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Status review of seahorse (*Syngnathidae: Hippocampus*) trafficking in the Philippines

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ABSTRACT

Seahorses *Hippocampus* spp. are a unique group of fish characterized by their unusual morphology and male pregnancy. The current 48 seahorse species occur mainly in shallow seawaters globally, of which 10 species occur in the Philippines. Estimated annual seahorse collection in the Philippines for the traditional medicine trade was 4,000,000 individuals and up to 1,000,000 individuals for the live aquarium trade prior to 2004. Due to the significant international trade threatening the survival of seahorses in the wild, the genus *Hippocampus* was listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora Appendix II in 2004. Although seahorses are protected nationally under the Philippine Fisheries Code of 1998 and Wildlife Act of 2001, large-scale illegal collection in the wild continues. It was estimated that 1.7 million seahorse individuals were collected in the Philippines per year after 2004. Open-source seizure data were collated and official seizure records from 2010 to 2021 were analyzed to provide a status review on seahorse trade dynamics and analyze Philippine law enforcement efforts. Nineteen seizure incidents involving approximately 658 kg of dried seahorses (approximately 280,318 individuals) were recorded in the study period. In addition, 181 kg of dried pipefishes and sea dragons were recorded. While seizures occurred across eight islands, 13 incidents (68%) were documented in the central Philippines (Visayas and Palawan). Preliminary analysis of the seizure data suggests the following: 1) a significant portion (95–100%) of the illegal seahorse trade is not detected by law enforcement activities; 2) National Capital Region and Cebu are important exit points for international trade, and 3) pipefishes and sea dragons may be targeted as an alternative to seahorses.

Keywords: CITES, pet trade, traditional medicine, wildlife trade

INTRODUCTION

Seahorses *Hippocampus* spp. are a group of fish with distinctive morphology, including a tubular snout, upright body posture, prehensile tail, and characteristic male pregnancy (Vincent 1996; Lourie et al. 2004). Along with pipefishes and sea dragons, they belong to the family Syngnathidae, where the

current 48 seahorse species occur mainly in shallow temperate and tropical seawaters worldwide (Vincent et al. 2011; Froese and Pauly 2021). The International Union for Conservation of Nature Red List of Threatened Species had assessed 42 seahorse species ranging from Data Deficient to Vulnerable (IUCN 2021). In the Philippines, ten species are known to occur throughout the archipelago, with populations



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concentrated mainly in the central Visayas (Foster and Apale 2016; Project Seahorse 2019).

Globally, the survival of seahorses in the wild is mainly threatened by habitat loss and overexploitation (Foster and Vincent 2004). For centuries, seahorses have been believed to cure various diseases and provide health benefits when consumed, making them a highly sought-after ingredient in traditional Chinese medicine (TCM), and resulting in the collection of millions of individuals annually (Vincent 1996; Vincent et al. 2011). A significant surge in demand was noted since the mid-1980s (Vincent 1996). This trade occurred in large quantities to meet the high demand for TCM, especially in China, Hong Kong, and Taiwan. It was estimated that 45,000 kg of dried seahorses (approximately 16,000,000 individuals) were consumed within Asian countries per year (Vincent 1996). To a lesser extent, seahorses are also traded as curios, amulets, and live as aquarium pets. Overexploitation may cause the decline of seahorse population and seahorse fishery was hypothesized to be unsustainable due to the dwindling catch (Vincent 1996; Pajaro and Vincent 2015; Yasué et al. 2015; Foster et al. 2019). Attempts have been made to breed seahorses in captivity; however, seahorse aquaculture is challenging with high production cost, technical difficulties, and increased susceptibility of seahorses to diseases resulting in mass mortality (Koldeway and Martin-Smith 2010; Koning and Hoeksema 2021). Currently, the vast majority of seahorses in the trade are still collected from the wild (Craig et al. 2011; UNEP-WCMC 2011; Vincent et al. 2011).

Due to the threat of overexploitation, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has regulated the international commercial seahorse trade by listing the genus in CITES Appendix II since 2004 (CITES 2003). In the Philippines, national legislation and regulations such as the Republic Act 8550 as amended by RA 10654 (Philippine Fisheries Code of 1998), RA 9147 (Wildlife Act of 2001), and Fisheries Administrative Order. 208 of 2001 (Conservation of rare, threatened, and endangered fishery species) are in place to protect endangered wildlife and their habitats by imposing a total ban on seahorse collection and trade since 2004. Although strong national legislation and regulations are in place, illegal collection and trafficking of seahorses continue due to the lucrative nature of the trade, particularly to intermediaries and exporters, and very limited alternative livelihoods to fishers who derive an essential portion of their meager income from seahorse fishery (Pajaro and Vincent 2015).

The Philippines is one of the major sources of dried and live seahorses in the international market. The three main collection sites are Palawan, central Visayas (including Cebu, Bohol, and Negros), and

Sulu Archipelago (Vincent 1996). It was estimated that 10,000 kg of dried seahorses (approximately 4,000,000 individuals) and up to 1,000,000 live seahorses were traded per year prior to 2004 (pre-CITES) (Pajaro and Vincent 2015; Foster and Apale 2016). Since the collection ban, it was estimated that 1.7 million seahorse individuals were collected in the Philippines per year after 2004 (Foster et al. 2019). Dried seahorses are sold at USD 460 (Vincent et al. 2011; Yasué et al. 2015; Foster et al. 2019;) to USD 600 per kg in 2018. In Manila City, TCM stores sell dried seahorses for USD 7–8 per individual (Sy unpubl. data).

Previous seahorse studies in the Philippines have provided critical information on seahorse fishery. However, limited information is available on trade routes, smuggling methods, and law enforcement activities. This study aimed to provide a status review on seahorse trafficking dynamics and law enforcement efforts by analyzing seizure data.

METHODS

Seizure records from 2010 to 2021 were collated from open-source news reports. In addition, unpublished seizure records of the Department of Environment and Natural Resources - Biodiversity Management Bureau (DENR-BMB), Bureau of Customs – Ninoy Aquino International Airport (BOC-NAIA), Palawan Council for Sustainable Development Staff (PCSDS), and Bureau of Fisheries and Aquatic Resources (BFAR) region VI, VII, and IX were reviewed. When an official record and news article reported different quantities, the official record was followed. Information was collated to determine the seizure location, quantity, date, commodity type (e.g. live, dried), and, if available, source, transit, and destination locations. A seizure incident involving six fishers on Dumaran Island mentioned “seahorses” were seized but did not specify the quantity (Taboada, 2019). In the absence of information on the exact seized quantity in this case, the quantity of at least two individuals were estimated. A previous study estimated 300–1,000 individuals per 1 kg of dried seahorses depending on species and source locations in the Philippines (Vincent 1996). This study used 426 individuals per 1 kg of dried seahorses based on the average quantity of test counts on seized seahorses conducted by BFAR Bacolod and Zamboanga in 2018 (Abeto and Munap pers. comm.). When reports only mentioned the number of containers (i.e. number of sacks or boxes), the weight using its minimum threshold value, based on previous seizures involving similar-sized containers was conservatively estimated. Informal interviews of TCM store personnel were also conducted to gather information such as prices and sources in 2018.

RESULTS

Seizure Records

Nineteen seizure incidents involving at least 62 live and 658 kg of dried seahorses (approximately 280,318 individuals) were documented from 2010 to 2021 (Table 1). No seizures were recorded in 2010–2011, 2013, and 2015–2016. Four incidents involved the seizure of live seahorses – three incidents while seahorses were being collected at sea and one incident in a pet market in Pasay City, Luzon. Fifteen seizure incidents (79%) involved dried seahorses – eight incidents while being transported in seaports or airports; five incidents while in the storage facilities of traffickers, and one incident in Manila City in a TCM store and another while being transported by a land vehicle.

Table 1. Seizure incidents per year and estimated dry weight (kg) quantity from 2010 to 2021.

YEAR	NO. OF INCIDENTS	ESTIMATED QUANTITY (KG)
2010	-	-
2011	-	-
2012	1	3.50
2013	-	-
2014	3	77.34
2015	-	-
2016	-	-
2017	3	149.03
2018	3	211.04
2019	5	173.61
2020	3	28.25
2021	1	15.25
TOTAL	19	658.02

While seizures occurred across eight islands, the majority of incidents (n = 13) occurred in the Visayas and Palawan region (Figure 1A), accounting for 68.4% of the total seahorse seizure incidents in the study period. Seizure incidents also peaked in 2017–2019, with a total of 11 incidents involving at least 57 live and 533.54 kg of dried seahorses, accounting for 81.1% of the total seizure quantity in dry weight in the past 12 years. This was mainly due to the three large dried seahorse seizures that involved 130 kg (estimated) in Manila City in 2017, 152.94 kg in Zamboanga City in 2018, and 104.54 kg in Puerto Princesa City, Palawan in 2019 (Figure 1B).

Other Syngnathids (sea dragons and pipefishes) have also been confiscated along with seahorses or separately. Four seizure incidents in Masbate and Palawan Province involved 181.27 kg of dried pipefishes and sea dragons between 2014 and 2020.

Smuggling Routes and Modus Operandi

Wildlife traffickers mainly utilized seaports and airports when transporting large quantities (> 10 kg) of dried seahorses. The contrabands are typically first packed in plastic, then in opaque sacks or cardboard boxes, and misdeclared as other dried fish or concealed with scrap plastic in closed van containers or trucks. In a four-year period (2017–2020), six dried seahorse smuggling attempts were documented in the Philippines. One incident each by commercial airline and cargo ship from Negros Occidental to the National Capital Region (NCR); two incidents by ship from Zamboanga City to the NCR; and two incidents from Cebu to Macau via commercial airlines in 2019 (Figure 2).

Arrests and Outcomes

A total of 70 individuals, of which 44 fishers were involved in seahorse poaching and 26 others involved in transporting or trafficking, were arrested and detained during the study period. The only case with a known resolution was the smuggling attempt of 53 kg of dried seahorses as reported by the Bureau of Customs with a wholesale market value of PHP 1,590,000 (USD 31,176) by two Chinese nationals with Macau passports in Cebu in 2019. The suspects only paid a total of PHP 30,000 (USD 588) fine. They were allowed to leave the country without facing a criminal case or undergoing deportation proceedings for violating RA 9147, RA 8550, and RA 10863 or the Customs Modernization and Tariff Act (CMTA).

DISCUSSIONS

Seizure Records

During the 12-year period from 2010 and 2021, only seven years had law enforcement activities involving seahorses. The average seized quantity was approximately 23,360 seahorses per year. Comparing the average seized quantity with the latest estimate of 1.7 million seahorses collected per year in the Philippines (Foster et al. 2019), law enforcement activities could only detect 0%–5.3% of illicit seahorse trade per year. A drop in seahorse seizure incidents recorded from 2020–2021 compared to 2017–2019 may be due to a combination of various factors – undetected smuggling activities, insufficient enforcement efforts, reduced poaching activities,

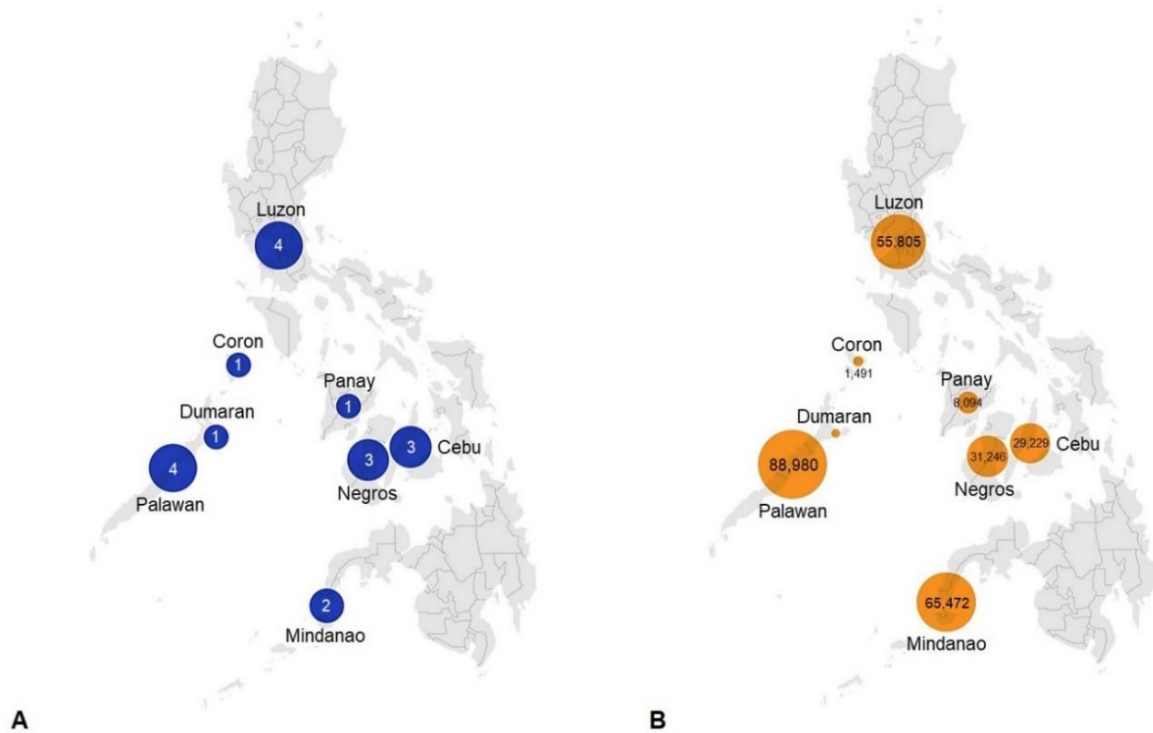


Figure 1. Location and number of seahorse seizure incidents (A) and estimated seized seahorse individuals (B). Note: All dried seahorse seizure records were converted to individuals based on the most recent estimate of 426 individuals = 1 kg dried seahorses. Authorities did not identify seized seahorses to species level.

and/or artifact of COVID-19 pandemic lockdown. While seizure data can provide critical trafficking information, it is only an indicative on wildlife trafficking and law enforcement efforts (Sy et al. 2020; Sy 2021). As such, it should be interpreted with caution due to imperfect detection rates, variable enforcement efforts, and incomplete reporting. The discovery of other Syngnathids that are not protected by law in seizure incidents indicates that they may be targeted as alternatives to seahorses and be threatened by overexploitation.

Smuggling Routes and Modus Operandi

Seahorse poaching and trafficking continue to threaten the survival of seahorses in the Philippines despite these national and international protections (Pollom et al. 2020). Although it is challenging to ascertain seahorse population decline due to limited population studies, previous surveys and interviews

with people involved in the trade chain in the Philippines indicated up to 70% decline in catch rate from 1985–1995 (Pajaro and Vincent 2015). The persistent high demand for seahorses for TCM from the Philippines (Figure 3) and abroad could be a major factor driving the perceived or actual population decline.

The NCR was implicated in the seahorse smuggling route as a destination in 50% of dried seahorse seizure incidents, but it could be a transit location for international smuggling. Dried seahorses are likely smuggled abroad for processing before being reimported in smaller quantities by TCM stores in the NCR for domestic trade and consumption (Vincent 1996). The TCM store personnel who participated in short and informal interviews conducted in Manila in 2018 revealed that they sourced dried seahorses overseas.



Figure 2. Smuggling routes of dried seahorses in the Philippines between 2017 and 2021.



Figure 3. Dried seahorses in the TCM trade in Manila City.

Law Enforcement

While the Philippines has strong national laws (i.e. RA 10654, RA 9147) to protect seahorses, ineffective implementation and low conviction rates and penalties undermine their usefulness. Seahorses are prohibited from all catch and trade, and violators may be meted with a heavy monetary fine and lengthy jail sentence—section 102(b) of RA 10654 makes it unlawful to “fish, take, catch, gather, sell, purchase, possess, transport, export, forward or ship out aquatic species listed in CITES Appendices II and III. If scientific assessments show that population of the species in the wild cannot remain viable under the pressure of collection and trade”. Violators may be penalized with three times the value of seized wildlife or up to PHP3,000,000 (USD58,824), whichever is higher, and sentenced to jail for five to eight years. Heavy penalties can serve as an effective deterrent if applied appropriately. However, violators typically receive significantly less severe penalties, as exemplified by the two foreign nationals caught with 53 kg of dried seahorses in 2019. The violators could have been fined PHP4,770,000 (USD93,529), sentenced up to eight years of imprisonment, and underwent deportation proceedings after serving the jail sentence. After the administrative hearing, the imposed total fine of PHP30,000 (USD588) was less than 1% of the maximum fine allowed under the law. The Philippines, together with other countries, have

declared a seahorse trade ban since 2004 but continues to play a significant role as a source country in the international trade chain (Christie et al. 2011; Foster et al. 2016; Kuo and Vincent 2018; Foster and Vincent 2021). The CITES trade records showed that the Philippines did not report seahorse exports after 2004. Between 2011 and 2016, the United States reported sourcing 253 seahorse individuals from the Philippines for educational and scientific purposes. In addition, Portugal and the United States reported seizure of 3.37 kg and 6,859 individual seahorses from the Philippines respectively (CITES Trade Database 2021).

Among the many threats to aquatic species, poaching and trafficking remain the primary threats to Syngnathids, particularly seahorses. Aquatic wildlife authorities should increase visibility and monitoring especially in known hot spot areas to prevent poaching. Information gathering and detection measures at seaports and airports should be enhanced to address illegal transporting of seahorses and other wildlife. An assessment of seahorse availability in TCM stores in the Philippines can provide additional insights into the sources, demand, and supply chains for seahorses in the country. Biologists, researchers, local coastal communities, fishers, and law enforcers should collaborate to raise seahorse awareness to conserve seahorses in the Philippines.

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