic invertebrates), and
- e. cold seeps (e.g., mud volcanoes, microbes, hard substrates for sessile invertebrates).

ANNEX 1 - THE CCAMLR DATA COLLECTION PLAN FOR EXPLORATORY FISHERIES (AS ADOPTED FROM THE CCAMLR CONSERVATION MEASURE 21-02 [2006])

Background

To ensure that adequate information is made available to the [CCAMLR] Scientific Committee for evaluation, during the period when a fishery is classified as exploratory, the Scientific Committee shall develop (and update annually as appropriate) a Data Collection Plan, which should include research proposals, as appropriate. This shall identify the data needed and describe any operational research actions necessary to obtain the relevant data from the exploratory fishery to enable an assessment of the stock to be made.

The Data Collection Plan shall include, where appropriate:

- (i) a description of the catch, effort, and related biological, ecological, and environmental data required to:
 - (a) evaluate the distribution, abundance, and demography of the target species, leading to an estimate of the fishery's potential yield;
 - (b) review the fishery's potential impacts on dependent and related species;
 - (c) allow the Scientific Committee to formulate and provide advice to the Commission on appropriate harvest catch levels, as well as effort levels and fishing gear, where appropriate.
- (ii) a plan for directing fishing effort during the exploratory phase to permit the acquisition of relevant data to evaluate the fishery potential and the ecological relationships among harvested, dependent and related populations and the likelihood of adverse impacts;
- (iii) where appropriate, a plan for the acquisition of any other research data by fishing vessels, including activities that may require the cooperative activities of scientific observers and the vessel, as may be required for the Scientific Committee to evaluate the fishery potential and the ecological relationships among harvested, dependent and related populations and the likelihood of adverse impacts;
- (iv) an evaluation of the time-scales involved in determining the responses of harvested, dependent and related populations to fishing activities.

Current Data Collection Plan for Exploratory Fisheries

1. All vessels will comply with the Five-day Catch and Effort Reporting System and Monthly Fine-scale Catch, Effort and Biological Data Reporting.
2. All data required by the CCAMLR *Scientific Observers Manual* for finfish fisheries will be collected. These include:
 - (i) position, date and depth at the start and end of every haul;
 - (ii) haul-by-haul catch and catch per effort by species;
 - (iii) haul-by-haul length frequency of common species;
 - (iv) sex and gonad state of common species;
 - (v) diet and stomach fullness;
 - (vi) scales and/or otoliths for age determination;
 - (vii) number and mass by species of by-catch of fish and other organisms;
 - (viii) observation on occurrence and incidental mortality of seabirds and mammals in relation to fishing operations.
3. Data specific to longline fisheries will be collected. These include:
 - (i) position and sea depth at each end of every line in a haul;
 - (ii) setting, soak and hauling times;

- (iii) number and species of fish lost at surface;
- (iv) number of hooks set;
- (v) bait type;
- (vi) baiting success (%);
- (vii) hook type;
- (viii) sea and cloud conditions and phase of the moon at the time of setting the lines.

ANNEX 2 - KEY PROVISIONS OF RELEVANT INTERNATIONAL AGREEMENTS AND INSTRUMENTS

27th COFI

77. Many Members referred to UNGA Resolution A/RES/61/105, especially paragraphs 80 to 91, and to the need that FAO act on the requests in the Resolution. COFI agreed that FAO should convene an expert consultation, no later than August 2007, to prepare draft technical guidelines including standards for the management of deep-sea fisheries in the high seas, to be finalized at a technical consultation in January or February 2008. This timing was to allow regional fisheries management organizations or arrangements (RFMO/As) and flag States to develop measures by the deadline of 31 December 2008, as required by A/RES/61/105. Some Members noted that the UNGA timeframe for RFMOs under development was 31 December 2007 and that the interim measures to be developed could be informed by the expert consultation. It was agreed that the technical guidelines should include standards and criteria for identifying vulnerable marine ecosystems beyond areas under national jurisdiction and the impacts of fishing activities on such ecosystems, in order to facilitate the adoption and the implementation of conservation and management measures by RFMO/As and flag States (pursuant to paragraphs 83 and 86 of the Resolution). It was also noted that a meeting of States engaged in high sea deep-seas fisheries was referred to in paragraph 89 of the UNGA Resolution. Japan informed the meeting that it would make available the funds for these activities. Iceland informed the members that it was willing to contribute up to US \$ 100.000. Some Members called for a moratorium on high seas deep-sea fisheries until the impacts of fishing activities on these ecosystems could be assessed.

81. COFI agreed that FAO should continue its work on biodiversity mapping as an important contribution to implementation of EAF in collaboration with CBD. It was also agreed that FAO should follow the request in: (i) paragraph 90 of the UNGA Resolution to create a global database on vulnerable marine ecosystems in areas beyond national jurisdiction, in cooperation with other relevant organizations such as IUCN, and (ii) paragraph 87 of the Resolution to create a list of authorized vessels engaged in high seas deep-sea fisheries.

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80. *Calls upon* States to take action immediately, individually and through regional fisheries management organizations and arrangements, and consistent with the precautionary approach and ecosystem approaches, to sustainably manage fish stocks and protect vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals, from destructive fishing practices, recognizing the immense importance and value of deep sea ecosystems and the biodiversity they contain;

81. *Reaffirms* the importance it attaches to paragraphs 66 to 69 of its resolution 59/25 concerning the impacts of fishing on vulnerable marine ecosystems;

82. *Welcomes* the important progress made by States and regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries to give effect to paragraphs 66 to 69 of its resolution 59/25, to address the impacts of fishing on vulnerable marine ecosystems, including through initiating negotiations to establish new regional fisheries management organizations or arrangements, but on the basis of the review called for in paragraph 71 of that resolution, recognizes that additional actions are urgently needed;

83. *Calls upon* regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries to adopt and implement measures, in accordance with the precautionary approach, ecosystem approaches and international law, for their respective regulatory areas as a matter of priority, but not later than 31 December 2008:

- (a) To assess, on the basis of the best available scientific information, whether individual bottom fishing activities would have significant adverse impacts on vulnerable marine ecosystems, and to ensure that if it is assessed that these activities would have significant adverse impacts, they are managed to prevent such impacts, or not authorized to proceed;
- (b) To identify vulnerable marine ecosystems and determine whether bottom fishing activities would cause significant adverse impacts to such ecosystems and the long-term sustainability of deep sea fish stocks, inter alia, by improving scientific research and data collection and sharing, and through new and exploratory fisheries;
- (c) In respect of areas where vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals, are known to occur or are likely to occur based on the best available scientific information, to close such areas to bottom fishing and ensure that such activities do not proceed unless conservation and management measures have been established to prevent significant adverse impacts on vulnerable marine ecosystems;
- (d) To require members of the regional fisheries management organizations or arrangements to require vessels flying their flag to cease bottom fishing activities in areas where, in the course of fishing operations, vulnerable marine ecosystems are encountered, and to report the encounter so that appropriate measures can be adopted in respect of the relevant site;

84. *Also calls upon* regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries to make the measures adopted pursuant to paragraph 83 of the present resolution publicly available;

85. *Calls upon* those States participating in negotiations to establish a regional fisheries management organization or arrangement competent to regulate bottom fisheries to expedite such negotiations and, by no later than 31 December 2007, to adopt and implement interim measures consistent with paragraph 83 of the present resolution and make these measures publicly available;

86. *Calls upon* flag States to either adopt and implement measures in accordance with paragraph 83 of the present resolution, mutatis mutandis, or cease to authorize fishing vessels flying their flag to conduct bottom fisheries in areas beyond national jurisdiction where there is no regional fisheries management organization or arrangement with the competence to regulate such fisheries or interim measures in accordance with paragraph 85 of the present resolution, until measures are taken in accordance with paragraph 83 or 85 of the present resolution;

87. *Further calls upon* States to make publicly available through the Food and Agriculture Organization of the United Nations a list of those vessels flying their flag authorized to conduct bottom fisheries in areas beyond national jurisdiction, and the measures they have adopted pursuant to paragraph 86 of the present resolution;

88. *Emphasizes* the critical role played by the Food and Agriculture Organization of the United Nations in providing expert technical advice, in assisting with international fisheries policy development and management standards, and in collection and dissemination of information on fisheries-related issues, including the protection of vulnerable marine ecosystems from the impacts of fishing;

89. *Commends* the Food and Agriculture Organization of the United Nations for its work on the management of deep sea fisheries in the high seas, including the expert consultation held from 21 to 23 November 2006 in Bangkok, and further invites the Food and Agriculture Organization of the United Nations to establish at its next Committee on Fisheries meeting a time frame of relevant work with respect to the management of the deep sea fisheries in the high seas, including enhancing data collection and dissemination, promoting information exchange and increased knowledge on deep sea fishing activities, such as through convening a meeting of States engaged in such fisheries, developing standards

and criteria for use by States and regional fisheries management organizations or arrangements in identifying vulnerable marine ecosystems and the impacts of fishing on such ecosystems, and establishing standards for the management of deep sea fisheries, such as through the development of an international plan of action;

90. *Invites* the Food and Agriculture Organization of the United Nations to consider creating a global database of information on vulnerable marine ecosystems in areas beyond national jurisdiction to assist States in assessing any impacts of bottom fisheries on vulnerable marine ecosystems and invites States and regional fisheries management organizations or arrangements to submit information to any such database on all vulnerable marine ecosystems identified in accordance with paragraph 83 of the present resolution;

91. *Requests* the Secretary-General, in cooperation with the Food and Agriculture Organization of the United Nations, to include in his report concerning fisheries to the General Assembly at its sixty-fourth session a section on the actions taken by States and regional fisheries management organizations and arrangements in response to paragraphs 83 to 90 of the present resolution, and decides to conduct a further review of such actions at that session in 2009, with a view to further recommendations, where necessary;

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66. *Calls upon* States, either by themselves or through regional fisheries management organizations or arrangements, where these are competent to do so, to take action urgently, and consider on a case-by-case basis and on a scientific basis, including the application of the precautionary approach, the interim prohibition of destructive fishing practices, including bottom trawling that has adverse impacts on vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals located beyond national jurisdiction, until such time as appropriate conservation and management measures have been adopted in accordance with international law;

67. *Calls upon* regional fisheries management organizations or arrangements with the competence to regulate bottom fisheries urgently to adopt, in their regulatory areas, appropriate conservation and management measures, in accordance with international law, to address the impact of destructive fishing practices, including bottom trawling that has adverse impacts on vulnerable marine ecosystems, and to ensure compliance with such measures;

68. *Calls upon* members of regional fisheries management organizations or arrangements without the competence to regulate bottom fisheries and the impacts of fishing on vulnerable marine ecosystems to expand the competence, where appropriate, of their organizations or arrangements in this regard;

69. *Calls upon* States urgently to cooperate in the establishment of new regional fisheries management organizations or arrangements, where necessary and appropriate, with the competence to regulate bottom fisheries and the impacts of fishing on vulnerable marine ecosystems in areas where no such relevant organization or arrangement exists;

ANNEX 3 - SOURCES OF INFORMATION ON HIGH SEAS AND DEEP SEAS SPECIES, HABITATS AND FISHERIES AND METHODS FOR OBTAINING ADDITIONAL INFORMATION

- a) By-catch from the fishing fleet or from scientific demersal fish surveys
- b) Scientific evidence from mapping and biological sampling. The scientific procedures includes visual transects and biological sampling
- c) Evaluation of the vulnerability of growth forms of species present in an area
- d) To model the likely distribution of vulnerable marine ecosystems by combining known distribution with relevant environmental factors/information
- e) Observations by the fishing fleet. The trawl can be equipped with several types of sensors and other equipment (and some already are) to measure/obtain; temperature, depth and visual information of the bottom. The vessels can continuously save depth information from the echosounders giving bathymetry.

ANNEX 4 - DECISION TREE FOR MANAGEMENT DECISION-MAKING

Here we present a decision tree that illustrates an approach to apply the guidelines developed to minimize or prevent significant adverse impacts of fishing activities in areas of Vulnerable Marine Ecosystems (VMEs). In particular, this approach defaults to precautionary management in the absence of adequate information but includes pathways to integrate new information into decision-making. The interactions of fishing activities with VMEs can be evaluated initially using existing data from fisheries and other sources. If VMEs are present or likely to occur in areas of current fishing activities, there is an obligation to cease fishing until conservation measures are adopted to prevent significant adverse impact. In the absence of empirical information it is possible to infer the presence or absence of VMEs from studies in other areas or other regions. If resources are available, surveys using a variety of approaches can verify the presence or absence of VMEs and actions to prevent significant adverse impact are reassessed and, if appropriate, modified in an adaptive management context. Feedback of information into decision-making for management includes experimental fisheries and other research approaches to refine understanding of significant adverse impact as well as adapt to changes in effort or unexpected encounters with VMEs.

For example, if data indicate the presence of deepwater coral and sponge communities in an area (e.g., meeting criteria for rare and fragile communities composed of animals with extremely slow growth rates, and are unlikely to recover after extensive impacts) the area should therefore be designated as a VME. For areas where the information is poor, the use of inference to predict the distribution of VMEs and significant adverse impact will be required. For example, seamounts with sides and peaks rising into the mesopelagic or epipelagic zone are rare islands of hard substrate habitat at the scale of biogeographic regions and could be considered rare. Suspension feeding communities dominated by corals and sponges are known to occur at high densities along the upper flanks and peaks of seamounts in the mesopelagic and epipelagic realms and such communities have characteristics as listed above. In the absence of additional data on the distribution of seafloor communities on these features, then the features themselves may serve as proxies for such communities.

This decision-tree is only an example of an approach for management as a wide range of situations and conditions will need to be accommodated on a case-by-case basis. However, all of the major types of decisions illustrated here will be required to implement the guidelines. Accommodation to acquire and integrate both existing and new information will be critical in any type of management framework in order to meet goals of both sustainable fisheries and conservation of VMEs.

Linking VMEs to Fisheries Management Measures

