

The role of CITES in the conservation of marine fishes subject to international trade

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Abstract

All possible tools need to be marshalled for marine fish conservation. Yet controversy has swirled around what role, if any, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) should play for marine fishes. This paper analyses the relevance and applicability of CITES as a complementary tool for fisheries management. CITES currently regulates the international trade of very few marine fish species, by listing them in its Appendices. After the first meeting of the Parties (member countries) in 1976, no new marine fish taxa were added to the CITES Appendices until 2002, when Parties agreed to act to ensure sustainable and legal international trade in seahorses (*Hippocampus* spp.) and two species of sharks. Progress has continued haltingly, adding only one more shark, humphead wrasse (*Cheilinus undulatus*) and sawfishes by 2012. Parties voice concerns that may include inadequate data, applicability of CITES listing criteria, roles of national fisheries agencies, enforcement challenges, CITES' lack of experience with marine fishes, and/or identification and by-catch problems. A common query is the relationship between CITES and other international agreements. Yet all these arguments can be countered, revealing CITES to be a relevant and appropriate instrument for promoting sound marine fisheries management. In reality, Parties that cannot implement CITES effectively for marine fishes will also need help to manage their fisheries sustainably. CITES action complements and supports other international fisheries management measures. As CITES engages with more marine fish listings, there will be greater scope to analyse its effectiveness in supporting different taxa in different contexts.

Keywords Fisheries management, international agreements, marine conservation, sustainable use, threatened species, wildlife trade

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Introduction

Ensuring sustainable extraction of marine fishes is crucial to the conservation of biodiversity in the oceans, well-being of local communities and food security globally. The Food and Agriculture Organization of the United Nations (FAO) indicates that 57% of all fisheries it tracks are fully exploited and

require effective management to avoid decline and that a further 30% are overexploited, depleted or recovering from depletion; the latter is a notable increase from 10% in 1974 to 26% in 1989 (FAO 2012a). Over 80% of global catches, however, are derived from fisheries lacking formal assessment, and small unassessed fisheries are in substantially worse condition than assessed fisheries (Costello

et al. 2012). There is, today, no doubt that populations of marine fishes can indeed be extirpated or become globally threatened, notwithstanding their typically high fecundity and capacity for wide dispersal (Hutchings 2001; Sadovy 2001; Reynolds *et al.* 2005). It is also evident that a tremendous number of people depend on fishing for livelihoods (up to 820 million people) and food security (some 3 billion people) (FAO 2012a).

The economic value of many species draws greatly from their international trade. Approximately 38% of all fish products (from both wild and cultured sources) were exported in 2010 (FAO 2012a). Increased trade is facilitated by improvements in storage and transport capabilities and stimulated by the increasing use of fish in expanding cash economies and for foreign exchange earnings (e.g. Béné *et al.* 2007; Asche and Smith 2009). It is also enabled by the spiralling prices attained by some species, such as bluefin tuna (*Thunnus thynnus*) (Collette *et al.* 2011). Seafood has become one of the most widely traded of all commodities, with a total export value of the seven principal fishery commodity groups (94.66% of world total) reaching 109 billion US dollars in 2010 (FAO 2012a). A study by TRAFFIC, the wildlife trade monitoring network, in the early 1990s found that fisheries constituted about 25% of international trade in wild species, which has a total worth of about \$160 billion (TRAFFIC as cited in Dickson 2002). In addition, many millions of tonnes of low trophic level fishes are used as fishmeal for agriculture and aquaculture or for other non-food purposes.

Conservation and sustainable use of fish stocks, populations and species has largely been vested in fisheries management agencies and organizations at national, regional and global levels. At the national level, fisheries and/or marine affairs agencies tend to be production oriented and distant from the forestry and environment agencies that are typically charged with conservation policy and activity. The approximately 17 Regional Fisheries Management Organizations (RFMOs: FAO 2012b) have a mandate for managing high seas, straddling and highly migratory fish stocks, either by taxon or by geographical region. Increasingly, however, there have been calls for RFMOs to improve their conservation and management of fishery resources (see refs in Gilman *et al.* 2013). Most RFMOs, for example, have large governance deficits in areas such as by-catch, with binding measures address-

ing about one-third of by-catch problems (Gilman *et al.* 2013), and many fisheries are not covered by any RFMO. FAO, often argued to be the arbiter of fisheries issues and concerns, has no fisheries management mandate or capacity *per se*, nor can it insist on agreed action (FAO 1995). Rather, FAO works primarily through its voluntary Code of Conduct for Responsible Fisheries (CCRF) across a wide range of fisheries issues, provides important capacity building assistance to many countries and collates and analyses fisheries data.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is ideally placed to complement national and regional management of fish species subject to international trade. First, CITES was crafted specifically to prevent international trade from contributing to the extinction of commercially exploited species. To that end, it has a precautionary mandate to regulate international trade of species that are or may become threatened by such commerce. Second, it has a long history of engagement with difficult issues and has achieved notable successes by catalysing improvements in the conservation status of taxa ranging from crocodiles to orchids (Kievit 2000; Dickson 2002). Third, CITES is the only multilateral environmental agreement that has legal mechanisms in place to promote compliance with agreed restrictions on exports. Fourth, CITES has a global reach with 177 member States (Parties), representing over 90% of the world's countries. CITES can be seen as both a trade Convention serving to address conservation concerns, and a conservation Convention that addresses threats by regulating trade.

In this paper, we analyse CITES' past and potential role in taking action for marine fishes. Our focus is particularly on why, despite its suitability for the challenge, CITES scarcely engaged with marine fish issues until 2002 and has made little progress thereafter. We introduce the Convention in a marine fish context, explore the marine fish issues brought to CITES, probe and address the objections and concerns expressed by Parties and other agencies about marine fish listings and comment on the beginnings of CITES activity on behalf of this huge and important group of animals, constituting approximately 15 300 species (Ausubel *et al.* 2010). Our focus is on fully marine (hereafter, just called 'marine') fishes but we also refer to anadromous sturgeons (Acipenseriformes) and the catadromous European eel (*Anguilla anguilla*). The

implementation of CITES action for marine species to date, and its effectiveness in supporting their populations, will be the subject of a second paper (in preparation).

The CITES context

To explore the relationship between CITES and marine fishes, we must first provide a brief outline of CITES and its particular dynamics. CITES was signed in 1973 (and came into force in 1975) at a time when international trade, particularly in mammals, was feared to be a major contributor to species decline (Huxley 2000; Wijnstekers 2011). Over 1000 animal and plant species were listed by consensus in the original Appendices. Recognition of the full threats of habitat damage and loss, invasive species and climate change came later. Unregulated exploitation and international trade continue, regardless, to be a great concern for many species.

The core strength of CITES lies in its capacity to add species of conservation concern to one of three lists, called Appendices to the Convention (CITES 2012a). Appendix I includes species threatened with extinction that are or may be affected by trade. As of November 2011, Appendix I included 926 species (625 species of animals and 301 species of plants) for which exports and imports for primarily commercial purposes are essentially prohibited (CITES 2012b). Appendix II is the heart of the Convention, providing a tool to ensure that the international trade of wild specimens is legal and sustainable. It lists species which, although not necessarily now threatened with extinction, may become so unless trade is regulated, along with some 'look-alike' species. As of November 2011, Appendix II included 33 700 species (more than 27 000 of them plants) that could only be exported with permits (CITES 2012b). Export of these species is dependent on three provisions: (i) confirmation that the export is not detrimental to wild populations of the species (called making a non-detriment finding or NDF); (ii) specimens are legally sourced; and (iii) live animals are transported according to welfare guidelines. In addition, CITES-listed species that are artificially propagated (plants) or bred in captivity (animals) must conform to a set of guidelines for international trade. Appendix III (266 species as of December 2011, CITES 2012b) represents requests by individual Parties for support from other CITES Parties with respect to a particular taxon of national concern,

often one for which exploitation is prohibited by national law. Criteria for listing in Appendices I and II were not included in the original text to the Convention, but early versions were formulated in 1976 at the first meeting of the Conference of the Parties (CoP) to CITES in Bern (Sand 1997).

Species are generally added to or removed from Appendix I or II at CITES CoPs, which take place approximately every 2.5–3 years. Although CoPs are primarily meetings of the Parties, they also involve Observer delegations from non-governmental organizations (NGOs) and intergovernmental organizations (IGOs) such as FAO, other treaties, RFMOs and the International Union for the Conservation of Nature (IUCN). An average of about 385 official Observer groups, representing a broad spectrum of perspectives, participated in CoP12 to CoP15. The observers provide expertise and support for Parties and can also exert considerable influence with them, through provision of information materials and persuasive argument. Extractive, trade and end-user interests are also active at CoPs, both on national delegations and as observer organizations. Primary extractors (e.g. fishers, farmers and loggers) are, however, seldom directly represented.

Any Party that wishes to propose a change to the list of species in Appendices I or II of CITES (add a species, remove it or transfer it between Appendices) must submit a formal written proposal 150 days before a CoP, after a consultation with range States (those where the species naturally occurs). The proposal is circulated to Parties and evaluated by many agents, particularly the CITES Secretariat, IUCN and TRAFFIC. Their recommendations are not binding on the Parties, but may be influential.

FAO has convened an *Expert Advisory Panel to assess proposals to amend Appendices I and II of CITES concerning commercially exploited aquatic species* prior to every CoP since CoP13 in 2004 (FAO 2006); it was called an *Ad Hoc Panel* for CoP13 and CoP14. CITES Parties are not obliged to agree with FAO evaluations and recommendations, but many Parties do take FAO's assessment seriously. Indeed, FAO Members have asked the FAO Regular Programme to begin providing funding for this work (FAO 2012c), which had previously been supported by Japan. FAO's involvement with CITES listing started well before this Expert Advisory Panel was formed and included involvement with reviews of the listing criteria after CoP8

and two *Technical consultations on the suitability of the CITES criteria for listing commercially exploited aquatic species* (FAO 2000a, 2001).

Amendments to the list of species in CITES Appendix I or II require approval of two-thirds of the Parties at the CoP that support or reject the proposal. The first vote on species proposals happens in Committee I of the CoP, which comprises hundreds of representatives of Parties and Observer groups; the latter have no vote. Efforts are made to reach consensus on proposals, but often a vote is taken. This is usually the only vote but some controversial taxa are taken to a second vote in Plenary at the end of the CoP, where the original Committee I result is either endorsed or overturned. Prior to the introduction of electronic voting (at CoP14), voting was usually undertaken through a show of placards. Under certain circumstances – usually at the behest of Parties – voting can, however, also take place as a roll call (when the names of all Parties are read in turn and the Party's vote is registered) or a secret ballot (when only the final tally is released).

In addition to species-specific concerns, CoPs also consider a number of cross-cutting and implementation issues, primarily in Committee II; these include relations with other multilateral agreements, rules and procedures for issuance of permits and certificates, transport of live animals, and enforcement and compliance issues. In both Committees, Parties also adopt Resolutions and Decisions relating to a range of taxonomic, implementation and cross-cutting issues.

Even if a taxon is listed in an Appendix, Parties may enter a reservation (within 90 days of the listing), effectively becoming a non-Party to CITES with respect to that taxon. The Party must, however, still conform to CITES provisions (with equivalent documentation to the CITES permits and documents) if it trades with other CITES Parties that have not entered a reservation. Now that the vast majority of the world's countries, and virtually all countries involved in international trade, are CITES Parties, these reservations have less significance than earlier in the Convention's history. Nevertheless, unregulated international trade between Parties with reservations may undermine CITES' effectiveness [Res. Conf. 11.3 (Rev. CoP15)].

The wide array of action that falls under CITES' remit necessitates scientific and management engagement at the national levels and by the CoP itself. Both exporting and importing Parties have

responsibility for implementation of CITES requirements. Each Party is required to designate one Scientific Authority and one Management Authority. Most such Authorities come from within government agencies, primarily Forestry or the Environment (which has its own implications for Fisheries – see below), although some Parties have separate marine or aquatic Authorities. CITES itself executes technical work through the CITES Animals and Plants Committees, each of which meets twice between CoPs. Among other business, these Committees lead a process known as the Review of Significant Trade [Res. Conf.12.8 (Rev. CoP13)], designed to identify cases of listed species where treaty requirements for non-detriment findings for Appendix II species may be poorly implemented and to assist exporting countries to correct deficiencies. As a final resort, this process can lead to trade suspensions and is a strength of the Convention.

CITES and action on marine fishes

Background to listing proposals for marine fishes

CITES has a mandate that includes all living organisms. Although it has consistently focused more on terrestrial than marine species, CITES is as relevant and applicable to marine fishes as to any other taxon. Indeed, the original text of the Convention makes special provisions for listing marine species. Under Article XV, the CITES Secretariat must immediately forward all listing proposals to the Parties and formulate a recommendation. For marine species only, the Secretariat must also consult intergovernmental bodies that deal with the species, asking for scientific data and ensuring coordination with any conservation measures adopted by such bodies. It then must communicate such information to the Parties as soon as possible [Article XV, paragraph 2(c)]. This singular obligation to consult for marine species has been labelled odd and 'short-sighted' (Wijnstekers 2011, p. 462), and the Secretariat has often chosen also to consult on non-marine taxa with relevant bodies that have arisen since CITES came into force.

The criteria for listing species in CITES Appendices I and II are related to (but not identical to) the criteria for listing species on the IUCN Red List of Threatened Species (www.iucnredlist.org). Challenges to the IUCN criteria from 1996, when the

first marine fishes were added to the IUCN Red List, also affected CITES criteria. Fisheries scientists and managers argued that the thresholds triggering threatened listings under the population decline criterion (IUCN Criterion A) were far too low for exploited and managed species (Matsuda *et al.* 1997). IUCN adopted a new Red List subcriterion in 2001 – characterized by higher thresholds for species where the causes of the declines are understood, managed and reversible (IUCN 2012) – and CITES similarly amended its own listing criteria for commercially exploited marine species in 2004 (see history in CITES 2013). FAO had significant input into the CITES changes, with two major FAO expert working groups, each followed by FAO Technical Consultations, as well as direct FAO input to CITES' own meetings.

CITES also deals with significant implementation issues for marine fishes, including how to handle specimens taken from the ocean beyond national jurisdiction (i.e. on the high seas). The CITES treaty calls this *Introduction from the Sea*, and CITES Parties have debated its implementation since at least 1994. It has been somewhat complicated, since CITES pre-dates the UN Convention on the Law of the Sea (UNCLOS), which entered into force 19 years after CITES, in 1994. A working group on the issue of *Introduction from the Sea* was established at CoP14 and CoP15 and was active between CoP15 and CoP16, grappling with the roles of the flag and port States, what constitutes the 'marine environment beyond national jurisdiction', and other related issues (CoP16 Doc. 32, www.cites.org).

Individual listing proposals for marine fishes

Initially, just one marine fish species, the coelacanth (later the West Indian Ocean coelacanth: *Latimeria chalumnae*) was included in the original Convention, along with four anadromous sturgeons. Since then, Parties have presented listing proposals for an additional 33 marine fish taxa at eleven CoPs over the 34 years from 1976 to 2010, with no proposals at CoP3, CoP5, CoP7 or CoP9.

We here discuss CITES action on marine fish taxa according to when a CoP first considered them, beginning with those placed in Appendices even before CoP1. The proposals are summarized in Table 1, IUCN Red List assessments are provided in Table 2, and we present an overview of

CITES involvement with marine fishes in Supporting Information (Table S1). Each proposal for listing a taxon in Appendix I or II was accompanied by an individual conservation justification, and each Party made its decision based on scientific and trade information for the species, as well as on its domestic economic and political concerns. Full proposals for each taxon, by CoP, can be found at <http://www.cites.org/eng/cop/index.php>; they provided the background information for this section. While our focus is marine fishes, we also include anadromous sturgeons and the catadromous European eel as points of reference. Again, we are focusing on CITES' decisions on whether to take action for marine fishes (and the controversies around such decisions) rather than on the implementation or effectiveness of the listings, which will be covered in a separate analysis.

Sturgeons – Order Acipenseriformes (listed in the original Appendices, then votes at CoP2, CoP4, CoP8 and CoP10)

CITES has dedicated considerable effort to the sturgeon, anadromous fishes that are largely in trade as roe or caviar (although some meat trade exists) (CITES 2012c). Many of the species face a high level of extinction risk as a result of overfishing, compounded by river engineering, pollution and habitat degradation. The first sturgeons were listed in 1975, even before CoP1, and all other members of the Order, including freshwater paddlefish, had been listed in Appendix I or II by 1997. The CITES listing directly stimulated the development of collaborative stock assessments and the establishment of quotas in the Black and Caspian Seas (a first for non-pelagic fin fish in the region), although these have had mixed results (Pikitch *et al.* 2005; Doukakis *et al.* 2009). Technical breakthroughs have made sturgeon aquaculture viable for some species (Bronzi *et al.* 2011), but it is difficult to determine the extent to which culture has contributed to the recovery of wild populations, such as through restocking programmes; some wild populations – and caviar production – may be almost entirely hatchery dependent (references in Raymakers 2006). In April 2000, the CITES Animals Committee (AC) launched a Review of Significant Trade for sturgeon, leading to recommendations to help range States improve the sustainability of their trade (Conf. 10.12(rev); SC45 Doc.12.1,

12.2). The first sturgeon species were placed on the first IUCN Red List in 1986; previously, the IUCN published Red Data Books, but these did not include marine fishes. Between 1997 and 2010, their status on the IUCN Red List moved from being primarily Endangered to primarily Critically Endangered (Table 2: www.iucnredlist.org). It is difficult to know how international trade contributed to such changes, given that domestic trade and habitat degradation were also problematic.

Coelacanth – *Latimeria* spp. (listed in the original Appendices, then votes at CoP6, CoP7 and CoP11)

There was evidently not much debate that coelacanths are rare and conservation dependent and need CITES protection, even if the trade is minimal. Both known species are large deep-water fishes and sole survivors of an ancient lineage of crossopterygian fishes thought to have gone extinct until discovery in the 1930s. Their evident rarity, limited geographical distribution, unique phylogenetic position, possible population declines, and possible threats from targeted and non-targeted fishing have been important aspects of the CITES listings. The first species, *L. chalumnae*, was placed on the original Appendix II, withstood a proposal to delist it in 1987 (CoP6), and was moved to Appendix I in 1989 (CoP7). Its more recently discovered congener was added to Appendix I by consensus in 2000 (CoP11). *Latimeria chalumnae* was rated as Data Deficient by the IUCN when it was listed but is now considered Critically Endangered, while *Latimeria menadoensis* has been evaluated as Vulnerable since its discovery (Table 2: www.iucnredlist.org).

Totoaba – *Totoaba macdonaldi*, originally *Cynoscion macdonaldi* (vote at CoP1)

This, the sole early listing (in Appendix I) of a marine fish of commercial importance, apparently avoided the later controversy around such animals. *Totoaba* populations suffered severe declines because of habitat change affecting spawning and nursery habitats (primarily from damming the Colorado River) and overfishing, largely as an incidental catch in shrimp fisheries although the species is also targeted for its high value swim bladder (Guevara 1990; Cisneros-Mata *et al.* 1995). It had not been assessed under IUCN Red List Criteria when it was listed in 1976 but was classified as Endangered in 1986 and Critically

Endangered in 2010, where it remained in 2012 (Table 2: www.iucnredlist.org).

Atlantic herring – *Clupea harengus* (vote at CoP8)

This listing was proposed at CoP8 for political reasons. Herring is of great economic importance to northern countries, not least as a major raw material in the fishmeal industry. By proposing this Appendix I listing for herring, the four Southern African proponent Parties sought to highlight their objections to the earlier Appendix I listing for African elephant (*Loxodonta africana*) at CoP7 (see below), which they felt had comparable value for some African countries. That said, there were also real conservation concerns for the species. In 1977, the herring fishery in the North Sea had been closed following recommendations from the International Council for Exploration of the Sea (ICES). At the time of CoP8 (1992), the recovering stock had not yet reached the level recommended by ICES (Dickey-Collas *et al.* 2010). The proposal was, however, withdrawn, with proponent Parties explaining that it had served its purpose, although they believed there was still a case for listing the species in the Appendices (CITES 1992). Herring populations have since recovered, thanks to effective national and international management (Dickey-Collas *et al.* 2010). When it was first added to the IUCN Red List in 2010, the herring was recorded as Least Concern with an increasing population trend (Table 2: www.iucnredlist.org). Today, a similar CITES listing proposal, whether for Appendix I or II, would not pass FAO Expert Panel scrutiny, nor an evaluation against the criteria originally suggested by FAO (2000a, 2000b) and revisited by Sant *et al.* (2012): biological vulnerability, value (or economic risk) and violability (or compliance risk).

Atlantic bluefin tuna – *Thunnus thynnus* (votes at CoP8 and CoP15)

The listing proposals for this species, possibly the world's most commercially valuable fish, have been hugely controversial at two CoPs. At CoP8 (1992), Sweden proposed listing the eastern Atlantic stock of this species in Appendix II, and the more threatened western Atlantic stock in Appendix I, because of significant declines in populations driven by international trade. Feelings ran high with, for example, a large contingent of Japanese fishers actively protesting outside the conference centre. After intense debate, Sweden eventually

Table 1 Outcome of listing proposals for marine species from 1975 to 2010. CITES Documents are mentioned only where they preceded the first vote.

Taxon	Scientific name	Appendix	1975	1	1976	2	1979	3	4	5	6	7	8	9	10	11	12	13	14	15
Sturgeons																				
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	I	✓						✓ ¹											
Lake sturgeon	<i>Acipenser fulvescens</i>	II	✓						✓ ²						✓					
Gulf sturgeon	<i>Acipenser oxyrinchus</i>	I/II	✓			✓ ¹														
Atlantic sturgeon	<i>Acipenser sturio</i>	II	✓						✓ ³											
All sturgeons (remaining 23 sp.)	Acipenseriformes spp.	II												✓						
European eel	<i>Anguilla anguilla</i>	II																	✓/✓	
Marine fishes																				
West Indian Ocean coelacanth	<i>Latimeria chalumnae</i>	II/I	✓							X ²	✓ ³									
Totoaba, Mexican seabass	<i>Totoaba macdonaldi</i> (was called <i>Cynoscion macdonaldi</i>)	I		✓																
Herring	<i>Clupea harengus</i>	I																		
Atlantic bluefin tuna	<i>Thunnus thynnus</i>	I/II ⁴																		
All sawfishes	Pristiiformes spp. (CoP10) then Pristidae (CoP14)	I ⁵													X				✓/✓	X
Whale shark	<i>Rhincodon typus</i>	II												Disc ⁶		(X)	(X)/✓			
White shark	<i>Carcharodon carcharias</i>	II												Disc ⁶		(X)		✓		
Basking shark	<i>Cetorhinus maximus</i>	II												Disc ⁶		(X)/(X)	(X)/✓			
All coelacanths	<i>Latimeria</i> spp.	I														✓ ⁷				
All seahorses	<i>Hippocampus</i> spp.	II														Disc ⁸	✓			
Humphead wrasse (or Napoleon fish)	<i>Cheilinus undulatus</i>	II														(X)	(X)	✓		
Patagonian and Antarctic toothfishes	<i>Dissostichus eleginoides</i> & <i>D. mawsonii</i>	II															W			
Porbeagle shark	<i>Lamna nasus</i>	II																(X)	✓/(X)	

Table 1 (Continued).

Taxon	Scientific name	Appendix	Pre-CoP 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Spiny dogfish	<i>Squalus acanthias</i>	II															(X)/X	X
Banggai cardinalfish	<i>Pterapogon kauderni</i>	II															W	
Scalloped hammerhead (with great hammerhead and smooth hammerhead sharks as look-alike)	<i>Sphyrna lewini</i> (with <i>S. mokarran</i> and <i>S. zygaena</i> as look-alike)	II															(X)/(X)	
(Sandbar and dusky sharks as look-alikes to scalloped hammerhead)	(<i>Carcharhinus plumbeus</i> and <i>C. obscurus</i> as look-alikes to <i>S. lewini</i>)	II															W	
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	II																(X)

✓, Adopted in Committee and did not go to Plenary; X, Defeated in Committee and did not go to Plenary; W, Withdrawn; (X), Defeated but known to have a simple majority; (50% of all votes plus one)✓, Disc Discussion Document before any listing proposal. See footnotes: ✓/X, Adopted in Committee but defeated in Plenary, will be (X) here, if known to have a simple majority; ✓/✓ – Adopted in both Committee and Plenary; X/X, Defeated in both Committee and Plenary, will be (X) here, if known to have a simple majority.

¹Transfer from Appendix I to Appendix II.

²Delete from Appendix II.

³Transfer from Appendix II to Appendix I.

⁴Western Atlantic population on App I, Eastern Atlantic population on App II at CoP 8, all on App I at CoP15.

⁵As a result of an amendment at CoP14, *Pristis microdon* (only) was listed on Appendix II to allow trade of live specimens for public aquaria for primarily conservation purposes.

⁶For all sharks, not these species *per se*. Doc. 9.58: Interpretation and Implementation of the Convention: Management of Sharks included all shark species.

⁷All coelacanth species listed in Appendix I.

⁸For all syngnathid fishes, not just seahorses. Doc. 11.36: Trade in Seahorses and Other Members of the Family Syngnathidae.

Table 2 IUCN Red List status of marine species proposed for CITES listing, for the whole species and for particular regions/populations. Red List Status: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient; NE, Not Evaluated.

Species/taxon proposed	Scientific name	CoP no.	CoP year	RL Status at time of listing/proposal	RL Status and date first added to RL	RL Status current
Sturgeons						
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Pre-CoP 1, 4	1975, 1983	NE	VU (1986)	VU (2004)
Lake sturgeon	<i>Acipenser fulvescens</i>	Pre-CoP 1, 4	1975, 1983	NE	VU (1986)	LC (2004)
Gulf sturgeon	<i>Acipenser oxyrinchus</i>	Pre-CoP 1, 2	1975, 1979	NE	VU (1986)	NT (2006)
Atlantic sturgeon	<i>Acipenser sturio</i>	Pre-CoP 1, 4	1983	NE	EN (1988)	CR (2010)
Sturgeons (all remaining 23 sp.)	Acipenseriformes species	10	1997	5 CR (1996), 11 EN (1996), 6 VU (1996), 1 NE	3 CR (1996), 1 EN (1986), 1 EN (1990), 8 EN (1996), 1 LC (2004), 1 Rare (1986), 2 VU (1986), 1 VU (1990), 5 VU (1996)	14 CR (2010), 2 LC (2004), 1 CR (2004), 1 CR (2011), 1 EN (2004), 1 EN (2010), 1 NT (2006), 1 VU (2004), 1 VU (2010)
European eel	<i>Anguilla anguilla</i>	14	2007	NE	CR (2010)	CR (2010)
Marine fishes						
West Indian Ocean coelacanth	<i>Latimeria chalumnae</i>	Pre-CoP 1, 6	1975, 1987	NE	DD (1988)	CR (2000)
Totoaba (or Mexican seabass)	<i>Totoaba macdonaldi</i> (was called <i>Cynoscion macdonaldi</i>)	1	1976	NE	EN (1986)	CR (2010)
Herring	<i>Clupea harengus</i>	8	1992	NE	LC (2010)	LC (2010)
Atlantic bluefin tuna	<i>Thunnus thynnus</i>	8, 15	1992, 2010	NE	DD (1996)	EN (2011)
All sawfishes	Pristiiformes spp. (CoP9) then Pristidae (CoP14)	10, 14	1997, 2007	3 NE, 3 CR (1996) and 1 EN (1996)	4 EN (1996), 3 others EN (2000)	1 CR (2005), 5 CR (2006), 1 CR (2007)
Whale shark	<i>Rhincodon typus</i>	11, 12	2000, 2002	VU (2000)	DD (1990)	VU (2005)
White shark	<i>Carcharodon carcharias</i>	11, 13	2000, 2004	VU (2000)	DD (1990)	VU (2009)
Basking shark	<i>Cetorhinus maximus</i>	11, 12	2000, 2002	VU (2000)	DD (1990)	VU (2005)
All coelacanths	<i>Latimeria</i> spp.	11	2000	1 CR (2000), 1 NE	1 DD (1988), 1 VU (2008)	1 CR (2000), 1 VU (2008)
All seahorses	<i>Hippocampus</i> spp.	12	2002	1 EN (1988), 18 VU (1996), 2 VU (2002), 5 DD (1996), 6 DD (2002), others NE	1 VU (1988), 21 VU (1996), 1 VU (2002), 3 DD (1996), 6 DD (2002), 1 DD (2003), 3 DD (2010), 1 DD (2012), others NE	1 EN (2012), 1 LC (2010), 1 VU (2002), 3 VU (2003), 6 VU (2012), 5 DD (2002), 10 DD (2003), 4 DD (2006), 3 DD (2010), 3 DD (2012), others NE

Table 2 (Continued).

Species/taxon proposed	Scientific name	CoP no.	CoP year	RL Status at time of listing/proposal	RL Status and date first added to RL	RL Status current
Humphead wrasse (or Napoleon fish)	<i>Chelinus undulatus</i>	12, 13	2002, 2004	VU (1996), EN (2004)	VU (1996)	EN (2004)
Patagonian & Antarctic toothfishes	<i>Dissostichus eleginoides</i> & <i>D. mawsonii</i>	12	2002	NE	NE	NE
Porbeagle shark	<i>Lamna nasus</i>	14, 15	2007, 2010	VU (2006) – Global; CR (2006) – Med; CR (2006) – NE Atl.; EN (2006) – NW Atl.	VU (1996) – Global; CR (2006) – Med; VU (2000), NE Atl.; EN (2006) – NW Atl.	VU (2006) – Global; CR (2006) – Med; CR (2006) – NE Atl.; EN (2006) – NW Atl.
Spiny dogfish	<i>Squalus acanthias</i>	14, 15	2007, 2010	VU (2006)	VU (2006)	VU (2006)
Banggai cardinalfish	<i>Pterapogon kauderni</i>	14	2007	EN (2007)	EN (2007)	EN (2007)
Scalloped, great & smooth hammerhead sharks	<i>Sphyrna lewini</i> , <i>S. mokarran</i> & <i>S. zygaena</i>	15	2010	2 EN (2007); 1 VU (2005)	1 DD (2000); 1 EN (2007); 1 VU (2005)	2 EN (2007), 1 VU (2005)
Sandbar & dusky sharks	<i>Carcharhinus plumbeus</i> & <i>C. obscurus</i>	15	2010	VU (2009); NE	VU (1996); NE	VU (2009); NE
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	15	2010	VU (2006)	VU (2006)	VU (2006)

Source: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>.

withdrew its proposals (CoP8 Prop 76 and 77) in exchange for an agreement to take strong action through the International Commission for Conservation of Atlantic Tunas (ICCAT) to restore and maintain Atlantic bluefin tuna populations, restrict trade in line with its conservation programme and improve data collection and research. Unlike herring, however, the tuna stock continued to plummet because of management problems at ICCAT, including quotas being set at levels far above those advised by scientists, and legal and illegal fishing taking place at levels well above even those quotas. Monaco submitted a proposal to CoP15 (2010) to include the species in Appendix I. There was overwhelming agreement that the species met CITES criteria for inclusion in Appendix I, with endorsements from: IUCN, TRAFFIC, the majority of the FAO Expert Advisory Panel, ICCAT's own scientific committee (the Standing Committee on Research and Statistics) (CITES 2009), other scientists, conservation organizations and many governments. However, most of these voices did not have a vote, and the proposal was defeated at the CoP. It did, however, generate enough discussion and political will to move ICCAT member governments to reduce the quota in line with science and address illegal fishing and overfishing. At ICCAT's 2010, 2011 and 2012 meetings, this commitment to address illegal fishing and keep quotas within scientific advice has continued (ICCAT 2012a,b,c). This species was on the IUCN Red List as Data Deficient in 1996, when first evaluated, but is now considered Endangered (Table 2: www.iucnredlist.org).

Sharks – Class Elasmobranchii (first CITES Document at CoP9 and votes at CoP11, CoP12, CoP13, CoP14 and CoP15)

Only a few of the more than 500 shark species have been proposed for listing (all in Appendix II), but all proposals have been characterized by robust debate. CITES has been deliberating over shark conservation and management issues since CoP9 (1994), when it noted concern that shark species were being heavily and unsustainably exploited. Tens of millions of sharks are killed and traded every year, although just 14 species are common in the international fin trade (Clarke *et al.* 2006a,b), although shark skin, teeth and meat from more species are also in trade (Musick and Musick 2011). Proposals for listing sharks in CITES Appendix II have often led to the need for

further fora for deliberation about CITES' engagement with marine fishes of commercial importance, and especially about CITES' relationship with FAO. Sharks were the first species for which CITES agreed to develop a Working Group and Resolution (Res. Conf. 9.17) before any listing proposal had been made for that taxonomic group and at a time when public awareness of shark conservation needs was still low. The Resolution noted concern that shark species were being heavily and unsustainably exploited, with increasing international trade demand a major factor in declines, and, *inter alia*, asked FAO to initiate a more intensive work programme on sharks and rays. FAO subsequently created a non-binding international plan of action for sharks (IPOA-Sharks: FAO 1998a,b). Its objective, adopted in 1999, was to ensure the conservation and management of sharks – the IPOA Sharks applies to all species of sharks, skates, rays and chimaeras – and their long-term sustainable use, within the framework of the CCRF. Trade and conservation engagement with sharks has since continued apace. CITES has taken numerous Decisions specifically for sharks, some of which have addressed implementation issues and how CITES might best complement FAO work, especially through the IPOA-Sharks, while FAO has been involved in all CITES activities on sharks.

Each of the first three species of sharks now included in Appendix II was rejected the first time the listing was proposed at a CoP, but accepted at a second CoP (Table 1). The then-recent adoption of FAO's IPOA-Sharks was used in 2000 as a major argument against the adoption of shark listing proposals at CoP11 (Table S1). By CoP12 (2002), however, it was obvious that (i) the IPOA-Sharks was not being implemented effectively and (ii) RFMOs, particularly tuna RFMOs, where sharks are taken in association with tuna fisheries, were not managing shark fisheries for sustainability. Two species (whale shark, *Rhincodon typus* and basking shark, *Cetorhinus maximus*) were added to Appendix II. Despite shark proposals at every CoP since then, only the white shark (*Carcharodon carcharias*) has been listed (Appendix II at CoP13). Two other species have each been rejected twice although the proposal to list one of them, the porbeagle (*Lamna nasus*), in Appendix II was adopted in Committee on the second attempt (CoP15) only to be rejected in Plenary (Table 1). Two more Appendix II listing proposals for shark

species (one including an additional four species as look-alikes) have also been rejected once, at CoP15 (Table 1).

The FAO Expert Advisory Panel found it could not determine whether the white shark met CITES criteria for listing at CoP13 (it was accepted) but did not support porbeagle or spiny dogfish (*Squalus acanthias*) listings at CoP14 (both of which were rejected). The Panel did agree that criteria were met for listing the scalloped hammerhead (*Sphyrna lewini*) (although not necessarily all its purported look-alikes), oceanic whitetip shark (*Carcharhinus longimanus*) and porbeagle – but not the spiny dogfish – at CoP15, yet all were rejected. The three shark species added to CITES Appendix II were first evaluated in 1990 as Data Deficient on the IUCN Red List, but have been considered Vulnerable since 2000 (Table 2: www.iucnredlist.org). The other species proposed for the Appendices but not listed were all judged to be at least Vulnerable at the time of the proposals and are faring no better now (Table 2: www.iucnredlist.org). Both the porbeagle and scalloped hammerhead sharks have been added to Appendix III by several countries, which requires trade monitoring but not NDFs. Three shark species plus two look-alikes have been proposed for Appendix II listings at CoP16 (2013), as have the two species of manta ray (*Manta biros-tris* and *M. alfredi*) and some of the South American freshwater stingrays (*Paratrygon aiereba*, *Potamotrygon motoro* and *P. schroederi*).

Sawfishes – Family Pristidae (votes at CoP10 and CoP14)

The sawfishes are subject to a small but important trade for fins (for large individuals), as curios and (to a small extent) as display animals for public aquaria. Target and by-catch fisheries (sawfish are highly vulnerable to entanglement in nets) have, with habitat degradation, extirpated sawfishes from most of their original range, and records in the wild are now extremely rare. The USA proposal to list all species of sawfishes in CITES Appendix I at CoP10 (1997) was defeated because of perceived data deficiencies and the relatively low international trade. The updated proposal for consideration at CoP14 (2007) presented new information on population status and trends and described an international trade in sawfish products that was enough to add to pressures on these species. The FAO Expert Advisory Panel recommended that all seven species of

sawfishes be added to Appendix I. This listing was largely accepted with one exception: the proposal was amended on the floor of the Conference to list one species, *Pristis microdon*, in Appendix II to allow commercial trade of live specimens for public aquaria ‘for primarily conservation purposes’. At the time of the first listing proposal in 1997, sawfishes were listed as Not Evaluated (three spp.), Endangered (one sp.) and Critically Endangered (three spp.), but all species had been assessed as Critically Endangered by the mid 2000s (Table 2: www.iucnredlist.org). A proposal to move *P. microdon* to Appendix I has been submitted to CoP16 by Australia, which finds the species in such poor shape that it is unable to issue an NDF for any exports from its stock, the world’s largest.

Seahorses – Hippocampus spp. (first CITES Document at CoP11 and vote at CoP12)

The agreement to list seahorses in Appendix II at CoP12 (2002) was the first for a new marine fish taxon since 1976. As well, uniquely among marine fishes, they were adopted after just one vote (in Committee 1, with no subsequent vote in Plenary) at the first CoP where they were proposed for listing. Tens of millions of seahorses (in at least 48 species) are traded each year among as many as 80 countries for traditional medicines (particularly traditional Chinese medicine, TCM), aquarium display, and/or curiosities and souvenirs. A combination of overexploitation and habitat damage had generated significant population declines. No agency was managing seahorse fisheries, although a few countries had decreed some seahorse species to be of conservation concern. Seahorses followed sharks in being (with other members of the family Syngnathidae) the focus of formal discussion at CITES during CoP11 (2000) – even before a listing was first proposed, at CoP12 (2002). That led to a working group and Decisions (11.97 and 11.153) that eventually created the context for a successful proposal for listing at CoP12. In what turned out to be a precedent-setting move for marine fishes, the seahorse listing was deferred to come into effect 18 months after the CoP, to allow Parties time to develop means to make NDFs (CoP12 Doc. 43; Decisions 12.53–12.56). Trade in seahorses may be one of the largest animal matters under CITES, in light of the volumes of animals and number of species and countries involved. Seven species of seahorse were

brought into the CITES Review of Significant Trade process in 2011 and 2012, the first such assessment for marine fishes (following the anadromous sturgeons). At the time of listing in CITES, six focal species were assessed as Vulnerable, with the remaining species all assessed as Data Deficient and listed for look-alike reasons. Now, of the 38 seahorse species that have been assessed, one is Endangered, 10 are Vulnerable, one is Least Concern and other 26 remain Data Deficient (Table 2: www.iucnredlist.org).

Patagonian and Antarctic toothfishes – *Dissostichus eleginoides* and *D. mawsonii* (vote at CoP12)

This is another example where CITES debate and controversy provoked improved management by an intergovernmental organization, without a CITES listing. Australia proposed listing *D. eleginoides* – and its look-alike congener, the Antarctic toothfish (*D. mawsonii*) – in CITES Appendix II. This large predatory fish is caught by deepwater bottom longliners in Antarctic waters, and its high value white fillets are predominantly marketed to North America, Europe and Japan. At the time of CoP12, populations of Patagonian toothfish had been declining at an alarming rate after a decade of overfishing, mainly by illegal, unreported and unregulated (IUU) operators. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) had already implemented a number of conservation measures for the Patagonian toothfishes, including a catch documentation scheme rather similar to CITES export permits. This CITES listing proposal faced the added challenges of dealing with *Introduction from the Sea*, with the associated jurisdictional uncertainty. After considerable debate at the CoP, the proposal was eventually withdrawn in favour of Res. Conf. 12.4 that called for cooperation between CITES and CCAMLR. CCAMLR has since adopted a more proactive stance and improved the toothfish catch documentation scheme after 2002 (CoP14 Doc. 61; Lack 2008). These species have not been assessed against the IUCN Red List Criteria.

Humphead wrasse – *Cheilinus undulatus* (vote at CoP12 and adopted by consensus at CoP13)

The eventual Appendix II listing for this species at CoP13 (2004) was the first for a coral reef food fish and also represents the only time a commercially exploited marine fish has been listed by consensus. Also known as the Napoleon or Maori wrasse, this species is highly valued as luxury

seafood and is often sold alive (typically in its juvenile phase) to the diner. International trade is fuelled by the high prices the fish can fetch in the restaurant trade and by associated IUU fishing. Many range States protect it nationally, some for cultural reasons; this is unusual among reef-associated fishes, which are typically unmanaged (Sadovy *et al.* 2003). Neither SEAFDEC (Southeast Asian Fisheries Development Center – an autonomous intergovernmental organization) nor any RFMO addresses humphead wrasse exploitation. An Appendix II listing proposal was defeated at CoP12 (2002) but a renewed proposal at CoP13 (2004) was successful, with the (then) newly formed FAO Ad Hoc Expert Advisory Panel concluding that it was warranted, the first time such a recommendation had been made (FAO 2004). At CoP15, CITES adopted a Decision (Decision 15.86, www.cites.org, accessed 31 December 2012) to examine international trade in this species. This wrasse was moved from Vulnerable (1996) to Endangered (2004) on the IUCN Red List (Table 2: www.iucnredlist.org) because of ongoing declines in sizes, catch rates and landings, and concern over the absence of effective management in most countries.

European eel – *Anguilla anguilla* (vote at CoP14)

The catadromous European eel was included in Appendix II at CoP14 (2007), with positive votes in both Committee and Plenary; it was possibly helped by the fact that CoP14 was held in Europe, and European eel was a local species submitted by Member States of the European Union. The meat of this species is highly valued for human consumption in Europe and East Asia at all stages of its life, with some countries preferring the small almost transparent glass eels and elvers. Since the 1960s, this species has undergone a sharp decline in recruitment across its range but rising prices for live glass eels for use in aquaculture drove continued exploitation (ICES 2012). It is also threatened by a parasite introduced from Japan, barriers to migration routes and water turbines that kill migrating fish. ICES recommended in 2001 that a recovery plan be developed for the whole stock on an urgent basis (Freyhof and Kottelat 2010). The European Council (EC) Regulation No 1100/2007 established measures in September 2007 for the recovery of the stock of European eel and stressed that inclusion in Appendix II would support these measures. The FAO Expert Advisory Panel also

gave its opinion that the species clearly met the criteria for listing in Appendix II, noting that implementation of CITES controls would be relatively unproblematic (FAO 2007). Despite such recommendations, the final decision to list the European eel was something of a surprise in the light of the substantial volumes and values involved. In 2010, *A. anguilla* was assessed for the first time under IUCN criteria and classified as Critically Endangered for its natural populations, amidst worries about persistent population decline (Table 2; www.iucnredlist.org).

Banggai cardinalfish – *Pterapogon kauderni* (vote at CoP14)

The proposed Appendix II listing was withdrawn in the face of opposition from the only range State, Indonesia. This small species is rare among marine fishes in having a very limited native geographical range, covering only one archipelago (Allen and Donaldson 2007). It is highly prized in the aquarium trade, largely unmanaged, and is subject to overfishing and habitat destruction. FAO along with China, Indonesia and Thailand opposed the proposal (submitted by the USA), highlighting the conclusions of the FAO Expert Advisory Panel that this species did not meet the Appendix II listing criteria. It was added to the IUCN Red List as Endangered in 2007, because of its small range, severe habitat fragmentation and ongoing population decline (Table 2; www.iucnredlist.org).

Comments on CITES action for marine fishes to date

As the previous section shows, CITES has been very slow to list marine fishes, with only a slight increase in listings since CoP12 (2002). After CITES listed coelacanth (1975) and totoaba (CoP1, in 1976), it was 16 years before other marine fish taxa were proposed for listing in the Appendices (tuna and herring, at CoP8 in 1992, both not adopted), and a total of 26 years before any new marine fish proposals were accepted (seahorses and two species of sharks), at CoP12 in 2002 (Table 1). This slowness is particularly remarkable given that most Parties proposing marine fish listings have taken a conservative approach, opting for an Appendix II listing proposal even if the species appeared to meet the Appendix I listing criteria (e.g. some hammerhead shark populations) (FAO 2013). The decisions to list seahorses and

then two species of sharks at CoP12 provided a sense that a tipping point might have been reached. Even the withdrawal of the toothfish proposal offered some hope, prompting CITES to engage with CCAMLR. Three more marine fish taxa (white shark, humphead wrasse and sawfishes) – plus the catadromous European eel – were added to the Appendices at CoP13 and CoP14 but all marine fish listing proposals were defeated at CoP15 (Table 1). That said, the taxa defeated at CoP15 were sharks and tuna, which CITES Parties have found controversial, and some of the votes (e.g. porbeagle, hammerhead sharks) were extremely close to achieving the two-thirds majority required for a proposal to be accepted.

Our overview also shows that marine fish listings, particularly those high value species for which commercial trade is significant, are generally controversial. All but one of the marine fish taxa added to the Appendices since 1976 were subject to at least two votes, either across two CoPs or in both Committee I and Plenary (Table 1, Appendix I). The sole exception was seahorses, which were accepted in Committee the first time, with no later challenge in Plenary, perhaps partly because of the activities of the *Working Group on Seahorses and Other Syngnathids* between CoP11 and CoP12 (CITES 2002a). Even so, the voting procedure for the seahorses was the subject of great debate in Committee, uniquely (among marine fish issues where such records exist) ending in a roll call vote of Parties (where each Party's vote was documented). The most notable transition in voting across two CoPs for marine fishes was for the humphead wrasse, which went from 65:42:05 (for:against:abstained) at CoP12 to a remarkable acceptance by consensus at CoP13. In contrast to the slow acceptance of marine fish listings, anadromous sturgeons and catadromous eels were listed on the first votes.

We do note that failed listing proposals for marine fishes often had more support than is evident from the outcomes. For listing proposals where the tally of votes is available, 77% (10 of 13) of those defeated in Committee and 75% (3 of 4) of those defeated in Plenary actually achieved at least a simple majority (50% of all votes plus one vote), but could not reach the necessary two-thirds majority (Tables 1 and S1). A simple majority is known to have voted against the proposal only four times sawfishes at CoP10, Atlantic bluefin tuna at CoP15 and spiny dogfish at CoP14 and CoP15.

The first wave of marine fish listings led to reservations from some of the Parties that voiced opposition to the proposals (Table S1). Five Parties entered reservations for seahorses – Indonesia, Japan, Norway, Palau (for two species) and South Korea – thereby exempting themselves from implementation of the Convention for this genus. The same five Parties plus Iceland also entered reservations for the sharks listed at CoP12, although one (Palau) subsequently co-sponsored shark proposals at CoP15.

In the light of the conflict surrounding marine fishes, the CoPs have repeatedly considered (and rejected) the idea of forming a Working Group for marine species. The first such proposal was submitted by the United States at CoP9 (1994), as a means of discussing implementation issues for commercially valuable marine species, but was not agreed. The concept arose again at CoP10 (1997) after the failed Atlantic bluefin tuna proposal of CoP9 [Doc. 10.60; Doc. 10.60.1], and again at CoP12 [Doc 12.61], where it was rejected in plenary (CITES 2002b). Those Parties in opposition to such a seemingly constructive Working Group appear to be concerned that it would facilitate adding more marine fishes to the Appendices or involve CITES in issues that should remain the purview of fisheries management bodies. Nonetheless, some Parties and Observers have maintained a strong interest in regulating the international trade in marine fishes of conservation concern, and the work of the AC is often focused on marine species; for example, a Shark Working Group has been convened at all nine AC meetings since AC18 in 2002, and there has been a specific agenda item on sharks at every Conference since CoP9 in 1994 (other than CoP11, where there was a listing proposal).

In addition to listing proposals, concerns about marine fish issues have also led to numerous CoP Resolutions and Decisions. Implementation of these has varied but some have played a vital role in the eventual listings in Appendices (see above) or have been important in supporting listed species (e.g. humphead wrasse, Decision 15.86–15.88, CoP15, on IUU trade). Sharks broke new ground at CoP9 (1994) when the Parties first agreed to take action on a taxon (Res. Conf. 9.17) without a prior listing in the Appendices. Similar preliminary engagement by CITES, in the absence of a listing,

followed for seahorses (Decisions 11.97 and 11.53) and then for sea cucumbers (Decision 12.60 and 12.61); the latter have not so far been proposed for CITES listing (although one species has been included in Appendix III by Ecuador). Another Decision adopted at CoP12 (Decision 12.7) approved the drafting of a Memorandum of Understanding between CITES and FAO, to establish a framework for cooperation between the two organizations, particularly on marine species.

CITES also has a mandate to promote species assessment and action aimed at either considering species' candidature for listing or helping to ensure that they do not need to be listed. The AC has implemented this for shark species under Res. Conf. 12.6 and Decisions 13.43 and 14.107, listing taxa that are affected by trade and making recommendations ranging from implementing strict national protection to improving fisheries data collection (e.g. CITES 2007). Only a few of these taxa have been proposed for listing in the Appendices.

Debates about listing marine fishes in CITES Appendices

There is clearly a need to understand why CITES has been so slow to engage with regulating international trade in marine fishes. We here (i) explore objections and concerns to marine fish listings raised by some Parties and other participants in the CITES process and (ii) discuss possible responses to those concerns. We group the objections as to whether they query (a) the appropriateness of CITES involvement or (b) the capacity for CITES Parties to implement a listing. Throughout this section, we draw on our extensive personal experience of the Convention to supplement the very brief written records of discussions in CoP Committee I and Plenary sessions – produced by CITES and the Earth Negotiations Bulletin (<http://www.iisd.ca/enbvol/enb-background.htm>) – and the FAO Expert Advisory Panel reports. Cumulatively, the authors have participated – on Party, IGO and NGO delegations – in 19 CoPs, dozens of AC meetings plus FAO Technical Consultations and Expert Advisory Panels (as both panel member and representative for a proponent). One or more authors has participated in every CITES CoP, AC and Standing Committee meeting since 1980.

Appropriateness

Threats of extinction for marine fishes

Objection/concern. Some Parties have argued that there is little risk of extinction for marine fishes, partly because of the life history characteristics of marine fishes (e.g. CITES Management Authority of PRC, 2002) and partly because economic extinction will precede biological extinction (e.g. sharks). It has been argued that marine fishes are more resilient than many other taxa, with large populations, high fecundity, high dispersal, wide distribution, high natural variability and positive density-dependent responses.

Response. Neither objection can be sustained.

1. First, CITES is most likely to consider marine fishes with biological characteristics that do make them more vulnerable to extinction. While some species do have high recruitment variability, others behave much more like mammals, with higher associated risk of declines, than the stereotypical expectation of a marine fish (Hutchings 2001). As an example, the FAO Marine Resources Service (FAO 2000b) warns of the need to approach the management of shark fisheries carefully, because sharks are so easily depleted and slow to recover from the effects of overfishing. Other species form spawning or feeding aggregations (e.g. totoaba, Atlantic bluefin tuna, humphead wrasse) that can make them the focus of targeted fishing even when populations are severely depleted as a result of hyperstability (Sadovy de Mitcheson *et al.* 2008). Yet other species have mating patterns or parental care (e.g. monogamy and long male pregnancy in the case of seahorses) that add to their vulnerability (Vincent *et al.* 2011).
2. Second, fisheries often (and increasingly) proceed well past any bioeconomic equilibrium because of subsidies, lack of opportunity costs, increasing value with increasing rarity, open access and the multispecies nature of many fisheries (Musick 1999; Dulvy *et al.* 2008). There are particularly high risks when species that are incidentally caught – and can thus yield return without the need for specific investment – have less resilience to fishing than those targeted by a fishery (Musick 1999) that uses non-selective gear or methods.

Availability of data for marine fishes

Objection/concern. Some Parties have expressed concern that limited high quality information available on the status of populations, fisheries and trades makes it difficult to implement CITES listings. CITES Parties have highlighted problems with identification and taxonomy, geographical coverage of population surveys, validity of scientific and trade data and evidence of trade as a factor determining declines (e.g. sawfishes, sharks, seahorses, humphead wrasse).

Response. The plea for more data is very common in most fields of resource management and conservation but adaptive management dictates that we act on what we have, always learning more and adjusting our approaches (Cochrane and Garcia 2009). There are at least six reasons why limited availability of data should not be used to delay marine fish listings.

1. Data for many marine fishes are measurably better than for many other taxa listed in the CITES Appendices, because of longer record keeping in fisheries and greater stakeholder and management interest.
2. The quantity and quality of data required by CITES is no greater than that required for national or regional fisheries management or for contributions to FAO record keeping. There are also approaches to management that specifically address data-poor situations in recognition of such situations, as for example, in tropical reef fisheries (Johannes 1988).
3. The precautionary principle (Principle 15 of the Rio Declaration of 1992) (UN 1992) dictates that the absence of perfect data or scientific certainty should not delay conservation or management action. This is applicable to action by RFMOs but also true for CITES regulations, which act to set a framework for national action that is particularly suited to adaptive management as new information emerges.
4. Inclusion in a CITES Appendix will help improve data collection on international trade, as a required part of making NDFs, and hence on the status of populations and fisheries. For example, examination of trade data collected by UK Customs under CITES provisions revealed that glass eel catches had been underreported before the CITES Appendix II listing of European eel (V. Fleming, in litt., 11

February 2013). CITES-related work conducted specifically in response to IUU fishing of the humphead wrasse also highlighted data gaps that are currently receiving attention (http://cmsdata.iucn.org/downloads/hhw_bali_workshop_report.pdf, accessed 23 February 2013).

5. The funding and attention to capacity building (and identification guides) that follow CITES listings can aid in reporting and stock assessments, thereby improving the quality of data and sustainability of fisheries. For example, listing sturgeon species in the CITES Appendices stimulated Black Sea and Lower Danube range and fishing States to develop an Action Plan and Regional Strategy to share data and develop stock assessments, quotas and NDFs (DSTF 2003).
6. New CITES trade data could also potentially be used to generate improved catch records and thus to develop better stock assessments (Clarke 2004, 2008; Clarke *et al.* 2009).

CITES listing criteria for marine fishes

Objection/concern. CITES Parties have argued that criteria for Appendix II listing laid down in Res. Conf. 9.24 (Rev. CoP15) ignore the fact that fisheries always intentionally reduce fish stocks, in a managed fashion, to attain maximum sustainable yield (MSY) (e.g. Atlantic bluefin tuna). Such Parties indicate that potentially high rates of population increase mean that marine fishes need different criteria.

Response. Space does not allow us to dissect the CITES listing criteria in detail, but their use for marine species has provoked debate. The matter has been acknowledged and addressed in Annex 5 of the CITES criteria. A footnote developed by FAO states that different (smaller) decline thresholds are deemed to be more appropriate for commercially exploited aquatic species [Res. Conf. 9.24 (Rev. CoP15), 2010]. FAO was closely involved in revising the CITES criteria for marine fishes that, in contrast to the IUCN Red List criteria, highlight the importance of declines from the historical baseline over recent declines. Subsequent performance analyses have shown that both IUCN and CITES criteria are well aligned with fisheries reference points, with decline thresholds triggered only once a species has dropped below fishery-based reference points (Dulvy *et al.* 2005; Cooke 2011). Parties continue, however, to have differing opin-

ions as to how the criteria for commercially exploited aquatic organisms should be interpreted. Some countries are uncomfortable with the provision for listing species in Appendix II 'which although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict regulation' (Article II.2.a). That text is, however, enshrined in the CITES treaty.

National agencies and CITES involvement with marine fishes

Objection/concern. Some Parties fear that CITES engagement would lead to unwarranted interference in domestic policy and management. They argue that fisheries should be managed nationally (and/or regionally) and Parties are capable of good management with a bit of strengthening and capacity building (e.g. Banggai cardinalfish).

Response. National fisheries agencies responsible for sustainable use should be assisted by the additional oversight – and complementarity – brought by a CITES listing. CITES works to regulate international trade, particularly in the control of exports, and not to manage fisheries. All CITES Appendix II listings refer all management back to the Parties and are directed at precisely the same sustainable use goals as good fisheries management plans (Cochrane and Doullman 2005). Except for species taken exclusively on the high seas, management is still fundamentally the responsibility of national governments; for high seas species, management and compliance are the responsibility of both fishing and port States. Some of this objection may reflect tensions between the national environment or forestry agencies – where CITES Authorities often sit – and national fisheries agencies, which have often only recently begun to engage with CITES issues. A well-functioning national fisheries agency would normally have the information, expertise and mandate required to ensure effective implementation of CITES listings for commercially harvested marine species, although this is not always the case. Parties are increasingly appointing their fisheries management experts as Scientific Authorities for fish species listed in the CITES Appendices. Indeed, good fisheries management and a successfully implemented CITES listing should be seen as complementary, rather than as mutually exclusive management options.

Multilateral agencies and CITES involvement with marine fishes

Objection/concern. Some Parties have claimed that fisheries are best managed through FAO and RFMOs, which have mandates for marine fish issues (e.g. ICCAT for Atlantic bluefin tuna and CCAMLR for toothfishes).

Response. This common objection can be addressed in at least six ways:

1. CITES action complements the work done by RFMOs. The former has the legal remit and competence to manage international trade, while the latter manages the fishery itself. CITES could assist RFMOs in compliance and monitoring measures where, for example, the latter have adopted measures prohibiting the retention, landing, transshipping, sale or trade in certain shark species (Pew 2012) proposed for listing in the CITES Appendices.
2. Compliance with decisions adopted by RFMOs and with the non-binding FAO CCRF is poor (ICCAT 2008; Mora *et al.* 2009; Pitcher *et al.* 2009), with some 11–26 million tonnes of fish, worth \$10 billion to \$23.5 billion, lost worldwide to illegal and unreported fishing (Agnew *et al.* 2009). It might be enhanced by listing some species in CITES Appendix II, which requires Parties to take targeted action where need is considered to be most urgent. Such action (e.g. to develop NDFs) should consider all related fisheries management initiatives that are useful, including RFMO measures for the taxon.
3. RFMOs are generally limited to certain species, such as tuna and tuna-like species, toothfish and, in some cases, other species taken in association with these fisheries. Even in the case of high seas, highly migratory or straddling stocks, RFMOs do not comprehensively cover the entire global ocean, leaving gaps in large geographical areas or ecosystems (e.g. parts of the central Pacific, Southwest Atlantic, parts of Southeast Asia and coral reef fisheries resources). They do not, for example, cover seahorses or humphead wrasse, or manage target fisheries for migratory sharks such as porbeagle and whale sharks or the mantas proposed for listing at CoP16. Furthermore, their measures are applicable only to the members of that RFMO (a maximum of 50 member governments) – and non-contracting

Parties to RFMOs that may fish in RFMO areas – while CITES has 177 Parties.

4. FAO is not a management body, and there are no plans to direct it to engage in the management of marine fishes of conservation concern. FAO focuses on food security and on the species that have historically been the most economically valuable. It serves a vital role in providing countries, particularly developing States, with capacity building, guidelines and guidance. It also gathers and analyses global fisheries data for a subset of exploited taxa on an annual basis. However, it has no legal remit or competence to manage fisheries or international trade.
5. The Memorandum of Understanding (MoU) between the CITES Secretariat and FAO (signed in 2006) provides for dialogue and consultation on commercially exploited aquatic species (CITES 2006). Further, FAO has an advisory role in the CITES process through its Expert Advisory Panel. It also collaborates on implementing listings, as with humphead wrasse (see below) and queen conch (*Strombus gigas*, an Appendix II-listed marine invertebrate of regional commercial importance). FAO could play an important role in capacity building for CITES implementation, especially in developing countries.
6. FAO, the UN General Assembly, and individual RFMOs regularly urge member States to improve collection of species-specific trade data (e.g. sharks and reef fishes), to eliminate IUU fishing and to conform with the CCRF. Progress in all can be enhanced by complying with CITES provisions.

Sequels to CITES listings of marine fishes

Objection/concern. Some CITES Parties fear that listing a marine fish in Appendix II will lead inexorably to trade bans under Appendix I and/or to the inclusion of many more species in the Appendices, including for look-alike reasons (e.g. tunas and sharks). Governments can perceive it as being difficult to remove a listed species from the Appendices. Although this latter concern applies to all taxa, the economic value of marine fishes puts it into sharp focus.

Response. This serious concern needs to be addressed carefully, on at least three fronts. While there is no demonstrated slippery slope to more severe restrictions or numerous new listings, there

can indeed be some reluctance at the CoP to remove species from the Appendices.

1. Contrary to fears, very few species move from Appendix II to Appendix I. The vast majority of Appendix II-listed species continue to be traded at significant levels. Effective implementation of an Appendix II listing should lead to sustainable trade and preclude the need for an Appendix I listing. In the rare situations where a transfer from Appendix II to Appendix I is proposed, that species is generally in considerable trouble.
2. The difficulty of removing a species from the Appendices is a legitimate concern. Ideally, a listing in Appendix II should provoke the management measures that might see a taxon eventually removed from the Appendices, as has happened for some commercially important orchid hybrids. Such a measure requires the same two-thirds vote that it takes to add a species. However, Parties sometimes prefer to retain a species in Appendix II. On occasion, there is a direct conservation concern, such as a need to ensure continued effective management and to encourage compliance (e.g. crocodilians). Often, however, there may be a strong (even ideological) reluctance to accept a delisting, even if it represents a conservation success (e.g. the response to a proposal removed the bobcat (*Lynx rufus*) from the Appendices: CITES 2010). Proposed transfers from Appendix I to II have also been highly controversial, sometimes opposed for political or emotional reasons; for example, the proposal to transfer the gyrfalcon (*Falco rusticolis*) from Appendix I to II was opposed based on unsubstantiated fears of a potential illegal trade that might emerge after such a change (CITES 2000).
3. Parties do sometimes take more stringent measures than are strictly required. As is their right under CITES, a few Parties have indeed decided to control trade in Appendix II-listed species by (at least temporarily) ending exports, banning extraction or requiring additional permitting (e.g. respectively, Peru for seahorses, Philippines for all CITES-listed species or Hong Kong Special Administrative Region for Appendix II-listed species). These domestic decisions emphasize the flexible application of CITES at the national level. They

can, however, be problematic in imposing greater export limitations than were warranted under the Convention, without necessarily reducing overall extraction of the species.

Implementation

Regulating exports of CITES-listed marine fishes

Objection/concern. Some Parties fear that implementation of CITES listings for marine fishes will be complicated and expensive in financial, technical and human resource terms. They worry that it will be difficult to track and regulate trade for fishes that arrive by sea (e.g. humphead wrasse) or in personal luggage (e.g. seahorses) or identify shark fins to species. Parties are also concerned about how to issue CITES documents for fishes caught beyond national jurisdiction as *Introduction from the Sea* (on the high seas).

Response. CITES is required to regulate exports for taxa ranging from giant clams (*Tridacna* and *Hippopus* spp.) to elephants to cacti and should manage to do the same for marine fishes. Under the terms of the Convention, anxieties about capacity should not be decisive factors in deciding whether to list a species. Nonetheless, the additional burden of any extra listings does worry some Parties, and the novelty of marine fish listings can make them seem daunting, especially with respect to the lack of controls for trade by sea.

Such challenges need not be as severe as some Parties fear. Indeed, the legal requirement to make NDFs should help Parties obtain additional information to move those fisheries towards sustainability.

1. CITES can help build capacity for managing trade. Proponents for seahorses and for all six shark proposals at CoP14 and CoP15 tried one approach (the effectiveness of which is still to be analysed) by delaying implementation by 18 months to enable Parties to resolve the related technical and administrative issues. The hope was that this waiting period would be used to assist Parties with capacity building, identification materials and compliance measures associated with the new listings – and that they should also strengthen support for other fisheries management requirements in these countries (e.g. under RFMOs). It is clear that, whether or not there is a deferred implementation (and the value of that approach is

not yet clear), many Parties will need help with resourcing and capacity building.

2. In reality, Parties may often have a greater capacity and information base for implementing CITES listings for marine fishes than for many terrestrial species. Parties are already required to have protocols for tracking and controlling certain fish landings and trades as part of their national fisheries management and reporting, and to implement RFMO agreements and various FAO Plans of Action and the CCRF. A CITES listing can help generate and/or extend fisheries management protocols and mobilize support from importing countries.
3. CITES approaches to *Introduction from the Sea* (see above) are complementary to the FAO Port-State Measures Agreement adopted in 2009, with the aim of preventing, deterring and eliminating IUU fisheries. Progress on the issue of *Introduction from the Sea* has been made, with hopes that deliberations at CITES CoP16 in 2013 will result in clear guidance to Parties on the roles of port and flag States.

Making NDFs for CITES-listed marine fishes

Objection/concern. Some Parties are uncertain about how to make CITES NDFs for marine fishes (e.g. Atlantic bluefin tuna, sharks, humphead wrasse, Banggai cardinalfish).

Response. Parties that cannot make NDFs for Appendix II-listed species also cannot manage their fisheries for sustainability, as the requirements are essentially the same. CITES Parties and associated national agencies are experienced in making NDFs for other CITES-listed fishes and marine invertebrates (e.g., sturgeon, giant clams and queen conch) and can marry this experience to basic principles of fisheries management in implementing marine fish listings. An *International Expert Workshop on CITES Non-Detriment Findings* was held in Mexico in 2008, and it produced some guidance for marine fish NDFs which are really, it noted, a type of risk analysis (CITES 2008). For managed marine species, particularly those managed by RFMOs or taken in RFMO-managed fisheries, there should be enough information (including stock assessments) and data to make an NDF. The IUCN Groupers and Wrasses Specialist Group, in collaboration with FAO, created a tool and novel population sampling protocol to be used in setting quotas for humphead wrasse; it has already been deployed by the two major humphead

wrasse exporters, Indonesia and Malaysia (Sadovy *et al.* 2007). NDFs for other species may be more difficult but that is where the legal requirement to do so should help Parties obtain information to move those fisheries towards sustainability. Parties will need to conduct assessments of wild populations, independent of fisheries where possible, to ensure that the numbers being removed are sustainable, with the rest of the assessments following from there.

Capacity to implement listings for CITES-listed marine fishes

Objection/concern. Some governments worry that their CITES Scientific and Management Authorities have limited capacity to implement marine fish listings, partly because many Authorities are based in the Ministries of Forestry or the Environment without a history or mandate for commercial marine fish involvement. They fear that unfamiliarity with fish issues will lead to slow permitting, which could damage trade, especially for those fish products that are traded fresh (chilled or live).

Response. CITES Authorities may defer to any other expert as a named Authority, so can certainly include fisheries experts in their assessments and permitting procedures. Many Parties have designated – or are in the process of designating (e.g. Indonesia) – their Fisheries Agencies to serve as CITES Management and Scientific Authorities for marine fish species. Parties are often already required to comply with FAO and RFMO reporting requirements – or those from an importing State – for trade in certain marine fishes. Concerns about how to export fresh products expeditiously have been addressed with many taxa including queen conch. Furthermore, many marine fish products are traded dried (e.g. shark fins, seahorses) or frozen, rather than fresh or live) although this can raise identification issues.

Identification and CITES-listed marine fishes

Objection/concern. CITES listings require that trade be regulated by species, yet Parties worry that it can be very difficult to distinguish among species, especially when look-alikes are involved (e.g. seahorses). Identification of parts and derivatives is particularly difficult (e.g. shark fins, packaged medicine containing seahorses, frozen fish fillets).

Response. Problems of identification have long beset CITES, for many taxa (both terrestrial and marine), and Parties are experienced in dealing with these issues. CITES and other groups continue

to develop useful identification guides and training tools to assist enforcement and Customs officers. CITES Parties may be farther ahead with fishes than with some other newly listed taxa because of existing needs to distinguish and identify species for reporting, stock assessments and management. The problem of distinguishing parts and derivatives remains a concern for species as varied as vicuña (*Vicugna vicugna*), Tibetan antelope (*Pantholops hodgsonii*) and yews (*Taxus* spp.). In some cases, CITES may be able to generate means of making NDFs that transcend species identification issues; for example, CITES agreed that a single minimum size limit for all species of seahorses (which can look similar in trade) might serve as one possible preliminary means of making NDFs (Foster and Vincent 2005; Notification 2004/033). As well, some of the shark products in trade, such as fins (the main driver of fisheries mortality in some sharks), can also easily be identified, at least for species being considered for CITES listings.

By-catch and CITES-listed marine fishes

There are concerns that CITES cannot do much for species caught indiscriminately as by-catch in non-selective fishing gear (e.g. seahorses in trawls, sharks in longline and purse seine tuna fisheries). Parties note that setting quotas for allowable exports will not diminish catch; it will merely lead to greater discards without reducing pressure on the wild populations.

Response. It is difficult to deal with by-catch, in all fisheries management. It is also true that merely setting quotas for export (one approach to making NDFs) is unlikely to relieve pressure on species taken as by-catch unless the measure is part of an integrated package of management initiatives. CITES listings can, however, help highlight the threats that non-selective gear poses to non-target marine organisms and to habitats and prompt solutions and funding. First, modifications of gear or methods might help to reduce by-catch of threatened or otherwise protected species (e.g. marine turtles in trawls, sharks in some fisheries) or increase survival after release from the non-selective gear (e.g. some sharks). Second, Appendix II listings may lead to better enforcement of by-catch regulations, simply because any specimen in international trade must have been legally obtained. For example, Thailand has been asked (as part of the Review of Significant Trade) to explain how it is enforcing its long-standing ban on the inshore trawling that is catching seahorses incidentally;

these animals obtained as by-catch are then exported without effective NDFs (CITES 2012d,e). Third, CITES regulation can help limit the extent to which non-selective fishing actually targets some of the secondary catch, as in the case of some tuna fisheries that are deployed specifically with an intent also to catch sharks for fins. Fishers are skilled in developing techniques for avoiding genuinely unwanted by-catch. Given that RFMOs adopt prohibitions on the retention of certain by-catch species (ICCAT, Inter-American Tropical Tuna Commission and Western and Central Pacific Fisheries Commission have also prohibited the retention of oceanic whitetip sharks), they can also set by-catch quotas.

Aquaculture and CITES-listed marine fishes

Objection/concern. Some Parties are concerned that a CITES Appendix II listing for marine fishes could negatively affect captive breeding, aquaculture and/or mariculture operations because of its regulatory requirements. Some Parties also consider that a CITES listing is unnecessary because, they claim, cultured animals will reduce/have already reduced excessive demand on wild populations (e.g. seahorses, humphead wrasse).

Response. Many of the issues arise from confusion about the terms of the Convention. CITES does not define aquaculture or mariculture, but does define 'bred in captivity' and has specific source codes for permits that relate to the origin of a specimen. Specimens of Appendix II species that are bred in captivity can be traded more easily than wild-caught specimens, as long as they are from the F2 generation (meaning, among other things, that their parents were born in captivity). In contrast, any captive grow out of wild-caught juveniles or first generation captive born animals is subject to CITES NDF and legality requirements. CITES has, in fact, achieved considerable success with regulating the international trade in other taxa that are often sourced from farming or ranching operations, including crocodiles, orchids, coral propagation, butterflies and bulbs (e.g. New 1994; Thorbjarnarson 1999; Dickson 2002).

All that said, aquaculture production may not reduce pressures on wild populations if, for example, culture facilities promote new products (e.g. as is often the case with seahorses), poor aquaculture practices affect the wild populations, fishing of wild animals continues apace despite the introduction of aquaculture operations, or consumers still prefer specimens sourced from the wild.

Live trade and CITES-listed marine fishes

Objection/concern. It has been claimed that CITES regulations would make it difficult to export live fish (e.g. seahorses).

CITES requirements for humane transport are basically the industry standard and thus pose no increased burden. CITES has a long and successful history of managing international trade in live animals, including arapaima (*Arapaima gigas*, a freshwater fish), giant clams, live reptiles and live birds. CITES technical committees regularly revisit this issue. The Convention has adopted the International Air Transport Association guidelines for the movement of live animals [Res. Conf. 10.21 (Rev. CoP14)].

Discussion

Current situation

Our analysis indicates that CITES has an essential role to play in the conservation of particularly vulnerable marine fishes subject to significant international trade. Yet marine fishes are the last major taxon of wild animals subject to significant international trade that has not been adequately addressed through CITES. No new marine fishes were added to the CITES Appendices between CoP1 and CoP12, 26 years later. Even now, the only marine fish taxa for which CITES regulates or prohibits international trade are coelacanth (both species), totoaba, seahorses (all), sharks (three species), humphead wrasse and sawfishes (all). Few of the most depleted fish species are listed in any CITES Appendix, despite clear evidence that some global fish species have become severely depleted by exploitation (Worm *et al.* 2009; Costello *et al.* 2010; Veitch *et al.* 2012). It is precisely because failures in marine fisheries management have led to declines in many species that CITES is appropriate for helping reduce extinction risks. Indeed, CITES is particularly well poised to help because, unusually among international agreements, it has the capacity to enforce its actions, through the Review of Significant Trade and possible ensuing trade suspensions, in concert with national-level enforcement and compliance measures.

Marine fishes may actually be among the best candidates for CITES support and action. CITES was created to address over-exploitation driven by international trade, the very pressure that hugely affects many marine species (Dulvy *et al.* 2003; Collette *et al.* 2011). In contrast, terrestrial or

freshwater taxa are more likely to be threatened by other pressures, such as habitat damage, introduced species, climate change or domestic exploitation (Hilton-Taylor 2000; Ruiz *et al.* 2000; Jackson *et al.* 2001; Scavia *et al.* 2002). In addition, the expansion of industrial fisheries means that an international agreement like CITES can sometimes be a perfect complementary mechanism to RFMO management or can stimulate management where there is no RFMO.

Parties that cannot implement a CITES listing for marine fishes must be struggling with their own fisheries management. The requirements to implement CITES Appendix II listings for marine fishes effectively are similar to those needed to manage fisheries sustainably. The corollary is that the implementation problems associated with a CITES listing – for example, record keeping and species identification – are no greater than those required for effective fisheries management. An Appendix II listing requires only that Parties regulate international trade such that the future viability of wild populations is ensured and specimens are legally acquired, goals entirely congruent with sound fisheries management at the national level. It accords Parties freedom in implementing such requirements and avoids intervention in managing fisheries and domestic trade. CITES marine fish listings support what governments should already be doing: investing in the management of fisheries for sustainability (including long-term food security and profitability to recoup management costs) and legality, and according to the FAO CCRF.

Parties' concerns about the practical challenges (time, expertise, resources) of implementing Appendix II listings do need to be addressed. On the one hand, essentially the same concerns apply to all animal and plant taxa and were accepted by the 177 Parties when they signed or acceded to CITES. On the other hand, there are real administrative challenges with respect to many CITES listings, which speak to the need for greatly enhanced capacity building, intergovernmental cooperation, enforcement capability and IGO, NGO and academic support. The high price and/or great cultural value of consuming many fish species currently listed in CITES – most are luxury or high priced in whole or in part, particularly at the retail end – is a double-edged sword. Such value may (i) support expensive fishing and trading operations and (ii) make it unlikely that economic extinction will precede biological extinction. It is, therefore,

important and worthwhile to invest in sound management practices. CITES' long history of helping innovation in support of sustainable trade (Sand 1997) makes it relevant for high risk marine fishes that qualify for CITES listing.

To rationalize CITES work on marine fishes, there is increasing interest in trying to set strategic priorities for the species that CITES considers listing. A recent report examines a risk-based approach to select those species most likely to benefit from CITES action (Sant *et al.* 2012). Such action might pay dividends in reducing some Parties' anxiety about marine fish listings by inserting more rationality. Parties' past experience with charismatic animals, where they perceived some listings as deeply problematic, may be influencing their expectations of – and misgivings about – marine fish listings. Certainly a risk-based approach to CITES listing proposals would make it yet more unlikely that highly resilient or well-managed fish species would be proposed seriously for the CITES Appendices. That said, the experiences described in this section illustrate that the bar to a successful listing proposal is already high, the FAO Expert Panel's expertise is valued, and species that will not clearly benefit from a CITES listing are most unlikely to receive approval from the necessary two-thirds of Parties.

Although implementation of fish listings is still relatively new and the anticipated benefits to follow are still largely untested, there are already indications that CITES' involvement – even in the form of a discussion about listing – may help to alleviate some of the pressure on wild populations of anadromous fish, marine fishes and marine invertebrates. For example, inclusion in Appendix II has helped generate significant progress on captive production for sturgeon, seahorses in live trade and tridacnid giant clams, relieving pressure on wild populations even if not yet rebuilding them (Raymakers 2006; Kinch and Teitelbaum 2010; Evanson *et al.* 2011). In the case of sturgeon, CITES has also led to stock assessment and quotas (Kinch and Teitelbaum 2010). In addition, CITES involvement has been quite effective in helping RFMOs to focus on their roles and responsibilities and to adopt conservation and management actions they might not otherwise have embraced (e.g. sharks, toothfishes and Atlantic bluefin tuna), even where listings did not materialize. Much of the awareness of the threatened status of sharks and the role of the international

shark fin trade in driving unsustainable fisheries can be traced to the first CITES Shark Resolution in 1994, which stimulated numerous reviews (see <http://www.traffic.org/fish/>), followed by national and regional measures to reduce shark mortality rates by prohibiting the removal of fins and discard of carcasses at sea. CITES involvement has also facilitated important national and regional action for humphead wrasse – with, for example, Indonesia (the major exporting Party) determining an NDF for the species (Sadovy *et al.* 2007) – and also promoted wide-ranging dialogue on reef fishery management in some countries. The Appendix II listing of queen conch (a commercially exploited mollusc) at CoP8 certainly led to enhanced regional cooperation in the conservation and management of this species, in part through the Review of Significant Trade process (Daves and Field 2006) and associated biological and fisheries research. While such beginnings are promising, it will be vital to undertake a full analysis of how best to maximize implementation and effectiveness of the CITES listings for marine fish and invertebrate taxa.

CITES' further engagement with marine fishes cannot and should not wait for long-term analysis of the current listings. It is already apparent that CITES is a relevant body for certain marine fish species of concern. In today's globalized economy, CITES' role in regulating international trade in wild species is more relevant than ever. Moreover, CITES listings are a benign way to add to the toolkit for conservation of marine fishes. First, CITES listings do not automatically change any Party's management of domestic fisheries or trade but are instead implemented by each Party in a nationally appropriate manner. Second, Appendix II requirements that trade be sustainable should improve the viability of a fishery and enhance associated social and economic benefits. If trade in threatened or potentially threatened species is not brought within biologically sustainable limits, then eventual loss of access to the resource will bring far greater economic hardship. Third, further Appendix II requirements that trade be legal can also benefit national interests. While IUU fishing certainly harms the species, it also costs national governments and local communities the economic benefits from legal fisheries; CITES Appendix II can help reduce this economic loss.

The general tendency of an influential minority of Parties to place full responsibility for marine

fishes within international or regional fisheries agreements misses the possible opportunities presented by CITES' approach. The combined skills and capacities of CITES, FAO and the RFMOs could and should be strongly complementary in moving towards sustainable resource use and reducing threats to marine fishes in international trade. CITES' focus on trade complements and bolsters many aspects of FAO's voluntary CCRF, while FAO and RFMOs bring scientific and technical expertise to the CITES process of listing species and making NDFs. Fisheries management agencies are simultaneously charged with maximizing commercial value and safeguarding the future of fish stocks, a challenge that CITES can help them meet. CITES Appendix II listings provide a context in which a wide array of fisheries managers can argue for access to more resources for fisheries management directed at ensuring that international trade is regulated at sustainable levels. Exporting Parties can sometimes also gain assistance in managing species from importing Parties. Finally, CITES Appendix II listings can provide support for species that are not covered by the mandate of Regional Fisheries bodies.

Anticipating the future

Significant action for marine fishes – by CITES, FAO, the RFMOs and many other organizations – is critical and will depend on a sea change in attitudes by resource managers and policy makers, towards proactive action for their conservation and sustainable use. **Given a common and persistent anxiety about losing access to a fisheries resource permanently through the CITES process, proposals to amend the Appendices for commercially important species might do better to continue to focus on Appendix II listings (sustainable use) instead of the more restrictive Appendix I listings (which effectively ban international trade).** Ultimately, of course, the aim should be to manage the fisheries that supply international trade so well that CITES can remove listed species from the Appendices entirely and leave them embedded solely within national and regional management efforts.

CITES' relatively recent cautious exploration of marine fishes as wildlife (as well as economic commodities) echoes the conservation community's careful initial engagement with marine fishes. Since the mid-1990s, both CITES and conservation advocates have become increasingly engaged with

marine taxa as many different studies have confirmed the threat that unconstrained extraction can pose to marine fish species (Baum *et al.* 2003; Dulvy *et al.* 2003; Worm *et al.* 2009; Jackson 2010). Even now, however, conservation of marine wildlife focuses much more on the vital and highly complementary spatial approaches, especially marine protected areas, than on managing fish species, fisheries or trades (FAO 2011). In that context, CITES has a significant opportunity to make a contribution to conservation of marine fish species and to complement national fishery management initiatives.

The sheer scale and urgency of the crisis in marine biodiversity and food security argues that the global community must use CITES effectively, while also drawing on all other tools at its disposal. The global community that convened for the United Nations Conference on Sustainable Development in Rio in 2002 – and again in Rio+20 in 2012 – agreed the need to ensure legal and sustainable fisheries and to maintain or restore stocks to levels that can produce MSY, as both a conservation and development issue. It also recognized the important role of CITES in seeking to ensure that no species in international trade is threatened with extinction. **It is indeed important that Parties to CITES limit trade in the most threatened species that need protection, allow controlled trade in those that can withstand it under managed circumstances and harness international collaboration to achieve its objectives.** At the same time, no matter how many species CITES lists, the vast majority of the 15,300 marine fishes (Ausubel *et al.* 2010) – including many that are or may become threatened by international trade – will never be added to the Appendices and will depend heavily on alternative support mechanisms. **We need to apply all possible effort to the conservation and management of marine fishes, recognizing that they are indeed wildlife as well as important sources of livelihoods and food security.**

Addendum

Preprints and executive summaries of this paper in English, French and Spanish were circulated at CITES CoP16 (Bangkok, 3–14 March 2013). The CoP subsequently adopted four proposals to include five species of sharks and the two species of manta rays (*Manta* spp) on CITES Appendix II. The sharks were *Carcharhinus longimanus* (oceanic

whitetip), *Sphyrna lewini* (scalloped hammerhead) – and its look-alikes, *S. mokarran* (great hammerhead) and *S. zygaena* (smooth hammerhead) – and *Lamna nasus* (porbeagle). Each proposal achieved the required two-thirds majority in Committee, all by secret ballot. Moves to re-open two of the shark proposals in Plenary failed to obtain adequate support, thus leaving them on Appendix II. The science of the proposals went largely unchallenged but many of the objections cited in this paper – particularly those prioritising the roles of FAO and RFMOs – were raised, and countered. See Supporting Information (Table S1) for additional documentation. The sawfish *Pristis microdon* remained on Appendix II. CoP16 also adopted, after years of debate, a Resolution relating to *Introduction from the Sea* that recognizes the roles of port and flag States in implementing CITES for species taken on the high seas. Finally, the report of a Working Group on unmonitored and unregulated trade in humphead wrasse led to recognition of the need for continued attention to this implementation issue.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. History of proposals to list marine fishes in CITES Appendices. Available at <http://seahorse.fisheries.ubc.ca/news/FaF-CITES-S1>.