International Expert Workshop on CITES Non-Detriment Findings

Working Group 8

Fishes

FINAL REPORT

The Fish Working Group (WG) considered five case studies produced for the workshop: seahorses *Hippocampus* spp., humphead wrasse *Cheilinus undulates* from Indonesia, sturgeons from the North west Black Sea and lower Danube river, *Arapaima* spp. from Brazil and eel *Anguilla anguilla* from Sweden. An extra species group was considered for sharks given the presence of experts in the group. After examining case studies in detail the WG considered each case study against the areas of information on the species, harvest, management measures and monitoring methods (Annex 1). The group further considered the logical steps to be taken when making an NDF. A flowchart was constructed reflecting the group's view on how NDF would be made on the short term and on a rolling basis to review the integrity of management and information associated with a species (Annex 2). An attempt to prioritize the critical elements to be taken into account to complete a NDF for each species groups was made and is reported in Annex 1 and in Table 1 of Annex 2. In addition, the WG considered the main problems, challenges and difficulties found in the elaboration of NDF, and reviewed the available references for an NDF formulation (Annex 1).

In examining the way in which an NDF would be considered for fish species, the WG considered some underlying assumptions that would support the conclusion that the general guidelines constructed by the WG were true to life:
  • Fisheries management has a long history of trying to understand how you can best manage the harvest of fish so it is not a new concept;
  • Many training manuals and databases exist to support those making NDF;
  • In terms of risk, fish listed on Appendix II of CITES have already been concluded by Parties to be vulnerable and trade is a particularly important threat;
  • More uncertainty requires more caution and leads to more monitoring; and
  • Experts, who understand the use of fisheries management tools, are available to Scientific Authorities.

The WG concluded the following were essential to enable the NDF process for fish:

- A need to consider all sources of significant mortality affecting species in trade
- A need to consider whether establishing harvest/export quota is enough to achieve conservation goals
- Collaboration between Scientific Authorities and fisheries experts
- Transboundary migrants and shared stocks require regional NDF cooperation
- Be cautious with fisheries dependent data, verify when possible
- When possible, base NDF on both fisheries independent and dependent information/data
- Need techniques and legislation to distinguish among farmed, captive bred and wild individuals
- Management on which NDF is based should employ principles of adaptive and participatory management
- Parties need to report to Secretariat methods by which NDFs are being made on an annual basis to enable transparency, learning between NDF processes and to ensure that fish species which range beyond the boundaries of one State are accounted for by all range States in there NDF processes.

Annex 1. Main outputs of the Fish WG

1.   Information about the target species or related species. The minimal information considered essential to make a reliable NDF for each of the case studies is highlighted in bold. Also highlighted are the most commonly used management measures and monitoring methods.

	General	Humphead wrasse	Seahorse	Sturgeons	Eels	Arapaima	Sharks
Biological and species status:	Taxonomy clarified Time-series of abundance Historical abundance Temporal and spatial distribution Size distribution Age distribution Sex ratio Maturity schedule Maternity schedule Recruitment Fecundity Type of reproduction Natural mortality rates/schedule Gamete viability (health) Critical habitats (spawning, nursery, feeding, overwintering, etc)	**Abundance Size distribution in wild Maturity schedule (size at first reproduction)** Temporal and spatial distribution Sex ratio Critical habitats Recruitment (SR relationship) Type of reproduction	**Size at maturity Taxonomy Critical habitats Temporal and spatial distribution Size distribution** Type of reproduction Time-series of abundance	**Age distribution Sex ratio Recruitment Critical habitats** Taxonomy Time-series of abundance Historical abundance Temporal and spatial distribution Size distribution Maturity schedule Type of reproduction Natural mortality rates/schedule	**Time-series of abundance Stage distribution Size distribution Sex ratio Recruitment** Natural mortality Temporal and spatial distribution Historical abundance Age distribution Gamete viability (health)	**Time-series of abundance (in one area) Size distribution Maturity schedule** Taxonomy clarified Recruitment Type of reproduction Air breather	Temporal and spatial distribution Age distribution Maturity schedule Maternity schedule Fecundity Natural mortality rates/schedule Critical habitats

	General	Humphead wrasse	Seahorse	Sturgeons	Eels	Arapaima	Sharks
Takes/uses (e.g. harvest regime):	Direct legal harvest by sectors (commercial, recreational, ranching, subs, etc.) Bycatch (post-capture mortality) Illegal harvest Collateral mortality (e.g. catch/release) Gear selectivity and impacts Market chain Harvest method	**Direct legal harvest by sectors Size distribution in trade Illegal harvest Market chain Harvest methods**	**Direct legal harvest Bycatch Market chain Harvest method**	**Direct legal harvest by sectors Illegal harvest Market chain Harvest method**	**Direct legal harvest by sectors Illegal harvest Collateral mortality (dams, etc) Market chain Harvest method**	**Direct legal harvest by sectors Illegal harvest (in unmanaged communities) Harvest method** Gear selectivity and impacts Bycatch	Direct legal Bycatch (post-capture mortality) (Basking) Illegal harvest Non-harvest related mortality (e.g. catch/release) Gear selectivity and impacts Market chain Harvest method
Other impacts	Habitat degradation (fisheries related or not) Habitat loss (dams, coastal development, navigation, etc) Environmental change Pollution Invasive species Genetic disruption (e.g. stocking, translocation) Hydro-power related mortality Water diversion Predator-prey dynamics	**Habitat degredation**	**Habitat degradation and loss (fisheries related or not)** Pollution	**Habitat degradation Habitat loss (dams)** Pollution (heavy metals, etc) Genetic disruption (e.g. stocking, translocation)	**Habitat loss Pollution Invasive species (parasite)** Environmental change Genetic disruption (e.g. stocking)	**Genetic disruption (e.g. stocking, translocation)**	Habitat degradation

	General	Humphead wrasse	Seahorse	Sturgeons	Eels	Arapaima	Sharks
Management, conservation	Management history (formal and informal) Protected areas Seasonal closures Bag limits Size limits Gear restrictions Rights-based management Community-based management Environmental education Capacity building Transport regulations Quotas Labelling/certification Product form regulations Enforcement	**Quota Size Limits Product form regulations (shipped alone) Protected Areas Protection of spawning aggregations Gear Restrictions Transport regulations (only by air) Stakeholder involvement**	**Protected areas (because of bycatch) Size limits (target fishery) Community-based management Capacity building Stakeholder involvement**	**Seasonal closures Size limits Quotas Transparency (website) Management history Protected areas Gear restrictions Rights-based management (licences) Environmental education Capacity building Labelling/certification (tagging, caviar labelling)**	**Size limits Seasonal closures Rights-based management (licences – effort control)** Gear restrictions Management history (formal and informal)	**Quotas Size limits Rights-based management Community-based management Seasonal closures Protected areas Product form regulations (whole animal) Gear restrictions Labelling/certification (tagged) Environmental education Capacity building**	Management history (formal and informal) Protected areas Size limits Gear restrictions Rights-based management (licenses) Community-based management Environmental education Capacity building (observers ID sharks) Quotas Product form regulations (fins attached to body, or fins to BW ratio)

	General	Humphead wrasse	Seahorse	Sturgeons	Eels	Arapaima	Sharks
Monitoring	Population monitoring Harvest monitoring Trade (domestic and international) monitoring Compliance assessment Ecosystem assessment Participatory monitoring	**Population monitoring Harvest monitoring Trade (domestic and international) monitoring**	**Population monitoring Harvest monitoring Trade (domestic and international) monitoring**	**Population monitoring (juveniles) Harvest monitoring Trade (domestic and international) monitoring Participatory monitoring Ecosystem assessment**	**Population monitoring Harvest monitoring Trade (domestic and international) monitoring Participatory monitoring**	**Population monitoring Harvest monitoring Participatory monitoring**	Population monitoring Harvest monitoring Trade (domestic and international) monitoring Participatory monitoring (log books)

2. Field methodologies and other sources of information.

Biological and species status data:	
Basic biological information (taxonomy and life history) (spatial/temporal approach)	DNA sampling Voucher (museum) specimens Age and growth methods Gonad sampling Measuring/weighting Life stage characterization Info on similar species Mark re-capture
Abundance and distribution (spatial/temporal approach)	CPUE (Fisheries dependent sampling) Visual surveys Recruitment indices Mark-recapture Interviews Fisheries indepdent sampling (See monitoring methods)
Population structure (spatial/temporal approach)	Length frequency analysis Age frequency analysis Genetic analysis (metapopulations structure) Sex ratio
Habitat and other impacts	GIS Remote sensing Visual surveys Substrate sampling Sonar Water quality assessment Temperature, salinity, turbidity assessment Ecosystem assessment
Harvesting and trade data:	Catch (port sampling, observers, trade data) Effort Market sampling Interviews Rapid Rural Appraisals Genetic analysis Catch and trade document schemes Databases Customs codes and Harmonized Systems (HS)

3. Types of approaches for data integration for NDF elaboration

- Analysis of time trends in biological/harvest data
- Analysis of spatial patterns in biological/harvest data
- Stock assessment methods
- Demographic analyses (e.g. life tables, matrix methods, etc)
- Rapid assessment methods

4. Approaches to assess data quantity and quality

- Transparency through peer review, stakeholder consultation, public communication, etc.
- Expert consultation/agreement[1]
- Statistical methods (e.g., power analyses, Bayesian methods)

5. Common problems, error, challenges or difficulties found on the elaboration of NDF

- Access to information - scattered, restricted, low level resolution
- Existing information very site/population specific
- Taxonomic uncertainty
- Challenge to monitor oceanic, large bodied, and low density animals in wild/harvest (e.g. sharks in wild, seahorses in bycatch)
- Lack of consistency in use of units in trade data
- Collection of trade data inconsistent among countries
- Lack of taxonomic resolution in trade data
- Expense of accessing trade data
- Reliability of fisheries dependent data
- Harvest effort not quantified/reported
- Lack of consistency of data from all range states of shared/migratory resources
- Lack of requirement to report NDFs
- Lack of mandated cooperation among range states for transboundary, migratory and shared stocks
- Illegal, unreported, and unregulated fishing (IUU)
- Cost of monitoring
- Lack of fisheries independent data
- NDFs not considering all sources of mortality (being made in isolation of all pressures on species)
- Lack of information on post-capture mortality
- Products in trade do not allow for easy determination of species/quantities (e.g.shark fins, shark cartilage supplements, seahorses in prepared traditional medicines, canned glass eels, processed products)
- Introduction from the sea - who does the NDF?

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[1] Examples qualitative indicators to be used in the evaluation of the reliability of fish abundance data can be found in Table 1 of FAO. 2007. Report of the second FAO Ad Hoc Expert Advisory Panel for the Assessment of Proposals to Amend Appendices I and II of CITES Concerning Commercially-exploited Aquatic Species. Rome, 26–30 March 2007. FAO Fisheries Report. No. 833. Rome, FAO. 2007. 133 p.is

- Accounting for intra-specific variability in life history (e.g. eel)
- Integration of diverse data sources into one assessment (e.g. eel)
- Lack of theoretical basis for establishing quotas (especially for eels)

6. Main recommendations which could be considered when making an NDF for this taxonomic group

- Must consider all sources of significant mortality when making NDF
- Consider whether establishing harvest/export quota is enough to achieve conservation goals
- Collaboration between Scientific Authorities and fisheries experts
- Transboundary migrants and shared stocks require regional NDF cooperation
- Be cautious with fisheries dependent data, verify when possible
- When possible, base NDF on both fisheries independent and dependent information/data
- Need techniques and legislation to distinguish among farmed, captive bred and wild individuals
- Management on which NDF is based should employ principles of adaptive and participatory management
- Report to the CITES Secretariat the methods by which NDFs are being made in order to improve transparency

7. Useful references for future NDF formulation.

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Seahorses

Hippocampusinfo.org

General

Fishbase.org
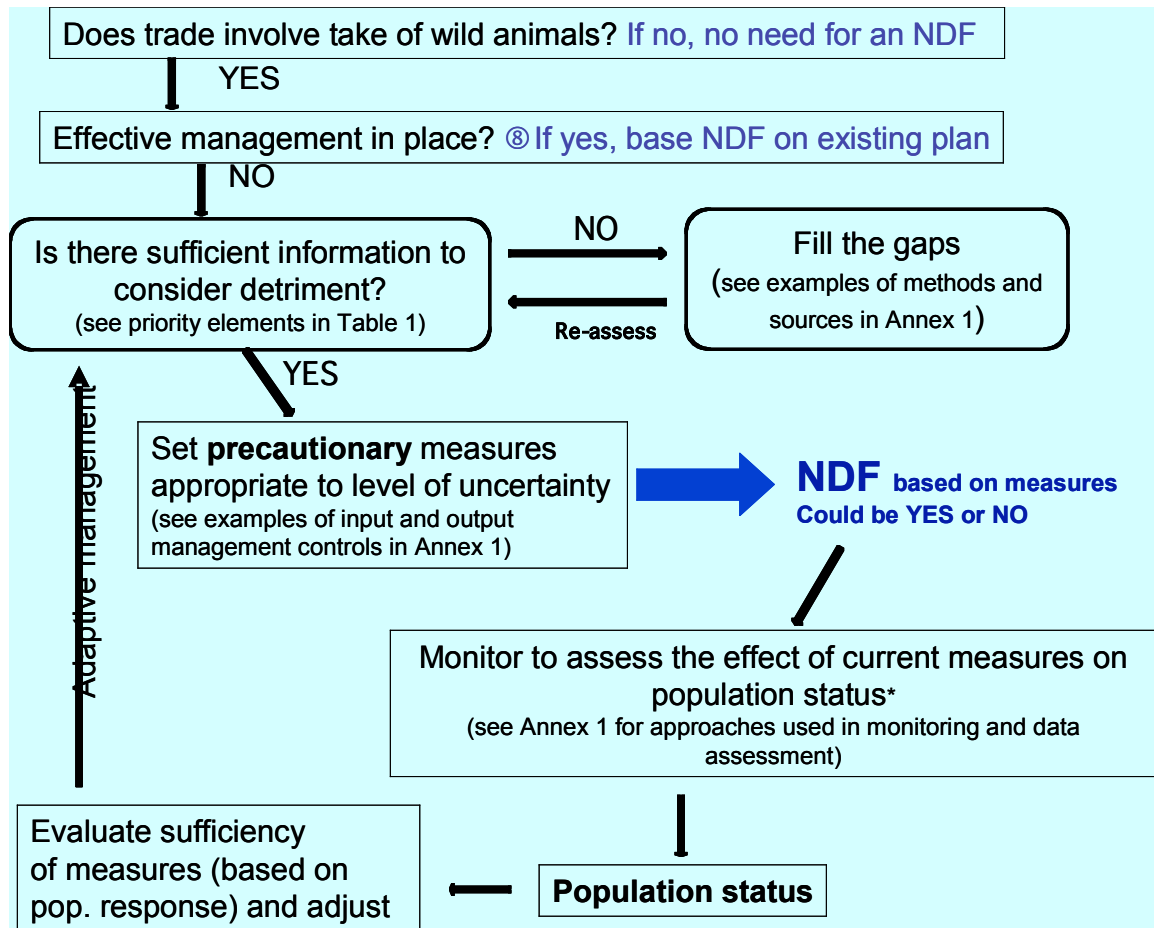Databases and guidelines available in the UN Food and Agriculture Organization (www.fao.org)
Information on marine species and fisheries available in the Sea Around Us project of the University of British Columbia (www.searoundus.org).
IUCN Species Specialists Groups
GoogleEarth

Annex 2. Flowchart describing the logical steps for making an NDF for fish species in trade.

Does trade involve take of wild animals? If no, no need for an NDF

YES

Effective management in place? ⑧ If yes, base NDF on existing plan

NO

Is there sufficient information to consider detriment?
(see priority elements in Table 1)

NO → Fill the gaps
(see examples of methods and sources in Annex 1)

Re-assess

YES

Set **precautionary** measures appropriate to level of uncertainty
(see examples of input and output management controls in Annex 1)

→ **NDF** based on measures
Could be YES or NO

Monitor to assess the effect of current measures on population status*
(see Annex 1 for approaches used in monitoring and data assessment)

Population status

Evaluate sufficiency of measures (based on pop. response) and adjust

Adaptive management

*Level/frequency of monitoring depends on life history, level of interaction and uncertainty (Annex 1 includes approaches for evaluating the quality and uncertainty in data).

Table 1. Biological characteristics, harvest and other impacts to be considered when making an NDF. All significant sources of mortality should be considered when making an NDF, including from legal and illegal direct take, bycatch, non-harvest related mortality and due to habitat loss.

Information needed	For what
which species	taxonomy
where (locations, depth, habitat)	spatial distribution; habitats
when (time of year)	temporal distribution
how many	abundance (preferably over time)
size/age stucture	size/age distribution; growth; mortality
sex (male, female, juvenile)	sex ratio
mature (yes/no)	size/age at maturity; maturity schedule
all significant sources of mortality	make NDF in context