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Comments on the Green Paper on the Reform of the Common Fisheries Policy (COM(2009) 163 final)

1. Introduction

Humane Society International (HSI) welcomes this opportunity to contribute to this public consultation on the reform of the Common Fisheries Policy (CFP).[1] We strongly believe that the radical reform of this policy is imperative in order to protect marine life and its welfare, and to secure the futures of our oceans and seas.

In 2002, the CFP underwent reforms to "to ensure the long-term viability of the fisheries sector through sustainable exploitation of living aquatic resources".[2] Nearly 20 years after its inception, it was apparent that this policy had failed to meet its objectives, leading to many fish populations being exploited beyond safe biological limits. An earlier Commission Green Paper had concluded that if the trend continued, many stocks would be liable to collapse. It also warned that the "available fishing capacity of the Community fleets far exceeds that required to harvest fish in a sustainable manner".[3]

Seven years on, it is evident that there has been scant improvement in EU fisheries despite these attempts at reform. The current levels of exploitation of marine resources continue to be unsustainable and it is uncertain whether some fish populations will ever recover from persistent overfishing. The EU fishing fleet continues to be oversized, certainly in relation to the declining fish stocks targeted by the fleet, and increasingly employs modern fishing technologies that allow the remaining fish stocks to be exhausted quicker than ever before. Fishing quotas have also led to excessive waste of marine life with high levels of bycatch and massive numbers of fish and other species being discarded at sea.

The Commission's own Green Paper notes that 88% of Community fish stocks are being fished beyond the Maximum Sustainable Yield (MSY) and that 30% of these fish stocks are now below the biological safety limits.[4] The damning report produced by the European Court of Auditors in December 2007 highlights the inadequacies of fisheries control in the EU and the unreliability of data used to set quotas and Total Allowable Catches (TACs). Moreover, it clearly shows how the CFP has consistently failed to meet its original objective of attaining sustainable fisheries in the European Union.[5]

HSI appreciates the Commission's public acknowledgement that political expediency and short-term objectives have frequently been invoked by Member States to allow for more generous short-term fishing opportunities. This has been at the expense of the long-term sustainability of fisheries and the marine ecosystem. To be effective, any reform of the CFP would necessarily have to ensure that the power for decision-making does not lie solely in the hands of the Council where the most powerful actors are able to

[1] Humane Society International (HSI) is one of the largest animal protection organisations in the world, with more than 11 million members and constituents across the globe. In the European Union, HSI addresses issues such as inhumane practices and conditions affecting companion and farm animals, fur production, illegal trade in wildlife, threats to endangered species, slaughter of marine mammals, and the use of animals in research and testing. At present, our main concerns with regard to fisheries are the protection of sharks, from overfishing and finning; bycatch, especially of marine mammals; and aquaculture, including predator management and the welfare of farmed fish.

[2] Council Regulation (EC) No 2371/2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy.

[3] Green Paper, The future of the Common Fisheries Policy, COM(2001) 135 final, 20.3.2001. p. 4.

[4] Green Paper, Reform of the Common Fisheries Policy, COM(209)163 final, 22.4.2009. p. 7.

[5] European Court of Auditors' Special Report No 7/2007on the control, inspection and sanction systems relating to the rules on conservation of Community fisheries resources together with the Commission's replies.

ensure that their own fleets can continue to overexploit fish populations at the expense of the marine environment.

Thus far the CFP has paid little attention to the welfare of fish and other aquatic species, which may be negatively impacted by fisheries. The 2002 reforms focused primarily on traditional conservation measures, such as TACs and restrictions on fishing methods, fleet management and various socio-economic measures. In reforming the CFP, HSI calls upon the Commission to also take adequate account of the impact of fisheries on (non-targeted) marine life and its welfare, and the welfare of fish bred and kept in aquaculture systems. The present submission therefore specifically addresses a number of issues, which are of particular concern to us as an animal protection organisation.

2. Bycatch and mortality of non-target species

HSI maintains that it is vital for all fisheries using all types of fishing gear to reduce and minimise bycatch and mortality of non-target species. This not only includes fish (discards), but also other marine species such as cetaceans, turtles and sea birds. The following provides a brief overview of the animal welfare problems associated with the bycatch of specific non-target species.

2.1. Cetacean bycatch

It has recently been estimated that worldwide more than 300,000 whales, dolphins and porpoises die annually as a result of becoming entangled in fishing gear. Indeed, some species, such as the North Atlantic right whale and the vaquita porpoise, are being pushed to the brink of extinction as a result of fisheries bycatch.[6] Fisheries bycatch is thought to pose the 'single greatest threat to many populations of marine mammals' across the globe.[7]

Bycatch is, however, not just a conservation issue. There are serious animal welfare implications for cetaceans that become entangled in fishing gear, such as fixed nets and traps. If these animals are unable to reach the surface to breathe, they will eventually die of asphyxiation. Larger cetaceans, such as the North Atlantic right whale (*Eubalaena glacialis)*, minke whale (*Balaenoptera acutorostrata*) and humpback whale (*Megaptera novaeangliae*), may well be able to swim away still entangled in the fishing gear. However, the injuries inflicted by the ropes can lead to prolonged suffering and eventually death.

A study on the fatal entanglement of North Atlantic right whales, for example, found that the remaining rope from fishing gear can progressively constrict one or more of the animal's body parts (e.g. flipper, baleen, rostrum or peduncle), causing tissue damage and debilitating it over a period of months with fatal consequences. The ropes can cause deep lacerations into the whale's blubber and even into its bones. An average of 5.6 months from entanglement to death was recorded, although it was noted that the deaths of entangled whales may go unrecorded because they debilitate very slowly and eventually sink at death.[8]

In the North Atlantic, gillnet and trap fisheries, which involve bottom set gear marked by surface floats, have been deemed the two types of fishery with the largest number of whale entanglements.[9]

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[6] Soulsbury, C.D., Iossa, G. & Harris, S. (2008) *The Animal Welfare Implications of Cetacean Deaths in Fisheries*. School of Biological Sciences, University of Bristol/Whale and Dolphin Conservation Society.

[7] Read, A.J., Drinker, P. & Northridge, S. (2005) Bycatch of marine mammals in U.S. and Global Fisheries'. *Conservation Biology.* Vol 20, No. 1, pp. 163-169.

[8] Moore, M.J., *et al* (2006) Fatally entangled right whales can die extremely slowly. Oceans 2006. Conference proceedings.

[9] Read, A.J., Drinker, P. & Northridge, S. (2005) Bycatch of marine mammals in U.S. and Global Fisheries'. *Conservation Biology.* Vol 20, No. 1, pp. 163-169; Leaper, R., Papastavrou, V. & Sadler, L. (2006) Consideration of

Whales are, of course, not the only cetacean species to suffer from entanglement in fishing gear. Bottom-set gillnets have been found to pose particular dangers to porpoises. Porpoises that have become entangled in such nets are found with characteristic rings incised around their heads and bodies, which correspond to the size of the mesh in which they have been caught up. Fins and tail flukes may also be partially or completely amputated as a result of having been caught in netting.[10] The animal will thrash about to try to escape and the netting will subsequently tighten and cause further injury and likelihood of death.

Longlines have also been found to cause death and injury to dolphins and other cetaceans. In addition to the drowning risk, being hooked on a longline can lead to fatally swallowing hooks or having the dorsal fin or flippers being partially or completely severed because the tension on the line increases as the animal attempts to pull away from it. Entrapment in trawl nets can lead to drowning as well as injuries, such as broken teeth, beaks or jaws as dolphins attempt to escape from them. Severe internal injuries may also occur as animals try to escape from the nets in which they are caught.[11]

Post-mortem data from 97 harbour porpoises and 80 common dolphins determined to have died as a result of bycatch in the United Kingdom revealed that 29.4% had net marks to their tail flukes or tailstock, 24.5% had net marks to their pectoral fins, 23% to the head/beak, 15.6% to the dorsal fins and 7.4% to the body. In addition, 17% had broken teeth and 24.2% a broken maxilla/mandible. Internal injuries recorded during these post-mortems included haemorrhaging, muscle tears and visceral congestion. For the animals that escaped from the fishing gear, such injuries are likely to have caused pain and debilitation for a prolonged period prior to death.[12]

Although cetaceans are protected by the Habitats Directive (92/43/EEC) from deliberate disturbance, capture and killing within Community waters, there are presently few EU legal provisions to protect whales, dolphins and porpoises during the course of other activities, such as commercial fishing, which have been repeatedly proved to have negative effects.[13]

Council Regulation (EC) 812/2004 is the only exception.[14] This Regulation was designed to reduce the number of cetaceans caught incidentally in driftnet fisheries in specific fishing areas within EU waters; the use of driftnets in the Baltic Sea was thus phased out by January 2008 in order to protect harbour porpoises. To protect cetaceans, this legislation also introduced the use of acoustic deterrent devices in specific fisheries and a system of onboard observer monitoring for vessels over 15 metres for pelagic trawls and bottom-set gillnet fisheries in specified areas.[15]

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factors affecting time to death for whales following entanglement in fishing gear. Submission by UK government to IWC.

[10] Soulsbury, C.D., Iossa, G. & Harris, S. (2008) *The Animal Welfare Implications of Cetacean Deaths in Fisheries*. School of Biological Sciences, University of Bristol/Whale and Dolphin Conservation Society.

[11] Ibid.

[12] Ibid.

[13] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

[14] It should be noted that here only legislative instruments, which are binding to the EU as a whole, are discussed in this regard. HSI acknowledges that there are two relevant regional agreements through which the Parties, in many instances also EU Member States, work cooperatively to reduce threats to cetaceans in their regional waters. These agreements are: the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) and Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS)

[15] Council Regulation (EC) No 812/2004 laying down measures concerning incidental catches of cetaceans in fisheries and amending Regulation (EC) No 88/98.

While Council Regulation (EC) 812/2004 does indeed recognise that cetacean bycatch is a significant problem, its provisions only extend to specific fisheries and areas within EU waters. This is problematic since the problem of cetacean bycatch is not exclusively restricted to a few specific fisheries or fishing grounds.

Despite this legislative effort, the levels of cetacean bycatch and the suffering inflicted on these marine mammals continue to be unacceptable and can be mitigated. As the Whale and Dolphin Conservation Society (2008) observes, the suffering of cetaceans may not be 'caused intentionally, but is nevertheless a predictable outcome of a wide range of fishing operations'.[16] Although the European Commission announced its intention in March 2009 to review (EC) 812/2004 and publish a new Communication on cetacean bycatch in 2010, HSI believes that there are also opportunities for this problem to be addressed within the process of reform of the CFP. This will be further discussed below in section 2.5.

2.2. Shark bycatch

Bycatch also has a significant impact on sharks in EU fisheries. Globally, bycatch accounts for around half of global shark catches. Longlines predominate in fisheries with significant shark bycatch, but sharks are also incidentally caught in nets. In the Pacific alone, 3.3 million sharks are incidentally caught each year on longlines. Sharks are often depleted as a result of being taken as bycatch in what may otherwise be sustainable fisheries.

Globally, the species most affected by bycatch are blue, thresher, shortfin mako, hammerhead and great white sharks. In the northeast Atlantic, for example, 89% of hammerhead sharks and 80% of thresher and great white sharks have disappeared in the last two decades as a result of bycatch.[17]

Much of the (EU) bycatch of sharks is associated with fisheries targeting tuna and swordfish. European tuna fisheries in the Atlantic alone report that 12 species of skate and ray, 11 species of pelagic shark and 46 species of coastal shark are taken as bycatch. [18] At least 10 species of pelagic shark are taken incidentally in Mediterranean pelagic fisheries.[19]

In its 2007 Consultation paper for the European Commission's Plan of Action for the Conservation of Sharks, the Commission made a number of references to bycatch taken by Community vessels outside EU waters. Some of these fisheries occur in the waters of the world's poorest countries, where sharks form a valuable part of the human diet. Off the West African coast, fisheries for small pelagic species take "significant by-catches of sharks which are discarded at sea".

The Commission also reports that around two-thirds of the elasmobranch bycatch in these fisheries consists of hammerheads, mainly scalloped hammerheads (*Sphyrna lewini)* and smooth hammerheads (*S. zygaena)*, which are classified by the International Union for Conservation of Nature (IUCN) as Endangered and Vulnerable respectively. Other species taken, such as thresher sharks (*Alopias vulpinus)*, shortfin makos (*Isurus oxyrinchus)* and a number of skates and rays fall within the IUCN's Threatened category. Skates and

[16] WDCS (2008) *Shrouded by the sea: The animal welfare implications of cetacean bycatch in fisheries – a summary document*. Whale and Dolphin Conservation Society.
[17] WWF: *Bycatch Victims.* http://www.panda.org/what_we_do/footprint/smart_fishing/bycatch/issue/bycatch_victims/
[18] Shark Alliance: Shark alert: re*vealing Europe's impact on shark populations.* Sonja V Fordham. August 2006.
[19] ICCAT: A*n overview of pelagic shark fisheries in the Northeast Atlantic*. Maurice Clarke1, Guzman Diez2, Jim Ellis3, Boris Frentzel-Beyme, Ivone Figueiredo, Kristin Helle, Graham Johnston, Mario Pinho, Bernard Seret, Helen Dobby, Nils-Roar Hariede, Henk Heessen, Dave Kulka and Charlott Stenberg. Collect. Vol. Sci. Pap. ICCAT, 62(5): 1483-1493 (2008) 1483.

rays are particularly vulnerable to bycatch in mixed trawl fisheries, with known bycatch levels of 25% in EU fisheries.[20]

In the Spanish deepwater bottom longline fishery off Mauritania, elasmobranchs are reported to account for 9-20 % of the bycatch in the 0 – 100 m depth range and up to 60 % in the deepest stratum (> 500 m depth).[21]

In the Southern Ocean, French, British and Spanish longline and bottom trawl net fisheries take sleeper sharks (*Somniosus* spp.) and porbeagles (*Lamna nasus)* as bycatch.[22] The IUCN Red List status of porbeagles ranges from Vulnerable to Critically Endangered in the northeast Atlantic.

The Commission also reports that several migratory oceanic sharks form a large component of the bycatch of large pelagic drift-net fisheries for tuna and billfishes. The species taken include blue sharks (*Prionace glauca)*, oceanic whitetips (*Carcharhinus longimanus)*, shortfin makos, thresher sharks, and porbeagles.

In its Community Plan, the Commission has highlighted the need to promote more selective fishing gear in order to reduce the bycatch and discards of sharks. This should be a priority. Measures should include the use of gear that is most likely to minimise, rather than simply reduce, bycatch. Efforts to minimise bycatch should be directed at all sizes and all species of elasmobranch, rather than solely at undersized individuals or unwanted species. Unwanted elasmobranchs should be released alive where possible and attempts should also be made to minimise post-release mortality. Sharks caught as bycatch and not released should be landed with their fins attached to their carcasses.[23]

2.3. Turtle bycatch

It has been estimated that worldwide more than 200,000 loggerhead (*Caretta caretta*) and 50,000 leatherback turtles (*Dermochelys coriacea*) are inadvertently snared each year in pelagic longline fisheries, with up to tens of thousands dying as a consequence.[24] These are the two sea turtle species most commonly caught in longlines. According to the IUCN Red List, the loggerhead turtle is categorised as Endangered and the leatherback turtle as Critically Endangered.[25]

Sea turtle bycatch occurs when these reptiles attempt to swallow bait on individually hooked lines or become entangled in fishing gear. When swallowed, hooks can lead the animal to suffocate or can cause internal bleeding. Swordfish and tuna longline fisheries account for the highest levels of turtle bycatch. The Mediterranean has been identified as one of the hotspots for turtle bycatch due to the intensive longline fishing efforts carried out by European fishing nations, such as Spain, Italy and Greece. One study estimates that between 60,000 and 80,000 loggerheads a year are caught as a result of Mediterranean longline fisheries.[26]

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[20] Shark Alliance, op cit.

[21] Commission Consultation: *European Commission Consultation paper for development of a Community Plan of Action (CPOA) for the conservation of sharks, 2007.* p.5.

[22] Ibid

[23] Council Regulation (EC) N°1185/2003 already bans and prevents any further development of this practice by allowing a ratio of 5% fins relative to the live weight of the shark to be granted to vessel with a special permit. In February 2009, the Community Action Plan for the Conservation and Management of Sharks was also adopted to provide additional protection to shark species.

[24] Lewison, R.L., Freeman, S.A. & Crowder, L.B. (2004) Quantifying the effects of fisheries on threatened species: the impact of pelagic longlines on loggerhead and leatherback sea turtles. *Ecology Letters*, (2004) 7: 221–231.

[25] http://www.iucnredlist.org

[26] Lewison *et al.* op cit.

Research has indicated that turtle bycatch can be reduced by substituting traditional 'J' shaped hooks with circle hooks, which are more difficult for turtles to swallow. Using different bait that comes off the hook more easily has also been identified as a means of reducing turtle bycatch.[27]

For example, one recent study on reducing turtle bycatch, which tested the use of different hooks and types of bait in swordfish fisheries in the Mediterranean and southeast Atlantic, found that turtles were more frequently caught using squid as bait rather than mackerel. No significant differences were identified between the bycatch rates using the two different kinds of hook. However, it was found that the turtles were less likely to swallow the circle hooks. One hundred and twenty-four (124) turtles (nine leatherbacks and 115 loggerheads) were caught during these experimental fishing trials; eight loggerheads are reported to have died and 37 sustained injuries due to the fishing gear.[28]

In addition to longline fisheries, turtles are also incidentally caught in gillnets and trawl nets. Turtle excluder devices (TEDS) can be used to prevent marine turtle mortalities, particularly in the shrimp trawling industry. These devices allow turtles to escape from nets used to catch shrimp. The use of TEDs has been found to reduce mortality significantly. In the United States, their use is now compulsory in shrimp fisheries.

2.4. Seabird bycatch

According to Birdlife International, an estimated 200,000 seabirds are annually snared, entangled and drowned on longline hooks and in trawls, driftnets and gillnets in European waters alone.[29] The main types of seabird affected are albatrosses, petrels, shearwaters and penguins. In particular, longline commercial fisheries – both demersal and pelagic – have been found to lead to a high level of mortality among seabirds.

These birds are attracted to the bait on longline hooks, can get caught on the hooks and subsequently drown. A number of factors, such as the type of fishing gear used (e.g. number of baited hooks and length of longline), the time of day for setting the lines, the season, the area fished and proximity to breeding colonies, have been found to affect the level of bycatch. There are a number of mitigation measures that can be employed to reduce and minimise seabird bycatch. For example, setting longlines at night reduces the catch of diurnal species, as does weighting lines and using line shooters to increase the sink rate of lines; and bird scaring devices are also employed.[30]

The rates of seabird bycatch in European waters have been recorded at 0.16 to 0.69 birds per 1000 hooks set. Species caught by longliners in Europe include gannets (*Sula bassana*), fulmars (*Fulmarus glacialis*), Manx shearwaters (*Puffinus yelkouan*), Cory's shearwaters (*Calonectris diomedea*), the critically endangered Balearic shearwater (*P. mauretanicus*), Audouin's gulls (*Larus audouinni*) and yellow legged gulls (*L. cachinnas*).[31]

Urgent action is required to prevent the unnecessary deaths of seabirds in European fisheries. HSI welcomes Commissioner Borg's recent announcement that the Commission is planning to launch a study in 2010 to collect data as a first step towards addressing the impact of commercial fisheries on seabird populations.[32] The reform of the CFP

[27] MRAG (2008) Field study to assess some mitigation measures to reduce bycatch of marine turtles in surface longline fisheries. Report submitted to DG Fisheries and Maritime Affairs, February 2008.
[28] Ibid.
[29] Birdlife International *Stopping seabird deaths in European fisheries: will Ministers push the Commission to act?* http://www.birdlife.org/news/extra/europe/seabirds.html.
[30] Joint Nature Conservation Committee. *Seabird bycatch.* http://www.jncc.gov.uk/page-1565
[31] Ibid.
[32] EC Press release, Fisheries Council moves forward on sustainability agenda, 20th November 2009.

also presents an opportunity to address this issue strategically and to implement measures to reduce the suffering and mortality of seabirds.

2.5. Reducing bycatch of non-target marine species

The reform of the CFP provides an opportunity to further regulate commercial fisheries to reduce the problem of the bycatch of non-target species, to protect the welfare of cetaceans, turtles and seabirds and the conservation of various protected species, including sharks.

One of the stated aims of reforming the CFP is to enable retailers and consumers to feel confident that fish originates from well-managed, sustainable fisheries. It seeks to ensure the low ecological impact of fisheries. The protection of non-target marine species should be part and parcel of this, because healthy ecosystems are necessary for sustainability. HSI therefore urges the Commission to include provisions in the reformed CFP to protect non-target marine species.

One possible option is to develop a more robust and specific bycatch response strategy into the CFP to address the issue of bycatch of marine species. One task would be to identify and prioritise the fisheries that have the most significant levels of bycatch and identify the gear type associated with bycatch of particular species. This should lead to the development and implementation of expanded or innovative technical measures to reduce and minimise the bycatch of non-target marine species.

The implementation and efficacy of technical measures and/or programmes introduced to reduce bycatch should be monitored. Failure to reduce or minimise bycatch levels within a specified timeframe could result in penalties for the fisheries in question, or even the (temporary) closure of fisheries that do not succeed in implementing the necessary measures to minimise the bycatch and suffering of non-target marine species. As the Commission's Green Paper observes, the fishing industry needs to be given incentives 'to behave as a responsible actor accountable for the sustainable use of a public resource'.[33]

In this regard, the implementation of sufficient technical measures to ensure the protection of non-target marine species should be included as criteria in any certification scheme that seeks and/or claims to provide guarantees on the traceability of wild-caught fish products. Each fishery is conducted under unique conditions not only with respect to the fishing gear employed, but also the specific ecological and geographical situation where fish are being caught. This renders some non-target marine species more vulnerable to bycatch than others under specific circumstances. This should also be taken into account when certifying individual fisheries. Consumers should be given concrete guarantees that the survival and welfare of cetaceans, turtles and seabirds have been adequately protected by these fisheries. Certified fisheries and those seeking certification must be able to provide full documentation and evidence of the measures that they have implemented to mitigate bycatch in the course of their fishing activities.

3. Aquaculture

As the Green Paper notes, aquaculture has become an important source of fish and other aquatic products worldwide. With fish stocks plummeting across the globe, aquaculture is today being viewed as a means of contributing to food security,[34] and in the coming years will supply more fish for human consumption than fisheries.[35] In 2006, the total aquaculture production for EU 27 was recorded at 1.282.000 tonnes (live weight)

[33] Green Paper, Reform of the Common Fisheries Policy, COM(209)163 final, 22.4.2009. p. 11.
[34] Fish farming seen driving food security, 27th November 2009. http://www.euractiv.com/en/cap/fish-farming-seen-driving-food-security/article-187688#
[35] Naylor RL, Hardy RW, Bureau DP, Chiu A, et al. (2009) Feeding aquaculture in an era of finite resources. *Proceedings of the National Academy of Sciences* 106(36):15103-10.

of fish, shellfish and crustaceans. Spain, France, Italy, Greece and the United Kingdom currently have the highest levels of aquaculture production in the European Union.[36]

Given the economic importance of aquaculture and the increasing demand for seafood within the EU, HSI believes it is vital to continue to regulate aquaculture as an integral part of the Common Fisheries Policy. Fish farming is inextricably interwoven with (pelagic) fisheries, particularly with respect to the supply of feed for the aquaculture industry, and cannot therefore be viewed as entirely separate from other commercial fisheries.

3.1. Sustainability

The majority of species reared in European aquaculture are carnivorous and thus dependent on the availability of fishmeal and fish oil. Worldwide, more small pelagic fish, such as anchovies, herring, blue whiting, capelin and mackerel, are converted into fishmeal and fish oil to be fed to farmed fish and other animals than are consumed by people.[37] This raises serious questions about the sustainability of aquaculture, as well as the inefficiency of using wild-caught small fish to feed other fish and as an ingredient of animal feeds rather than consuming them directly.

On average, it takes 3 kg of wild-caught feed grade fish to produce 1 kg of salmon, and 12 kg of fish to produce 1kg of fish oil. The production of 'farmed' tuna is even more wasteful – notwithstanding the threats posed to wild stocks of bluefin tuna by the fish farming industry – with up to 20 kg of small pelagic fish, such as sardines and anchovy, being used to produce just 1kg of tuna.[38] This places significant pressure on many fish stocks that are already subject to unsustainable harvest levels.

It should also be noted that removing a large number of small fish species from the food chain has potentially devastating consequences on the ecosystem in question, particularly when the demand for fish for feed is leading to the harvest of fish species, such as round sardinella (*Sardinella aurita),* which have not been previously exploited by commercial fisheries.

At a very minimum, it should be mandatory for feed for farmed fish to be produced using the waste (offal and trimmings) from (certified) sustainable fisheries intended for human consumption and fish-derived proteins substituted with plant-based alternatives.

Further, the 'farming' of blue fin tuna in the Mediterranean generally requires the capture of wild tuna for fattening in aquaculture facilities. This necessitates the capture of tuna from the wild, further exploiting an already over-exploited species. Additionally the removal of these fish for aquaculture may not be counted against quotas on fishing for tuna. These fish must be accounted for in calculating quotas.[39]

3.2. Environmental Impacts

Finfish aquaculture operated in open systems has the potential to result in a number of significant adverse impacts on the farmed species as well as wild marine species and their habitats. Aquaculture has been reported as the second-greatest cause after shipping of non-native species introduced to an ecosystem.[40] The effects of fish escapes have been most thoroughly documented for salmon due to the industry's large scale and the

[36] Eurostat (2009) *Key figures on Europe – 2009 edition*. p. 137.
[37] Tacon, A. G. J. and Metian, M.. (2009). "Fishing for Feed or Fishing for Food: Increasing Global Competition for Small Pelagic Forage Fish." *AMBIO* 38 (6):294-302.
[38] Marine Conservation Society. http://www.fishonline.org/farmed/finfish.php
[39] Farming the Seas. http://www.pbs.org/emptyoceans/fts/tuna/casestudy.html.
[40] Molnar JL, Gamboa RL, Revenga C, and Spalding MD (2008) Assessing the global threat of invasive species to marine biodiversity. *Frontiers in Ecology and the Environment* 6, doi:10.1890/070064.

uniqueness of wild salmon subpopulations.[41] Wild salmon are thought to form local, distinct subpopulations adapted to specific areas and expressing traits based on the regional environmental conditions.[42] The growth of the salmon aquaculture industry has been identified as a contributing factor in the diminishing numbers of wild salmon,[43] in fact, catches of wild salmon in the North Atlantic dropped by 80 percent between 1970 and 2000.[44]

Escapement of non-indigenous fish species poses a risk of competition for food and habitat or predation on wild stocks. Though escapees are generally less adapted to survival in the wild, they will still compete with wild fish for resources. Competition for food is common since the diets of cultured and wild fish overlap,[45] though wild fish will likely prevail over cultured fish of the same size for limited food and habitat. In the presence of abundant food supplies, however, cultured fish selected for growth may exhibit a size advantage, enabling them to dominate their wild counterparts.[46]

Escapement may also result in successful inter-breeding with wild fish stocks, resulting in hybrids less fit for life in natural environments. When interbreeding occurs, the genetic makeup of hybrids is altered compared to wild populations.[47] This introgression—the incorporation of genetic material from escapees into the gene pool of a native population following interbreeding—is frequently negative and can result in fitness reduction from combinations of beneficial genes being broken up in succeeding generations.[48] One study found the lifetime success of different hybrid groups to be 27 to 89 percent that of their wild counterparts, with 70 percent of second-generation embryos not surviving.[49]

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[41] Naylor R and Burke M. (2005) Aquaculture and ocean resources: raising tigers of the sea. *Annual Review of Environment and Resources* 30:185-218.

[42] Bridger CH and Garber A. (2002) Aquaculture escapement, implications, and mitigation: the salmonid case study. In: Costa-Pierce BA (ed.), *Ecological Aquaculture: the Evolution of the Blue Revolution.* Malden, MA:Blackwell Science, pp. 77-102.

[43] Ford JS and Myers RA. (2008) A global assessment of salmon aquaculture impacts on wild salmonids. *PLoS Biology* 6(2):e33-9.

[44] Esmark M, Stensland S, and Lilleeng MS. (2005) *On the run—escaped farmed fish in Norwegian waters*. WWF-Norway report, May.

[45] Fleming IA, Hindar K, Mjølnerød IB, Jonsson B, Balstad T, and Lamberg A. (2000) Lifetime success and interactions of farm salmon invading a native population. *Proceedings of the Royal Society London B* 267:1517-23.

[46] Bridger CH and Garber A. (2002) Aquaculture escapement, implications, and mitigation: the salmonid case study. In: Costa-Pierce BA (ed.), *Ecological Aquaculture: the Evolution of the Blue Revolution.* Malden, MA:Blackwell Science, pp. 77-102; Naylor R, Hindar K, Fleming IA, et al. (2005) Fugitive Salmon: Assessing the risks of escaped fish from net-pen aquaculture. *BioScience* 55(5):427-37.

[47] McGinnity P, Prodohl P, Ferguson A, et al. (2003) Fitness reduction and potential extinction of wild populations of Atlantic salmon, Salmo salar, as a result of interactions with escaped farm salmon. *Proceedings of the Royal Society of London B* 270:2443-50; Goldburg RJ, Elliott MS, and Naylor RL. (2001) *Marine aquaculture in the United States: environmental impacts and policy options.* Pew Oceans Commission, Arlington, Virginia.

[48] Ibid. Bridger CH and Garber A. (2002) Aquaculture escapement, implications, and mitigation: the salmonid case study. In: Costa-Pierce BA (ed.), *Ecological Aquaculture: the Evolution of the Blue Revolution* Malden, MA:Blackwell Science, pp. 77-102; Naylor R, Hindar K, Fleming IA, et al. (2005) Fugitive Salmon: Assessing the risks of escaped fish from net-pen aquaculture. *BioScience* 55(5):427-37; Fleming IA, Hindar K, Mjølnerød IB, Jonsson B, Balstad T, and Lamberg A. (2000) Lifetime success and interactions of farm salmon invading a native population. *Proceedings of the Royal Society London B* 267:1517-23. .

[49] McGinnity P, Prodohl P, Ferguson A, et al. (2003) Fitness reduction and potential extinction of wild populations of Atlantic salmon, Salmo salar, as a result of interactions with escaped farm salmon. *Proceedings of the Royal Society of London B* 270:2443-50; Naylor R, Hindar K, Fleming IA, et al. 2005. Fugitive Salmon: Assessing the risks of escaped fish from net-pen aquaculture. *BioScience* 55(5):427-37.

Pollution from open systems can negatively affect wild fish and the surrounding ecosystem. Few attempts are made to reclaim, capture, or process the pollutants that flow from the enclosures into the environment.[50] The main outputs from net pens are suspended solids of uneaten feed and faecal material.[51] The amount of waste in the form of particulate organic matter has been estimated to equal 10 to 25 percent of the dry weight of feed that fish consume; as a result, depending on the size of the facility, the waste can be many thousands of kilograms per day.[52] When these outputs exceed the capacity of the local ecosystem to assimilate wastes, water quality deteriorates and can be toxic to aquatic biota.[53]

Uneaten food that falls to the bottom under the cage may cause suffocation or displacement of benthic organisms and loss of otherwise productive benthic habitat. Fish offal, which may transfer nitrogen and phosphorus, can affect water quality and cause mortality of plankton. It may also increase primary productivity (algae) to a detrimental degree including documented incidents of increase in harmful algal blooms downstream of sites. In combination, these released nutrients can alter the chemistry of the surrounding ecosystem, leading to low levels of dissolved oxygen; murky waters; mortality in fish, corals, and sea grasses; and dead-zones (regions with very low to no oxygen).[54]

Antibiotics fed to the fish can taint wild species and may also change the benthic bacterial community. Pesticides used as therapeutics can cause either sub-lethal or direct mortality of marine life. Anti-foulants used on cage structures can also cause sub-lethal or direct mortality of marine species or adversely affect their behaviour.[55]

Farmed fish may also transmit diseases or parasites to marine wildlife. For example, farmed salmon have been found to transmit viruses, bacteria and parasites to wild fish, with one survey revealing that 225 species of infectious agents from farmed salmon have been found in marine and freshwater habitats. Further, depending on the infectious agent and the infectious load at the aquaculture site, pathogens can be transmitted to invertebrates, birds, other fishes, plankton and sediments. And they may be carried in various fish wastes which, in turn, can serve as reservoirs for the pathogens.[56]

The placement of net pens in an ocean environment may also cause habitat exclusion, as large marine mammals may not be able to traverse the obstacle course they present. Use of high intensity acoustic harassment devices to reduce predator interactions may also cause habitat exclusion, with one study finding that harbour porpoise were displaced beyond the 3.5 km sighting range of the study.[57] Additionally some net pens, particularly those used for "ranching" large species of fish, may use whole fish food that attracts marine mammals to the site. Several studies have found fatal entanglement of dolphins in net pens where whole fish food was used.[58]

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[50] Goldburg R and Naylor R. (2005) Future seascapes, fishing, and fish farming. *Frontiers in Ecology and the Environment* 3(1):21-8.
[51] Iwama GK. (1991) Interactions between aquaculture and the environment. *Critical Reviews in Environmental Control* 21(2):177-216.
[52] Kutti T, Hansen Kupka P, Erivk A, Høisæter T and Johannessen P. (2007) Effects of organic effluents from a salmon farm on a fjord system. II. Temporal and spatial patterns in infauna community composition. *Aquaculture* 262:355-366.
[53] Hargreaves JA. (1998) Nitrogen biogeochemistry of aquaculture ponds. Aquaculture 166:181-212.
[54] Goldburg RJ, Elliott MS, and Naylor RL. (2001) *Marine aquaculture in the United States: environmental impacts and policy options.* Pew Oceans Commission, Arlington, Virginia.
[55] Milewski, I. (2001) Impacts of salmon aquaculture on the coastal environment: a review. In M. Tlusty, H. Halvorsan, S. Oktay, J. Pearce and R. Rheault (eds). *Marine Aquaculture and the Environmen*t. Cape Cod Printing Inc. pp. 166-197.
[56] Ibid.
[57] Young, S. (2001) Potential adverse impacts of aquaculture on marine mammals. In M. Tlusty, H. Halvorsan, S. Oktay, J. Pearce and R. Rheault (eds). *Marine Aquaculture and the Environment.* Cape Cod Printing Inc. pp. 215-220
[58] Ibid.

The aforementioned issues need to be urgently addressed in the context of CFP reform.

3.3. Predator control

Seals, particularly grey (*Halichoerus grypus*) and common (*Phoca vitulina*) seals, are regularly killed in Europe because they are perceived as a threat to fish stocks. Purported predation on fish farms, especially those producing salmon, is one of the reasons why these marine mammals are shot. Seals are attracted to fish kept in cage systems and nets, which they can damage while also causing stress to the fish.

There are a number of non-lethal methods that can be used to deter seals from fish farms, such as scare mechanisms, net-tensioning, robust anti-predator nets and acoustic deterrent devices (although there are concerns about the impact of the latter on non-target marine mammals – see above). However, seals in the vicinity of fish farms are frequently shot. This practice is particularly prevalent in Scotland, where the majority of the UK seal population is found. There is no statistical data on the numbers of seals that are actually killed, but it is estimated that over 3500 seals are shot annually in this region.[59]

In Scotland, the shooting of seals is still legally permitted during the breeding season. This means that not only pregnant seals may be killed, but also those that are lactating. In consequence, seal pups dependent on their mother's milk will be left to starve.[60] There are also significant welfare implications with regard to killing seals, as was highlighted in a 2007 report by the European Food Safety Authority.[61]

In addition to seals, the Great cormorant (*Phalacrocorax carbo*) is also persecuted because it is viewed as being responsible for significant economic losses in pond aquaculture systems and inland fisheries. Just as with seals, only non-lethal methods should be employed to deal with bird predation. The animal welfare implications relating to such wildlife-fisheries conflicts should also be taken into account during the process of CFP reform.

3.4. Welfare of Farmed Fish

Under EU legislation, Council Directive 98/58/EC establishes minimum standards for the protection of animals kept for farming purposes, including fish.[62] This Directive does not, however, apply to fish living in the wild. The protection of fish welfare is a legal requirement exclusively related to aquaculture and thus distinguishes it as a separate and unique branch of fisheries in terms of our obligations towards protecting fish welfare. It is therefore essential that in the reform of the Common Fisheries Policy due attention is paid to the welfare of species that are bred and kept on fish farms.

There are significant animal welfare problems relating to the production of fish within the various different aquaculture systems. Fish farming methods in Europe vary considerably from open systems using cages or pens that are open to the sea to closed, land-based systems, which are not connected to any body of water. Tuna 'farming' is also a form of aquaculture more recently introduced to the Mediterranean (see above); juvenile tuna are caught in the wild using purse seine vessels and transported live to cages closer to the coast to be fattened.

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[59] Commission Staff Working Document SEC(2008) 2290/2 *Impact Assessment on the potential impact of a ban of products derived from seal species*. p. 74.
[60] *A Seal's Fate: The animal welfare implications of shooting seals in Scotland.* Advocates for Animals.
[61] Scientific Opinion of the Panel on Animal Health and Welfare on a request from the Commission on the Animal Welfare aspects of the killing and skinning of seals. *The EFSA Journal* (2007) 610, 1-122.
[62] Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes

Farmed fish are frequently subjected to overcrowded and restrictive conditions, which can potentially lead to the deterioration of water quality, cause severe stress, and result in increased mortality. Aquaculture practices and production – including handling, grading, transport, genetic manipulation, aggression from conspecifics, predation, physiological stress, and inhumane slaughter – can compromise the welfare of these animals.

In January 2009, the European Food Standards Authority (EFSA) Panel on Animal Health and Welfare adopted a scientific opinion on a general approach to fish welfare and to the concept of sentience in fish. This opinion concluded that the concept of animal welfare was the same for all animals, including fish. It noted that there is presently a lack of clearly defined protocols to evaluate fish welfare, but – given the great variation between species – indicators for fish welfare should be "species-specific, validated, reliable, feasible and auditable". Further to this, the EFSA panel also determined that there was sufficient scientific evidence to support the assumption that some fish species have the capacity to experience pain and fear. With regard to the issue of stress, the panel drew the following conclusion:

> 'Fish possess a suite of adaptive behavioural and physiological responses that have evolved to cope with stressors. Many of these are homologous with those of other vertebrates. Fish show short term adaptive responses which may be important to the maintenance of homeostasis but these do not necessarily imply any harmful consequences. Prolonged exposure to stressors generally leads to maladaptive effects or chronic stress. Chronic stress responses indicative of poor welfare include reduction in immune function, disease resistance, growth and reproduction, eventually death.'[63]

It should be noted that the scientific body of knowledge on fish welfare is considerably less well-developed than for terrestrial animals raised for the purposes of human consumption. To align welfare issues with those commonly considered for other farm animals, the Brambell Committee's (1965) 'Five Freedoms' have been adapted to fish as follows:[64]

1. *Freedom from hunger and thirst*: Captive fish should have a nutritionally appropriate diet to avoid decreased welfare.
2. *Freedom from discomfort*: Appropriate water conditions should be provided as fish, through the surface area of their gills, are in intimate contact with their environment..
3. *Freedom from pain, injury, and disease*: While many diseases of fish may be poorly understood, they are frequently caused by problems with the environment. When outbreaks occur, they can lead to high mortality rates..
4. *Freedom to express normal behaviour*: Appropriate densities and environmental conditions to enable the fish to exhibit natural behaviours should be maintained throughout the life cycle.
5. *Freedom from fear and distress*: Factors that cause fear, distress, discomfort, and other welfare impairing conditions should be minimised.[65]

As the above suggests, there are a variety of issues that can affect the welfare of farmed fish. The welfare and health of fish can be significantly impacted by the quality of the water in which they are kept. Fish are, for example, very sensitive to pollution, poor water quality, water temperature and (artificial) light. According to a 2005 review, "Science-Based Assessment of Welfare: Aquatic Animals," published in the OIE's *Animal*

[63] Scientific Opinion of the Panel on Animal Health and Welfare on a request from European Commission on General approach to fish welfare and to the concept of sentience in fish. *The EFSA Journal* (2009) 954, 1-26. p. 18.
[64] Five Freedoms, Farm Animal Welfare Council. http://www.fawc.org.uk/freedoms.htm.
[65] Five freedoms for fish as outlined in: *An HSUS Report: The Welfare of Animals in the Aquaculture Industry*. http://www.humanesociety.org/assets/pdfs/farm/hsus-the-welfare-of-animals-in-the-aquaculture-industry-1.pdf; See also Huntingford FA, Adams C, Braithwaite VA, et al. (2006). Current issues in fish welfare. *Journal of Fish Biology* 68(2):332-72; Southgate P and Wall T. (2001). Welfare of farmed fish at slaughter. In *Practice* 23(5):277-84.

Welfare: Global Issues, Trends and Challenges, failure to provide ideal environments "may result in stress, distress, impaired health and mortality, all of which are often associated with the intensive rearing conditions that cause poor water quality."[66]

Likewise keeping fish at high stocking densities, which is a common practice within aquaculture, can also have a negative impact on their health and welfare. This not only relates to the effects on water quality, but also to the ability of fish to display their natural behaviours, including the avoidance of their conspecifics. Research on salmon, for example, has demonstrated that stocking densities have an impact on the mortality of young salmon. Social stress as a result of elevated stocking densities has been identified as a contributing factor to decreased disease resistance, aggression (and associated injuries) and suppressed growth in this farmed species.[67]

Disease and parasites also pose a significant welfare problem to fish reared in aquaculture systems. There is a link between stress and the reduction in immune function in farmed fish, which can lead to increased mortality and susceptibility to disease. Poor water quality can also lead to injuries to gills, which can increase propensity to develop bacterial infections and the fish's ability to breathe. Additionally, farmed fish – particularly salmon – have been found to develop heart deformities, cataracts and skeletal deformities as a result of their confinement in aquaculture systems. Parasitic infections, such as sea lice, can also compromise the health and welfare of farmed fish and have been linked to stocking densities.[68]

The handling and transport of farmed fish can also be detrimental to their welfare and a source of significant stress. In its 2004 opinion on the welfare of animals during transport, the Scientific Panel on Animal Health and Welfare states that the prolonged deprivation of food prior to transportation causes poor welfare in fish. Furthermore, fish may injure themselves in poorly designed containers and water leakage can also be detrimental to fish welfare. The Opinion emphasised that exposure to air should be avoided when loading and unloading fish. Fish should be provided with appropriate levels of oxygen in the water and maintained at a suitable stocking density during transport. It also concludes that 'the duration of transport, stocking densities and environmental conditions during the process can result in deterioration in the welfare, including the health, of the particular fish species.'[69]

Finally, the stunning and slaughter of fish is also a serious animal welfare concern with respect to aquaculture. In 2004, the Scientific Panel on Animal Health and Welfare in its opinion on stunning and killing methods for commercially farmed species concluded that 'many existing commercial killing methods expose fish to substantial suffering over a prolonged period of time. For some species, existing methods, whilst capable of killing fish humanely, are not doing so because operators don't have the knowledge to evaluate them'.[70] The Scientific Panel also observed that many processes for killing fish are designed for commercial efficiency, rather than having fish welfare in mind. Moreover, it was also noted that for many species there was not yet a commercially acceptable method to kill fish humanely.[71]

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[66] Håstein T, Scarfe AD, and Lund VL (2005) Science-based assessment of welfare: aquatic animals. *Revue Scientifique et Technique Office International des Epizooties* 24(2):529-47.
[67] *HSUS Report: The Welfare of Animals in the Aquaculture Industry*. Op cit. pp. 7-8.
[68] Ibid.
[69] Opinion of the Scientific Panel on Animal Health and Welfare on a request from the Commission related to the welfare of animals during transport. *The EFSA Journal* (2004) 44, 1-36, The welfare of animals during transport
[70] Opinion of the Scientific Panel on Animal Health and Welfare on a request from the Commission related to welfare aspects of the main systems of stunning and killing the main commercial species of animals, *The EFSA Journal* (2004), 45, 1-29.
[71] Ibid.

The following methods were found to be inhumane methods for killing fish: CO_2 narcosis, asphyxia, asphyxia in ice/thermal shock, salt bath, ammonia solution, electro-immobilisation/electrostimulation/physical exhaustion using electrical shocks, decapitation and bleeding out/exsanguination. In addition, shooting and electric harpoon for farmed tuna, hydraulic shock and hypoxic stunning were deemed to have poor welfare implications. The Opinion found that percussive stunning can lead to a humane death – if applied correctly – to moderately sized species of fish (0.2 to 14kg). Likewise, electrical methods were determined to be humane, but only if the correct parameters are employed; otherwise electrical stunning and killing systems can result in 'substantial suffering when incorrectly applied'. Finally, mechanical spiking methods were considered humane for specific species if the force to be applied and the correct target area are specified.[72]

In a follow-up to the aforementioned Opinion, EFSA has also recently produced a series of seven scientific opinions on the welfare aspects of the stunning and killing methods used for the following farmed fish species: turbot, tuna, carp, seabass and seabream, eels, rainbow trout and Atlantic salmon.[73] It is recognised that a species-specific approach is necessary to address the issue of fish welfare.

The Commission's recent communication on the future of aquaculture in the EU recognises that animal welfare is an important criterion for consumers. HSI welcomes the inclusion of animal welfare in this Communication and the Commission's commitment to launching an evaluation of fish welfare on fish farms with a view to potentially developing legislation in this area.[74] Although aquaculture and fish welfare have been addressed separately in the aforementioned Communication, it is vital that adequate attention is paid to animal welfare in the context of aquaculture within the process of CFP reform.

In this regard, it is desirable that any aquaculture producers receiving monetary aid from the European Union in the context of the CFP must also respect fish welfare and health standards as a precondition to receiving such subsidies. The mechanism of 'cross-compliance' is already in operation with respect to direct aid payments made to livestock farmers within the context of the CFP's sister policy, the Common Agricultural Policy. HSI strongly recommends that similar cross-compliance measures are developed and applied to aquaculture as part of CFP reforms.

4. Concluding Remarks

Humane Society International hopes that the issues outlined in the present submission will be taken into consideration during the process of CFP reform. In this regard, it should be noted that under Article 13 of the recently ratified Lisbon Treaty there is also an obligation to integrate animal welfare considerations into EU policymaking, including fisheries policy.[75] We therefore anticipate that some form of animal welfare impact assessment will be initiated as part of the CFP reform process, which will encompass the issues outlined above.

The EU has a responsibility towards ensuring the welfare and health of those species raised in captivity and killed for the purposes of human consumption. The growth of aquaculture production to meet the protein

[72] Ibid.
[73] See http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1211902131969.htm.
[74] Communication from the Commission to the European Parliament and the Council *Building a sustainable future for aquaculture: a new impetus for the Strategy for the Sustainable Development of European Aquaculture.* COM(2009) 162 final.
[75] Article 13 of the Treaty on the Functioning of the European Union explicitly states "In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage"

demands of human populations, however, raises serious questions about the sustainability of such enterprises, particularly due to the impact of using wild-caught fish to feed fish on fish farms. These are issues that need to be seriously addressed in the CFP to avoid placing additional pressures on wild fish populations and the ecosystems in which they live.

It is vital that the CFP is reformed in a way that will provide additional protection to marine life that is affected by commercial fisheries, both within European waters and other regions where EU-registered commercial fishing vessels are in operation. There is a large body of evidence, which corroborates the fact that the welfare of various marine species and protection of their habitats are negatively impacted by commercial fishing activities. It is imperative that action is taken to increase scientific knowledge and understanding of these impacts and, more importantly, that steps are urgently taken to minimise these impacts and reduce animal suffering. In so doing, we will stand a better chance of securing the futures of our oceans and seas.

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