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Examining the impact of the European Union's carding scheme to combat Illegal, Unreported, and Unregulated fishing on the Republic of Panama's seafood trade

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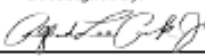
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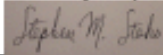
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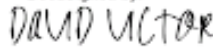
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Abstract

The European Union (EU) developed a market-based approach to prevent, deter, and end illegal, unreported, and unregulated (IUU) fishing. Its carding scheme highlights countries that lack adequate measures to combat IUU fishing and introduces a trade sanction that prevents “red-carded” countries from exporting their seafood products to the EU. Before a trade sanction, the European Commission warns countries with a "yellow card." Delisting from a red or yellow card results in a "green card." The Republic of Panama (Panama) was the first country that received a yellow card twice. This allowed us an opportunity to examine how the yellow card impacted Panama’s seafood trade. We used publicly available datasets—the United Nations Comtrade Database and Food and Agriculture Organization of the United Nations FishStatJ statistical software—to quantify changes in the EU's seafood imports from Panama following carding decisions and to examine whether a yellow card impacted Panama's seafood trade. Between 2010 and 2020, we observed very little change in the imports of Panama's seafood products to the EU. In the EU, Spain and Portugal were the biggest importers of Panama's seafood commodities, mainly importing frozen, non-filleted seafood products. We expected that Spain and Portugal, as EU member states, would decrease imports from Panama to distance the EU from carded countries. However, we found that Spain and Portugal responded inversely over the course of the decade that the IUU Regulation has been in place and that Panama received its carding decisions. Our study aligns with and IUU Watch report (Mundy 2018) that suggested that Portugal may be an entry-point for high risk, IUU products into the EU. From our study, we could not determine if it was the yellow card alone that accounted for Spain’s, and the EU’s, overall decrease in Panama’s seafood imports. Instead, it may be partially due to Panama’s overall catch decline or other factors not measured that also impact fisheries trade. Conversely, we were not expecting to find Portugal’s increased imports from Panama and recommend that the EU ensures its member states are implementing the IUU Regulation within its own countries. We recommend that the EU continues to collaborate with and listen to Panama to create better fisheries management practices and IUU strategies. We agree with Sumaila (2019) that suggested if countries, like the United States and Japan, enact similar carding schemes to incentivize countries like Panama, this may place greater effort on preventing IUU fishing.

Key Words

Carding scheme, EU, fisheries, IUU fishing, Panama

Executive Summary

Illegal, unreported, and unregulated fishing harms ecosystems, contributes to overfishing, and is linked to forced labor and slavery at sea (FAO 2010; Mackay, Hardesty, and Wilcox 2020). There is international interest and investment to combat IUU fishing to improve sustainability of fisheries (FAO 2010). This report investigates the trade impacts of the European Union's (EU) carding scheme (which forms part of the EU IUU Regulation) on Panama's seafood trade between 2010 and 2020. There are three cards in the carding scheme: yellow, red, and green. A yellow card is a warning to countries that are not doing enough to prevent IUU fishing; a red card is a trade sanction that prevents exports of seafood products to the EU; and a green card signals delisting from a yellow or red card and is given to countries that implement enough measures to prevent IUU fishing (European Commission, 2008). Since the EU IUU Regulation and the EU carding scheme entered into force in 2010, Panama has received three cards, yellow in 2012, then green in 2014, and a second yellow in 2019 from the European Commission (European Commission 2019). Panama was the first country to receive two yellow cards by the European Commission (Honniball 2020).

While the yellow card is not a trade sanction, we assessed whether or not the yellow card impacted Panama's seafood trade to better understand if the yellow card acts as an incentive for Panama to improve its fisheries. We used publicly available trade datasets, United Nations Comtrade and Food and Agriculture Organizations FishStatJ, to analyze how imports by the EU changed following the European Commission decisions. Specifically, we focused on Spain and Portugal's seafood imports because they imported 92 percent of the EU's seafood imports (by net weight) from Panama. We compared these imports to the overall catch statistics that have been declining since 2001. In general, total EU seafood imports from Panama declined between 2010 and 2020. However, fluctuations in the data made it difficult to discern if the carding scheme had an impact. We found that Spain's seafood imports from Panama have been declining overall, which aligns with Panama's national catch declines. Conversely, our study supports previous work by the IUU Watch (Mundy 2018) that Portugal's imports from Panama have been increasing since 2010, right before the initial yellow card. This indicates that Portugal may import high-risk products and re-export them to the EU, meaning that the EU still receives high-risk products despite yellow cards. We also observed that Spain and Portugal's primary imports are different from one another. Spain primarily imports skipjack and yellowfin tuna, most likely to use in its tuna canning process. In contrast, Portugal primarily imports sharks and swordfish, which Portugal may re-export some of those items to other EU countries.

We expected that the EU's imports from Panama would change with the carding scheme and that Panama would instead turn to local partners, and the United States and Japan which are the second and third biggest seafood importers in the world. Therefore, we examined if trade from Panama to select countries changed since 2010. We examined imports by neighboring countries, Costa Rica, Colombia, Ecuador, and the Dominican Republic, as well as the United States and Japan, the second and third highest importing countries that have also committed to combating IUU fishing. Ecuador's seafood imports from Panama declined over time, Colombia and the Dominican Republic did not have enough data to use, Costa Rica, Ecuador, and Japan imports declined. The United States' imports were consistent over time. In general, the trade varied, and we could not conclude if imports by other countries changed following Panama's yellow card.

Meanwhile, Panama instituted new fisheries regulations following the first and second yellow cards. The second set of regulations, Executive Decree 161 (2020), may better prevent IUU fishing in the future. Panama also began working with Global Fishing Watch for vessel monitoring, which may help to prevent IUU fishing (Bladen 2019).

There are a number of future studies that would further explore how the yellow card influences trade. While Panama was the first to receive two yellow cards from the European Commission, Ghana received a second yellow card on June 2, 2021 (European Commission 2021). Future studies on the yellow card would benefit from also studying how these warnings have impacted Ghana's trade. Should there be any similar patterns, this may strengthen the argument that the EU needs its member states to respond to the yellow card similarly, rather than one country increasing its imports while others decrease. Since we found that there were discrepancies between how Spain and Portugal responded to Panama's yellow card, future studies would benefit from studying Spain and Portugal more closely following carding decisions. For example, Spain has a large distant water fleet that may be impacted and may not be allowed to fish in Panama's waters if Panama receives a trade sanction. Studies on how and where Spain fishes before and after carding decisions could indicate how and why their trade changes with a yellow carded country. Portugal should be further investigated to assess its behavior following yellow carded countries by examining its trade with countries that are carded. It would also be beneficial to explore the change in prices for seafood commodities to determine if Portugal's economic incentive to import from countries that have recently been yellow carded. Investigations on Spain and Portugal's imports on recent yellow carded countries, like Ecuador and Ghana, would strengthen arguments about how the yellow cards influence member states' trade behavior. Studies should also examine Panama's changes in its flags of convenience vessels to determine if the yellow card has influenced the number of vessels flagged to Panama.

We recommend that the EU investigate the behavior of Portugal following carding decisions to determine if it is responding appropriately to yellow carded countries. We also support former studies (Sumaila 2019) that suggest that if more major seafood importing countries, like Japan and the US, implement strategies like the carding scheme, Panama will have more incentive to prevent IUU fishing. This is because it would reduce the amount of options high risk countries, like Panama, could trade to. Lastly, we recommend that the EU continue listening to and working with Panama to improve its fisheries management efforts.

Introduction

Seafood is the most commonly traded food product on the planet (FAO 2019). The demand for seafood is growing, and the majority of this demand is fulfilled by global marine capture fisheries (OECD/FAO 2020; Swartz et al. 2010). However, the world's marine fish catch has been plateaued for several decades. Like Pauly and Zeller (2016), some studies suggest that total global catches are declining (OECD/FAO 2020; Pauly and Zeller 2016). Fisheries' landings are affected by many factors, including climate change, overfishing, and illegal, unreported, and unregulated (IUU) fishing. Nations are recognizing the significance of the ocean's depleting resources and the urgency to act. IUU fishing is one area that governments are seeking to control to improve fisheries management. For example, Targets 14.4 and 14.6 of the United Nations Sustainable Development Goals seek to maintain and improve fish stocks and prevent any subsidies that contribute to IUU fishing by implementing international regulations (UN General Assembly 2015).

Illegal, unreported, and unregulated fishing is composed of three interconnected components. Illegal fishing refers to activities performed by national or foreign vessels that may operate in a country's waters without permission, violate a country's laws and regulations, or operate in the high seas without the appropriate markings (FAO, 2001) (For complete definitions, Illegal, Unreported, and Unregulated Fishing Definitions). Unreported fishing refers to catches that are not reported or misreported to the appropriate authority (FAO, 2001). Unregulated fishing occurs by those vessels without nationality or by those flying a flag of a country that is not a party to a specific organization (FAO, 2001). IUU fishing may also occur in places without conservation or management measures (FAO, 2001).

IUU fishing occurs in all ocean basins, including the high seas and the Exclusive Economic Zones (EEZs) of coastal nations (Sumaila et al., 2006). IUU fishing commonly occurs in areas with weak governance so that perpetrators face little to no repercussions (Long et al. 2020). Vessels may participate in IUU fishing to avoid operational, labor, and permit costs, while others unknowingly contribute to it by misreporting or not reporting their catch (Agnew and Barnes 2004). IUU fishing can have significant detrimental impacts on ecosystems by overharvesting target and non-target species, preventing the recovery of fish populations and ecosystems (U.R. Sumaila et al. 2020). Certain IUU fishing activities use destructive fishing gear and methods that may damage reefs or create significant amounts of discarded catch (FAO 2010).

In addition to environmental harm, IUU fishing can be costly to economies at local and global levels. Globally, a 2009 study estimated that IUU fishing losses are between 10 and 23.5 billion dollars annually (Agnew et al. 2009). IUU fishing contributes to sizeable economic losses by creating unfair competition to legal fishers by decreasing their profits and employment opportunities (Hutniczak et al. 2019). It also threatens food security for countries that depend on healthy fish stocks as a primary protein source. Furthermore, IUU fishing is connected to extreme human rights abuses and human trafficking (Mackay et al. 2020).

Measures to Prevent IUU Fishing

Historically, mariners were unrestricted in utilizing the ocean's bountiful resources (Dyke, 2000). As fisheries technology improved, the over-exploitation of marine resources became more pronounced, and the need for resource management grew (Palomares and Pauly 2019). The

United Nations Convention for the Law of the Sea (UNCLOS) established rules for ocean governance and ocean use in 1982 (UNCLOS, 1982). Article 94 of UNCLOS articulates that a nation is responsible for maintaining all vessels flying its flag. Other articles (Articles 56, 57, and 58) define the rights and responsibilities within a nation's EEZ. UNCLOS offers a framework to prevent IUU fishing from happening by creating regulations, but enforcement is lacking (Ma, 2020).

Over the past two decades, there have been urgent calls for international collaboration to combat IUU fishing. In 2001, the Food and Agriculture Organization of the United Nations (FAO) published the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported, and Unregulated Fishing to provide a framework and outline responsibilities for all countries, organizations, and fishers to prevent IUU fishing. Then, in 2015, the United Nations developed the UN Sustainable Development Goals (SDGs) to eradicate poverty and hunger and sustainably manage resources (United Nations, 2015). Target 14.4 aims explicitly to regulate and end IUU fishing by 2020 and replace it with science-based management plans (United Nations, 2015). While strides have been made, 2020 has passed, and IUU fishing is still prevalent.

Difficulties in enforcing international law to combat IUU fishing have sparked exploration into market-based measures to disincentivize IUU fishing by restricting trade on IUU caught products (Ma, 2020). The United States, for example, introduced the Seafood Import Monitoring Program (SIMP) to trace thirteen species from the point of harvest into the US market. SIMP requires catch documentation and reporting of these species to prevent IUU caught fish from entering the market. Conversely, the European Union has a similar approach. However, it takes it a step further by necessitating catch documentation for all species and using a carding scheme that can blacklist countries from exporting fishery products to the EU (EC No 1005/2008).

EU Regulations to Combat IUU Fishing

Currently, the EU imports the most seafood in the world and is considered the global leader in preventing IUU fishing (de Jong 2019; Rosello 2020). The EU developed a framework to warn or restrict countries' trade if they engage in IUU fishing (Hutniczak et al., 2019). The European Commission established the Council Regulation (EC) No 1005/2008, referred to as the IUU Regulation, on January 1, 2010. The IUU Regulation seeks to eliminate IUU fishing through mechanisms like port inspections, catch certificates, and by categorizing fishing vessel activities (European Commission, 2008). It also requires that flag States certify the origin and the legality of the fish, contributing to the traceability of traded seafood products (European Commission, 2008). A flag State is the country to which a vessel is registered to (UNCLOS 1982). This means that the State has the authority to regulate and enforce legislation on this vessel in the high seas.

Furthermore, the IUU Regulation developed a system that may ban imports from countries that do not make an effort to prevent IUU fishing to ensure that no IUU-derived products enter the EU market (European Commission, 2008). Implemented in 2010, the carding scheme designates red, yellow, and green cards depending upon how countries respond to IUU activity (European Commission, 2008). Under Chapter VI of the IUU Regulation, the European Commission must notify countries that they may be identified as a non-cooperating country (European Commission, 2008). The Commission lists the facts and reasons for the warning or pre-identification (European Commission Decision 2012). The yellow-carded country may offer a

response that refutes the reasons or create a plan to address the issues laid out by the Commission. Should the pre-identified, or yellow-carded, country not take adequate action to address the Commission's concerns within two years, they may be identified, or red-carded, as a non-cooperating country in the fight to end IUU fishing. Should the country take enough corrective measures after receiving a red or yellow card, they may be delisted with a green card. One of the critical components of the EU IUU Regulation is that it initiates a dialogue between the EU and international partners to end IUU fishing (Tavornmas and Cheeppensook, 2020). While countries may be yellow or red-carded, the EU continues to work with countries to improve efforts to prevent, deter, and eliminate IUU fishing (Tavornmas and Cheeppensook, 2020).

Fisheries Management in Panama

The Republic of Panama is the isthmus that connects North and South America. It borders Costa Rica on the West, Colombia on the East, the Caribbean Sea to the North, and the Pacific Ocean to its south. In 2018, the World Bank classified Panama as a high-income country from an upper-middle country, meaning that Panama has a gross national income per capita of \$12,055 (World Bank Data Team 2018). Panama has over 2500 km of coastline, and most places in Panama are fewer than 50 km from the Atlantic or Pacific (Spalding et al., 2015). Mangrove forests hug this highly productive coastline and neighbor coral reefs and seagrass beds. These tropical ecosystems provide Panamanians with abundant seafood resources to harvest and consume or export to other countries.

Fishing in Panama is open access, which means everyone has a right to fish (FAO 2018). The fishing sector provides food and food security, especially to coastal communities that live far from urban areas. Fishing employs 44,800 people, of which 11 percent fish in freshwaters the rest in marine ecosystems. Fish consumption per capita is one of the highest in Central America, between 10 and 14 kg per person annually.

Most fishing occurs on the Pacific side, where most of the population resides and nutrient-rich upwelling events occur, providing essential nutrients for hundreds of species (FAO 2018; Spalding et al., 2015). The catches on the Pacific side are mostly made up of tuna and small pelagics. The Panamanian fishing industry is comprised of small artisanal vessels to large industrial fleets that fly Panama's flag. Panama's vessels are registered in several Regional Fishery Management Organizations (RFMO), including the Inter-American Tropical Tuna Commission (IATTC), the Indian Ocean Tuna Commission (IOTC), the International Commission for the Conservation of Atlantic Tunas (ICCAT), and the Western and Central Pacific Fisheries Commission (WCPFC). Most vessels are registered under the IATTC.

Flags of Convenience

Panama's flag is often flown as a "flag of convenience" (FOC) for a fee (Negret 2016). Vessels must adhere to the laws of the country they are registered under (UNCLOS 1982). This includes adhering to labor costs, registration fees, and taxes, and countries are expected to monitor their registered vessels. Despite Article 91 of the United Nations Convention on the Law of the Sea (UNCLOS) that states there should be a "genuine link" between the vessel and its flag State, several countries and vessels ignore it (UNCLOS 1982; Chacón 2018). Due to FOCs, Panama has consistently been the world's largest ship register, with nearly 8,000 vessels registered

(Chacón 2018). FOCs make it particularly challenging to control IUU fishing because they add a layer of complexity to effective enforcement (Rosello 2020). Typically, vessel operators will fly flags of convenience because there is a general expectation that laws will not be enforced or will be lightly enforced by that country.

Transshipment

Some of Panama's FOCs are transshipment vessels. Transshipment at sea occurs when two vessels meet to transfer goods, people, or supplies from one vessel to another (Miller et al. 2018). This allows vessels to stay at sea for extended periods of time. Transshipment has been found to mix legally and illegally caught products into a web that blurs transparency in the seafood supply chain (Boerder et al. 2018). Additionally, transshipment is linked to human trafficking and human rights abuses and prevents people abused aboard from reaching land. Panamanian-flagged transshipment vessels are involved in most encounters with fishing vessels from China, Taiwan, South Korea, and Japan (Miller et al. 2018). Panama accounts for 20 percent of the total reefers, the refrigerated cargo vessels that stay out at sea (Boerder et al. 2018).

Panama's Carding History

The Republic of Panama (herein referred to as Panama) is the first country to be yellow carded twice by the European Union—first in 2012 and again in 2019. Since Panama received a second yellow card, this could indicate that an EU trade sanction threat was not enough to change Panama's behavior.

First Yellow Card

Between June of 2010 and November of 2012, the European Commission, or Commission, worked with the authorities of Panama to verify Panama's cooperation to prevent, deter, and end IUU fishing (Commission Decision 2012/C 354/01). On November 15, 2012, the European Commission notified the Republic of Panama (Panama) that the country had failed to adequately implement measures to reduce IUU fishing under Article 31 (4) to (7) of the IUU Regulation (Commission Decision 2012/C 354/01). The Commission specifically highlighted Panama's failure to comply with international regulations and failure to monitor its vessels. The Commission drew upon published RFMO IUU vessel lists ("IUU Vessel List") and found several flying Panama's flags. Because of this, the Commission determined that Panama was not monitoring its vessels accordingly and violated UNCLOS. Thus, Panama was pre-identified as a non-cooperating country, or yellow-carded, signaling that continued offenses of international rules could later result in a red card, which would indicate that Panama is an uncooperating country to end IUU fishing.

Green Card

Following the yellow card issuance, formal dialogue between the Commission and Panama began in which Panama provided oral and written comments to the Commission. In response to the yellow card, Panama developed legal frameworks to improve inspection and control of vessels flying the Panamanian flag (Executive Decree 161). By October 15, 2014, the EU determined that Panama had taken adequate measures to prevent and end IUU fishing activities. Thus, the EU delisted Panama from a yellow card to a green card (Commission Decision 2014/C 364/02).

Second Yellow Card

The second yellow card occurred after a series of new offenses the Commission uncovered. In 2019, the Commission visited Panama twice to determine if Panama was enforcing regulations and conservation and management measures on its vessels (Commission Decision 2020/C 13/06). During its assessment of Panama, the Commission found that the Panama Maritime Authority (AMP) registered several vessels as non-fishing vessels that later engaged in fishing activities. Therefore these vessels circumvented a mandatory fishing license from the national fisheries authority, Aquatic Resources Authority of Panama (ARAP), and their fishing activities were not monitored or controlled. Without adequate control, vessels have transported fishery products without proper licenses and authorizations. Some Panama flagged vessels were fishing in areas closed to fishing, while others were operating in regions where they were not licensed. Thus, the Commission concluded that Panama did not adequately control its vessels and could not ensure that fishery products entering the EU market and processing plants were not IUU born.

Additionally, the Commission determined that ARAP did not impose strong enough sanctions against vessels engaging in IUU fishing to deter offenders from continuing IUU fishing (Commission Decision 2020/C 13/06). Furthermore, the Commission stated that Panama was uncommunicative to the Commission or EU Member States' requests for information between 2015 and 2018. Only after the Commission began planning its visits in 2019 was Panama responsive.

Since receiving its second yellow card, Panama has introduced an additional legal framework to control international fishing licenses that include additional annual fees (Executive Decree 131). It also disallows international fishing licenses to vessels that plan on using trawls and driftnets. The decree also places responsibilities on companies that own vessels with foreign flags to ensure that their vessels have not engaged in IUU fishing. Failure to comply results in fines. Articles 24 and 25 of Executive Decree 131 (2020) declare that purse seine vessels may only transfer their products at ports authorized by ARAP. Panama-flagged refrigerated cargo ships may only receive transshipment at sea if the vessel carries an observer onboard.

Implications of the Second Yellow Card

With this second yellow card, Panama serves as a credible warning to all countries pre-identified or identified and subsequently delisted. The European Commission will give a yellow or red card again. Moreover, while Panama received a green card for putting an adequate legal framework to prevent IUU fishing, it received its second yellow card for lack of sufficient fisheries law revision, implementation, control, and enforcement (Commission Decision 2020/C 13/06).

According to Sumaila (2019), the average annual fish products imported by the EU from Panama between 2010 and 2014 was 23,012 tonnes. About 5 percent of their total products to the EU are fish-related. Since Panama was pre-identified as a non-cooperating country, its trade with the EU is threatened.

Since the EU's carding scheme can result in a trade sanction via a red card, we wanted to understand better how Panama's trade shifted following its yellow cards and how Panama responded politically after each carding decision. Although the yellow card does not initiate a

trade ban, we expected that EU countries would import fewer seafood products from Panama in anticipation of a trade ban, thus beginning to disassociate themselves from a carded country. We also expected that Panama would export more of its products to non-EU countries to prevent economic losses from a potential trade sanction by the EU. Here, we studied the impacts of the yellow card on Panama's seafood trade by (i) examining political responses by Panama following the yellow card, including legal frameworks created, and (ii) assessing how EU countries' seafood imports from Panama changed following carding decisions.

Materials and Methods

To determine how the EU's yellow card influenced Panama's trade, we divided our methods into three parts: First, we examined Panama's fisheries' landings, which we later compared to the seafood products imported by the EU. Second, we wanted to know which fisheries products were the most commonly exported from Panama to the EU and which EU countries imported the most products from Panama during the years Panama was carded. Lastly, we looked at Panama's exports to countries outside the EU to determine if there were any shifts in trade during the years of the yellow card.

We expected to find that Panama's fisheries' landings would be similar to the FAO's findings that global fisheries have been plateaued for several decades. We also expected that any changes in trade would be similar to changes in landings. Next, we expected that the EU's imports from Panama would decrease following the yellow card decisions in an effort to distance the EU from a carded country that could face an export ban.

FishStatJ and UN Comtrade Databases

To conduct this study, we used publicly available resources, FishStatJ and UN Comtrade, to better understand fisheries capture and trade data in Panama. FishStatJ is the United Nation's Food and Agriculture Organization's, FAO, software for statistical fisheries data that includes aquaculture, capture production, trade, and consumption datasets. We used FishStatJ's capture production dataset to determine how much of a given species was caught and reported at the shore or landed in Panama between 2008 and 2018. To better understand the types of Panama's fishery products imported by the EU, we used UN Comtrade. UN Comtrade holds official international trade statistics. We used UN Comtrade to calculate trade to look for trade patterns across multiple countries and regions. Using one trade database kept consistency.

Fish Landings in Panama

To illustrate how Panama's overall fisheries landings have changed over time, we retrieved the live weight of fish landed in Panama from the FAO's FishStatJ (2021) datasets from 2008-2018. The capture production data refers to aquatic plants and animals taken from brackish and marine waters, and all data are in tonnes (1000 kg) (FishStatJ). We later compared the EU's overall imports from Panama to the landings data to assess if there was a correlation between the trade and landings data.

Fish Imported by Countries of the EU

Next, we wanted to understand which EU countries were importing the most seafood products from Panama and what type of products they were. By distilling the biggest importers and

seafood products, we could more closely examine changes in trade in the most significant seafood products after each carding decision. Thus, we retrieved international trade statistics for fisheries commodities between Panama and the EU. UN Comtrade reported all trade values in USD and net weights in kg. The codes may include freshwater and marine species. However, the majority of species will be from the ocean (for more detail on the codes and how we used UN Comtrade, see Information on the Harmonized System in the Appendix).

We ranked Panama's fishery products that the EU most commonly imported. The EU's most significant seafood imports were frozen non-filleted fish and crustaceans (HS 0303 and HS 0306, see Table A-1). Panama's main export for its farmed shrimp is Europe (FAO 2018). Since we could not distinguish between farmed and wild-caught shrimp (aquaculture products would not be banned from the EU's carding scheme) using UN Comtrade, we did not review HS 0306 more closely. Conversely, HS 0303 comprises tunas, billfishes, and other high-value fish susceptible to IUU fishing. We determined that Spain and Portugal imported the most seafood products from Panama of any other EU country—although Spain imported substantially more than Portugal. Together, they imported 92 percent of the imports by net weight from Panama and 83 percent of the total value of seafood imports from Panama (Table 1). Most of their trade comes from frozen, non-filleted (HS 0303) products. Therefore, we extracted the 6-digit level seafood products within 0303 imported in Spain and Portugal from the UN Comtrade database. These codes include all frozen, non-filleted species including, yellowfin tuna, bigeye tuna, sharks, and more. We used these codes to help determine which species were the most significant to Spain and Portugal, representing the most significant seafood imports to the EU.

Comparing Panama's Captured Fisheries Products to Panama's Fisheries Trade

Next, we wanted to compare seafood imported by the EU from Panama to the amount of fish landed in Panama. If the EU's imported fishery products followed along with the fish landed by Panama flagged vessels, that may signal that the carding scheme did not impact Panama's trade. However, the Harmonized System does not divide fisheries products by species alone. Instead, it divides products by how they are preserved (fresh and chilled, frozen, canned, etc.) and then by type (fillets, non-fillets, fins, etc.) and species. Conversely, FishStatJ records fisheries products by species. Thus, a direct comparison was not possible.

Then we compared the top species within frozen, non-filleted seafood products (HS 0303) to FishStatJ's landed data to identify any similar patterns—does trade increase as landings increase, or not? For example, we compared frozen, non-filleted yellowfin tuna (HS 030342) to FishStatJ's yellowfin tuna landings data. Frozen, non-filleted yellowfin tuna (HS 030342) may not include every yellowfin exported to the EU—because yellowfin can also be chilled, canned, filleted, etc. However, if there are similar or inverse patterns of trade and captured data, that may indicate that they are related to one another.

Fish Exported to and Imported by Non-EU Countries

Lastly, we examined if the carding scheme had any effect on seafood trade imports to countries beyond the EU. We expected that when Panama was yellow carded, it may have instead exported its products to non-EU countries, thus seafood products imported from Panama may have increased. Therefore, we calculated HS 0303 trade data between Panama and its neighboring countries (Costa Rica, Colombia, and Ecuador), the USA, and Japan. We chose to study the

neighboring countries because they are well-positioned to receive any unwanted catch by the EU and because Panama already trades with them. We included the US and Japan because they are the second and third biggest importers of seafood products and are the most likely to care about importing IUU-derived products. Thus, if both countries were to introduce a similar carding scheme, we could better understand how Panama would respond.

Results

Regional Landings in Panama from 1950 to 2018

Fisheries landings by Panama flagged vessels increased from 1950 to 2001, with a peak in 1985 at 290,547 tonnes landed (Figure 1). However, from 2001 and onward, Panama's landings decreased, with a low in 2015 at 143,801 tonnes.

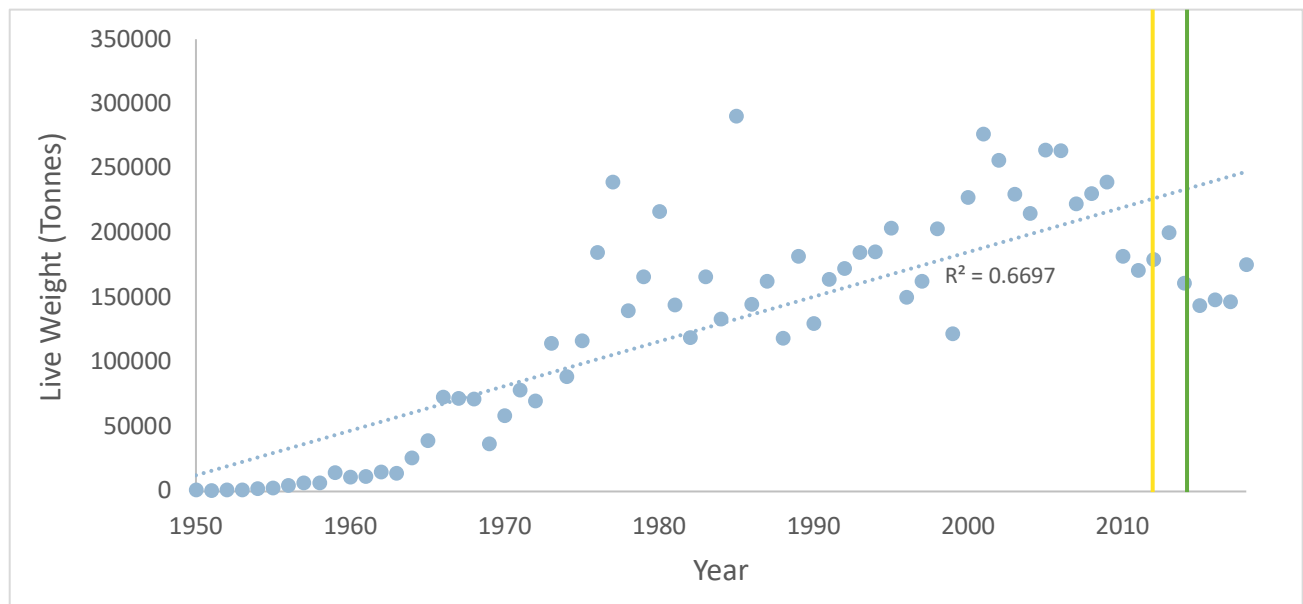


Figure 1. Total fish captured in Panama from 1950 to 2018 ($R^2 = 0.6697$). Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014. Data

Fisheries Imports by the EU from Panama

Total Seafood Products Imports by the EU from Panama

We wanted to know how the EU carding scheme impacted Panama's seafood trade to the EU. By looking at Figure 3, we can see that seafood imports by the EU from Panama did not significantly change between 2010 and 2020 ($R^2 = 0.07$). There was a peak in 2014 at 3,682.4 tonnes and a low in 2020 at 181.8 tonnes (Figure 2), but no significant pattern before and after carding decisions. Then, we determined which EU countries imported Panama's seafood products the most. We found that 17 of the EU28 countries reported seafood (HS 03) imports from Panama between 2010 and 2020 (Table 1). Over this time period, 577,656.4 tonnes of these products were imported by EU countries. From Table 1, we can see that Spain and Portugal import the most seafood products from Panama than any other EU country and that Spain imports significantly more from Panama than Portugal does.

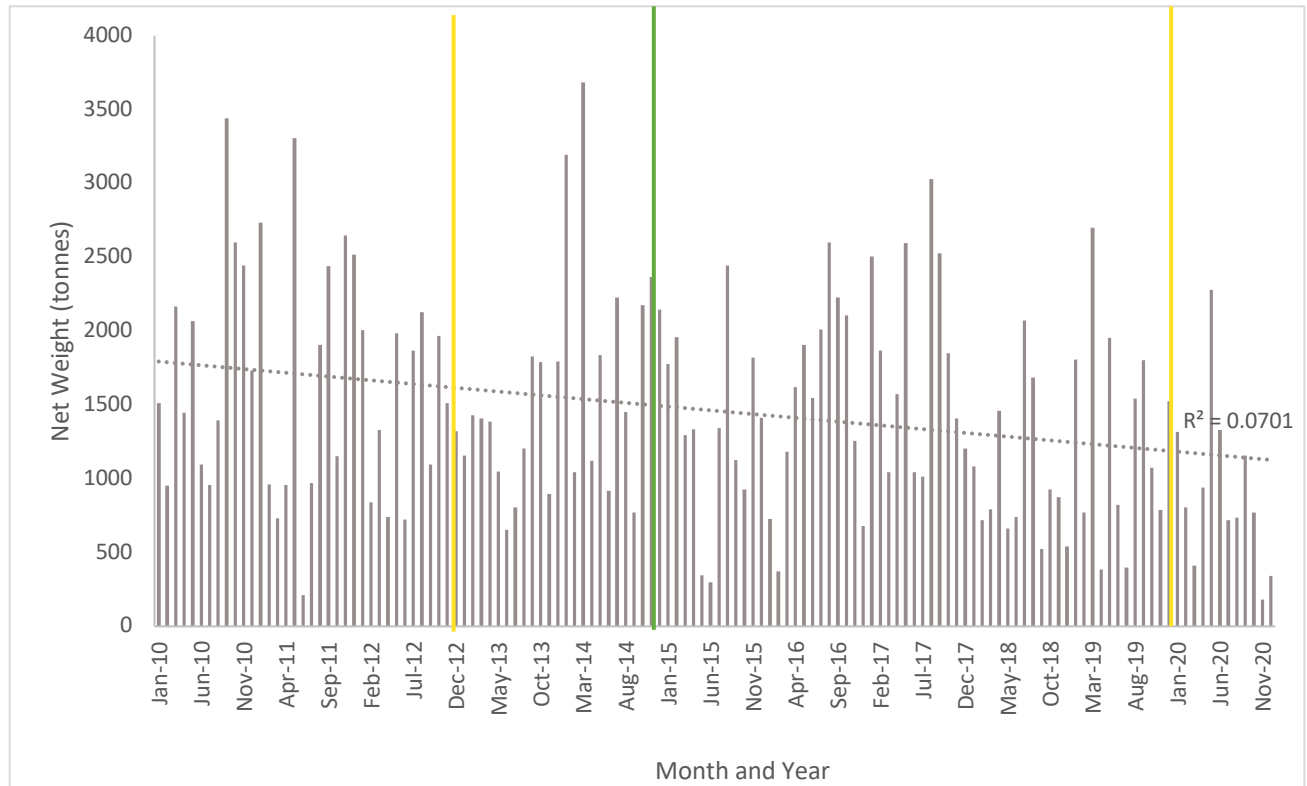


Figure 2. Total imports of HS 03 products (HS 0301-HS 0308) from Panama to the EU between January 2010 and December of 2020. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014. There is no significant trend from January 2010 to December 2020 ($R^2 = 0.0701$).

<i>EU Country</i>	<i>Imports from Panama (tonnes) (2010-2020)</i>
<i>Spain</i>	163,219.4
<i>Portugal</i>	14,855.6
<i>Italy</i>	6,928.0
<i>Denmark</i>	2,877.8
<i>France</i>	2,374.2
<i>Germany</i>	689.5
<i>Netherlands</i>	674.5
<i>United Kingdom</i>	503.2
<i>Greece</i>	428.9
<i>Slovenia</i>	109.2
<i>Belgium</i>	55.1
<i>Czech Rep.</i>	22.9
<i>Poland</i>	20.0
<i>Slovakia</i>	3.4
<i>Luxembourg</i>	1.3
<i>Croatia</i>	0.2
<i>Finland</i>	0.03

Table 1. EU countries that imported seafood (HS 03) products from Panama between 2010 and 2020 (tonnes).

Total Frozen, Non-filleted Fish

The most frequently imported seafood products (HS 03) by Spain and Portugal were within the category of HS 0303, frozen non-filleted fish. In Spain, the two most commonly imported products by net weight within this category were frozen and non-filleted yellowfin tuna and frozen and non-filleted skipjack tuna (Figure 4). Frozen, non-filleted bigeye tuna (HS 030344), frozen, non-filleted swordfish (HS 030357), frozen, non-filleted albacore and long-finned tunas (HS 030341), and frozen, non-filleted dogfish and other sharks (030381) were also common. In Portugal, the greatest product imported by net weight was frozen, non-filleted swordfish (HS 030357), followed by frozen, non-filleted dogfish and other sharks and frozen, non-filleted yellowfin tuna (Figure 5).

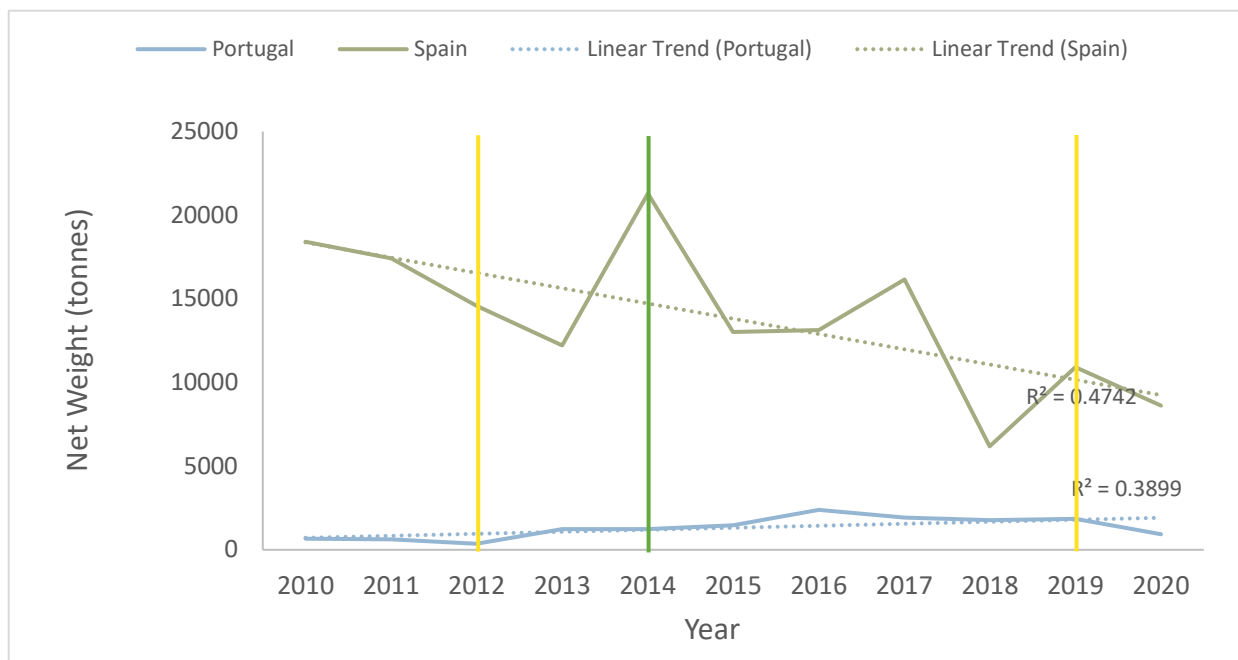


Figure 3. Total frozen, non-filleted seafood products imported by Spain and Portugal. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line marks when Panama was delisted in October of 2014.

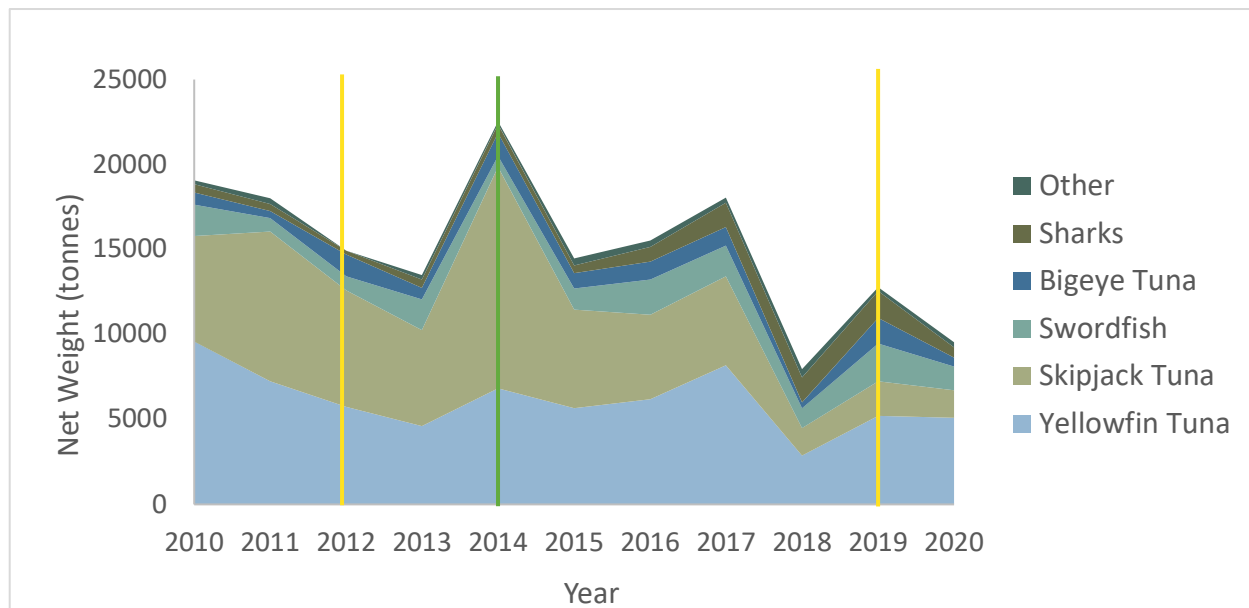


Figure 4. Spain's imports of frozen, non-filleted seafood products from Panama (tonnes) from 2010-2020. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line marks when Panama was delisted in October of 2014.

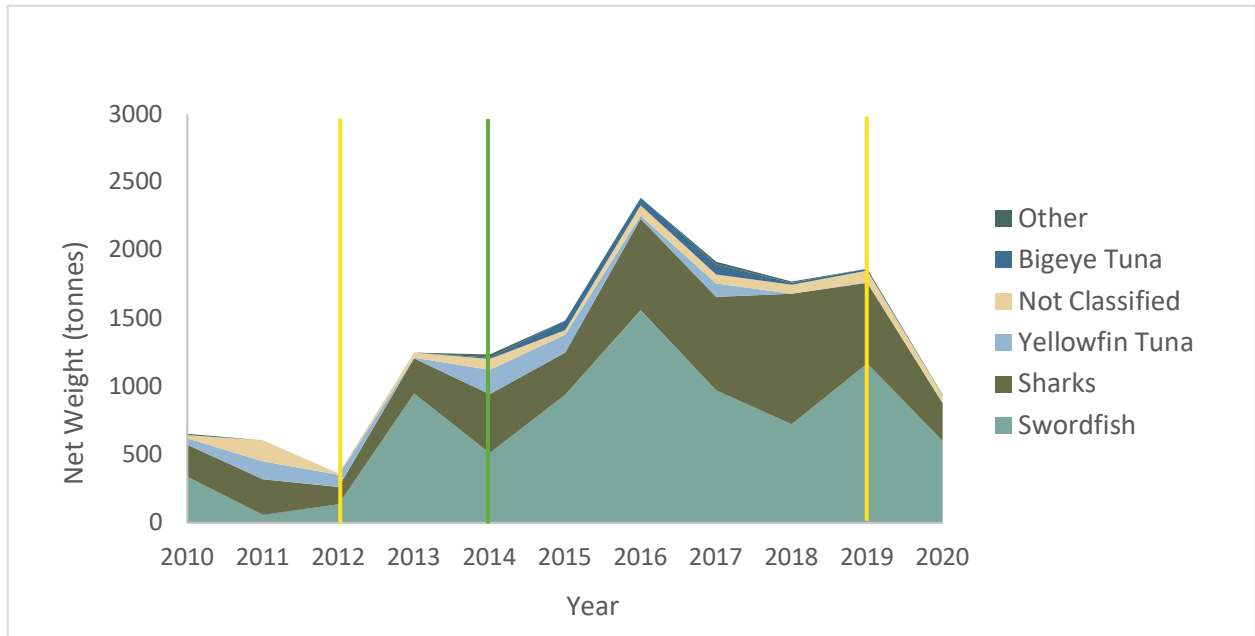


Figure 5. Portugal's imports of frozen, non-filleted seafood products from Panama (tonnes) from 2010-2020. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line marks when Panama was delisted in October of 2014.

To better understand if the amount of fish landed in Panama influenced the seafood imported by Spain and Portugal, we analyzed the landings of skipjack tuna, yellowfin tuna, bigeye tuna, swordfish, and sharks (Figure 6) because these species were the top imports of Spain and Portugal. According to FishStatJ's software, the landings of skipjack tuna and bigeye tuna had very little to no change between 2008 and 2018 ($R^2 = 0.0079$ and $R^2 = 0.0994$ respectively). Conversely, yellowfin tuna landings slightly decreased in the same time period ($R^2 = 0.3505$). Lastly, swordfish landings were reported in 2014, but not in any of the other years, so trends could not be calculated. Between 2008 and 2018, skipjack tuna's lowest landings by net weight in Panama was in 2010 at 31,847 tonnes while its highest was in 2008 at 53,121 tonnes. For yellowfin tuna, the lowest landings were reported in 2012 at 24,914 tonnes and highest in 2009 at 43,754 tonnes. Bigeye tuna's lowest landings were reported in 2012 at 7,077 tonnes and highest in 2018 at 14,135 tonnes. Following the first yellow card in 2012, skipjack tuna, yellowfin tuna, and bigeye tuna reported an increase in landings by net weight in 2013. Based on the reported landings for swordfish in Panama, swordfish had the highest landings in 2014 1,864 tonnes, all other years were unreported, or 0.

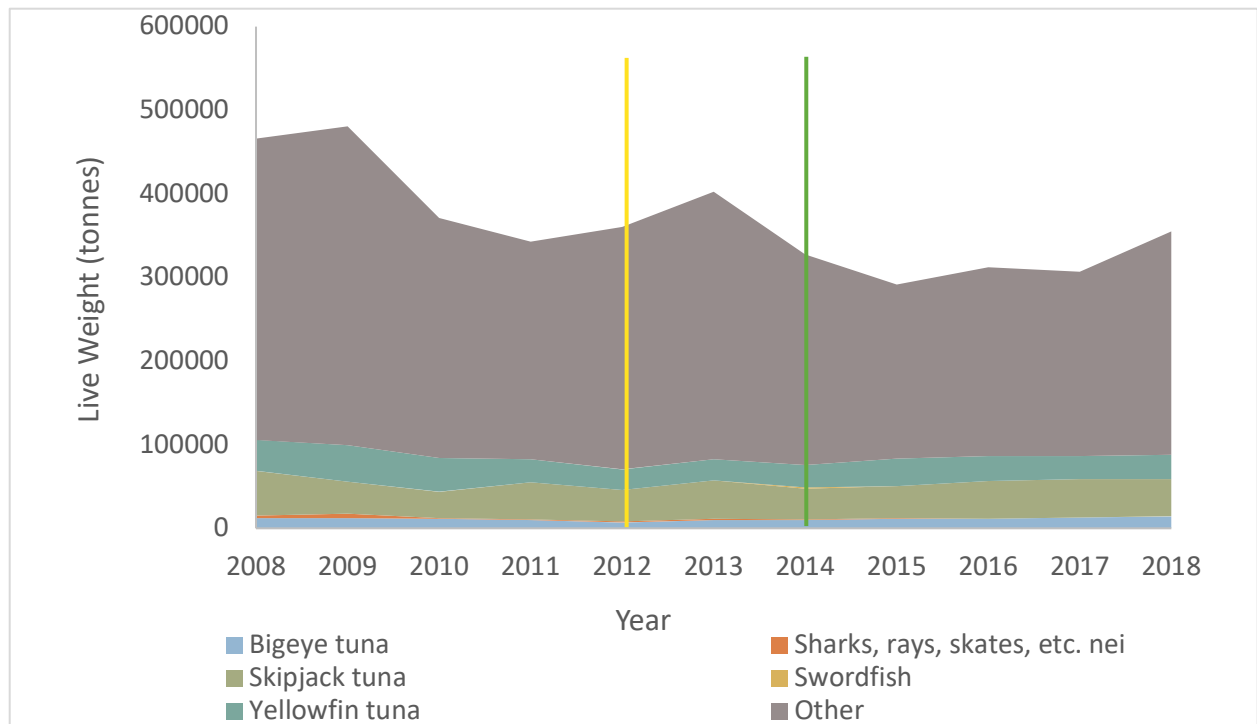


Figure 6. Total reported landings of seafood products in Panama. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014.

Imports of Seafood Products by Non-EU Countries

To determine if Panama exported more to non-EU countries because of the yellow cards, we examined the overall reported imports of seafood products (HS 0301 – HS 0308) to the United States, Japan, Costa Rica, Colombia, Ecuador, and the Dominican Republic. Imports to the United States stayed relatively the same from 2010 to 2020, with a peak in 2013 at 109,371.5 tonnes imported (Figure 7). After a large drop between 2010 and 2011, Japan increased its imports from Panama from 2011 to 2020 but did not reach its peak in 2010 at 5,796.5 tonnes imported. Japan did not report any imports from Panama in 2013. Imports to Ecuador from Panama decreased from 2010 to 2020 after its highest imports in 2011 at 66,924.3 tonnes. There were very few imports reported by Colombia and the Dominican Republic. Of the years reported, the Dominican Republic’s imports from Panama decreased between 2010 and 2020. Costa Rica’s imports from Panama stayed about the same throughout 2010 and 2020.

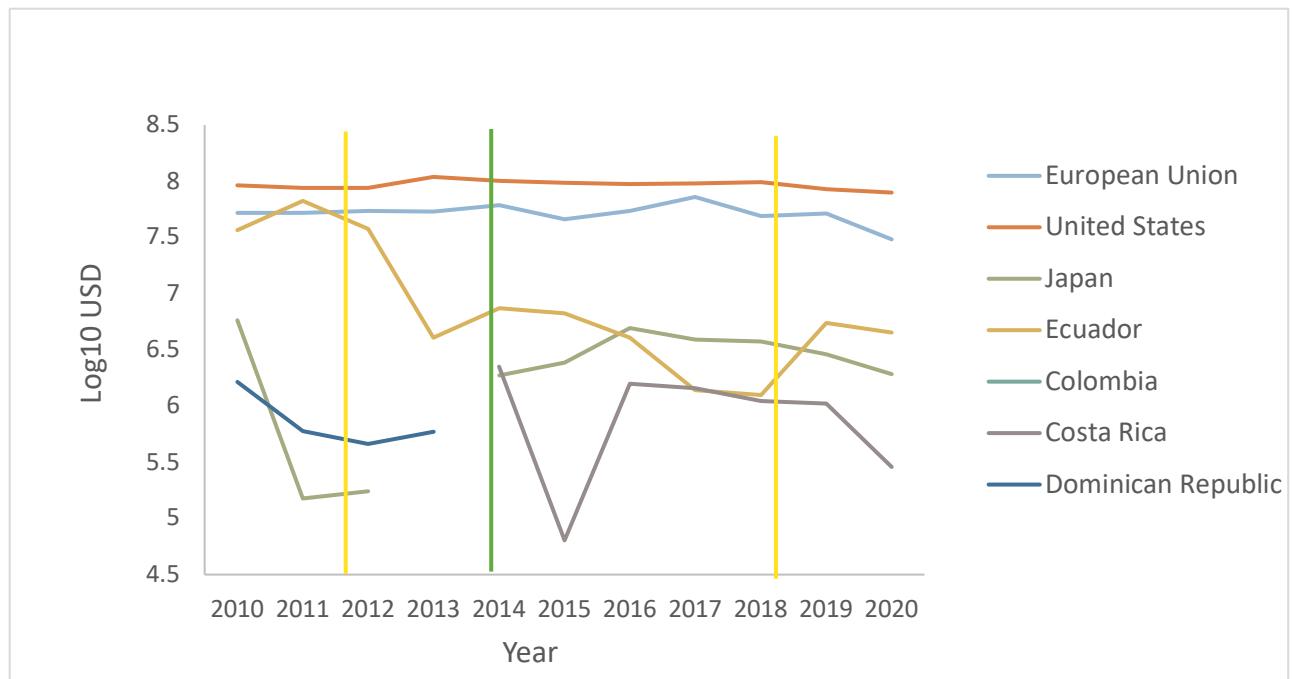


Figure 7. Imports of Panama’s seafood products (HS 03) by the EU and selected non-EU countries (USD). Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line marks when Panama was delisted in October of 2014.

Discussion

We conducted our study to determine how the yellow card issued by the European Commission influenced Panama’s seafood trade to the EU and beyond. While the yellow card does not initiate a trade sanction as the red card does, we expected to see a decrease in seafood imports from Panama to the EU for two reasons: first, we anticipated that Panama might increase trade with other partners more to mitigate any economic losses from a possible red card by the EU, and second, we recognized that EU member States may be anticipating a future red card on Panama and could begin to distance themselves. Based on our findings, we cannot conclude that the yellow card had a significant effect on Panama’s seafood trade to the EU between 2010 and 2020. Nor can we conclude that Panama’s seafood trade to the studied countries shifted because of the yellow card. Although we do not see significant changes in the data, this may be because IUU fishing and fisheries management are affected by so many variables; pinpointing the exact reason for any change is challenging. It could also indicate that a warning of a potential trade sanction does not necessarily change Panama’s or EU countries’ trading behavior. Our findings also suggest that EU countries, especially Portugal, that increased their trade with Panama are just as, if not more, responsible for changing their behavior in the fight to end IUU fishing.

Limitations

Several limitations posed challenges for this project. Fisheries are influenced by many factors, including the environment, consumer demand, and changing regulations. IUU fishing adds a layer of complexity to fisheries management. Due to these and other factors, we cannot say for sure how the carding scheme affected Panama’s seafood export trade to the EU.

One major limitation of both FishStatJ and UN Comtrade datasets is IUU fishing and fisheries management's inherent challenge: unreporting and misreporting. One example of misreporting is using generic names to describe the catch (FAO, 2021). In general, landings data is well-known to be unrepresentative of the actual amounts of species caught and landed due to under or misreporting. Smithsonian Tropical Research Institute and University of British Columbia (2014) estimated that about 40 percent of Panama's total catch is unreported. The under-reported species are primarily bycatch from industrial fleets and include catches by foreign vessels and recreational and artisanal fisheries. Conversely, Panama has been collecting landings data on its most commercially valuable species, particularly its tuna species, regularly (Harper et al. 2014). However, we found that Portugal's swordfish imports from Panama were much higher than Panama's reported catch in FishStatJ. This could suggest a gross under-reporting of a commercially valuable species. Indeed, one of the reasons the European Commission gave Panama a second warning in 2019 was because one of the fish processing plants could not provide ICCAT swordfish documents, and the Panamanian authorities had not noticed (Commission Decision 2020/C 13/06). Thus, the data we used does not give the overall picture of fisheries trade in Panama because it is missing unreported catch data and misreported catch and trade data. We, therefore, expect that our values for the net weight of fish landed are lower than the actual amount caught and landed. This error is likely consistent across the most recent decade and do not expect our overall patterns were impacted severely (2010-2020). We also expect that the reported trade is imperfect and that not every individual fish is recorded correctly. It is beyond the scope of this project to calculate how often species were unreported or misreported.

Furthermore, at the time of this project, FishStatJ only had data available through 2018 for Panama, while UN Comtrade had EU imports from Panama reported up to February 2021. Neither database is always complete. For example, within UN Comtrade's database, the United States' reported imports from Panama did not include net weight value, only trade value. Thus, this created a challenge when comparing trade. Additionally, FAO and UN Comtrade classify their fishing products differently. The FAO categorizes by species and Comtrade categorizes by product type, which includes the species. While we compared species to species to the best our data would allow, they may not perfectly align.

A final limitation is traceability. Tracing fisheries products from ocean to plate is one of the key challenges to ending IUU fishing. Most of the products that Spain and Portugal imported from Panama are high-value, commercially important species and are the most important species caught worldwide (Miyake and FAO 2010). These species—tuna, sharks, and billfishes (like swordfish)—are commonly transshipped in national and international waters (Boerder, Miller, and Worm 2018). Transshipment blurs seafood transparency, and the likelihood of accurately tracing these fish from Panama-flagged vessels to countries of import is slim (Miller et al. 2018). Just before its yellow card in 2019, Panama started to publish their vessel tracking data via Global Fishing Watch, which signals a new step in Panama's willingness to be transparent about their vessels' locations (Bladen 2019). While this new partnership helps, seafood traceability is still a massive problem.

Panama's Landings Data

Since the FAO started assembling fisheries data, Panama has steadily increased its landings through 2001. Panama's industrialization of its fisheries began in the 1950s and 1960s with shrimp and fishmeal production (Harper et al. 2014). Then, the FAO began to record large pelagic species landings, like tuna and billfish, in the 1970s, despite evidence of tuna fishing occurring earlier. In the 1980s, Panama's shark fishery developed and exported shark fins to Hong Kong and the United States. The industrialization of Panama's fisheries coincided with global fisheries facing increased pressure (Rousseau et al. 2019). According to Rousseau et al. (2019), the number of global marine fishing vessels doubled from 1.7 million in 1950 to 3.7 million in 2015. Engine power also increased, allowing vessels to travel farther and faster in shorter amounts of time. Thus, technological advancement and efficiency contributed to the increasing trend we observed in Panama's landings.

From 2001 and onward, Panama fisheries' landings showed an overall decline, while aquaculture and fisheries imports increased. Based on a report by the FAO, Panama's captured products declined from USD 260 to USD 160 million in 2018 (FAO 2021). Conversely, in Harper et al.'s (2014) study to reconstruct Panama's fisheries data, they noted that large pelagic species in Panama sharply increased in the early 2000s until 2010, likely due to the recent inclusion of flag of convenience vessels' landings. One reason that landings may have declined is fewer fish but stock assessments of Panama's fisheries are lacking or inconclusive (Harper et al. 2014). For example, stock assessments by the IATTC for yellowfin tuna, skipjack tuna, and bigeye tuna in the Eastern Pacific Ocean could not clearly identify how the abundance of these species changed over time because of the uncertainty in their data collection methods (IATTC 2018). Perhaps fisheries landings declined because fishing may not be as prosperous as other jobs: many fishers in fishing communities have switched to tourism to make a more significant profit (FAO 2018). To better understand the cause of fisheries declines in Panama, stock assessments by both RFMOs and ARAP would need to improve.

Panama's Overall Trade of Fisheries Products to the EU

Despite the issuance of two yellow cards over the course of a decade, we cannot conclude for certain that Panama's seafood (HS 03) exports to the European Union responded to the carding scheme. Within the EU, the two countries that imported the most seafood imports from Panama were Spain and Portugal, with Spain as the dominant importer. Since these countries were responding differently over the same time period, we suspect that the changes in trade are not due to the general decline in Panama's fisheries landings.

Spain's reduction in imports is consistent with EU yellow-card issuance having an effect on overall EU imports from Panama, however we would need to do more extensive analysis to fully understand this relationship. In general, Spain has taken several steps to reduce IUU fishing in recent years, and decreasing its imports from a yellow-carded country like Panama could be another one (EJF 2017). Some of Spain's initiatives include fining Spanish nationals for their involvement in IUU fishing, removing fishing licenses, and prohibiting access to subsidies between 5 and 12 years (EJF 2017).

Changes in prices for seafood products may also have contributed to declines in seafood imports. The primary products that Spain imported were most likely used for canned tuna. In 2010, Spain

accounted for nearly 10 percent of the world's canned tuna production, and it processes over two thirds of the EU's canned tuna. The most common species for canned tuna in the EU are skipjack, yellowfin, and bigeye tuna, which we found were Spain's biggest imports from Panama (European Commission 2017). Tuna loins and frozen whole tuna are the most common supplies for canned tuna (European Commission 2017). Moreover, in 2014, Spain's canned seafood production declined in value due to the price of raw tuna decreasing. This could contribute to some of the declines in imports from Panama. However, Panama is not considered one of the EU's primary suppliers for its canned tuna (European Commission 2017). If the European Commission red cards Panama, Spain and Portugal have other suppliers.

Our study found that Portugal's seafood imports from Panama increased slightly in the past decade. Portugal has the third-highest seafood consumer per capita in the world (Almeida et al. 2015). To feed their consumption, Portugal relies heavily on imports because their local fish stocks have declined (Bjørndal et al. 2016). Portugal's fish processing has been increasing for several decades (Bjørndal et al. 2016), which could be why we observed growing imports by Portugal from Panama. Portugal's main export markets are Spain, France, Italy, and Brazil—three of these four countries are EU member states (Bjørndal et al. 2016). In 2014, Portugal's most important species to export to Spain were ink fish, prawns, and swordfish (Bjørndal et al. 2016). It is likely that Portugal imports these items from non-EU countries then re-exports them to EU markets.

While the EU IUU Regulation can introduce a trade sanction on a non-EU country for inadequately preventing IUU fishing, there is an onus on EU member States to also abide by the IUU Regulation. In this study, we found that two EU countries' seafood imports responded oppositely from one another after Panama received a yellow card. Spain slightly decreased its imports from Panama, while Portugal slightly increased them. Although not enough to offset Spain's reduction, Portugal's increase in imports demonstrates a potential problem if not all EU member countries follow the same trade measure. An IUU Watch report even noted that following Panama's first yellow card in 2012, Portugal drastically increased swordfish and dogfish imports from Panama while Spain decreased them, which our findings support (Mundy 2018). At first glance, Spain appears to be distancing itself from a yellow-carded country. However, Mundy's report (2018) also remarked that intra-EU trade from Portugal to Spain increased following the yellow card in 2012. This is also not the first time Portugal increased its trade with a country following a carding decision. Portugal also increased its swordfish imports from Taiwan and Korea after these countries were yellow carded. Some studies suggest that Portugal is considered an entry point for IUU derived fish (Mundy 2018). Thus, we speculate that there may be a reshuffling of imported products to make it appear that high risk seafood products are not entering specific EU countries, when in relating the trade flow has changed.

Imports in Other Countries

We expected to find that Panama would increase its exports to non-EU countries following the EU's yellow cards in anticipation of a potential trade sanction by the EU. We expected that Panama would increase its exports to nearby countries especially if the EU's imports from Panama decreased. We did not find that to be the case in the countries we looked at. Instead, we found a decrease in imports of Panama's seafood products by countries close to Panama, like Ecuador and Costa Rica.

While overall imports to these countries may be changing, we noticed that Panama did not ship as many frozen, non-filleted fish to these countries compared to the EU. Therefore, we cannot conclude that Panama would shift its non-frozen filleted fish to any of these countries if the EU sanctions Panama's seafood trade. They might, however, ship more fresh, chilled seafood products if the EU were to give Panama a red card. This would be interesting and relevant for future studies to determine if Panama's type of products change over time.

Beyond Trade

While the yellow card did not appear to change overall trade significantly, Panama did introduce new legal frameworks and create new partnerships after both yellow cards to prevent and deter illegal fishing. For example, a fishery improvement project for Panama's Purse Seine Tuna Fishery, which includes bigeye, skipjack, and yellowfin tuna on the high seas of the Eastern Pacific Ocean was announced in January of 2020 (Key Traceability 2020). In April of 2020, Panama introduced Executive Decree 131 established regulations to prevent and discourage IUU fishing (Ministry of Agricultural Development 2020). Thus, the yellow card did have some intended impact to prevent IUU fishing in Panama because a more robust legal framework was created. Enforcement of this legal framework is one of Panama's next steps.

Future Studies

There are a number of other reasons that Panama's trade fluctuated beyond the carding scheme. Future studies would benefit from discussions with Panama's fisheries, government, and industries and appropriate representatives of Spain and Portugal to better understand the relationship of Panama's seafood trade to the EU. Additionally, the European Union's process for carding decisions is difficult to find and follow. Speaking with EU representatives that were a part of Panama's carding decisions would improve the work we have already done.

We also suggest that future studies look into how EU fisheries have responded to the IUU Regulation. For example, Spain's imports from Panama may have declined because of the caveat of the IUU Regulation: if Panama does receive a red card, no EU vessels may fish in Panama's waters. Spain fishes an average 3,000 km away from its home ports (Tickler et al. 2018), accounts for 8 percent of the global high-seas fishing revenue, and receives substantial subsidies for their high seas fishing fleet (Sala et al. 2018). We suspect that Spain may decrease its imports from carded countries, especially countries it fleet fishes in, so that they do not miss the economic opportunity to fish in their waters. For further studies, we would examine Trygg Mat Tracking's IUU vessel lists, IATTC vessel lists, and EU vessel lists to investigate how Spain's distant water fleet has been impacted by the EU carding scheme.

In addition to understanding EU countries' distant water fleets, an important study should examine how the yellow card influences the seafood industry by Panama's flags of convenience have changed over time to assess whether the carding scheme has had any influence over this. Using similar vessel lists as above, we would investigate the change in number of vessels that have used Panama's flag before and after carding decisions.

Additionally, Spain imports most of its frozen tuna supplies for its canned tuna from Ecuador (European Commission 2017). Ecuador received a yellow card in October of 2019. Future

studies on how Spain responds to a carded country that is more important to them economically, like Ecuador, will give the European Commission better insight on how its Member States are willing to cooperate with the EU IUU Regulation, more so than Panama.

Conversely, the biggest importer of Panama's seafood market is the United States. If the US introduces any trade sanction to Panama, this would likely give Panama more incentive to combat IUU fishing. Therefore, creating a study to predict how Panama would respond to a US sanction would be important to incentivize Panama to prevent IUU fishing.

Recommendations

We recommend that the European Union investigate why Portugal has increased its imports from Panama after a yellow card was instated, especially since this was not the first time. Further, the EU needs to ensure that its Member States follow the trade measures the European Commission establishes—otherwise the trade measures will be considered weak if some Member States ignore it. We also recommend that the EU, United States, and Japan, the three biggest seafood importers, work together to create and enforce international trade measures in order to be more effective at combatting IUU fishing. Lastly, we recommend that Panama improve its fisheries management efforts by providing more robust stock assessments and providing better trade data to ensure that fisheries products are traced more accurately.

Conclusion

Panama's second yellow card is a warning to other third countries that the EU will continue to evaluate countries' IUU behavior even after delisting (Honniball 2020). By better understanding Panama's response to the yellow cards via trade, we can consider if the yellow card is the best method to incentivize change in Panama or other countries. Due to the complexity of fisheries and trade, pinpointing the exact cause for fluctuations in import data may not be achievable. Our analysis suggests that the yellow cards Panama received from the European Union did not significantly change the trade between Panama and the European Union. Moreover, we found a discrepancy between how Portugal and Spain responded after Panama's yellow card. This discrepancy emphasizes that in order for any trade sanctions to work, including warnings, all EU countries must respond in accordance with the IUU Regulation. Ending IUU fishing will take tremendous effort at local and global scales, and we cannot conclude that the carding scheme, by only the EU, is the right incentive for Panama to prevent IUU fishing. Nevertheless, future studies should help determine the best approach.

Acknowledgements

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Abbreviations

AMP	Panama’s Maritime Authority
ARAP	Panama’s Authority on Aquatic Resources
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FOC	Flag of Convenience
IATTC	Inter-American Tropical Tuna Commission
IUU	Illegal, Unreported, and Unregulated Fishing
PSMA	Agreement on Port State Measures
SDG	United Nations Sustainable Development Goals
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
US	United States

Illegal, Unreported, and Unregulated Fishing Definitions

Full definitions of IUU fishing contained in the FAO International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated fishing (FAO 2001):

“Illegal fishing refers to activities:

- *Conducted by national or foreign vessels in water under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations;*
- *Conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or*
- *in violation of national laws or international obligations, including those undertaken by cooperating States to a relevant regional fisheries management organization.*

Unreported fishing refers to fishing activities:

- *which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or*
- *undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.*

Unregulated fishing refers to fishing activities:

- *in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or*
- *in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law.”*

Information on the Harmonized System

Seafood products are categorized by the Harmonized Commodity Description and Coding System, or Harmonized System (HS) as HS Chapter 03, or "Fish, Crustaceans, & Aquatic Invertebrates." In the HS classification, each product is assigned a 6-digit code. This code is encompassed in a broader, 4-digit one, and then all 4-digit ones are categorized into the broadest, 2-digit category. For example, fresh or chilled crabs are categorized as 030619. The 4-digit group the fresh and chilled crabs belong to is 0306, Crustaceans, and the 2-digit chapter, 03, Fish, Crustaceans, and Invertebrates. We used the HS 4 and 6-digit levels to determine which products were the most significant trade from Panama to the EU.

At first, we used monthly export data using "Panama" as the "reporter" and "All" as the "partner" from the years 2010-2018. By doing this, we were able to collect reported trade data from Panama to each of its trading partners around the world. However, Panama's reported data in UN Comtrade only existed through 2018. For this reason, we also selected each EU country as the "reporter" and "Panama" as the "partner" to collect the net weight (kg) and trade values (USD) of imported seafood products to the EU from the years 2010-2020. Panama had significantly fewer data reported compared to the individual EU countries; therefore, the EU's import data was used to capture trade patterns between Panama and the EU.

Year	HS 0302	HS 0303	HS 0304	HS 0306	HS 0307	Grand Total
2010	7500	19065296	186116	2548336		21807248
2011	15902	18016301	139700	2355121		20527024
2012		14954616	74129	2480837		17509582
2013	1580	13525794	24580	1837889		15389843
2014	92047	20427650	24006	2394452	100	22938255
2015	69021	13253552	50949	2706420	19	16079961
2016	111936	15570148	77283	2472897		18232264
2017	93828	18110191	180013	3278006		21662038
2018	74135	7973497	69818	3949466		12066916
2019	19895	12784526	144484	2617302		15566207
2020	661	9670443	29524	1283301		10983929
Grand Total	486505	163352014	1000602	27924027	119	192763267

Table A-1. Overall net weight of HS 03 products (HS 0301-HS 0308) imported to Spain from Panama between 2010 to 2020.

Fisheries Landings of Specific Species

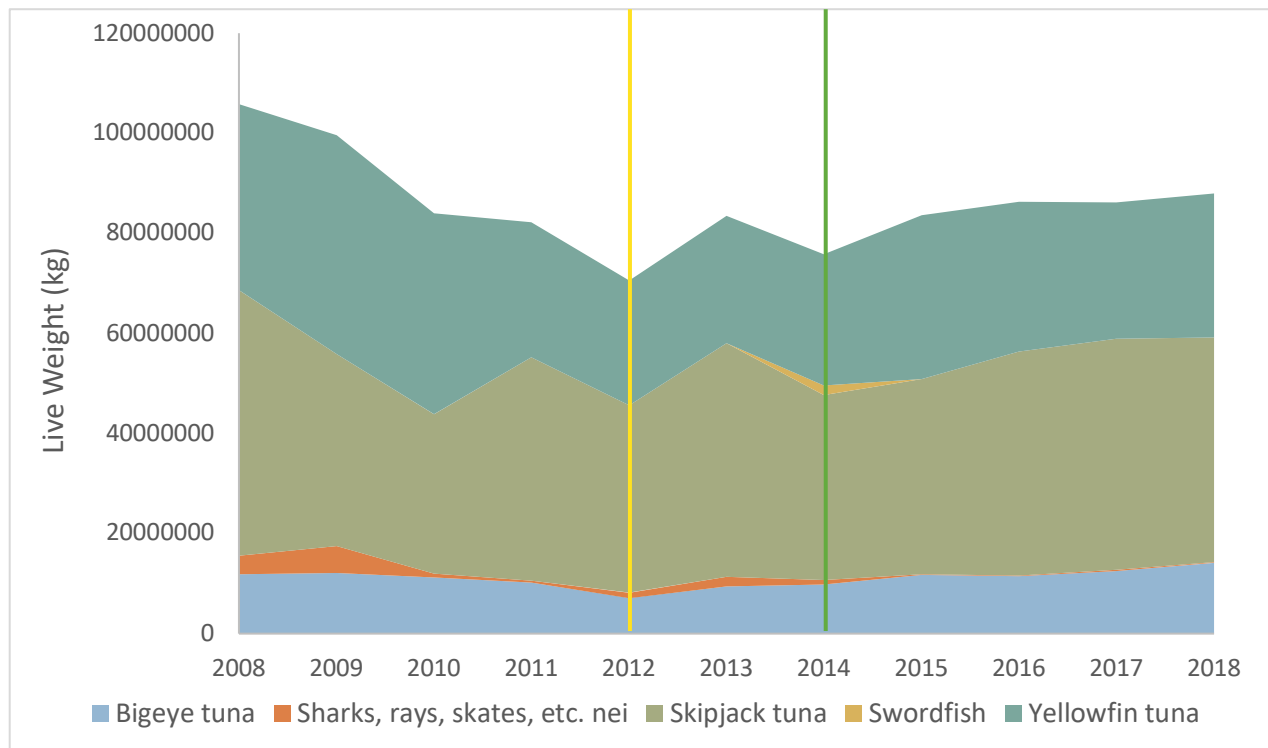


Figure A-1. Displays the reported landings of Panama for bigeye tuna, sharks, skipjack tuna, swordfish, and yellowfin tuna. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014.

Time Series of Spain and Portugal's Imports from Panama by Product

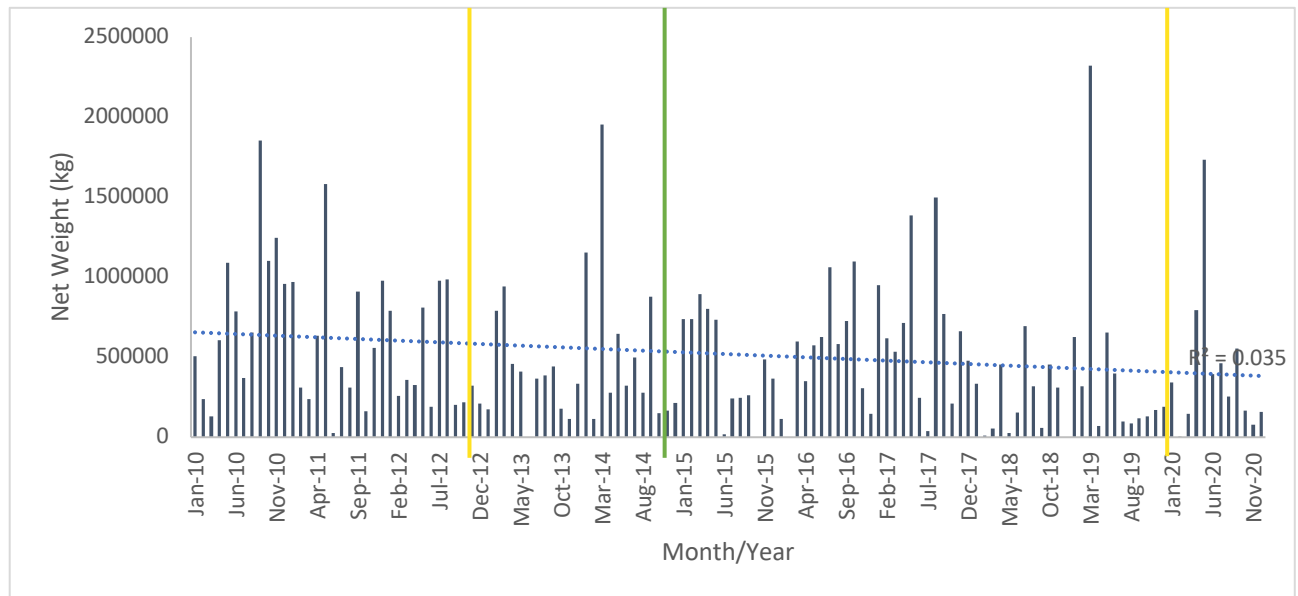


Figure A-2. Spain's monthly imports of frozen, non-filleted yellowfin tuna (*Thunnus albacares*) between January 2010 and December of 2020. There is no significant trend ($R^2 = 0.035$). Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014.

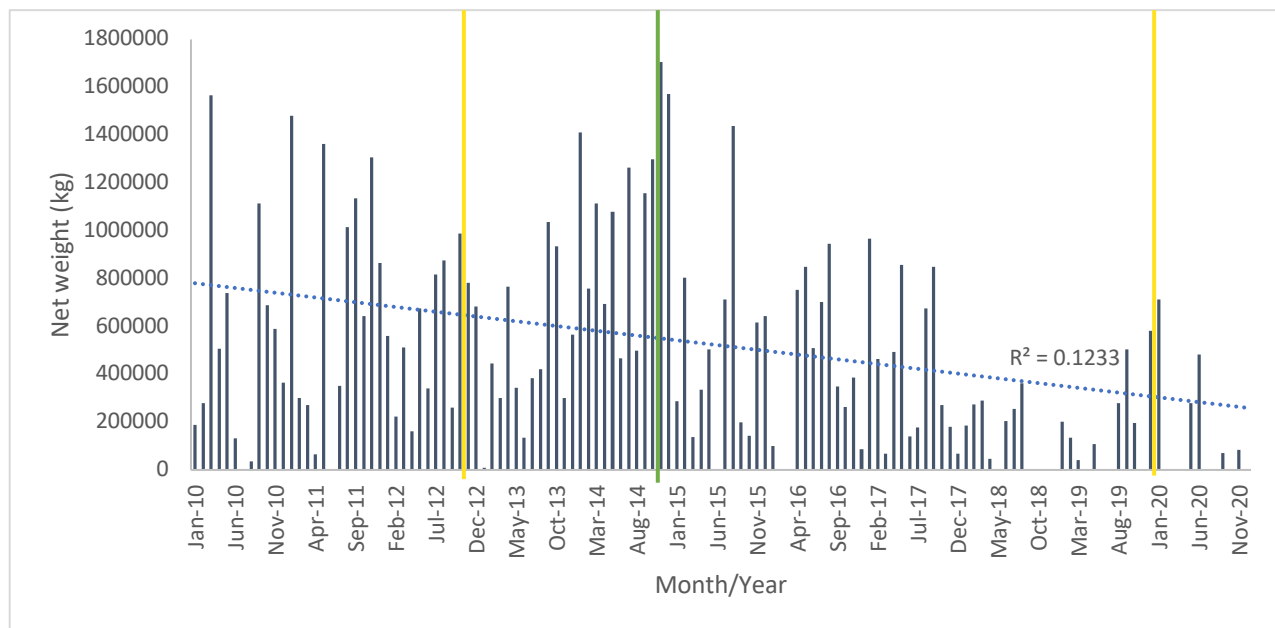


Figure A- 3. Spain's monthly imports of frozen, non-filleted skipjack tuna (*Katsuwonus pelamis*) from Panama between January 2010 and December of 2020. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014. There is a slight decreasing trend over time, but it is not significant ($R^2 = 0.1233$).

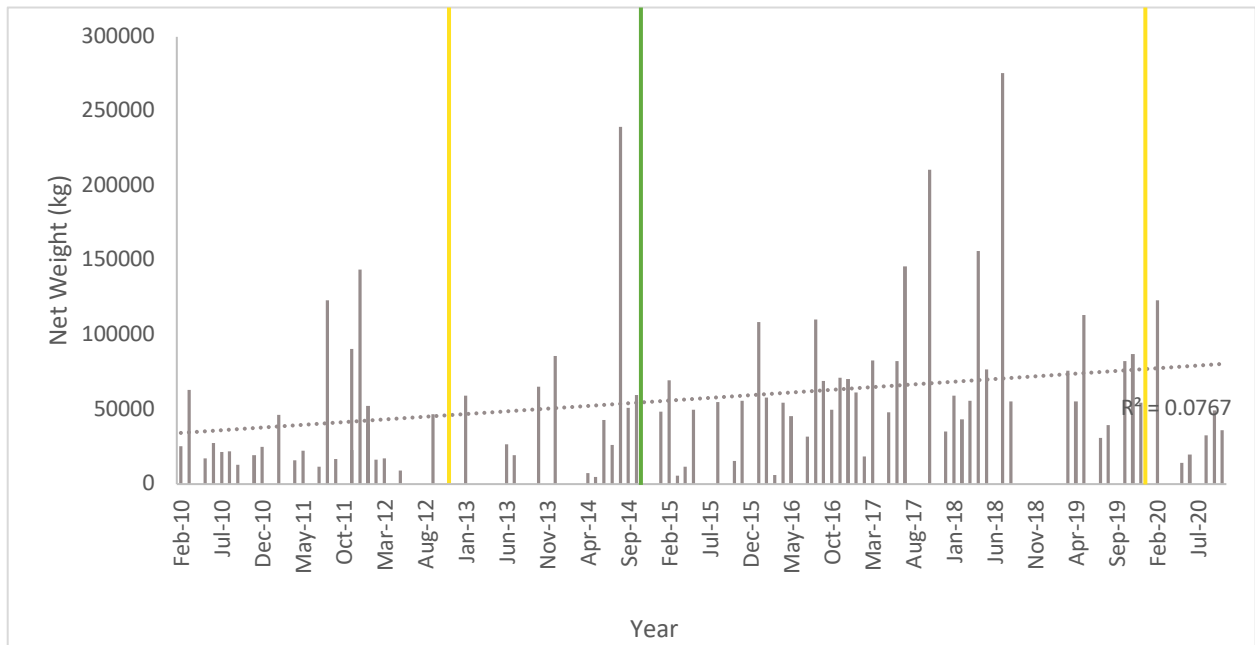


Figure A-4. Frozen, non-filleted dogfish and other sharks imported in Portugal from Panama. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014. There is no significant trend from January 2010 to November of 2020 ($R^2 = 0.0767$).

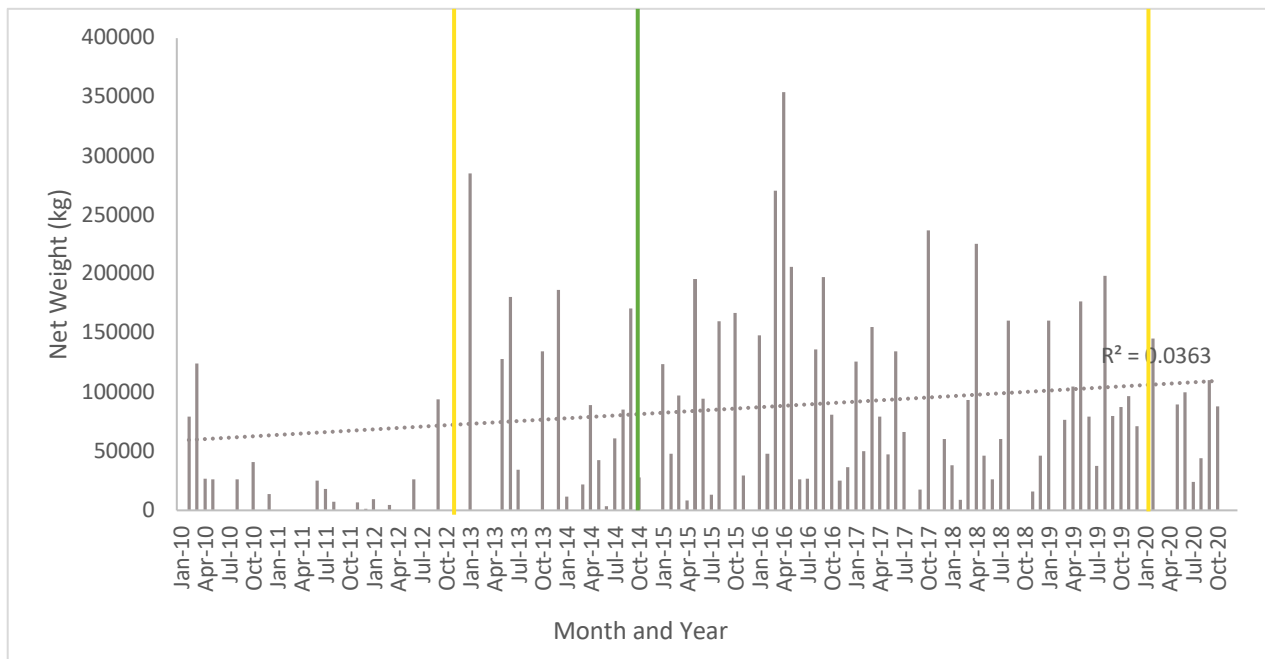


Figure A-5. Imports of Panama's frozen, non-filleted swordfish to Portugal January 2010-December 2020 ($R^2 = 0.0363$). Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014.

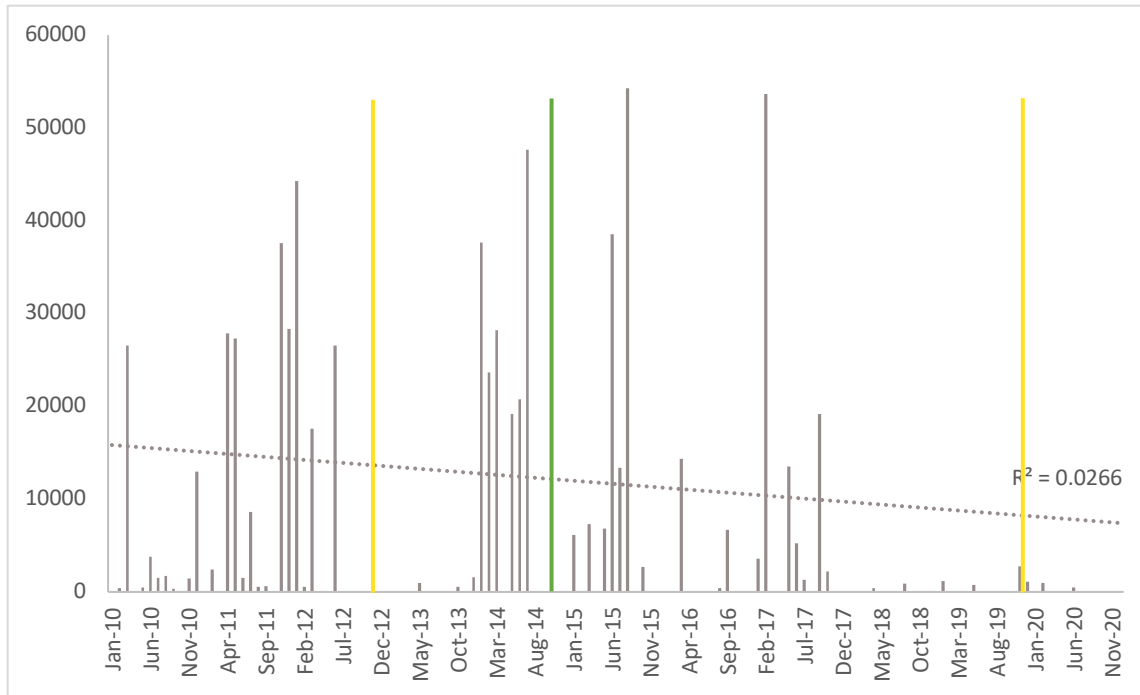


Figure A-6. Imports of Panama’s frozen, non-filleted yellowfin tunas to Portugal slightly decreased from January 2010 through December of 2020. Yellow lines denote the yellow cards, which occurred in November of 2012 and December of 2019, and the green line denotes when Panama was delisted in October of 2014.

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