Marine Fish and the IUCN Red List of Threatened Animals

Report of the workshop held in collaboration with WWF and IUCN at the Zoological Society of London from April 29th-May 1st, 1996.

WWF

ZOOLOGICAL SOCIETY OF LONDON

IUCN
The World Conservation Union

Marine Fish and the IUCN Red List of Threatened Animals

Report of the workshop held in collaboration with WWF and IUCN at the Zoological Society of London from April 29th-May 1st, 1996.

Edited by

Elodie Hudson & Georgina Mace

Institute of Zoology
Zoological Society of London
Regent's Park
London NW1 4RY
Tel. 0171 449 6690
Fax. 0171 483 2237
Email. e.hudson@ucl.ac.uk

10th May, 1996

Front Cover Photograph: Nassau Grouper (Callum Roberts)

Contents

I. Introduction and Aims

Lists of threatened animals have been compiled by the World Conservation Union (IUCN) since the 1960s, and over the last 10 years they have been published roughly every three years. In 1994, IUCN accepted new criteria for the listing of species in red lists, and these are being applied to all animals for the first time in the 1996 red list.

Marine fish have never been well represented in threatened species lists, although they are probably more in need of the attention of conservationists than has been recognised. Since the new criteria for listing species, as adopted by IUCN, were primarily tested on terrestrial species, there has been concern about the extent to which they are applicable to marine species, including fish. We were very fortunate to receive funding from the WWF Endangered Seas Program to support a meeting to address these two major issues.

Proposals for listing species in the Red List are increasingly becoming a responsibility of the relevant IUCN/SSC Specialist Groups, and part of the reason that there have been few proposals for marine fish is that in recent times the SSC network for marine fish has been largely inactive. This meeting was held under the umbrella of IUCN/SSC, to feed results and recommendations back to the body which oversees the development of the criteria and the listing of threatened species.

A workshop was held over 3 days (April 29th-May 1st 1996) at the Zoological Society of London. The aims of the workshop were as follows:

1) *To evaluate the applicability of the new criteria to marine fish species.*
The new criteria were approved by IUCN Council in November 1994, and are now being used for all species. So far, they have not been well tested on marine species. We hoped to identify problems with the application of the new criteria to marine fish, and to seek ways to resolve these problems. At present the criteria cannot be changed, but there are many ways of interpreting them, and this had not so far been investigated for marine fish. In addition, serious difficulties and inadequacies could be compiled and sent to IUCN for their consideration whenever an opportunity for revising the criteria arises.

2) *To evaluate candidate marine fish for inclusion in the 1996 Red List*
Representation of marine fishes in the IUCN Red List of threatened animals has been very poor, perhaps partly because they have traditionally been of lower conservation concern than their terrestrial counterparts. Interest in marine conservation issues appears to be growing, and we hoped to fuel this interest by initiating a process to evaluate marine fish for the IUCN red list. The wide range of independent scientists with expertise in a variety of marine fish groups were able to provide the data and knowledge to make this possible. Our aim was to produce a list of evaluated species which could be included in the 1996 red list.

3) *To develop recommendations for future management of marine fish issues within the IUCN/SSC*

There were 31 participants from 9 countries. This report summarises the results of our deliberations on points 1 and 2 above. The list of species in section II.C has been forwarded to WCMC for consideration for the *1996 IUCN Red List of Threatened Animals.*

Copies of the booklet describing the new IUCN categories and criteria are available in English, French and Spanish, and can be obtained from:

IUCN,
Rue Mauverney 28,
CH-1196,
Gland,
Switzerland.

II. Results and Recommendations

A. Future Recommendations and Caveats

During the course of the meeting, a couple of points about the new IUCN categories and criteria and their applicability to marine species became significant. These are detailed below.

In general, these are not points that are exclusive to marine fish. The first point was felt to be sufficiently important that the participants requested that it be included with the list of species evaluated as threatened, as a caveat to listing (see section II.C).

1. The Criteria and Extinction Risk

The criteria (A to D) provide relative assessments of trends in the population status of species across many life forms. However, it is recognised that these criteria do not always lead to equally robust assessments of extinction risk, which depend upon the life history of the species. For example, declines recorded under criterion A may pose lower risks to species with high growth rates, high reproductive potential and early maturity.

During the process of reviewing potentially threatened marine fish for the red list, we concluded that the quantitative criterion (A1a,b,d) for the threatened categories may not be appropriate for assessing the risk of extinction for some species, particularly those with high reproductive potential, fast growth and broad geographic ranges. Many of these species have high potential for population maintenance under high levels of mortality, and such species might form the basis for fisheries. The question of how to determine the extinction risk of such species remains. Whatever their resilience, there is a point of decline below which even these species can be driven to extinction. Certain populations continue to show continued decline even when managed. To highlight this problem, we have used the existing criteria to identify populations that may be severely depleted. However, it is presently difficult to estimate the precise degree of extinction risk for these species.

2. The Criteria and Depleted Species

Species showing persistent depletion, more than ten years or three generations ago (whichever is longer), including those with a high carrying capacity, are not being identified by the criteria at present. These species are more susceptible to unforeseen catastrophic events or perturbations. To be classified as threatened, these species would need to qualify under two threshold population and area levels in criteria B and C. We suggest that it would be useful to develop criteria for depleted species which are too wide-ranging or have to many mature individuals to meet criteria B and C.

3. The Criteria and Harvested Species

Species that are the target of commercial fisheries may show a decline in population numbers caused by intentional management action. Under the current criteria, such a population could qualify for threatened status under criterion A (Declining Population). Concern was expressed that such a listing might not reflect extinction risk, especially as the decline was designed to maximise yield from the fishery. The participants decided that this effect should not be problematic, because if the fishery is managed effectively, there would be no future decline, and eventually the species would no longer qualify for listing. If declines continued, then there would be reason for concern, and the listing would still apply.

4. Measuring Generation Time

Exploitation reduces the average size and age of individuals is a population of marine fish. Under the criteria, generation time is based on the average age of parents in the population. If this criterion is applied to an exploited age structure it will lead to a shorter period of time being considered than if the unexploited age structure had been used. This leads to a less precautionary assessment of the percentage population decline in the past or the future. This point is discussed further in section II.B(6).

5. Definition of Mature Individuals

Several problems arose when considering how the number of mature individuals relates to the fecundity of those individuals in the population, as this can vary according to the age structure of the population which can change under exploitation. It has been suggested that the definition of mature individuals should reflect the number of adults that will produce mature individuals in the next generation, and not just those that produce eggs or young. Guidelines on this issue are described in section II.B.(7).

B: Guidelines for applying the new IUCN Categories and Criteria to Marine Fish

The following guidelines have been compiled to help evaluate extinction risk in marine fish using the new IUCN categories and criteria. Many, although not all of the problems encountered were specific to the marine environment. These guidelines should be used in conjunction with the IUCN Red List Categories booklet.

1. Extent of occurrence

Extent of occurrence is defined under the criteria by convex polygons. This measure may be of limited use for fish (coastal fish in particular) because very large areas of unoccupied open ocean get included, although it is worth noting that the definition of extent of occurrence allows large areas of unsuitable habitat to be excluded. This problem is not specific to fish but it suggests that the application of Criterion B may not be appropriate for some fish species. The cut off points for extent of occurrence in Criterion B will rarely capture marine species considered vulnerable for other reasons. This is not the case when extent of occurrence is used in Criterion A, where a percentage decline in extent of occurrence is used.

2. Area of Occupancy

(i) Range Size

In the marine environment range sizes tend to be much larger than those of terrestrial species (although narrowly distributed species are more common than generally acknowledged). This can give the impression of commonness, when in reality the species may occupy a very small proportion of the range. With this in mind it may be more appropriate to consider using area of occupancy instead of extent of occurrence. This measure reflects the fact that a taxon will not usually occur throughout its extent of occurrence.

(ii) Habitat specificity

The area of occupancy is the smallest area essential at any stage in the life cycle to the survival of existing populations of a taxon. This definition may be particularly relevant to marine fish as many species of fish use more than one habitat at different stages in their life history. The problem with this criterion for marine fish is that we typically have rather limited knowledge of (a) areas of the different habitats in species ranges, and of (b) habitat requirements at different life stages. For some species, spawning areas may be highly restricted spatially. If those areas are distinctive and/or consistently used then it may be appropriate to define area of occupancy on the basis of them. Although it could be argued that aggregations could potentially form in alternative locations, the precautionary principle should dictate that we may consider present sites critical. Our poor knowledge of the basic natural history of many of these species does limit the application of the criteria; however, from a practical viewpoint, research to identify critical habitat requirements will be necessary.

(iii) Fish live in 3-dimensional space

The criteria only specify extent of occurrence and area of occupancy in 2-dimensional space. Depth ranges of marine fishes can vary widely, and it is possible that greater depth ranges may reduce extinction risk, all other things being equal. Shallow water, inshore species may be particularly vulnerable to exploitation and habitat degradation. When evaluating area of occupancy consideration could be given to the depth range over which the species occurs. If the depth range of a species contracts over time in response to threats, and if the surface area range is unchanged, the range contraction could pass unnoticed. In the absence of any data on depth ranges, the precautionary approach is to consider the smaller, 2-dimensional range. Although depth range is not specifically referred to in the criteria, it could be incorporated into the threshold range values specified in the criteria by interpreting the habitat range by adding up two-dimensional patches on different planes. This method could also be used to calculate habitat loss. Depth ranges should also be considered when making inferences and projections.

3. Wide-ranging, rare species.

Concern was expressed at the meeting about the best way to evaluate naturally rare, wide-ranging species using the criteria. It was agreed that this did not present a problem, and that the most appropriate criterion for highlighting conservation concern in wide-ranging naturally rare species, such as the Great White Shark, is Criterion A, declining population.

4. Number of mature individuals

(i) Sex-changing fish

Many species of fish change sex as they grow, including many exploited species. The criteria acknowledge that the definition of number of mature individuals can take into account biased sex ratios. However, calculating effective breeding population sizes for sex changing fishes is hampered by lack of knowledge of how changes in sex ratio affect reproductive output. There may be non-linear effects of density reduction on reproductive output with possible threshold population densities for the limiting sex below which reproductive success is greatly reduced. Such thresholds may be reached well before population sizes of mature fish pass the cut off points for endangerment given in the criteria. This uncertainty should be borne in mind when estimating the number of mature individuals.

(ii) Reproductive Behaviour

For all species, not just sex-changing species, behavioural effects on reproductive capacity may be important. These include mating patterns, parental care, site fidelity and density. Such behavioural parameters should be considered when estimating the number of mature individuals, if appropriate data are available.

5. Age at maturity in exploited populations.

When a fish population is exploited, the average age of mature individuals is often reduced. It is also often the case that recruitment in fish populations is both variable

and unpredictable. If the generation time of the population is reduced below the average time span between successful recruitment episodes, then even though population egg production may remain high, populations may face an increased risk of extinction. There will be fewer adult age classes to buffer against a stochastic recruitment failure event. This effect should be incorporated into the process of applying the IUCN criteria by allowing a more precautionary approach when considering the effective population size of exploited populations to accommodate the greater uncertainty in recruitment.

6. Generation Time

(i) Generation Time in Exploited Populations

Exploitation reduces the average size and age of individuals is a population of marine fish. Under the criteria, generation time is based on the average age of parents in the population. If this criterion is applied to an exploited age structure it will lead to a shorter period of time being considered than if the unexploited age structure had been used. The implications of this regarding the assessment of the species' status is that a shorter time period will be less precautionary than a longer one. How much less precautionary will depend on the shape of population decline curve. Figure 1 below shows the worst case scenario where the population decline was historically steep, and then slowed down, resulting in a much lower value for the percentage reduction in population numbers using the shorter (more recent) time window.

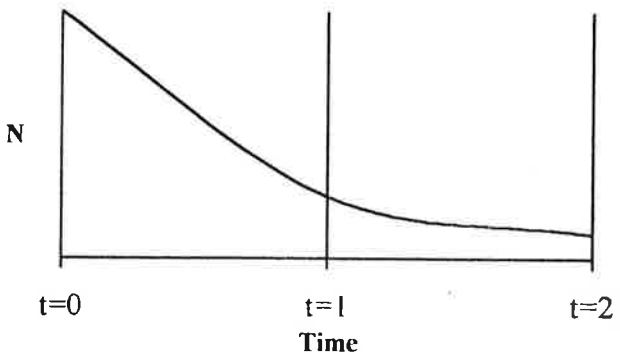

Figure 1. t=0 to t=2 represents the 3-generation time period in an unexploited population, t=1 to t=2 represents the time period in an exploited population, which is shorter due to a reduction in the average age of mature individuals. t=2 is the present day. In this scenario the percentage reduction in N (population numbers) is smaller for t=1 to t=2 than for t=0 to t=2, and could affect which category of threat the population will qualify for.

It was suggested that because of this effect, the generation time of the population in its unexploited state should be used when evaluating exploited populations.

(ii) Definition of Generation Time.

The differences in fecundity between individuals of different ages can be marked. At present, generation time is defined as the mean age of parents in the population. There was concern that this measure did not account for changes in fecundity with size and age. It has been suggested that there should be the option to define generation time as the age below which 50% of egg production is achieved- this is the 'egg' analogy of the mean age of parents.

7. Fecundity in Exploited Populations

In many species of marine fish, mean size (especially mass) is usually very closely related to reproductive capability (even for males). Since exploitation shortens the mean age and size of individuals, expressing decline in abundance of a population in terms of numbers of mature adults will underestimate the jeopardy imposed on a stock by exploitation. It is essential when evaluating changes in stocks to reflect both the change in numerical abundance and the decrease in reproductive potential of the remaining individuals.

The existing criteria allow such fecundity considerations to be made, as population declines may be based on 'an index of abundance appropriate for the taxon'. Below are suggestions for ways in which to reflect the combination of numerical abundance and reproductive potential.

The simplest procedure is to describe abundance in terms of biomass (of mature adults or of the rarer sex if preferred), if there is evidence that biomass is a better reflection of reproductive potential than population numbers. This procedure is common in the arena of fishery management. Alternatively, current numerical abundance in terms of number of individuals of the mean reproductive capability of those in the unexploited stock could be used. For instance, it is relatively easy to calculate the mean biomass of mature individuals (or of males or females) that would exist under natural mortality alone. This mean biomass (virgin) divided into the total biomass of mature fish under contemporary conditions will express the current population in terms of effective adults (adults of the size existing in the virgin stock).

The advantage of the two procedures employing biomass is that they relate the current IUCN criteria to criteria for stock status assessment in fisheries management. If either the contemporary biomass or the contemporary number of effective individuals is expressed as a proportion of the virgin stock, the ratio is generally equivalent to either the spawning stock biomass ratio (SSR), or spawning stock biomass per recruit ratio (SPR) (given equilibrium), and then further to a level of fishing mortality rate, F, (assuming the recruitment age remains unchanged). These values, SSR, SPR, and F, are implicit to many fishery management plans. This allows fishery management information to be translated to a form to which the IUCN criteria can be readily applied.

8. Taxonomic Issues

(i) Resolving the problem of distinct subunits and species

The criteria can only be applied at the species level or below. If the taxonomy is confused, the currently accepted species name, together with synonyms in brackets afterwards, should be used. A footnote should be added with the following:

a) The taxonomy is currently being revised
b) The taxonomy needs revision

Any clarification of species relationships should be submitted to IUCN and WCMC for updating of lists on the Web and printed update lists. Taxonomic updates should come from refereed journals or following approval from the appropriate Specialist Group.

Recommendations should be made every three years if there has been no attempt to clarify the taxonomy where noted.

Where no species name is available, a common name can be used e.g. Haplochromis Velvet Black, provided there is a museum reference number (or equivalent) for a reference specimen and information about geographic distribution.

Where sufficient data are available, subspecies and stocks/populations can be included in the list, with two provisos:
(a) the criteria are applied to the species as a whole,
(b) the subunits are geographically distinct.

C: Species List

148 species of marine fish were evaluated, and they are listed in the pages that follow. 80% of the species listed were classified as threatened (i.e. were Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). The selection of species for evaluation was entirely in the hands of the participants, and is in no way representative or systematic. However, the distribution of the categories resulting from the classification process are shown below in Figure 2. The species evaluated came from 40 Families and 18 Orders, and included seahorses, sharks, coral reef fish and tunas. Of the 118 threatened marine fish, 83 of them (70%) were classified using the A criterion (Declining Population).

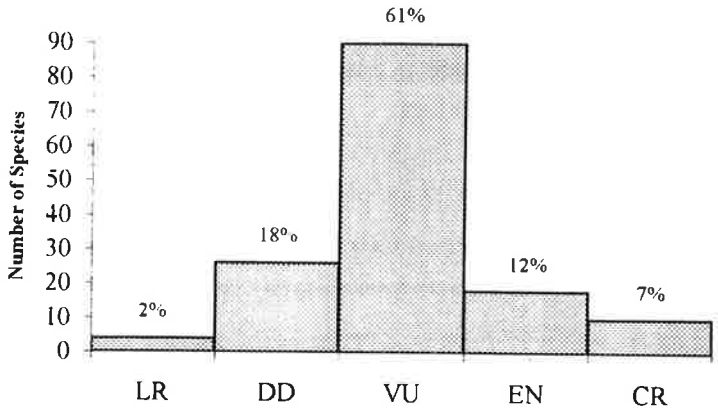

Figure 2. The distribution of categories used to classify 148 species of marine fish at the red listing workshop held in London (29th April-1st May, 1996). LR=Lower Risk, DD=Data Deficient, VU=Vulnerable, EN=Endangered, CR=Critically Endangered.

The evaluations were carried out by four working groups which represented coral reef fish, seahorses and pipefish, sharks and tunas, and other teleosts. The data collected was input directly into computers, using forms designed to record the relevant information for each species. A copy of the form is given in Appendix C. Between working group sessions, the workshop reconvened to discuss issues that had been raised during the evaluations.

The list of species which follows has been submitted to WCMC for consideration for the *1996 IUCN Red List of Threatened Animals*.

C: Global Species Evaluations: Marine Fish

*Species also listed as a subpopulation (see below), (C) Caveat A applies- see end.

			Distribution	Contact
CLASS	**ACTINOPTERYGII**			
Order	**Batrachoidiformes**			
Family	Batrachoididae			
	VU D2	*Batrachoides manglae* Cotuero Toadfish	Only known from four localities on the coast of Colombia & Venezuela.	Arturo Acero
	VU D2	*Sanopus astrifer* Whitespotted toadfish	Belize	Callum Roberts
	VU D2	*Sanopus greenfieldorum* Whitelined toadfish	Belize	Callum Roberts
	VU D2	*Sanopus reticulatus* Reticulated toadfish	Belize	Callum Roberts
	VU D2	*Sanopus splendidus* Splendid toadfish	Cozumel Island (Mexico), Belize (1 location)	Callum Roberts
Order	**Clupeiformes**			
Family	Clupeidae			
	EN B1,B2e	*Alosa alabamae* Alabama shad	Alabama rivers & tributaries, other gulf of Mexico rivers	Gene Huntsman
	VU D2	*Jenkinsia parvula* Venezuelan Herring	Endemic to <5 islands off coast of Venezuela (Los Roques)	Arturo Acero
Order	**Gadiformes**			
Family	Bythitidae			
	VU D2	*Saccogaster melanomycter*	Santa Marta, Colombia	Arturo Acero
Family	Gadidae			
	VU A1b,d	*Gadus morhua (C)* Atlantic cod	Mid-Atlantic (US) to Northern Europe	Jack Sobel
	VU A1d, A2d	*Melanogrammus aeglefinus (C)* Haddock	2 stocks in W. Atlantic- George's Bank & Gulf of Maine, other stocks in E. & N. Atlantic.	Jack Sobel
Family	Moridae			
	CR D1	*Physiculus helenaensis* Skulpin	St Helena, Atlantic Ocean	Paul Pearce-Kelly (London Zoo)

Order	**Gasterosteiformes**			
Family	Pegasidae			
	DD*	*Eurypegasus draconis*	Madagascar, Red Sea, Indian Ocean, S.E Asian waters, Pacific.	Amanda Vincent
	DD	*Eurypegasus papilio*	Hawaiian islands only	Amanda Vincent
	DD	*Pegasus lancifer*	S.Australia: W. Australia to Victoria & Tasmania	Amanda Vincent
	VU A2c,d	*Pegasus laternarius*	Japan through to Sri Lanka	Amanda Vincent
	DD*	*Pegasus volitans*	Japan, Taiwan, NSW, around Queensland to Tanzania & Red Sea	Amanda Vincent
Family	Syngnathidae			
	DD	*Doryrhamphus dactyliophorus* Banded pipefish	IndoPacific: South Africa, Red Sea, N.Australia, Indonesia, Taiwan, Japan & Pacific Is.	Amanda Vincent
	VU A2d	*Hippocampus abdominalis* Big-bellied seahorse	S.Australia to Tasmania to NSW and then New Zealand.	Amanda Vincent
	VU A2c,d	*Hippocampus aimei*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus angustus*	W. Australia	Amanda Vincent
	DD	*Hippocampus bargibanti*	New Caledonia & Queensland	Amanda Vincent
	VU A2c,d	*Hippocampus borbonensis*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus brachyrhynchus*	Indo-Pacific	Amanda Vincent
	DD	*Hippocampus breviceps* Short-headed seahorse	NSW to W. Australia	Amanda Vincent
	VU A2c,d	*Hippocampus camelopardalis*	Indo-Pacific	Amanda Vincent
	EN B1, B2c,e	*Hippocampus capensis* Knysna seahorse	Knysyna, Swartvlei, Keurbooms, Klein Brak estuaries in South Africa.	Amanda Vincent
	VU A2c,d	*Hippocampus coronatus*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus erectus* Lined seahorse	Nova Scotia to Uraguay, except W. Caribbean	Amanda Vincent
	VU A2c,d	*Hippocampus erinaceus*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus fuscus*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus hippocampus* Short-snouted seahorse	Bay of Biscay, Mediterranean to N. Africa	Amanda Vincent
	VU A2c,d	*Hippocampus histrix*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus horai*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus ingens* Giant seahorse	Baja California to Ecuador	Amanda Vincent
	VU A2c,d	*Hippocampus japonicus*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus jayakari*	Indo-Pacific	Amanda Vincent
	VU A2c,d	*Hippocampus kuda*	Indo-Pacific	Amanda Vincent

VU A2c,d	*Hippocampus longirostris*	Indo-Pacific	Amanda Vincent
DD	*Hippocampus minotaur*	Southern N.S.W and E. Victoria. Very restricted range.	Amanda Vincent
VU A2c,d	*Hippocampus novaehebudorum*	Indo-Pacific	Amanda Vincent
VU A2c,d	*Hippocampus planifrons*	Indo-Pacific	Amanda Vincent
VU A2c,d	*Hippocampus raji*	Indo-Pacific	Amanda Vincent
VU A2c,d	*Hippocampus ramulosus* Long-snouted seahorse	Bay of Biscay, Mediterranean to N. Africa, Black sea & Azov sea	Amanda Vincent
VU A2c,d	*Hippocampus reidi* Slender seahorse	Florida - Caribbean - Uruguay	Amanda Vincent
VU A2c,d	*Hippocampus sindonis*	Indo-Pacific	Amanda Vincent
VU A2c,d	*Hippocampus spinosissimus*	Indo-Pacific	Amanda Vincent
VU A2c,d	*Hippocampus taeniops*	Indo-Pacific	Amanda Vincent
VU A2c,d	*Hippocampus takakurae*	Indo-Pacific	Amanda Vincent
VU A1c,d, A2c,d	*Hippocampus trimaculatus* Three-spotted seahorse	China - S. Africa	Amanda Vincent
VU A2c,d,e	*Hippocampus whitei* White's seahorse	New South Wales	Amanda Vincent
VU A2c,d	*Hippocampus zosterae* Dwarf seahorse	W. Caribbean, Gulf of Mexico and E. Florida	Amanda Vincent
DD	*Phycodorus eques* Leafy seadragon	W.Australia to S.Australia, restricted to <20m depth among kelp.	Amanda Vincent
DD	*Phyllopteryx taeniolatus* Weedy or Common seadragon	NSW to Tasmania to W.Australia, from 3-50m.	Amanda Vincent
VU A1d, A2d	*Solegnathus dunckeri* Duncker's pipehorse	NSW to Queensland	Amanda Vincent
VU A1d, A2d	*Solegnathus hardwickii* Pipehorse	Japan, South China Sea and Australia at 12-100m.	Amanda Vincent
VU A2d	*Solegnathus lettiensis* Gunther's pipehorse	W. Australia & Indonesia at 146-180m	Amanda Vincent
VU A2d	*Solegnathus robustus* Robust pipehorse	Southern Australia, at 42-68m.	Amanda Vincent
VU A1d, A2d	*Solegnathus spinosissimus* Spiny pipehorse	SE Australia & New Zealand, from 2-550m, mostly 29-232m.	Amanda Vincent
DD	*Sygnathoides biaculeatus* Double-ended pipefish	South Africa to India to NSW to Japan to Tonga	Amanda Vincent

Order	**Lophiiformes**			
Family	Brachionichthyidae			
	CR A1c,d,e	*Brachionichthys hirsutus* Spotted Handfish	Australia (endemic to small area of southeastern Tasmania)	Barry Bruce & Peter Last (CSIRO, Australia)
Order	**Perciformes**			
Family	Acropomatidae			
	CR A1b,d	*Stereolepis gigas* Giant Sea Bass	Humboldt Bay, CA (US) to Baja California (MX), coastal	Jack Sobel
Family	Blenniidae			
	DD	*Entomacrodus cadenati*	Sao Tome and Principe, Gulf of Guinea	Callum Roberts
Family	Callionymidae			
	CR D1	*Callionymus sanctaehclenae* St Helena dragonet	St Helena, Atlantic Ocean	Paul Pearce-Kelly (London Zoo)
Family	Chaenopsidae			
	VU D2	*Coralliozetus tayrona* Tayrona blenny	Endemic to Santa Marta, Colombia	Arturo Acero
	VU D2	*Protemblemaria punctata*	Venezuela, one locality	Arturo Acero
Family	Chaetodontidae			
	VU D2	*Chaetodon flavocoronatus* Yellow-crowned butterflyfish	Guam, Micronesia	Callum Roberts
	VU D2	*Chaetodon litus* Easter Island butterflyfish	Easter Island	Don McAllister
	VU D2	*Chaetodon marleyi* Marley's butterflyfish	S.E. Africa only	Callum Roberts
	VU D2	*Chaetodon obliquus*	St. Paul's Rocks, Atlantic Ocean	Callum Roberts
	VU D2	*Chaetodon robustus*	Cape Verdi Is.	Callum Roberts
Family	Gobiidae			
	DD	*Bathygobius burtoni*	Sao Tome and Principe, Gulf of Guinea	Callum Roberts
	LR(nt)	*Priolepis robinsi*	Colombian Carribbean coast	Arturo Acero
Family	Haemulidae			
	EN A2c	*Anisotremus moricandi* Brownstriped grunt	Panama, Columbia, Venezuela, Brazil (5 localities)	Arturo Acero
Family	Labridae			
	VU A1d, A2c,d	*Cheilinus undulatus* Humphead wrasse	Red Sea to Tuamotus, north to Ryukyus, S. to New Caledonia, Great Barrier Reef, throughout Micronesia.	Yvonne Sadovy

	VU A2d	*Lachnolaimus maximus* Hogfish	W. Atlantic: N. Carolina to Brazil	Gene Huntsman
	VU D2	*Thalassoma ascensionis*	Ascension Island, Atlantic Ocean	Callum Roberts
	VU D2	*Xyrichthys virens*	Society Islands	Callum Roberts
Family	Lutjanidae			
	VU A2d, B1, B2e	*Lutjanus analis* Mutton snapper	North Carolina to Brazil	Gene Huntsman
	VU A2d	*Lutjanus cyanopterus* Cubera snapper	Tropical Atlantic: N.Carolina to Brazil	Gene Huntsman
Family	Pomacanthidae			
	VU D2	*Centropyge resplendens* Resplendent Pygmy Angelfish	Ascension Island, Atlantic Ocean	Callum Roberts
Family	Pomacentridae			
	VU D2	*Chromis sanctaehelenae*	St. Helena, Atlantic Ocean	Callum Roberts
	VU D2	*Stegastes sanctaehelenae*	St. Helena, Atlantic Ocean	Callum Roberts
	VU D2	*Stegastes santipaulae*	St. Paul's Rocks, Atlantic Ocean	Callum Roberts
Family	Pseudochromidae			
	VU D2	*Pseudochromis pesi*	Gulf of Aqaba, Red Sea	Callum Roberts
Family	Scaridae			
	VU A1d,A2d	*Scarus guacamaia* Rainbow Parrotfish	Western Caribbean, South Florida to Argentina	Yvonne Sadovy
Family	Scombridae			
	EN A1c,A2d	*Scomberomorus concolor* Monterrey Spanish Mackerel	Northern Gulf of California	Carl Safina
	DD*	*Thunnus alalunga (C)* Albacore tuna	Atlantic, Pacific, Indian, Mediterranean	Yuji Uozumi
	LR (lc)	*Thunnus albacares (C)* Yellowfin tuna	Tropical Oceans worldwide	Andre Punt
	CR A1b,d	*Thunnus maccoyii (C)* Southern bluefin tuna	Southern Ocean, Southern Indian, spawning in Java Sea	Andre Punt
	VU* A1b,d	*Thunnus obesus (C)* Bigeye tuna	Atlantic, Pacific & Indian Ocean	Yuji Uozumi
	DD*	*Thunnus thynnus (C)* Northern bluefin tuna	N. Atlantic, S. Atlantic to Brazil, Mediterranean, Pacific	Carl Safina

Family	Serranidae			
	VU D2	*Anthias salmopunctatus*	St. Paul's Rocks, Atlantic Ocean	Callum Roberts
	CR A1d, A2d	*Epinephelus drummondhayi* Speckled hind	Cape Hatteras to Amazon, inc. Gulf of Mexico	Gene Huntsman
	DD	*Epinephelus exsul* 10-spine grouper	Mexican Pacific coast	Gene Huntsman
	VU A2d	*Epinephelus inermis* Marbled grouper	Western tropical & subtropical Atlantic- continental shelf	Gene Huntsman
	CR A1d, A2d	*Epinephelus itajara* Jewfish	Tropical E. Atlantic, also W.Africa (Gulf of Guinea) & E. Pacific	Yvonne Sadovy
	VU A2d	*Epinephelus lanceolatus* Giant grouper	Red Sea to Hawaiian, Line, Pitcairn Is., N-S Japan, S to New Caledonia, Micronesia, India & S.Africa	Yvonne Sadovy
	LR (nt)	*Epinephelus marginatus* Brown grouper	Mediterranean, W.Africa, S.E. Africa, Brazil	Gene Huntsman
	CR A1d, A2d	*Epinephelus nigritus* Warsaw grouper	Tropical & Subtropical W.Atlantic, Cape Hatteris to S.Brazil & Gulf of Guinea (1record)	Yvonne Sadovy
	VU A1d, A2d, B1, B2e	*Epinephelus niveatus* Snowy grouper	Cape Hatteras to Key West (US), Gulf of Mexico to N. Brazil	Gene Huntsman
	EN A1d, A2d	*Epinephelus striatus* Nassau grouper	Florida-Brazil, W. Bermuda, Gulf of Mexico, Cuba, Carribbean	Yvonne Sadovy
	VU D2	*Hypoplectrus providencianus* Masked hamlet	Western Caribbean	Arturo Acero
	VU D2	*Mycteroperca cidi* Venezuelan Grouper	Venezuela endemic, a few records from Colombia, Suriname and Jamaica (1 record)	Arturo Acero
	VU A1d, A2d	*Mycteroperca jordani* Gulf Grouper	Baja California, Mexico	Callum Roberts
	VU A1b,d, A2d	*Mycteroperca microlepis* Gag	South Eastern U.S., Mexico & Brazil	Gene Huntsman
	VU A2d, D2	*Mycteroperca olfax* Bacalao Grouper	Galapagos Archipelago only	Callum Roberts
	VU A1d, A2d	*Mycteroperca prionura* Sawtail Grouper	Baja California, Mexico	Callum Roberts
	VU A1d, A2d	*Mycteroperca rosacea* Leopard Grouper	Baja California, Mexico	Callum Roberts
	DD	*Mycteroperca rubra* Comb grouper	Mediterranean, West Africa, Sahara Banks	Gene Huntsman

	LR (nt)	*Paralabrax dewegeri* Meo viejo	Venezuela- endemic, coastal	Arturo Acero
	VU D2	*Plectranthias chungchowensis*	Southern Taiwan	Callum Roberts
	VU D2	*Pseudanthias regalis*	Marquesas Islands	Callum Roberts
Family	Sparidae			
	EN A1b,d, A2d	*Pagrus pagrus* Red Porgy	Circumatlantic, inc. Mediterrenean & Northern Gulf of Mexico	Gene Huntsman
Family	Xiphiidae			
	DD*	*Xiphias gladius (C)* Swordfish	Atlantic, Mediterranean, Pacific	Carl Safina
Order	**Pleuronectiformes**			
Family	Pleuronectidae			
	EN A1d	*Hippoglossus hippoglossus* Atlantic Halibut	Atlantic	Jack Sobel
	VU A1b,d	*Pleuronectes ferrugineus (C)* Yellowtail flounder	Mid-Atlantic (US) to Labrador (CA)	Jack Sobel
Order	**Scorpaeniformes**			
Family	Scorpaenidae			
	VU D2	*Pontinus nigropunctatus* Deepwater Jack	St Helena, Atlantic Ocean	Paul Pearce-Kelly (London Zoo)
	EN A1b,d	*Sebastes fasciatus* Redfish (Ocean perch)	North Atlantic from New England (US) to Norway	Jack Sobel
	CR A1a,b,d, A2d	*Sebastes paucispinus* Boccacio Rockfish	Baja California (MX) to Kodiak, Alaska (US), 20-500m	Jack Sobel
Order	**Siluriformes**			
Family	Ariidae			
	EN B1, B2c,d	*Arius bonillai* New Grenada Sea Catfish	NW coast of Colombia	Arturo Acero
Order	**Tetraodontiformes**			
Family	Balistidae			
	VU A2d	*Balistes vetula* Queen triggerfish	Widespread tropical Atlantic	Callum Roberts
	VU D2			
	VU D2	*Canthigaster rapaensis*	Rapa Island, French Polynesia	Callum Roberts
	DD	*Lagocephalus gloveri*	Southeastern Indonesia	Callum Roberts
	VU D2	*Liosaccus pachygaster*	Southern Taiwan	Callum Roberts

	DD	*Takifugu niphobles*	Southern Japan to southern Taiwan	Callum Roberts
	DD	*Takifugu poecilonotus*	Southern Japan to southern Taiwan	Callum Roberts
	DD	*Takifugu xanthopterus*	Southern Japan to southern Taiwan	Callum Roberts
	DD	*Torguigener brevipinnis*	Southestern Inonesia	Callum Roberts
CLASS	**CHONDRICHTHYES**			
Subclass	**ELASMOBRANCHII**			
Order	**Carcharhiniformes**			
Family	Carcharhinidae			
	VU A1b,d, A2d	*Carcharhinus limbatus* Blacktip shark	Coastal circumtropical to warm-temperate seasonal	Sarah Fowler & Jack Musick
	EN A1d, A2d	*Carcharhinus obscurus* Dusky shark	All tropical & sub-tropical seas, seasonally warm temperate seas	Jack Musick
	VU A1b,d, A2d	*Carcharhinus plumbeus* Sandbar shark	Coast and pelagic zone; temperate and topical waters	Jack Musick & Sarah Fowler
	CR A1b-e, Ac-e, C2b	*Glyphis gangeticus* Ganges shark	Lower reaches of Ganges-Hooghi river system, possibly taken off Karachi, Pakistan.	Leonard Compagno
Order	**Hexanchiformes**			
Family	Hexanchidae			
	VU A1d, A2d	*Hexanchus griseus* Bluntnose Sixgill shark	Temperate & tropical seas of continental shelves of Pacific, Atlantic, Indian & Mediterranean to 200m	Sid Cook & Leonard Compagno
Order	**Lamniformes**			
Family	Cetorhinidae			
	VU A1a,d, A2d	*Cetorhinus maximus* Basking shark	Temperate waters	Sarah Fowler
Family	Lamnidae			
	VU A1b,c,d, A2c,d	*Carcharodon carcharias* Great white shark	Sub-tropical & warm temperate seas - always rare	Sarah Fowler
	VU A1b,d, A2d	*Lamna nasus* Porbeagle	N. Atlantic, coastal amphitemperate, S. Atlantic coastal, S. Indian, S. Australia, New Zealand, coastal SE Pacific.	Sarah Fowler & Jack Musick
Family	Odontaspididae			
	EN A1a,b, A2d	*Carcharias taurus* Sand tiger shark	Circumpolar, warm-temperate to cool tropical, except East Pacific	Jack Musick

Order	**Myliobatiformes**			
Family	Dasyatidae			
	EN A1b-e, A2c-e	*Himantura chaophraya* Giant Freshwater Stingray	Recorded in a number of large tropical river systems in South East Asia and Australia.	Leonard Compagno & Sid Cook
Order	**Orectolobiformes**			
Family	Rhincodontidae			
	DD	*Rhincodon typus* Whale shark	All warm temperate and tropical waters - coastal and oceanic	Sarah Fowler
Order	**Rajiformes**			
Family	Arynchobatidae			
	DD	*Bathyraja abyssicola* Deepsea skate	Depths of 396-2904m in Northern Pacific, only rarely recorded.	Sid Cook, George Zorzi & Leonard Compagno
Family	Pristidae			
	EN A1b,c,d, A2c,d	*Pristis microdon* Freshwater sawfish	Marine and freshwater habitats in N. Australia & SE Asia	Sarah Fowler
	EN A1b,c,d, A2c,d	*Pristis pectinata* Smalltooth sawfish	Warm temperate & tropical wters, W. Atlantic, Indian Ocean, SE Asia. Coastal to 10 m depth & estuarine.	Sarah Fowler
	EN A1b,c,d, A2b,c	*Pristis perotteti* Largetooth sawfish	Warm temperate tropical, marine nearshore brakish and freshwater lakes and river. E. Pacific and Atlantic	Sarah Fowler
	EN A1b,c,d, A2c,d	*Pristis pristis* Common sawfish	E. Atlantic & W. Mediterenean.	Sarah Fowler
Order	**Squaliformes**			
Family	Dalatiidae			
	VU A1d, A2d	*Dalatias licha* Kitefin shark	Warm-temperate & tropical areas down to 1800m, N&C Atlantic, W.Indian, W&C Pacific.	Sid Cook & Leonard Compagno
CLASS	**SARCOPTERYGII**			
Order	**Coelacanthiformes**			
Family	Latimeriidae			
	EN A2c,d,C2b	*Latemaria chalumnae* Coelacanth	Comoros, South Africa	Jack Musick

*Subpopulation Evaluations: Marine Fish

(C) Caveat A applies

CLASS	ACTINOPTERYGII		Distribution	Contact
Order	**Gasterosteiformes**			
Family	Pegasidae			
	VU A2d	*Eurypegasus draconis*	Philippine waters	Amanda Vincent
	VU A2d	*Pegasus volitans*	South China Seas	Amanda Vincent
	VU A2d	*Pegasus volitans*	Philippine waters	Amanda Vincent
Order	**Perciformes**			
Family	Scombridae			
	VU A1b,d	*Thunnus alalunga (C)* Albacore Tuna	N Atlantic	Yuji Uozumi
	CR A1b,d	*Thunnus alalunga (C)* Albacore Tuna	S. Atlantic	Yuji Uozumi
	EN A1b,d	*Thunnus obesus (C)* Bigeye Tuna	Pacific	Yuji Uozumi
	CR A1b,d	*Thunnus thynnus (C)* Northern bluefin tuna	W. Atlantic	Carl Safina
	EN A1b,d	*Thunnus thynnus (C)* Northern bluefin tuna	E. Atlantic	Carl Safina
	EN A1b,d	*Xiphias gladius (C)* Swordfish	North Atlantic	Carl Safina

(C) Caveat

The criteria (A-D) provide relative assessments of trends in the population status of species across many life forms. However, it is recognised that these criteria do not always lead to equally robust assessments of extinction risk, which depend upon the life history of the species. The quantitative criterion (A1a,b,d) for the threatened categories may not be appropriate for assessing the risk of extinction for some species, particularly those with high reproductive potential, fast growth and broad geographic ranges. Many of these species have high potential for population maintenance under high levels of mortality, and such species might form the basis for fisheries.

Appendix A: Participants Address List
IUCN Marine Fish Red Listing Workshop

Professor Arturo Acero,
Instituto de Ciencias Naturales,
Universidad Nacional de Colombia,
Apartado 1016 (INVEMAR),
Santa Marta, Colombia.
Fax. 1-520-621-9190 (USA)
Email. aacero@ums.ccit.arizona.edu (USA)

Dr. Christopher Andrews,
Senior Director of Biological Programmes,
National Aquarium in Baltimore,
Pier 3, 501 East Pratt Street,
21202, Baltimore, MD, USA.
Tel. 1-410-576-8239, Fax. 1-410-576-1080.
Email. candrews@clark.net

Dr Patricia Almada-Villela,
Co-Chair, IUCN SSC,
Coral Reef Fish Specialist Group,
60 Newington, Willingham,
Cambridge, CB4 5JE, U.K.
Tel. 44-1954-260-520, Fax. 44-1954-202-291.
Email. palmada@aquacon.demon.co.uk

Jonathan Baillie,
133 Bishop Street, Apt #3,
New Haven, CT, 06511, USA,
Tel. 1-203-865-5399, Fax. 1-203-865-5399.
Email. baillie@minerva.cis.yale.edu

Dr. Vadim Birstein,
Chairman, Sturgeon Specialist Group, IUCN.
The Sturgeon Society,
331 West 57th Street, Suite 159,
New York, New York 10019, USA.
Tel. 1-212-245-3907, Fax. 1-212-956-2515.
Email. birstein@pipeline.com

Amie Brautigam,
IUCN U.S.,
1400 16th Street NW,
Washington D.C. 20036, USA.
Tel. 1-202-939-3451, Fax. 1-202-797-5461.
Email. abrautigam@iucnus.org

Dr. Merry Camhi,
National Audubon Society,
Living Oceans Program,
550 South Bay Avenue,
11751, Islip, NY, USA.
Tel. 1-516-581-2927, Fax. 1-516-581-5268.
Email. mcamhi@audubon.org

Stephen Casey,
Institute of Zoology,
Zoological Society of London,
Regent's Park, London NW1 4RY, UK.
Tel. 44-171-449-6633, Fax. 44-171-586-2870.
Email. s.casey@ucl.ac.uk

Neil Cox,
Species Unit,
World Conservation Monitoring Centre,
219 Huntingdon Road,
Cambridge, CB3 ODL, U.K.
Tel. 44-1223-277-314, Fax. 44-1223-277-136.
Email. neil.cox@wcmc.org.uk

Sarah Fowler,
Director, Nature Conservation Bureau Ltd.,
36 Kingfisher Court, Hambridge Road,
Newbury, Berkshire, RG14 5SJ, U.K.
Tel. 44-1635-550-380, Fax. 44-1635-550-230
Email. 100347.1526@compuserve.com
or sarahfowler@naturebureau.co.uk

Mariano Gimenez Dixon,
Species Survival Commission, IUCN,
Rue Mauverney 28,
CH-1196 Gland, Switzerland.
Tel. 41-22-999-0001, Fax. 41-22-999-0015.
Email. mgd@hq.iucn.ch

Dr. Heather Hall,
Zoological Society of London,
Regent's Park, London, NW1 4RY, U.K.
Tel. 44-171-449-6480, Fax.44-171-722-2852.
Email. h.hall@ucl.ac.uk

Elodie Hudson,
Institute of Zoology,
Zoological Society of London,
Regent's Park, London NW1 4RY, U.K.
Tel. 44-171-449-6690, Fax. 44-171-483-2237.
Email. e.hudson@ucl.ac.uk

Dr Gene Huntsman,
205 Blades Road,
Havelock, NC 28532, USA.
Tel. 1-919-447-4061
Email. shuntsman@hatteras.bea.nmfs.gov

Dr Georgina Mace,
Institute of Zoology,
Zoological Society of London,
Regent's Park, London NW1 4RY, UK.
Tel. 44-171-449-6692, Fax. 44-171-483-2237.
Email. g.mace@ucl.ac.uk

Mr. Akihiro Mae,
Fisheries Agency of Japan,
Ministry of Agriculture, Forestry and Fisheries,
Japan.
Tel. 81-3-3591-6582, Fax. 81-3-3595-1426.
Email. eco-naka@sc.maff.go.jp

Dr. Don E. McAllister,
Ocean Voice International,
Co-Chair, IUCN SSC
Coral Reef Fish Specialist Group.
P.O. Box 37026, 3332 McCarthy Rd.
Ottawa, ON K1V 0W0, Canada.
Tel: 1-613-264-8986, Fax: 1-613-264-9204
E-mail: mcall@superaje.com

Simon Mickleburgh,
Fauna and Flora International,
Great Eastern House,
Tenison Road, Cambridge, CB1 2DT, UK.
Tel. 44-1223-461-471, Fax. 44-1223-461-481.
Email. info@ffint.org

Maggie Mooney-Seus,
Sr. Conservation Associate/Policy Analyst,
New England Aquarium,
Central Wharf, Boston,
Massachusetts 02110-3399, USA.
Tel. 1-617-973-6587, Fax. 1-617-973-0242.
Email. mmooneys@aol.com

Ms. Teresa Mulliken,
Programme Officer, TRAFFIC International,
219c Huntingdon Road,
Cambridge, CB3 0DL, U.K.
Tel. 44-1223-277-427, Fax. 44-1223-277-237.
Email. teresa.mulliken@wcmc.org.uk

Dr John A. Musick,
Virginia Institute of Marine Science,
Gloucester Pt., VA 23062, USA.
Tel. 1-804-642-7913. Fax. 1-804-642-7913.
Email. jmusick@vims.edu

Dr Andre Punt,
CSIRO Division of Fisheries,
GPO Box 1538,
Hobart, Tasmania, 7001, Australia.
Tel. 61-02-325-492, Fax. 61-02-325-000.
Email. andre.punt@ml.csiro.au

Dr Callum Roberts,
Dept. of Environmental Economics &
Environmental Management,
University of York,
Heslington, York, YO1 5DD, UK.
Tel. 44-1904-434-066, Fax. 44-1904-432-998.
Email. cr10@york.ac.uk

Dr Yvonne Sadovy,
Dept. of Ecology & Biodiversity,
University of Hong Kong,
Pokfulam Road, Hong Kong.
Tel. 852-2859-8977, Fax. 852-2517-6082.
Email. yjsadovy@hkuxa.hku.hk

Dr Carl Safina,
Director, Living Oceans Program,
National Audubon Society,
550 South Bay Avenue,
11751, Islip, N.Y. U.S.A.
Tel. 1-516 277 4289, Fax. 1-516 581 5268.
Email. csafina@audubon.org

Jack Sobel,
Senior Scientist, Ecosystem Protection,
Center for Marine Conservation,
1725 DeSales Street, NW,
Washington, DC 20036, USA.
Tel. 1-202-429-5609 or 1-202-857-5552,
Fax. 1-202-872-0619
Email. sobelj@dccmc.mhs.compuserve.com

Mike Sutton,
Director, Endangered Seas Campaign,
WWF International,
Panda house, Weyside Park,
Godalming, Surrey GU7 1XR, UK.
Tel. 44-1483-426-444, Fax. 44-1483-426-409.
Email. 102060.343@compuserve.com

Dr. Yuji Uozumi,
Fisheries Agency of Japan,
Ministry of Agriculture, Forestry and Fisheries,
Japan.
Tel. 81-3-3591-6582, Fax. 81-3-3595-1426.
Email. eco-naka@sc.maff.go.jp

Dr Amanda Vincent,
Department of Zoology,
University of Oxford,
South Parks Road, Oxford, OX1 3PS, UK.
Tel. 44-1865-271-217, Fax. 44-1865-310-447.
Email. amanda.vincent@zoo.ox.ac.uk

Sue Wells,
56, Oxford Road,
Cambridge, CB4 3PN, UK.
Tel. 44-1223-350-409.
Email. sue.wells@wcmc.org.uk (until June 1st).

Dr Elizabeth Wood,
Holybush, Chequers Lane,
Eversley, Hook,
Hampshire, RG27 0NY, U.K.
Tel. 44-1734-734-127.

Appendix B:
Marine Fish Red Listing Workshop Agenda

Monday 29th April

9:30 am	Tea & Coffee
10:00 am	Introduction- Georgina Mace (Zoological Society of London) Introduction- Mike Sutton (WWF)
10:30 am	An overview of the new IUCN categories- Georgina Mace
11:00 am	Tea & Coffee
11:30 am	Applying the new criteria to marine fish- Jonathan Baillie (IUCN)
12:00 pm	Examples of marine fish evaluations- Jonathan Baillie (IUCN)
1:00 pm	Lunch
2:00 pm	Break into working groups made up of 4/5 people working on related groups of fish, and someone familiar with IUCN categories and criteria, in order to carry out evaluations. Each group must nominate a rapporteur to input data into the evaluation forms on the computers (FORM.XLS).
3:30 pm	Tea & Coffee
4:00-5:30 pm	Continue with working groups

Tuesday 30th April

9:30 am	Reconvene in working groups to do evaluations
10:30 am	Tea & Coffee
11:00 am	Working groups report back to raise issues & problems with applying the new criteria: 11:00 am Coral Reef Fish Group 11:15 am Seahorses & Pipefishes Group 11:30 am Shark, Tuna & Billfish Group 12:00 pm Other Teleost Group
12:15 pm	General Discussion of problems
1:00 pm	Lunch
2:00 pm	Break into discussion groups to write guidelines
3:00 pm	Reconvene in working groups to do evaluations
3:30 pm	Tea & Coffee
4:00-6:00 pm	Reconvene in working groups to do evaluations

Wednesday 1st May

9:30-12:00pm	Working Group Sessions
10:30 am	Tea & Coffee
12:00 pm	Preparation of final species list
1:00 pm	Lunch Time
2:00-5:00 pm	Discussion of final species list and general issues

Appendix C: Evaluation Form

Name of reviewer	
Genus and Species Name	
Common name	
Family	
Order	
Class	
Distribution Data	

Estimated current population size: number of mature individuals Please estimate which band the population falls into- if this is not possible, comment on abundance.	Y / N / ? Comment:
	<100
	100-1,000
	1,000-10,000
	10,000-100,000
	100,000-1,000,000
	>1,000,000

Estimates of Life History Parameters		
age at maturity	*males*	*females*
generation time	*males*	*females*
maximum life span	*males*	*females*
annual fecundity	*males*	*females*

Evidence of reduction in numbers, range or habitat quality?	observed, estimated, inferred or suspected in the past projected or suspected in the future
Is there any evidence of continuing decline?	in population numbers? in habitat?

Threats	Loss of habitat Habitat degradation Hybridisation with released stock Inbreeding Introduced predators/pathogens or competitors Over-exploitation for food Over-exploitation for sport Over-exploitation for other purposes Loss of food/prey species of species in question Pollution effects

Protection Status	Is any of the habitat protected, e.g. marine reserve? Is there a regulated commercial fishery? Is there unregulated fishing in open access waters? Is there illegal fishing and/or trade activity? Is the species farmed? Has the species appeared on previous Red Lists? If Yes, what was the category?

Any other comments:	

Genus and Species Name **Common name**	

Categories and Criteria	Critically Endangered	Endangered	Vulnerable
A (1) a A (1) b A (1) c A (1) d A (1) e A (2) a A (2) b A (2) c A (2) d A (2) e			
B B (1) B (2) B (3)			
C C (1) C (2) a C (2) b			
D (1) D (2)	n/a	n/a	
E			

Assessment of data quality 1=scientific survey data 2=CPUE data 3=Observer data 4=anecdotal observations	

Area/Population: Final Evaluation: Supporting Criteria:			