Inclusion of Coralliidae spp. in Appendix II, with the following annotation: "the entry into effect of the inclusion of species in the family Coralliidae in Appendix II of CITES will be delayed by 18 months to enable parties to resolve the related technical and administrative issues".

Proponents: Sweden, on behalf of the Member States of the European Community, and the United States of America

Summary: Coralliidae spp. are a group of about 31 species of octocorals that occur throughout the world. They are benthic suspension feeders, occurring at depths ranging from seven to 1500 m. They are part of a valuable group known as precious corals, but many species have populations that are too small or scattered to be useful for commercial fisheries. The species that are used commercially include *Corallium rubrum* in the Mediterranean and North-east Atlantic and several species in the North-west Pacific. The axis colour of the various species ranges from white, through various shades of pink and orange, to deep red, and the products are used extensively in jewellery and art objects. Many species, especially those in deeper waters, are slow-growing and long-lived and particularly vulnerable to over-exploitation. *C. rubrum*, which occupies depths from seven to 300 m, reaches maturity relatively quickly and has had sustained extensive exploitation in several areas of the western Mediterranean for many years; however, populations have shown a dramatic decrease in their size, age and reproductive output in recent years and some populations are no longer commercially viable. Genetic studies of *C. rubrum* and some Pacific species have demonstrated significant isolation between some populations and considerable heterozygote deficiencies in some species, but not others.

Trade data show the most important producers of *Corallium rubrum* for the period 1967–2006 have been Italy, Spain and Tunisia, with smaller quantities from Albania, Algeria, Croatia, France, Greece and Morocco. Dredging the seabed in the past to collect *C. rubrum* and other species destroyed large areas of habitat, but these crude methods have largely been replaced by more selective, less damaging ones. The commercial species in the Pacific occur mainly in Japan, Taiwan (Province of China), the USA, and seamounts in international waters. Based on trade data, the most important species are *Corallium secundum*, *C. elatius*, and *Paracorallium japonicum*, with very small quantities of *C. konojoi*. There have also been large quantities of an undescribed species, referred to as “Midway deep coral” but, without taxonomic documentation, this cannot be definitely ascribed to this family. The Pacific species have been subject to rapid exploitation following discovery of commercially viable beds, leading to exhaustion of the resource. After harvesting has been discontinued, the populations have shown signs of recovery but, even after a number of years, have not fully recovered. Much of the trade is in the form of processed beads, traditionally processed and exported by Italy but, more recently, several Asian countries have been involved. The USA is the main importer of Coralliidae products, involving millions of unworked and worked items. Illegal harvesting was a problem in US territorial waters in the past and has been reported with increasing frequency in Spanish waters. The main threat to Coralliidae is over-harvesting, but secondary human impacts include pollution, sedimentation in the Mediterranean and incidental take and habitat degradation, associated with longline fishing and bottom trawling in the Pacific. Climate change may also provide an additional threat; it has been asserted that dense, short-lived populations with a high turnover are likely to be more susceptible to mass mortalities when fishing pressure is combined with global climate change (especially temperature anomalies). Mass mortalities have also been linked to disease.

Harvesting of *Corallium rubrum* is regulated in most countries. The Pacific species are regulated in the Hawaiian Islands, other areas under US jurisdiction, Japan and Taiwan (Province of China). Coralliidae are not managed by any existing fisheries management organizations. *C. elatius, C.* (= *Paracorallium*) *japonicum, C. konjoi* [sic] and *C. secundum* were listed in Appendix III by China, effective from 1 July 2008.There are currently no captive-breeding or propagation programmes for Coralliidae.

Analysis: Coral derived from Coralliidae species is a valuable commodity that is traded in large amounts. Populations of various Coralliidae species, chiefly in the Mediterranean, North-east Atlantic and North-west Pacific, have been exploited for their coral, much of it destined for international trade. This exploitation has often been intensive and, in recent years, some populations have shown very marked decreases in size, age and reproductive output.

There remain, however, significant uncertainties regarding the impact of harvest for international trade on Coralliidae species, particularly in regard to the Pacific species. These uncertainties include: the proportion of each species that remains inaccessible to harvest and how changing technologies may in future alter that proportion; the proportion of accessible populations that is not harvested (because it is not economic to do so or because of enforced controls on harvest); rates of recovery of harvested populations and the degree to which species can recolonize areas; the age of reproduction of colonies relative to the age at which they are harvested; the impact of other factors, such as sedimentation, pollution and incidental take, on Coralliidae populations; in some cases the identity of the species involved. Given these uncertainties, it is not possible to say with certainty whether or not most Coralliidae species meet the criteria for inclusion in Appendix II set out in *Resolution Conf. 9.24 (rev. CoP14*).

Considerably more is known about *Corallium rubrum* than about other Coralliidae species, but even in this case it is difficult to apply the criteria in *Resolution Conf. 9.24 (Rev. CoP14)* for inclusion in Appendix II in a straightforward way, largely because they were clearly not established with widely distributed, colonial marine organisms in mind. In attempting to assess this species against the criteria, it may be argued that the "application of decline to commercially exploited aquatic species" set out in the footnote to Annex 5 should apply. In fact, the language in the footnote is derived from conventional fisheries biology and management practice, which itself can only meaningfully be applied to conventional fisheries stocks. It is, arguably, even less relevant to the case of Coralliidae than the general criteria and guidelines in the Resolution. Taking these as set out in Annex 2a of *Resolution Conf. 9.24 (Rev CoP14)*, two cases apply: is regulation (i.e. inclusion in Appendix II) required to ensure that the species does not become eligible for inclusion in Appendix I in the near future (Annex 2a A.); or is regulation required to ensure that harvest is not reducing the wild population to a level at which its survival might be threatened by continued harvest or other influences (Annex 2a B.)?

The first case requires assessment using the Appendix-I criteria. The species evidently does not have a small population, nor a restricted area of distribution, nor is it predicted to have so in the near future. Regarding any observed or inferred decline in population, if population size is taken to mean number of colonies, then it is unlikely that the species has undergone a recent marked decline or will do so in the near future: most current harvest is agreed to have the effect of reducing the average size of colonies (sometimes drastically) rather than their absolute number. However, were it to be argued that the total number of individual polyps was more indicative of population size, then the overall mass or weight of the population might be a more relevant measure. In this case, because the average size of colonies in exploited areas has decreased, then it is possible that the species has undergone an overall marked decline in these areas (it has certainly done so locally). Exploitation is increasingly targeting deeper waters, where colonies are generally larger but more sparsely distributed, so that such a decline might be expected to continue. However, considerable uncertainties remain because, as with other species of Coralliidae, there is a lack of knowledge of the overall biomass of deeper water colonies and of their current rate of exploitation. Because of these uncertainties, it is not possible to say whether the overall rate of decline of the species (as measured by biomass) is near to being "marked" or not. Interpretation is further hampered by the fact that there is no settled definition of generation time for this species, nor is one likely to be agreed on, although it can assumed to be longer than the earliest reported age at maturity (seven years). The high unit value of the species in international trade would indicate that there is an incentive to target (and deplete) any accessible stocks.

Regarding the second criterion, it has been argued that reduction in average colony size as a result of harvest for trade reduces reproductive potential and makes colonies more liable to destruction from other sources. The evidence that harvest for trade is likely to lead to the survival of the species becoming threatened in either of these ways is weak. No definite link has been established between recruitment rates (as opposed to recruitment potential) and colony size or absolute production of larvae, nor has it been clearly demonstrated that small colonies or those at lower densities are inherently more vulnerable to extinction. The species has a wide distribution and at least some populations are extremely likely to remain inaccessible to exploitation or economically unviable to exploit, and otherwise remote from other direct human influences. This means that the species as a whole is inherently unlikely to become extinct, unless there are wholesale and catastrophic environmental changes throughout its range.

In conclusion, it is conceivable, but by no means certain, that *Corallium rubrum* meets the criteria for inclusion in Appendix II by virtue of regulation of trade being necessary to prevent the species becoming eligible for inclusion in Appendix I in the near future, applying the decline criterion for Appendix-I listing to overall mass of the species rather than colony number, assuming an extended generation time for the species and assuming that deeper water, inaccessible colonies do not represent a significant proportion of the recent overall mass of the species as a whole. The species does not appear to meet any other criterion for inclusion in Appendix II.

Species of Coralliidae in trade resemble each other and it probably will not be possible to identify all specimens in trade to the species level; therefore, inclusion of some but not all species in the Appendices might create implementation problems.

Supporting Statement (SS)	Additional information
Taxonomy	
Recent taxonomic revisions divide the family Coralliidae into two genera, *Corallium* and *Paracorallium*. There are currently 31 recognized species, in addition to several undescribed species and one listed as '*Corallium* sp. nov. Midway deep coral'. Note that the taxonomy of the undescribed Midway coral has not yet been clarified, and there are some indications that Midway coral may represent several species. 25 species are listed: *Corallium abyssale*, *C. borneense*, *C. ducale*, *C. elatius*, *C. halmaheirense*, *C. imperiale*, *C. johnsoni*, *C. kishinouyei*, *C. konojoi*, *C. lauuense, C. maderense*, *C. medea*, *C. niobe*, *C. reginae*, *C. rubrum*, *C. secundum*, *C. sulcatum*, *C. tricolor*, *Paracorallium inutile*, *P. japonicum*, *P. nix*, *P. salomonense*, *P. stylasteroides*, *P. thrinax*, *P. tortuosum* *C. regale* is treated as a synonym of *C. lauuense*. A further six species: *C. boshuense*, *C. niveum*, *C. porcellanum*, *C. pusillum*, *C. vanderbilti*, *C. variabile* are listed as 'additional species'. It is recommended that the Parties adopt Bayer and Cairns (2003) as an official nomenclatural reference for Coralliidae.	*Some unresolved taxonomic problems remain concerning the family* Coralliidae*. Due to taxonomic confusion, '*Corallium *sp. nov.'. The basis for its inclusion in the genus* Corallium *or the family* Coralliidae *remains unpublished.* *An as yet unpublished molecular study, Ardila and Sánchez (in prep.), identified two strongly supported clades, corresponding to* Corallium *and* Paracorallium*, but* C. rubrum, C. kishinouyei *and* C. niveum *were found to be part of the* Paracorallium *clade rather than* Corallium*.* **C. regale*:*** *Baco & Shank (2005) stated: '*C. lauuense *was previously misidentified and referred to as* C. regale' *which is not an indication of synonymy. There are, however, still unresolved taxonomic problems concerning these two species.* *Bayer & Cairns (2003) differs from the SS species list in a number of ways:* C. boshuense*,* C. niveum*,* C. porcellanum*,* C. pusillum*,* C. vanderbilti *and* C. variabile *are not mentioned;* C. regale *is treated as valid.*
Range	
Species in the family Coralliidae are found throughout the world in tropical, subtropical and temperate oceans, including the Atlantic Ocean, Mediterranean Sea, Indian Ocean, Eastern Pacific Ocean, and Western Pacific Ocean at depths of 7- 1 500 m. ***Corallium rubrum:*** is endemic to the Mediterranean, primarily around the central and western basin (7–300 m depth, but most commonly at 30–200 m) with smaller populations in deeper water in the eastern basin, and to the eastern Atlantic off the	*Only six Pacific species of commercial value are listed in the SS Annex. The seventh species in the quoted reference (Grigg, 1982) was 'momo'* C. nobile*, but this was subsequently (Grigg, 1984) referred to as* C. elatius*.* C. rubrum *(Albania, Algeria, Cape Verde, Croatia, France, Gibraltar, Greece, Italy, Libya, Malta, Mauritania, Monaco, Montenegro, Morocco, Portugal, Senegal, Spain, Tunisia, Turkey)* C. elatius *(Guam, Japan, Mauritius, Philippines, Solomon Islands, Taiwan [Province of*

Supporting Statement (SS)	Additional information
coast of Africa. Isolated colonies of Coralliidae also occur off Australia, the Solomon Islands, Vanuatu, Fiji, Kiribati, Tonga, Samoa, and the Cook Islands at 200–500 m depth, in international waters on the New England Seamount Chain (Atlantic Ocean), and in U.S. waters off Florida, California (Davidson Seamount), Alaska (Gulf of Alaska Seamounts), Guam, and three locations in American Samoa.	*China])* C. secundum *(American Samoa, Japan, Taiwan [Province of China], USA, Emperor Seamounts)* C. lauuense *(American Samoa, USA, international waters) C. regale (American Samoa, USA, Vityaz Seamount)* P. japonicum *(Japan, Taiwan [Province of China])* C. konojoi *(Japan, Philippines, Solomon Islands, Taiwan [Province of China])* *Identified range states for the genus are: Bahamas, Brazil, British Indian Ocean Territory, Cape Verde, France, Fieberling Tablemount, Indonesia, Ireland, Japan, Malaysia, Mauritius, Mexico, Morocco, New Caledonia, New Zealand, Portugal, Samoa, Spain, Sri Lanka, USA, US minor Pacific Islands, Vanuatu and Vityaz Seamount.* *Unidentified* Coralliidae *colonies have also been found in the New Zealand region (Consalvey* et al.*, 2006). The species on the New England Seamount Chain has not yet been identified.*

IUCN Global Category

Biological and trade criteria for inclusion in Appendix II (*Resolution Conf. 9.24 (Rev. CoP14)* Annex 2 a)

A) Trade regulation needed to prevent future inclusion in Appendix I

B) Regulation of trade required to ensure that harvest from the wild is not reducing population to level where survival might be threatened by continued harvest or other influences

Supporting Statement (SS)	Additional information
The only known Coralliidae populations large enough to support commercial harvest are found north of 19º N latitude, including seven Pacific species and one Mediterranean species (*C. rubrum*). All known species in this family occur at low abundances. ***Information included below is presented that is generally applicable to the family, then specifically for species in the Mediterranean followed by species in the Pacific.*** Coralliidae species are primarily K-selected with life-history characteristics typical of low productivity organisms that make them particularly vulnerable to over-exploitation, including extreme longevity (75–200 years), late age of maturity (7–12 years or possibly up to 25 years), slow growth (< 1 cm/yr) and low fecundity. FAO previously suggested *C. rubrum* was a medium-productivity species. In the absence of fishing pressure they can attain heights ranging from 300 mm (*P. japonicum, C. konojoi*), 500-600 mm (*C. rubrum*), to over 1 m (*C. secundum, C.*	Coralliidae are considered the slowest growing marine resource, present or past and

Supporting Statement (SS)	Additional information
elatius). *Corallium rubrum* exhibits average growth rates of 0.2-2 cm/yr in length and 0.24-1.32 mm diameter, with growth rates declining with age.	
All known Pacific species and deep water populations of *C. rubrum* occur naturally at a relatively low density (typically <1 colony/m^2), and any further reduction in density will double or triple the distance between colonies, which could result in an Allee effect. While low density is less of a problem for *Corallium* species that broadcast their gametes *C. rubrum* requires internal fertilisation which will not occur if a male colony is separated from a female colony by too great a distance.	
C. rubrum**:** Historically, *C. rubrum* colonies frequently attained masses greater than 2 kg, heights of 500 mm, and basal diameters of 30–100 mm. Previous it was believed that *C. rubrum* colonies with a basal diameter of 7 mm may be attained within 7 years but more recent estimates consider this size to be reach by 30-40 years old. *C. rubrum* colonies with a basal diameter of 5-7 mm with unbranched sticks no more than 20-30 mm tall, each with a maximum of 100 polyps capable of producing tens to no more than a few hundred larvae annually. After a century, they can grow to be 500 mm tall with hundreds of branches and thousands of polyps, which can release hundreds of thousands of larvae each year.	**C. rubrum:** *Each polyp only produces a few larvae (one to several larvae per polyp), so 'hundreds of thousands of larvae' seems too high an estimate. The actual calculations and conclusions of this paragraph are, however, valid. (Tsounis, 2009).* *Jebali (2006) used an adjusted method of ageing* C. rubrum*, based on growth rings, and estimated an average growth rate of basal diameter in Tunisia of 0.35 mm per year, which equated with the results of Marschal et al. (2004) in France, but was considerably lower than the results obtained by García-Rodríguez and Massó (1986) in Spain (1.32 mm per year), and by Santangelo* et al. *(1993) in Italy (0.93 mm per year).*
For a modular organism that characteristically forms highly complex, branched colonies, a shift from historic measures of 200-500 mm height to >90% of colonies that are less than 50 mm tall equates to a loss of 80-90% of the reproductive modules of individual colonies. Apart from few known deep-water populations, today colonies of *C. rubrum* rarely exceed 100-200 mm in height and 20 mm basal diameter at depths of 60 m or less, with most populations dominated by 20-50 mm tall colonies as commercial take has removed most large colonies. Restoration of this population structure would require removal of fishing pressure for decades.	
Local populations of Coralliidae spp. are self-seeding and genetically distinct, with occasional long-distance dispersal events maintaining connectivity between sites. Several studies have identified significant genetic isolation and limited larval dispersal between populations, with individual beds relying primarily on local recruitment. New data from Sardinia also show a high degree of genetic differentiation and distinct population segments in deep and shallow water, which reduces the likelihood that these deep populations serve as a refuge for over-exploited shallow populations.	*No reference was given for the new data from Sardinia, but Casu (2008) is apparently an appropriate one. The study confirmed the use of a simple, inexpensive molecular technique to perform genetic analysis on populations of* C. rubrum*. However, the results did not show a clear cut difference between shallow and deep water populations.*
Deep-water Coralliidae habitats have been impacted by dredges and trawls used to collect corals and by trawl fisheries targeting seamount and deep sea associated fishes. In the western Mediterranean, non-selective coral fisheries have degraded the three dimensional structure created by *C. rubrum* apparent 20 years ago to a 'grassplain'-like structure from the original 'forest-like' structure that was still apparent	

Supporting Statement (SS)	Additional information
20 years ago. **Population size**: Most often, colonies occur at low densities (low number of colonies per unit area, generally <1 per square meter), a low overall abundance (number of colonies) within an individual bed, and a small area of occupancy within individual areas of suitable habitats. The few larger, commercially exploitable populations reported from the Mediterranean and western Pacific are also characterised by low densities and a relatively small number of mature, economically valuable colonies. The only exceptions are certain shallow-water habitats in the Mediterranean that are no longer considered commercially viable, as these populations are now dominated by small (10-50 mm tall) colonies that never achieve a size large enough to support legal collection. Pacific: Coralliidae beds off Hawaii have been found in 16 areas at depths of 380–575 m, but only three of these are considered large enough to support commercial fisheries. The largest bed off Oahu is dominated by *C. secundum* at densities of 0.3 colonies/m², with a total population size of 120 000 colonies. Keahole Point Bed covers an area of 0.96 km² and contains up to 7 000 legal-sized *C. regale* colonies. **Population structure**: Mediterranean: Since recruitment potential is directly linked to the number of polyps per colony, heavily fished populations dominated by young colonies are more likely to be driven to local extinction when compounded by other stressors, unless there is an external source of larvae. Deeper-water Coralliidae populations have become increasingly important targets for fisheries as shallower populations are fished out. At a recent expert consultation held in Italy (Red Coral Workshop: Naples, Italy 2009), consensus was reached that shallow populations in the Mediterranean are over-exploited and should be protected from fishing, while deep areas still contain large colonies that could be harvested. However, it appears that deep populations may exhibit a very short period of high commercial viability, as corals occur at lower densities at these depths, and at more exposed positions, making them more vulnerable to fishing pressure. There are reports that several *C. rubrum* populations located in deep water have been depleted since the 1980s, and have not yet recovered from centuries of heavy dredging. **Population trends**: It is likely that precious corals become economically extinct before they reach biological extinction, as they are widespread colonial animals that are highly resistant to total colony mortality once a large size is achieved. However, exposure to unsustainable fishing pressure can and has resulted in removal of the most critical segments of the population for persistence of those populations (large colonies), followed by continued (illegal) removal of smaller colonies as the demand	***Population size***: C. rubrum *can occur at high densities at depths of > 100 m in some areas – photos by ROVs and accounts of professional fishermen in Albania, Algeria and Morocco. The comparison of current densities with those of 'Several decades ago' may be misleading due to the differences in sampling strategy and comparison of the different sites (Harmelin, 2007).* *In the eastern Mediterranean* C. rubrum *is much scarcer than in the west, e.g. it was only located at one site in the Aegean Sea by Salomidi* et al. *(2009).* ***Population structure**: The population structure of the poorly known eastern Mediterranean populations was studied in Croatia by Krŭzić and Popijač (2009), and they found that protected populations were in much better condition than unprotected ones, and that depth had a significantly positive effect on maximum height of colonies.* *Gandini (2009) studied two populations, one in Italy and one in Spain, and found that the former had a significantly higher reproductive output, which seemed to be mainly influenced by the higher density of the adult colonies, and the size and structure of the sex ratio of the population.* *Despite the restrictions to gene flow at short distances evidenced by microsatellites, a study of intron sequences suggested a general homogeneity of* C. rubrum *across its Mediterranean distribution area (Mokhtar-Jamaï* et al.*, 2009).* ***Population trends***: *Bavestrello* et al*. (2009) noted that data about the growth rate of just settled or juvenile colonies living in shallow waters (< 50 m) were abundant and values of 1 mm year-1 for the base diameter and 1 cm year-1 for the height of the colony are generally accepted. Nevertheless it has been demonstrated that 4-5 years after the settling, the growth virtually stops or becomes negligible: colonies monitored for more than 20 years along the French coast reached an height of about 4 cm and a basal diameter of 0.5 cm. Historical and recent data about the size and density of the shallow water population of Portofino Promontory (Ligurian Sea) indicate important fluctuations of these parameters on banks not subjected to anthropogenic impact.*

Supporting Statement (SS)

increases and the resource declines.

Global harvest statistics from 1950 to 2001 provide an indication of the rapid decline in abundance of Mediterranean and Pacific species corresponding with the discovery, inception of commercial fishing, increase in landings, over-exploitation, and, ultimately, exhaustion of the resource. A large bed discovered in 1965 (300-500m depth) and a second bed discovered in 1978 (900-1500 m), both on the Emperor Seamounts, were fished by 100s of boats during peak years and production neared or exceeded 300 metric tons (t) during several years. Landings crashed by 1989 and have remained below 5 t/yr for the last 19 years. Recent submersible surveys within these former coral beds identified isolated colonies, many of which were broken, dead, and with no remaining large populations.

<u>Mediterranean</u>: In Spain, the mean basal diameter of colonies declined from 7.2 mm to 4.8 mm, with mean height decreasing from 61.8 mm to 27 mm from 1986 to 2003. Even in areas protected from fishing for over 14 years, the largest colonies rarely exceeded 200 mm in height and the average basal diameter was only 4.8 mm, corresponding to an average age of 7.5 years. Colony height increases with depth to 40 mm height at 25-50 m and 60 mm at 50-90 m; the largest colonies (130-160 mm height) are found in non-harvested areas >50 m depth. In contrast, colonies collected in the 1950s and 1960s were frequently up to 500 mm height and 20 mm diameter. A 1962 collection off Costa Brava, Spain, consisted of colonies with basal diameter of 10-45 mm (mean = 16 mm) and height of 100-500 mm (mean = 115 mm) with the largest corals estimated at 50-80 years in age.

In France, colony size (basal diameter and height) in non-harvested sites was four times larger and average height was two times greater than that of corals in harvested areas. Relative to historic records of colonies that were 300-500 mm in height and 10-30 mm diameter, colonies in fished areas today are of 30-50 mm height, which equates to a mean of less than 10% of the historic number of polyps per colony and 20-30% of the number of polyps per colony within areas protected from fishing for 10-15 years; these smaller colonies will produce less than 10% of the offspring per colony that was observed historically.

The first deep-water study conducted in Spain reported an increase in the size structure of corals that was directly related to water depth from about 30-50 mm height in shallow water (<30 m depth) to 100-150 mm at 80-120 m depth, with larger corals found below areas currently targeted by SCUBA fisheries.

More recently, deep areas examined off Sardinia also contained larger corals. More than 50% of the landings were below the minimum recommended diameter (10 mm) established for this location based on a sample size of over 200 colonies. This suggests larger colonies, while present, only make up a small proportion of individual

Additional information

Firstly, the colony size is inversely related to their density, suggesting an intraspecific competition linked to the space availability and trophic inputs. Moreover, it is surprising that in the last ten years the Portofino populations have shown an unusually fast growth rate, reaching the maximal colony size never recorded in the previous 43 years (15 cm in height and 20 DW g). This unusually fast growth rate was recorded after the mass mortality episodes of 1999 and 2003, involving not only red coral but also several other benthic species and provoking a significant change in the structure of the coralligenous assemblage. All this evidence suggest that the growth of the Mediterranean red coral is strongly affected by intra- and interspecific interactions linked not only to local variables but also to stochastic events.

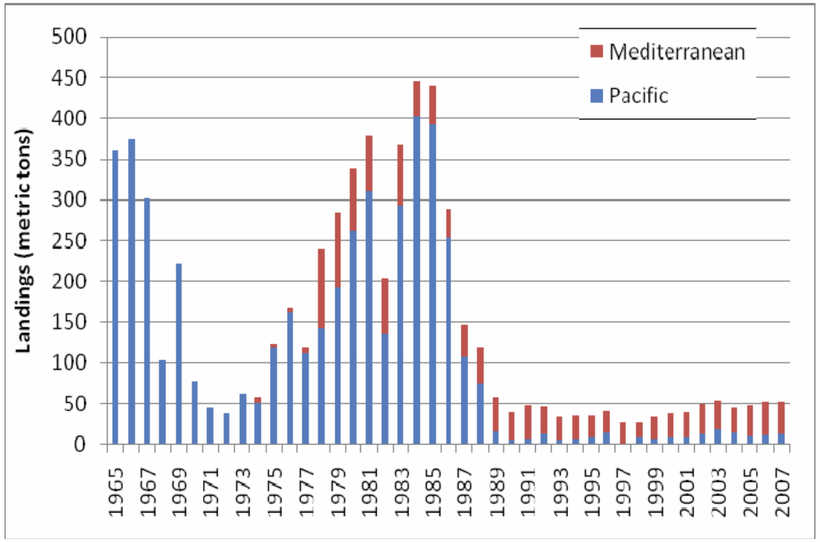
Historical records either refer to the presence of maximum size colonies (50 cm), or state that large colonies of approximately 30 cm were abundant. Data on early SCUBA harvesting yield in historical records further support these records (Tsounis et al.*, in press). However, since there are no precise data about the historical population structure in shallow water, it is difficult to estimate the historical abundance of large colonies. Therefore, a value of the relative reduction of polyps in the population has to be considered a rough estimate. The fact that in some reef coral populations the older half of the colonies produce 98% of the oocytes (Beiring & Lasker 2000), or that 22% of the largest colonies produce 80% of the oocytes annually (Babcock, 1984), demonstrates that the removal of large colonies reduces the total number of polyps (and thus fecundity) in a population dramatically, even if these large colonies were not abundant in the natural population (Tsounis, 2009).*

Supporting Statement (SS)	Additional information
populations, and continued pressure on these resources in the absence of more thorough information on population status and trends is likely to result in rapid depletion of these resources, as already experienced in shallow water. <u>Pacific:</u> In 1971, following two brief periods of commercial harvest, Makapu'u Bed (off Hawaii) was estimated to contain 79 200 colonies of *C. secundum*, with colonies occurring at a mean density of 0.02 colonies/m^2. Between 1974 and 1979, about 40% of the standing stock (17 500 kg) was harvested. Six years after harvesting ceased, colony density was similar to pre-harvest levels (0.022 colonies/m^2) although colonies were younger and smaller, and colonies over 35 years of age were absent. By 2001, the percentage of older size classes (20-45 years) increased, but the oldest colonies (45-55 years) were still under-represented, despite the absence of any fishing pressure over this period. Harvesting techniques can be highly destructive although some have been banned. Limited low-impact harvesting has been conducted by submersibles off Hawaii and using SCUBA in the Mediterranean since the 1950s. Although most *Corallium rubrum* fishermen are now using SCUBA, they are exploiting increasingly smaller colony sizes and using highly destructive methods affecting the whole size range of populations, completely removing their bases and reducing the chance for re-growth. **Geographic trends**: Coralliidae fisheries have displayed boom and bust cycles of with rapid increases in effort and landings shortly after a discovery of a new precious coral bed, followed by sharp declines a few years later once the bed is depleted. Since 1990 no new large commercially viable beds have been discovered and landings have remained at historically low levels that are 10-20% of that reported in the late 1980s. Most western Mediterranean populations of *Corallium rubrum* were also depleted within 4-5 years of their discovery, leading to termination or relocation of fishing effort as new beds were discovered. The only instances involving discovery of large, valuable Coralliidae beds occurred from the 1960s to the 1980s in the far west Pacific, primarily around Emperor Seamounts and the Hawaiian Islands. Additional locations with Coralliidae have been identified in Hawaiian waters over the last decade using submersibles and ROVs, although only three of these are large enough to support commercial extraction, including one with an MSY estimated at only 35 kg per year. While fishing pressure is unlikely to have affected the geographical distribution of individual species, it has resulted in commercial extinction of individual beds and a loss of biodiversity due to limited connectivity and dispersal between these subpopulations.	*Submarine surveys in the French Frigate Shoals (Hawaiian Islands) found an abundance of pink corals* Corallium *sp. leading to plans to renew a harvest in the area (Parrish* et al.*, 2002). It has been clarified that these plans have not been developed, and that the traders in Hawaii are phasing out all use of Coralliidae in their jewellery once existing stocks have been exhausted. (Cooper, 2009).* *Dredging is often considered the most destructive method of harvesting coral. SCUBA in general is not a destructive harvesting method, but the practice by poachers of removing all colonies, of course is although it causes no collateral damage to non-targeted species (Tsounis* et al.*, in press; Tsounis, 2009).* ***Geographic trends**: Liverino (1983) and Tescione (1973) describe the historic Mediterranean fishery. The last discovery of an extensive stock was the 14 mile long Scherzi Channel between Sicily and Tunisia. 80 divers from Italy, France and Spain harvesting 70-120 t in 1978, starting at 60 m and gradually working their way down to 130 m. This submarine canyon was described as an oasis for marine fauna and flora, uncontaminated and exceptionally rich in rare species. In 1979 there were 366 boats at work (283 of them were registered in Italy) and 150 divers (Liverino 1983). One stock that appears to be still holding large colonies in deep water (>90m) is located in Sardinia. Apparently, high taxes and the gradual phasing out of dredging beginning in 1979 contributed to lower the annual yield and thus improving management. Stocks in Morocco (at SCUBA depths) on the other hand, seem to show a similar level of over-exploitation as northern Spain did in 1986 (Tsounis* et al.*, in press; Tsounis, 2009)* *Tsounis* et al. *(2009) noted that there was anecdotal information about commercial diving teams harvesting large colonies of* C. rubrum *on international seamounts, where there was currently no regulation. They surmised that these could be the last natural populations that could serve as a baseline for ecological research and that, therefore some protection would be warranted.* *A survey in previously unexplored areas in the far North Western Hawaiian Islands in 2003 found five new sites for* Coralliidae *(Baco, 2007).* ***Vulnerability**: Jabin et al. (2008) provided details of a continuous size-structured red coral growth model, which they hoped could be developed to precisely describe mass mortality events and their consequences on red coral dynamics.*

Supporting Statement (SS)	Additional information
Vulnerability: New sources of disturbance to *Corallium rubrum* populations and increased severity of these perturbations have been observed since the late 1990s, including several mass-mortality events linked to elevated temperature anomalies and mechanical disturbance due to increased recreational diving (Mediterranean) and souvenir collection. Computer simulations show that mass die-offs, which have occurred during recent exceptionally warm summers, can eliminate shallow-water populations already stressed by over-harvesting. Healthy populations will probably recover from such setbacks, but over-exploited ones may not. An event in 1999 caused extensive mortality to shallow-water populations (<30 m depth) along 50 km of coastline in the Provence region of France, with overall losses estimated in the millions of colonies. This unusual die-off was attributed to a disease and linked to temperature anomalies. A comparable mass-mortality event occurred in 1987 on deep reefs (>80 m depth) between Marseille and Nice, and in shallow populations at La Ciotat in 1983.	*Linares* et al*. (2009) highlighted the need for intensive (long-term) and extensive (large spatial-scale) studies, including photographic monitoring of permanent plots for* C. rubrum*, to improve knowledge of the response of coralligenous communities when faced with anthropogenic disturbances.* *Santangelo* et al*. (2009a) developed demographic models, based on life-history tables, to simulate the effects of mortalities on the structure and dynamics of populations of* C. rubrum*, which facilitated the projection of population trends over time. They suggested that there have been few studies of the long-term effects of mass mortality because a thorough evaluation of the impact, in terms of mortality, of such events on long-lived species required a long-time series of data collected before and after the event. However, they felt that a demographic approach, based on sound population data, might provide a good prediction of the mass mortality impact on population dynamics.* *These problems have been studied by the Medchange project, which has provided, through detailed and multidisciplinary studies, invaluable data on the resistance, adaptation and evolutionary capacities of long-lived emblematic species of the Mediterranean confronted with temperature regime changes in littoral habitats. This knowledge should provide the proper scientific basis to anticipate marine biodiversity trajectories over mid- and long-term scales in view of the predicted climate change scenario (Garrabou* et al*. (2009).* ***Utilisation and Trade:** Powder from* Coralliidae *is sold to India, Pakistan, Japan and Taiwan (Province of China), where it is used in traditional medicine, mostly involving Asian species. Coral pieces are also used as biomaterial in bone transplants (Amel and Noureddine, 2006).*
Utilisation and Trade: Precious corals in the family Coralliidae include species highly valued for jewellery and art objects. They are traded as whole dried colonies; unworked branches and branch fragments; beads and polished stones; manufactured jewellery; and powder, pills, granules, ointment and liquid. Small colonies traditionally were rejected by the high end fashion jewellery industry, which used neither small-sized corals nor reconstituted coral embedded in epoxy. However, the demand for smaller corals and fragments, available at less cost, has risen due to their use in both the ethnic and tourism markets. The most valuable species are *Corallium rubrum*, *C. secundum*, *C. elatius*, *C. konojoi*, *Paracorallium japonicum* and 'Midway deep coral', and the most valuable specimens are those collected when alive. They are harvested in the Mediterranean Sea, mainly from 30–120 m depth, and in the western North Pacific Ocean, in two depth zones: 200–500 m and 1000–1500 m. Commercial yields (of all species combined from FAO statistics) peaked in 1984 at 45 mt, declined to 40 mt by 1990 and fluctuated between 28 and 54 mt from 1991–2005.	C. regale *was referred to by Bayer (1956): 'Of all the Hawaiian precious corals,* C. regale *has the best colour and might be of commercial value if it could be fished in quantity.' The only indication of trade in this species was 61 kg collected in 2000 but it is not known whether the specimens involved entered international trade. There is no evidence that any of the other 23 species have been involved in trade.* Paracorallium tortuosum *was noted by Bayer (1956) as 'appears to be the most abundant precious coral in Hawaiian waters but, due to its small size and usually deformed axis, it probably has no commercial possibilities.'* Paracorallium japonicum *is valued at approximately USD 6600-8800/kg, and is thus the most valuable precious coral at the moment.* (*Tsounis, 2009).* *There appear to be some inconsistencies in the trade data reported in the SS with those given by the source used (FAO, 2008).*

Supporting Statement (SS)	Additional information

Supporting Statement (SS)



Mediterranean: A fishery for *C. rubrum* has existed in the Mediterranean for about 5 000 years, with supplies waxing and waning depending on supply, demand, discovery of new coral banks and political and economic stability of the countries involved.

Total landings of Mediterranean *C. rubrum* reported over a 30-year period (1976-2006) totalled 1250 metric tons (t) with 33.5% from Italy, 17.6% from Spain, 15.3% from Tunisia, and 9.9% from France. Landings from these four major source countries showed a decreasing trend over 15 years (>85% decline from 97 t in 1976 to 12 t in 1992), with the largest declines reported from European countries. For country specific data see SS.

Recent yield has been likely been maintained by taking a larger number of small colonies.

Illegal harvesting is reported with increasing frequency in Spanish waters.

Pacific: *Corallium* fisheries started in the Pacific in 1804 in Japan and expanded over the years, targeting grounds in waters of Japan and Taiwan (Province of China). Landings of *Corallium* and *Paracorallium* from the Pacific reported by Japan and China (island of Taiwan) showed five major peaks over a 45 year period (1962-2007). For species and country specific data see SS. Significant declines in landings

Additional information

No trade has been reported from the Libyan Arab Jamirihiya, although the WWF Mediterranean Programme Office (2005) noted that a licence was about to be issued to an Italian company to exploit their populations. It is not known whether this was taken up.

Corallium rubrum *is sold for high prices; high quality raw colonies are sold for USD 1500 kg. Even thin juvenile branches are bought for USD 230-300 kg, whereas they were practically worthless some decades ago. Manufacturing is time consuming. Prices vary according to species and size. Large jewellery pieces of* C. elatius *that were sold to tribal groups in Nigeria during the 1960s are now being bought back by the industry to be resold to the luxury market, indicating a shortage of large tropical* Corallium *colonies (Tsounis* et al.*, in press).*

Illegal harvesting has also been confirmed in Italy and is probably common throughout the Mediterranean. Unofficial estimates by fishermen suggest that there are as many or more poachers active in Spain than licensed divers (Tsounis et al.*, 2009).*

There appear to be some inconsistencies and errors in the trade data reported in the SS. No landings of 'C. sp. nov' have been reported since 1992 by FAO.

Japan currently harvests only three out of 28 coral beds, mostly located off coastal

Supporting Statement (SS)	Additional information
are noted and less than 10 t have been harvested annually from the Pacific over the last 15 years. Currently all known Coralliidae beds in international waters around Midway Islands and Emperor Seamounts have been depleted and are not supporting any large-scale commercial fisheries, although small amounts of this taxon (<1 t/yr) are reported in FAO landings data and coral harvesting vessels were seen operating in this area as recently as 2007. New beds were discovered north of Midway Island in 1965 and, over the next 20 years, most of the world's harvest came from the Milwaukee Bank and surrounding seamounts. The USA harvest figures were not included in the FAO data but for *C. secundum* a total of 1 800 kg was harvested in the years 1966–1969, and 6 427 kg from 1973–1978. The U.S. fishery was revived in 1999-2000, by use of one-person submersibles with 700 m depth range. In 2000, 1 216 kg *C. secundum* from the Makapu'u Bed and 61 kg of *C. regale* (*C. lauuense*) were collected from exploratory areas off Kailua, Kona. No harvest occurred from 2001 to 2009.	*islands. One area is harvested by submarine, while in the other two areas strong currents are presents, and dredges are therefore used. 112-160 boats are only active for two weeks per year and employ their dredge for 4h a day, harvesting about 12kg of coral per boat and year. Furthermore, they seem to largely target deposits of dead coral in sandy bottoms, which are located near rocky habitat where live coral can be found (and is also targeted by the fishery, on separate occasions). Both Japan and Taiwan (Province of China) harvest up to 80% dead coral. Fishery independent surveys by ROV would greatly assist these fisheries to set optimal yield levels, but do not seem to have been conducted yet. (Tsounis, 2009).* *In 2008 two coral fishing boats from Taiwan (Province of China) were sighted in the waters of the Emperor Seamounts (Fisheries Agency of Japan, 2008).*
A smaller fishery in U.S. waters off Hawaii started 1966, initially with tangle net dredges, followed by manned submersibles in the until 1978 when this practise was abandoned due to high operating costs. In 1988 dredging only harvested dead or low-quality pink coral and was discontinued. Illegal harvesting was a problem in Hawaiian territorial waters in the past.	
In 1969, Hawaii's precious corals industry produced approximately USD2 million in retail sales, partially from domestic harvest and the remainder consisting of jewellery imported from the island of Taiwan (Province of China) and Japan.	*The figure of USD2 million for Hawaii included black corals Antipatharia (Grigg, 1993).*
Much of the trade is in the form of processed beads and Italy has long been the most important processor and exporter. The trade has a very high value; superior beads fetch prices of up to USD50 per gram and necklaces cost up to USD25 000. In 1988 the value of coral exports from Torre del Greco amounted to nearly USD30 million. Processing centres developed in other countries, particularly China and Japan. USA is the major consumer importing un-worked skeletons and processed Coralliidae products of precious corals.	*Using additional information such as price, most peaks can be identified and demonstrate the discovery and depletion of specific beds, as described in the SS. The data thus describe the biomass decline of these specific stocks. However, pooled landings data over a longer period summarising several species and stocks cannot not be used to infer the biomass decline of the total population (Tsounis* et al.*, in press; Tsounis, 2009).* *Grigg (2007) suggested that most, if not all, trade in the Pacific, i.e. Japan, Taiwan (Province of China) and Hawaii (USA), involved raw material that had been stockpiled for many years; and that there was also a large stockpile in Italy.* *Industry experts note that a delay of implementation of 18 months would not be sufficient to deal with the issue of stockpiles (Tsounis, 2009.)*

Supporting Statement (SS)	Additional information

Inclusion in Appendix II to improve control of other listed species

A) Specimens in trade resemble those of species listed in Appendix II under *Resolution Conf. 9.24 (Rev. CoP14)* Annex 2 a or listed in Appendix I

Supporting Statement (SS)	Additional information
Features sufficient for reliable identification at the species level within the family Coralliidae do not exist for skeletons or as manufactured jewellery and curios, which is the bulk of the trade. Taxonomic identification of octocorals requires microscopic analysis of shape, size and colour of sclerites (tiny calcified skeletal elements) embedded in the coenochyme and in the organic matrix of the axial skeleton; these are lost when processed for jewellery. Therefore, it may only be possible to identify worked specimens to the family level (Coralliidae), particularly where worked specimens contain multiple species. As the family was recently divided into two genera, and future taxonomic revision may create more, it is difficult to readily identify worked specimens to genus level. As such, it is justified to use higher taxon names on permits for worked specimens. Where raw or dead corals are concerned, these can usually be identified to species level. Reconstituted coral pieces can be identified through either chemical analysis or using a microscope to examine growth rings. For coral powder that might be in trade, species may not be readily recognizable unless labelled as such, in which case it would fall under the provisions of *Res. Conf. 9.6 (Rev.)*.	*Smith et al. (2007) referred to distinctive parallel striations that are visible to the naked eye on the surface of unworked pieces of* Coralliidae *and also on worked items such as beads. They described the very different open, porous structure of sponge coral Melithaea ochracea, but made no mention of bamboo corals, family Isididae.* *Cooper (2009) reported on the development of a guide to the identification of precious corals, which will deal with the problems of distinguishing* Coralliidae *specimens from other coral taxa and imitations. In addition, TRAFFIC is collaborating on a project to identify* Coralliidae *products to species level using DNA analysis (Cooper, 2009).*

B) Compelling other reasons to ensure that effective control of trade in currently listed species is achieved

Other information

Other threats

Supporting Statement (SS)	Additional information
Coralliidae mortality can be caused by smothering by sand, detachment and toppling caused by organisms that weaken the site of basal attachment, predation by gastropods. Secondary human impacts include pollution, sedimentation, tourism and recreational diving (Mediterranean), and incidental take, or habitat degradation associated with longline fishing and bottom trawling (western Pacific). The benthic impacts of mobile fishing gear have been likened to clear-cutting techniques in old-growth forests.	

Conservation, management and legislation

Supporting Statement (SS)	Additional information
In 2008, China included four species of Coralliidae in Appendix III of CITES (*Paracorallium japonicum, Corallium elatius*, *C. konojoi*, *C. secundum*). Coralliidae not listed on any other international wildlife or fisheries agreements and has no international legal status.	
Coralliidae are protected by national legislation in Croatia, Gibraltar, Monaco, Montenegro, New Zealand and Turkey. In Morocco harvesting is controlled and a quota system is in place.	C. rubrum *is fully protected in Malta (Flora, Fauna and Natural Habitats Protection Regulations, 2003) and harvesting is regulated in Greece (Dounas* et al.*, 2009) and Tunisia (Chouba and Tritar, 1998).*

Supporting Statement (SS)	Additional information
The European Union*:* *Corallium rubrum* is listed in Annex V of the European Union Habitats Directive. *C. rubrum* is listed in Annex III of the Bern Convention, and Annex III of the Protocol concerning Special Protected Areas and Biological Diversity in the Mediterranean. In 1994, the European Union banned the use of the *ingegno* or St. Andrew's Cross) (Council Regulation No. 1626/94). The Spanish Government has established reserves for the protection of *C. rubrum* in the Mediterranean Sea. In 2006, the Spanish Ministry of Agriculture, Fisheries and Food published a new *Ministerial Order for the Integral Fisheries Management of the Mediterranean,* which bans the use of bottom trawling, purse seining and drag netting to 50 m depth.	*The legislation relating to harvesting in Algeria was summarised by Akrour (1989); subsequently it was strictly controlled in 1995 under Décret Exécutif no. 95-323, and then suspended in 2001 under Décret Exécutif no. 01-56, awaiting the results of a study evaluating the resource. Belbacha* et al. *(2006, 2009) updated information on the status of the species in Algeria, where harvesting is still apparently suspended.* C. rubrum *is not considered threatened in France (Labarraque* et al.*, 2000). However, the fishery there is subject to management and regulation: collection by diving is generally prohibited, but licences are issued on provisional exemptions, which are subject to annual renewal. In Corsica, the numbers of collectors was limited to 8 and they agreed to work below 50 m to allow the stocks in shallower waters to recuperate. (Harmelin, 2007). Sardinia (Italy) has regional legislation on coral fishing, issued in 1979 and modified in 1989. In 2009, a maximum of 30 coral fishing permits was allowed for issue (Anon., 2009).*
The USA*:* The Western Pacific Fishery Management Council's (WPFMC) Precious Corals Fisheries Management Plan (FMP) has regulated the harvest of Coralliidae since 1983. The FMP imposes permit requirements valid for specific locations, harvest quotas for precious coral beds, a minimum size limit for pink coral, gear restrictions, area restrictions, and fishing seasons. The Northwest Hawaiian Islands (NWHI) National Monument prohibits taking of all precious coral within the Reserve. The State of Hawaii prohibits the take or sale of pink coral without a permit and has established a minimum size (254 mm). California prohibits the commercial harvest of Coralliidae.	*Parrish* et al. *(2009) noted that three additional National Marine Monuments were established in 2009, for the USA Line and Phoenix Islands, for Rose Atoll, and for the three islands of the Northern Marianas, along with the Marianas Trench. However, it is not known whether Coralliidae occur in these areas.*
China: Harvest regulations for the island of Taiwan were renewed in January 2009. Vessels harvesting Coralliidae are regulated by licensing and harvest zone and maximum harvest days per year are established. VMS (Vessel Monitoring System) data, daily logbooks, designated landing ports, centralised auction markets, and observer programmes are used to monitor the fishery and to enforce the regulation. Fifty-six vessels are licensed to harvest *Corallium* and *Paracorallium* legally and harvest and export quantities are limited to 200 and 120 kilograms, respectively, per vessel per year. Confiscation of fishing gear and suspension of the *Corallium* and *Paracorallium* harvest licence can be imposed for violations.	*Tsounis* et al. *(in press) provides information that 'The Taiwan precious coral fishery began in 1929 and in 1983 was limited to 150 vessels. Currently there are 53 vessels harvesting* Corallium *sp. in five regions, each vessel with an annual quota of 200 kg over a 220 day activity limit for each year. The fishermen employ traditional unselective gear consisting of the tangle nets typical for Asia fished at a slow speed of 1.5 knots. Only 2% of the harvested coral in Taiwan is live coral; 83% is dead coral and a further 15% is dead coral that has been on the seafloor long enough to wither.'*
Japan: *Corallium* and *Paracorallium* harvest in Japan is regulated by the prefectural governors (Kochi, Okinawa, Kagoshima, Nagasaki), according to the fishery rule for adjustment under the Fishery Law and Conservation Policy for Marine Resource. Both fishermen and vessels are licensed and legal harvest zones are designated. No specific harvest season or quotas exist.	*Tsounis* et al. *(in press) noted that 'Red, pink and white corals are harvested by traditional stone weighted unselective tangle nets in Kochi. Since 1983, in waters extending from Kagoshima to Okinawa harvesters have used manned and unmanned underwater vehicles, which follow self-imposed size limits (Iwasaki and Suzuki, 2008). There is no official quota for these fisheries because the research needed to manage the stocks has only recently been initiated. Yields have been stable during the last decade and catches in at least one area (Kochi prefecture) indicate 80% dead coral, which implies a low level of renewal of the resource.'* *In the Philippines, precious corals belonging to the genus* Corallium *are banned from exploitation and export under the Fisheries Administrative Order No. 202, Series of 2000.*

Supporting Statement (SS)	Additional information
	The SS refers to all species of 'red coral' being absolutely protected in New Zealand, implying that this covers Coralliidae *spp. However, the term 'red coral' in New Zealand legislation refers to Stylasteridae spp. and there is no specific protection for* Coralliidae *spp. (Consalvey* et al.*, 2006).*
Harvest management Area closures and rotational harvests are effective tools for conservation of reef fishes with pelagic dispersal of larvae. However, for sessile, slow-growing organisms like *C. rubrum*, area closures are less effective unless they are permanent, as these species are likely to require up to 100 years or more for full population recovery. There are currently four marine protected areas (MPAs) in the northwestern Mediterranean that protect red coral (France: 3, Spain: 1). After 14 years of closure in the Medas Islands MPA off Spain, populations have not rebounded to their natural state, as colonies over 200 mm height are still absent At this time, there is no evidence that the number, size, and placement of existing MPAs is adequate to protect or sustain populations of *C. rubrum.* Another harvest measure widely used in the Mediterranean is a minimum basal diameter of 7 mm. It is 10 mm in Sardinia, but a 20% variance is allowed. Recent fisheries landings data showed >50% of the colonies were under 10 mm basal diameter. Since fertility and number of larvae is known to increase with colony size (height and number of branches), the current harvest size for *C. rubrum* colonies is inadequate to protect reproductive stocks. These small colonies can reproduce only 2-3 times at most before harvest, and their small size and relatively limited branching pattern limits their reproductive potential. Scientists have suggested that, due to the very slow growth rates (and new information on growth rates) legal minimum size should be increased. In U.S. waters, MSY was established based on presumed rates of growth and abundance of corals within surveyed areas, with a minimum allowable size (height) of harvest. In the Makapu'u Bed off Hawaii, low levels of selective harvest from 1972 to 1978 caused a decrease in the proportion of large colonies that was still apparent 20 years later, even though no additional harvest had occurred during this period. In 2004, the member States of the United Nations agreed to take urgent action for the protection of vulnerable marine ecosystems (VMEs), such as coldwater corals. The non-binding U.N. General Assembly resolution measures prohibit destructive fishing practices, including bottom trawling, that have adverse impacts on VMEs. Few management measures for Coralliidae fisheries have been implemented or enforced in the Pacific, particularly in international waters. Management has been hampered by enforcement and jurisdiction problems, the multinational character of the fishery, presence of precious coral beds in waters not under the jurisdiction of	***Harvest management*** *The Scientific Advisory Committee of the General Fisheries Commission for the Mediterranean (GFCM) (2008) recommended that in Northern Spain (GSA 06), owing to the following problems: high fishing mortality; low abundance; overexploited stock (being exploited at above a level which is believed to be sustainable in the long term, with no potential room for further expansion and a high risk of stock depletion/ collapse); that the following measures be considered: progressive reduction of number of licenses to allow recovery within the next 5-10 years (through not issuing new licenses in replacement of existing ones); review of the current allowed quota (400 kg per year/fisherman); closure of the fishery from 15 June to 31 August (reproductive period). A study in the area the GFCM Report is referring to (Montgri coast, northern Spain) showed that a 5-year moratorium resulted in only negligible recovery of the stocks (Tsounis et al., 2006). Costantini et al. (2007) demonstrated that rotational harvesting is detrimental to the genetic biodiversity of populations. (Tsounis, 2009).* *A survey of MPAs in the Mediterranean (Abdulla* et al.*, 2008) found that* C. rubrum *occurred in about half of the 85 MPAs that responded to a questionnaire.* *Santangelo* et al. *(2009b) recommended that shallow-water populations of* C. rubrum *should be protected, and that the future of harvesting should be linked with deep-water populations, which would need careful management based on sound population and fishing data, and a reliable analysis of demographic trends that would allow the establishment of a minimal colony size. However, Tsounis* et al. *(2009) felt that exploitation of the deeper populations could be problematic because they could be contributing to the recruitment of shallow water colonies.* *Anon. (2008) reported on the identification of VMEs and an assessment of impacts caused by bottom fishing activities on VMEs and marine species.*

Supporting Statement (SS)	Additional information
any State, and a lack of knowledge of population status and biology of Coralliidae.	

Captive breeding/artificial Propagation

Supporting Statement (SS)	Additional information
Currently there are no comprehensive captive-breeding programmes for Coralliidae. A method for coral propagation on artificial substrates has been developed at the University of Pisa, Italy and a small project to rear *C. rubrum* on artificial substrates and transplant into the wild has shown relatively high survival, but to date restoration efforts remain in infancy and have not been widely applied.	*Harmelin (2006) discussed the possibilities of propagating* C. rubrum*, including a project in Monaco in 1989 and 1993, but concluded that there was still much to be learnt.*

Other comments

Supporting Statement (SS)	Additional information
Bamboo and sponge corals have appeared on international markets as jewellery, often being dyed pink or red and sold as Coralliidae. Unworked Coralliidae have distinct growth patterns that are apparent under microscopic examination. Bamboo coral's nodes with black gorgonin substance and sponge coral's porous structure and distinctive two-color reticulated pattern exclude their identification as Coralliidae.	*Pedersen (2007) clarified that bamboo corals also have striations but, whereas the striations on* Coralliidae *specimens are very fine – 0.25 to 0.5 mm apart – those of bamboo coral are ~1 mm apart, so the two types of coral are easily distinguishable.* *Bamboo coral harvest in Bone Bay, Sulawesi, (Indonesia) appears to have increased significantly in recent years because exports of more than 100 t were reported in 2005. This development may represent the phenomenon called 'fishing down the price list', i.e. shifting to the next available resource after depleting the most valuable ones, and indicate changing demand/supply situations for* Coralliidae *(Tsounis* et al.*, in press; Tsounis, 2009).*

Reviewers:

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