Caught in the Act: How the U.S. Lacey Act Can Hamper the Fight Against Cyanide Fishing in Tropical Coral Reefs

Ricardo Calado[1], Miguel C. Leal[1,2], Marcela C.M. Vaz[1], Chris Brown[3], Rui Rosa[4], Todd C. Stevenson[5], Cara H. Cooper[6], Brian N. Tissot[7], Ya-Wei Li[8], & Daniel J. Thornhill[8]

[1] Departmento de Biologia & CESAM, Universidade de Aveiro, Campus de Santiago, 3810-193, Aveiro, Portugal
[2] Skidaway Institute of Oceanography, University of Georgia, 10 Ocean Science Circle, Savannah, 31411, GA, USA
[3] Sea Life, Lodmoor Country Park, Weymouth, Dorset, DT4 7SX, UK
[4] Laboratório Marítimo da Guia, Centro de Oceanografia, Faculdade de Ciências da Universidade de Lisboa, Avenida Nossa Senhora do Cabo 939, 2750-374, Cascais, Portugal
[5] School of Marine and Environmental Affairs, University of Washington, 3707 Brooklyn Avenue NE, Seattle, WA, 98105-6715, USA
[6] 3 Little Birds Consulting, LLC, P.O. Box 3461, Saint Petersburg, FL, 33731, USA
[7] Department of Biological Sciences, Humboldt State University, Arcata, CA, 95521, USA
[8] Department of Conservation Science and Policy, Defenders of Wildlife, 1130 17th St. NW, Washington, DC, 20036, USA

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Correspondence
Ricardo Calado, Departmento de Biologia, Universidade de Aveiro, Campus de Santiago, 3810-193 Aveiro, Portugal.
Tel: +351 234370779; fax: +351 234372587.
E-mail: rjcalado@hotmail.com

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Abstract

Cyanide fishing is one of the most destructive techniques employed to collect live reef fish. While national laws of most source countries ban this practice, cyanide is still widely employed to capture live reef fish for human consumption and marine aquariums. The United States is one of the largest importers of live reef fish, and the implementation of new approaches to screen for fish caught with cyanide is urgently needed. A fast and reliable noninvasive and nondestructive approach to screen live reef fish for cyanide poisoning was recently developed, yet deployment of this test may be obstructed by U.S. law. The Lacey Act prohibits the import, export, transport, and acquisition in interstate or international commerce of fish taken in violation of any foreign law. Therefore, if a fish tests positive for cyanide poisoning, the testers could expose themselves to liability for potential Lacey Act violations, as they are "knowingly" engaging in an illegal act. To eliminate this disincentive, the U.S. government should help conservationists develop protocols on how to test for cyanide poisoning without violating the Lacey Act.

Introduction

In general, wildlife trade regulations aim to fight illegal trafficking and ensure that commercial transactions of wild fauna and flora do not become a threat to their survival. One of the first laws ever adopted to specifically regulate wildlife trade was the U.S. Lacey Act of 1900. Introduced to the U.S. Congress by John Lacey, it aimed to "enlarge the powers of the Department of Agriculture, prohibit the transportation by interstate commerce of game killed in violation of local laws, and for other purposes" (Lacey Act 1900). Initially, the Lacey Act only addressed domestic affairs, as it made absolutely no mention of foreign laws; federal sanctions applied only to individuals violating a state law. It was not until 1935 that Congress expanded the Act to encompass violations of federal or foreign law. Over time, the Lacey Act shifted from a modest environmental law to a powerful tool of the U.S. Federal Government to protect a variety of species.

Currently, the Lacey Act makes it "unlawful for any person to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any fish or wildlife taken, possessed, transported, or sold in violation of any law or regulation of any State or in violation of any foreign law" (Lacey Act, 16 U.S.C. § 3372(a)(2)(A)). Under this prohibition, the U.S. government successfully prosecuted those responsible for smuggling rock lobster

and Patagonian toothfish into the United States; the illegally harvested wildlife in this case had a combined value in the millions of U.S. dollars (Meyer 2008). The Act, however, has faced controversy. Notably, opposition to the Act flared after a 2008 amendment that directly affected individual musicians and manufacturers of musical instruments relying on the import of exotic hardwoods (known in the music industry as tonewoods) (Pryce 2012). Timber industries also claim that the Lacey Act Amendment of 2008 promoted "a state of uncertainty" on how the industry should comply with their legal obligations (Saltzman 2010).

The Lacey Act remains a powerful piece of legislation for reducing illegal trade of wildlife both domestically and aboard. The Act should help reform U.S. ocean policy and serve as a deterrent to people involved in the illegal coral reef wildlife trade, where cyanide is used to capture reef fish in countries such as the Philippines and Indonesia (Tissot *et al.* 2010). However, we have observed that the inflexibility of the Lacey Act may discourage cyanide testing of live reef fish, a scenario that will certainly be problematic for conservation and wildlife management.

Cyanide fishing

For decades, cyanide fishing has been recognized to be one of the most destructive techniques employed in coral reefs to collect fish, especially in the Indo-Pacific region (Barber & Pratt 1997; Burke *et al.* 2011). Despite the efforts of several governmental and nongovernmental initiatives, as well as widespread laws banning the practice in most source countries, cyanide is still widely employed in the capture of live reef fish for human consumption and to supply the marine aquarium trade (Bruckner & Roberts 2008). This effective fishing method can be briefly described as follows: 1) fishermen typically prepare squirt bottles with a "cocktail" of one or two sodium cyanide (NaCN) or potassium cyanide (KCN) tablets dissolved in seawater; 2) the resulting hydrogen cyanide (HCN) solution is then dispensed onto the reef by divers in a series of short pulses, targeting fishes swimming by and hiding away in coral crevices; 3) the cyanide poisons and temporarily stuns the targeted fish, making them easy to collect, but kills a multitude of invertebrates and nontargeted fish on the spot; and 4) stunned fish are then brought aboard fishing vessels where they are allowed to recover in "cyanide-free" seawater (Rubec 1988; Rubec *et al*. 2001). Recently, an even more destructive version of cyanide fishing has been impacting Indo-Pacific coral reefs. It mostly targets live reef fish for human consumption, although marine ornamental fish are also considered a viable part of the catch, as no fishing boat(s) can economically sustain its trip to go out to remote reefs hundreds or thousands of miles away and collect just marine ornamental fish. Its *modus operandi* can be described as follows: 1). fisherman fill up a 100–200 L plastic/metal drum with a cyanide solution and load it on a small boat; 2) once a suitable site is selected, divers set up gill or barrier nets (strategically placed depending on current) around a large coral reef; 3) the boat drives around the site releasing the cyanide around the targeted coral reef; 4) the cyanide mixture drifts down and around the area stunning fish, in particular schooling species, which are harder to capture using the squirt bottle method; 5) other small boats come in hand netting the stunned fish as they float upwards and divers go down to collect the rest (Mike Stewart, personal communication). The increasing market demand for reef fish and their high financial rewards drive the continued use of cyanide among fishermen supplying the live fish industry for human consumption in the whole Asian Market, as well as the global trade of marine ornamental fish (Halim 2002; Bruckner & Roberts 2008).

Tracing fish poisoned by cyanide

The traceability of live reef fish is an exceptionally challenging task because of the taxonomic diversity and inability to accurately identify traded species, as well as the lack of an international monitoring system tracking exports and imports of these animals (see Rhyne *et al.* 2012; Cohen *et al.* 2013; and references therein). Recently, a fast and reliable approach was developed to screen live fish for cyanide poisoning using a noninvasive and nondestructive sampling scheme. This approach can be briefly described as follows: a water sample (2–5 mL) is collected from the holding container (commonly a plastic bag) employed to export the marine reef fish at arrival to the importing destination; water is screened for trace levels of thiocyanate (SCN^-) (in the range of $\mu g\ L^{-1}$), as marine fish can self-depurate from cyanide (CN^-) poisoning by conversion of highly-toxic CN^- into less toxic SCN^- through the action of the enzyme rhodanese; SCN^- is latter excreted through the fish urine and accumulates in the shipping water (Vaz *et al.* 2012). This new method is advantageous because 1) it detects for a longer living compound (thiocyanate); 2) delivers results in a much faster way than most current techniques testing for total cyanide; 3) does not require the sampling of any fish muscle or blood (surveyed fish do not need to be sacrificed or manipulated); and 4) it is easier, safer, and cheaper to use than current alternative techniques to detect live reef fish poisoned by cyanide (Mak *et al.* 2005). The technique has been welcomed by researchers, public aquariums, environmental NGOs, marine aquarium traders, policy makers, and the general public, as they all

recognize that it could play a decisive role in the fight against cyanide fishing.

The United States is one of the largest importers of live reef fish for the aquarium trade (Wabnitz *et al.* 2003; Rhyne *et al.* 2012). However, it is also recognized that this country (as well as all other countries) currently lacks a feasible test to screen imported live reef fish for cyanide poisoning (Bruckner & Roberts 2008). Thus, it was not surprising that several U.S.-based marine ornamental fish traders, NGOs, and researchers were highly receptive to implement this new screening approach to live reef fish entering the country (personal observations) and in doing so begin to eliminate demand for destructive cyanide fishing .

Caught in the Act

As noted above, the Lacey Act prohibits acquisition of or trade in wildlife that was collected in violation of any foreign law and cyanide fishing is illegal in most source countries. To assess a civil penalty against a person for violating these prohibitions, the federal government must prove that the person failed to exercise "due care" in knowing that the wildlife was acquired in violation of a foreign law. Assessing a criminal penalty requires an even higher burden of proof—that a person "knowingly" engaged in the illegal act. While the "due care" and "knowing" standards limit legal liability, the risk of prosecution remains, particularly because there are no clear guidelines on what level of diligence satisfies the "due care" standard. This risk of prosecution can undermine efforts to combat cyanide fishing by discouraging importers and others from testing live reef fish that they have acquired for cyanide poisoning. If a fish tests positive for active excretion of thiocyanate, the tester might reasonably be concerned about Lacey Act enforcement or eventual prosecution. This is the case even if the government does not ultimately prevail in court—the mere possibility of enforcement action and the negative publicity that results are significant concerns for many businesses. Rather than invite trouble, most people would logically not test for cyanide poisoning, thus undermining efforts to combat cyanide poisoning of live reef fish.

Unlike the Lacey Act, laws such as the U.S. Endangered Species Act (ESA) have provisions that practically eliminate the legal risk of undertaking conservation measures. The ESA creates a system to permit conservation activities that would otherwise violate the statute. For example, in restoring endangered species habitat, a person may inadvertently violate the prohibition on harming individuals of the species. But by obtaining an ESA enhancement of survival permit for the restoration activities, that person can easily safeguard herself from legal liability. This same permitting system allows universities and zoos to conduct scientific research on endangered species, without fear of enforcement action. The public needs the same "peace of mind" under the Lacey Act to incentivize widespread testing for cyanide poisoning.

The structure of the Lacey Act can undermine conservation in situations like the one we describe. The Act lacks the exceptions needed for it to be nimble and responsive to certain novel conservation challenges. Nevertheless, we urge the U.S. government to administer the Act flexibly and creatively to maximize conservation outcomes. For example, the government could work with scientists, conservation organizations, and importers on a case-by-case basis to identify the testing protocols that satisfy the "due care" and "knowing" standards. As a starting point, they could review the "due care" protocols being developed for the timber industry, with emphasis to the enforcement of supply chains that simply avoid operating on known problem areas (Saltzman 2010). Importers should also publicly disclose their good-faith efforts to monitor the legality of their practices along the supply chain.

Ultimately, the government needs to provide written assurance on how the "due care" standards will be interpreted and applied to the trade of marine organisms potentially captured using cyanide. Doing so will provide greater legal certainty to testers and lower a major hurdle to combating the trade of cyanide caught fish.

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