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Importation of marine ornamental fishes to Switzerland

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ABSTRACT

This study examines Switzerland's role in both the European and global marine aquarium trade providing basic information on trade data and offers tangible ideas on how to adapt the European Trade Control and Expert System (TRACES) to adequately collect species data. The trade in marine ornamental fishes comprises an increasingly important industry that handles millions of specimens annually. Although the potential for overexploitation of some marine ornamental fishes is great, only few mechanisms exist to control this financially strong trade. Analyses of data from 2014 to 2017 show that 19 countries exported over 193 850 fishes to Switzerland with over 70% of specimens remaining in Switzerland and the rest being trans-shipped to 11 European countries. Family diversity was between 54 and 60 taxa with most imported families being Pomacentridae, Labridae, Gobiidae, Acanthuridae and Pomacanthidae. Between 172 and 331 species where imported to Switzerland although as little as 16.9% of all imported specimens were discernible to species level in 2016. The two most traded species were *Amphiprion ocellaris* and *Chromis viridis*. The IUCN Red List labelled between 30.8% and 34.4% of species entering Switzerland as 'not evaluated' and 'data deficient'. The global number of reef fish species labelled 'not evaluated' and 'data deficient' decreased from 73.3% in 2014 to 44.8% in 2018, which means that more species have been assessed by the IUCN Red List. As very few species are protected under the Convention on International Trade in Endangered Species (CITES), very little specific trade data is collected. This study should extend the information on species regarding trade for the classification in IUCN and proposes some species to be protected through CITES.

1. Introduction

Global trade in marine ornamental fishes began already in the 1930s in Sri Lanka but is today a rapidly expanding industry that involves at least 45 exporting countries around the world (Rhyne et al., 2017; Schwerdtner Máñez et al., 2014; Shuman et al., 2005; Cohen et al., 2013; Wood, 2001). The few previous studies regarding the volume and diversity of the marine aquarium trade have mainly focused on the role of the United States (US) as the largest importing country for marine ornamental fishes (Rhyne et al., 2017, 2012; Wabnitz et al., 2003). With over 500 million inhabitants, the European Union (EU) plays at least as large a part as the US in this trade (Biondo, 2017; Leal et al., 2015; Wabnitz et al., 2003). With advances in marine aquarium technology in the 1990s, hobbyists started shifting their preferences from fish-only 'tanks' to displaying more complete coral reef ecosystems and since then, the popularity of marine aquariums has proliferated (Biondo, 2017; Rhyne et al., 2017, 2012; Cohen et al., 2013; Wabnitz et al., 2003).

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The habitat of most marine ornamental fishes, coral reefs, are among the most diverse ecosystems in the world but are declining globally (Hughes et al., 2017; Triki et al., 2017). Today, 19% of the original area of coral reefs has been destroyed, 15% are seriously threatened with loss within the next 10–20 years, and 20% are under threat of loss in 20–40 years due to anthropogenic pressure (Hughes et al., 2017; Ferrari et al., 2011; Gattuso et al., 2014; Wilkinson, 2008; Hoegh-Guldberg et al., 2007).

The marine ornamental fish trade is estimated to be worth US$ 1.5 billion annually (Biondo, 2017; Rhyne et al., 2017, 2012; Leal et al., 2015; Dee et al., 2014; Monticini, 2010; Smith et al., 2008; Wabnitz et al., 2003). In 2000, 1 kg of coral reef fish for the aquarium trade fetched US$500 whereas food fish sold for US$6 (Cato, 2003). Compared to its market value, relatively little is known about the global volume and diversity of traded species because the industry lacks monitoring or systematic regulations in a number of places (Biondo, 2017; Rhyne et al., 2017, 2012; Stevens et al., 2017). Marine ornamental fishes are widely collected from coral reef habitats throughout the Indo-Pacific, as well as the Caribbean region. However, many supply systems are unorganized, multi-layered and patchy (Prakash et al., 2017; Cohen et al., 2013; Rhyne et al., 2012). In some places trade directly threatens ornamental species due to poor handling during capture and transportation or damages ecosystems due to unsustainable practices including the illegal use of cyanide in Southeast Asia (Cohen et al., 2013; Vagelli, 2011). Limited knowledge regarding the dynamics of exploitation has aroused increased concerns by stakeholders including fishermen, diving and other tourism operators, and environmentalists, that fishing is having negative impacts on targeted populations and associated coral reef habitats (Biondo, 2017; Rhyne et al., 2017; Okemwa et al., 2009).

Wildlife trade regulations such as the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES) aim to ensure that the international trade of wild fauna and flora does not become a threat to their survival (CITES, 2018). However, very few species of marine ornamental fishes are regulated through CITES (CITES, 2018). Many of all marine ornamental fish species represented in the comprehensive FishBase database are not assessed by the IUCN Red List due to lack of information (Biondo, 2017). The IUCN Red List category is a starting point to warrant protection of a species.

The present study represents a continuation of a study published in 2017 (Biondo, 2017) concerning the trade in the European region with a focus on Switzerland. In 2009 the import data consisted of hard-copy shipment declarations (Biondo, 2017), whereas since 2011, electronic data is available via the Trade Control and Expert System (TRACES), which collects data for all imports of live animals or parts thereof from non-EU countries into the European region to monitor animal diseases. This data provides further information on volume, biodiversity and trade pathways and contributes to understanding the commerce of marine ornamental fishes. In addition, the larger dataset could aid in the collation of information for possible later evaluation of species through the IUCN Red List, and could also facilitate the listing on CITES of certain species or species groups, if deemed appropriate.

2. Material and methods

The European database Trade Control and Expert System (TRACES) stores data on the imports and exports of live animals and animal products within and across the borders of the European Union including Switzerland. TRACES is not intended to monitor wildlife trade, rather it is intended to monitor potential threats from animal diseases. However, TRACES is the only tool to evaluate the volume of marine ornamental fish trade in the European region. Traders are required to declare their exports at the border to an EU country or to Switzerland by entering the freight details in TRACES.

TRACES was introduced in 2004, although data on marine ornamental fishes only began to be collected in 2011. Between 2011 and 2013, data was insufficiently specific (at least family level) and many fishes were recorded under the name ‘otra pesca’ (other food fish) which is why these three years were excluded from the study. The information entered by traders in TRACES corresponds mainly to the information contained in the Common Veterinary Document (CVDE) accompanying the consignments on paper. Dealers must register in order to be able to enter the shipment data in TRACES. Government officials can request full access to the database through their local TRACES representative, but the data is not publicly accessible because it contains confidential company information. TRACES data for this study was provided on request by the Swiss Federal Food Safety and Veterinary Office (FSVO). The FSVO anonymized the data by removing the company information and provided it in Excel format. We then imported the data into our own Microsoft Access database.

A peculiarity of the TRACES database is the fact, that it records the species of fish in a field called ‘species’, which may either contain the proper scientific species name or just its family name. Spelling errors are not possible because TRACES offers a list of all possible families and species to choose from when entering shipment details. But the fact that the ‘species’ field can contain either a family or a species makes analysis of all species traded difficult. Our MS Access database separates the information of the TRACES species field into a real ‘species’ and a ‘family’ field on the condition that, if it contains two words, it must be a species, otherwise a family. All taxa in the MS Access database were checked manually. The records containing a species in the species field were then supplemented with the correct family name. The family name comes from FishBase, the most frequently accessed online database for fish species (Froese and Pauly, 2014). Information on origin and destination including trans-shipping (shipments entering into Switzerland and being transferred to another country), as well as volume and diversity of species were analysed. All species of marine ornamental fishes entering Switzerland were assigned the IUCN conservation status using the IUCN Red List database (IUCN, 2018). A list of all coral reef fishes worldwide was extracted from FishBase (Froese and Pauly, 2014) by filtering ‘reef-associated’ and ‘tropical’ species and also assigned a conservation status.