



Original Research Article

Quantifying the trade in marine ornamental fishes into Switzerland and an estimation of imports from the European Union



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ABSTRACT

Millions of marine ornamental fishes are traded every year. Today, over half of the known nearly 4000 coral reef fish species are in trade with poor or no monitoring and demand is increasing. This study investigates their trade into and through Switzerland by analyzing import documents for live animals. In 2009, 151 import declarations with attached species lists for marine ornamental fishes from non-EU countries totaled 28 356 specimens. The 62% of the fishes remaining in Switzerland, comprised 440 marine species from 45 families, the rest transited to EU and non-EU countries. Despite the recognized large trade volume for the European region, due to bilateral agreements, no data is collected for imports from the EU. However, inferred data shows that more than 200 000 marine ornamental fishes could be imported into Switzerland every year and an unknown quantity re-exported. As biggest import region, it is therefore safe to assume, that the European region is importing at least as many marine ornamental fishes as the US. There is no adequate data-collecting system known to be in place in any country for monitoring this trade. The EU Trade Control and Expert System (TRACES) to monitor animal diseases could be adjusted to gather compulsory information for the EU and Switzerland. More than half of the species imported into Switzerland are not assessed by the IUCN and therefore marked as 'not evaluated' on the Red List. Overall, 70% of all known coral reef fish species have not been evaluated. If coral reef fishes are threatened or endangered due to large, possibly unsustainable numbers traded, it may be rational to monitor the trade in these species through the Convention on International Trade of Endangered Species (CITES).

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1. Introduction

Coral reefs occupy less than 0.1% of the total expanse of the world's ocean areas (Spalding et al., 2001). However, coral reefs are considered to be amongst the most biologically rich and productive ecosystems on Earth, often referred to as the 'rainforest of the seas'. Coral reefs support approximately 4000 species of fish (Froese and Pauly, 2014) (or a third of the world's known marine fishes), about 800 species of reef-building corals (stony corals) (Veron, 2000), and a great number of other invertebrates (Spalding et al., 2001). Roughly 7.5% of the human population depends on coral reefs, for example, for food (Madin and Madin, 2015). However, over one third of the scleractinian corals are at elevated risk of extinction

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(Carpenter et al., 2008). The world has effectively lost 19% of the original area of coral reefs, 15% are seriously threatened with loss within the next 10–20 years, and 20% are under threat of loss in 20–40 years (Wilkinson, 2008). Furthermore, overexploitation, coastal development (Wear, 2016) as well as land-based pollution (Lough, 2016) are identified as major threats.

Ornamental coral reef fishes and invertebrates are the most valuable product (Fotedar and Phillips, 2011; Wabnitz et al., 2003) that can be harvested from a coral reef, hence making it a profitable target for trade. In 2000, 1 kg of coral reef fish for the aquarium trade sold for US\$500 whereas food fish sold for US\$6 (Cato, 2003). Overcollection of coral organisms for the aquarium trade can have a significant impact on both population viability and the wider ecological system (Thornhill, 2012; Vagelli, 2011; Tissot et al., 2010; Bshary, 2003; Sadovy et al., 2001). According to a comprehensive study by the United Nations Environment Program (UNEP) and the World Conservation Management Centre (WCMC), the vast majority of fishes for marine aquariums come from the wild and only about 1% (approximately 15 species in 2003) are commercially produced and readily available (Wabnitz et al., 2003). The Food and Agriculture Organization of the United Nations (FAO) and the World Association of Zoos and Aquariums (WAZA) state that only 25 marine ornamental fish species are being captive bred in commercial numbers (Penning et al., 2009; Bartley, 2005). A list of captive bred marine ornamental fishes published by the Marine Breeders Association (MBA) lists 15 species in 2013 and 29 species of captive bred marine ornamental fishes in 2015 and 27 in 2016, which are readily available in the US (Sweet, 2016a, b, 2014). There are reports of between 100 and 330 species of marine ornamental fish having been bred in captivity, largely on a hobbyist or research scale. Of these, approximately 30–35 species are currently in commercial production, albeit still on a relatively small scale (Sweet, 2016b; Fotedar and Phillips, 2011).

The United States (US) constitutes the largest importing country whereas all the countries of the European Union (EU) correspond to the largest market of marine ornamental fishes (Leal et al., 2015; Wabnitz et al., 2003). The diversity of species in trade has increased from 1000 marine ornamental fish species in 2001 and 1471 in 2005 (Rhyne et al., 2012; Wabnitz et al., 2003; Wood, 2001) to around 2300 species in international trade today (Rhyne et al., 2017) the volume being between 20 and 30 million a year (Wabnitz et al., 2003; Wood, 2001), 11 million alone to the US (Rhyne et al., 2017; 2012). Despite the volume and diversity of fishes traded few laws or regulations are in place to control this animal trade (Rhyne et al., 2017; 2012 and Wabnitz et al., 2003). Most exporting countries are reported to have either no specific management plans, or they have produced management plans that are rarely enforced and implemented based on weak scientific baseline studies or monitoring activities (Dee et al., 2014; Thornhill, 2012; Wabnitz et al., 2003).

Many fishes die during capture due to trauma, poor handling, stress and in transportation or as a result of poisoning from sodium cyanide, which, although illegal, is still widely used for the capture of reef fish throughout Southeast Asia and causes extensive fish mortality as well as damage to many more coral habitat animals (Dee et al., 2014; Cervino et al., 2003; Wabnitz et al., 2003). Therefore, the number of fishes extracted from the reefs must be higher than the estimated numbers (Militz et al., 2016). There are about two million private (Wabnitz et al., 2003) and about 1000 public (ConsultEcon, 2008) marine aquariums worldwide. Globally, many cities are planning to build new public aquariums (ConsultEcon, 2008) and also private demand is increasing (Santhanam et al., 2015; Fotedar and Phillips, 2011). Animation films such as Disney/Pixar's 'Finding Nemo', which first aired in 2003, seem to promote incentives to own marine aquariums in domestic environments, which may have a significant impact on trade and keeping (Frisch et al., 2016; Madduppa et al., 2014; Jones et al., 2008). Conservationists worry that the follow-up film 'Finding Dory' could spike trade volumes as, in contrast to the main character in 'Finding Nemo', a clown fish, Dory, a surgeon fish, cannot be bred in captivity. So far, no increase in trade could be observed (Militz and Foale, 2017).

Data regarding numbers of marine ornamental fishes entering Switzerland is very limited. In 1995, the Swiss Animal Protection Organization (Schweizer Tierschutz STS) estimated that the most commonly kept pets in Switzerland constituted seven million ornamental fishes (Stumpf, 1995). The US is estimated to keep 160 million ornamental fishes (ASSALCO, 2015), around 10 millions of which are of marine origin (Rhyne et al., 2012). Very few marine ornamental fish are protected or monitored by the Convention on International Trade of Endangered Species (CITES), the exceptions are sea horses (*Hippocampus* spp.), the humphead wrasse (*Cheilinus undulatus*) and since 2017 the clarion angelfish (*Holocanthus clarionensis*). Trade information on marine ornamental fishes in Europe is collected through the trans-European veterinary health agreement (Trade Control and Expert System TRACES).

Declarations pertaining to shipments from outside the EU are recorded on the Common Veterinary Entry Document (CVED) and it is optional to list species. The CVED is used in Switzerland as well as in the EU. A registered importer or private person has to declare imports to the appropriate border veterinary control body prior to importation. Border customs execute random checks by inspecting two boxes per shipment. Due to bilateral agreements, no import declarations are required to accompany a shipment when entering Switzerland through an EU country (European Trade Commission, 2016). In order to be able to monitor or restrict trade for a marine ornamental fish not only biological and ecological criteria are necessary (which are lacking for 70% of all known coral reef fishes) but also trade volumes are required. Both are necessary to convince the world community of the necessity of CITES-listing of species to monitor trade.

Except for very few studies on the marine ornamental fish trade (Rhyne et al., 2017, 2012; Smith et al., 2009, 2008), to date, no other study has tried to quantify the imports of marine ornamental fishes. The present study focuses on the import of marine ornamental fishes into Switzerland and their transit to EU and non-EU countries through Switzerland in 2009. This study is the first to analyze CVED information for the European region.

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