

THE COCAINE-WILDLIFE CONNECTION:
CRIME CONVERGENCE IN
CENTRAL AMERICA

by

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LIST OF ABBREVIATIONS

Abbreviation	Description
CCDB	Consolidated Counterdrug Database
CITES	Convention on the International Trade in Endangered Species
CONAP	Consejo Nacional de Áreas Protegidas de Guatemala
DEA	Drug Enforcement Administration of the United States
DTO	Drug Trafficking Organization
FAO	Food and Agriculture Organization of the United Nations
FOIA	Freedom of Information Act
GAO	Government Accountability Office
IWT	Illegal Wildlife Trade
LEMIS	Law Enforcement Management Information System
MBC	Mesoamerican Biological Corridor
MBR	Maya Biosphere Reserve
NGO	Non-Governmental Organization
PA	Protected Area
SINAC	Sistema Nacional de Áreas de Conservación Costa Rica
UNODC	United Nations Office of Drugs and Crime

USFWS

United States Fish & Wildlife Service

WCS

Wildlife Conservation Society

ABSTRACT

This thesis analyzes the illegal wildlife trade (IWT) in Central America and its connections to cocaine trafficking in ecologically protected areas by conducting a multi-sited study of Costa Rica and Guatemala. Although Central America is known for its niche biodiversity, protected areas of Costa Rica and Guatemala vary in their responses to the impacts of organized crime. Recent research on international crime convergence suggests that illegal trading networks intersect, however, the links between illicit activities and global environmental change are poorly understood. My research asks: What are the spatiotemporal and species patterns of wildlife trafficking to the United States in Costa Rica and Guatemala from 2000-2014? And, what relationship, if any, exists between wildlife trafficking and cocaine trafficking in the region? To answer these research questions, I employ a mixed methodology, drawing on semi-structured interviews and statistical analyses of species patterns and cocaine and wildlife flows to uncover the relationship between these illicit commodity networks.

My research suggests that wildlife trafficking is increasing due to the proliferation of drug trafficking organizations (DTOs), their drug smuggling and money laundering activities in protected areas, and the subsequent proliferation of multiple illicit markets. My findings reveal that insects were the most common species shipped from Costa Rica to the United States for collectors and hobbyists, while reptiles, birds, and mammals were the prevailing species' shipped from Guatemala to the United States intended for the exotic pet trade. My non-parametric Spearman's Rho correlation resulted in a positive,

statistically significant correlation between cocaine seizures and wildlife shipments (both legal and illegal) from Costa Rica, and a moderately positive correlation from Guatemala. Finally, my thirteen interviews with protected area stakeholders provided further empirical insights into the ways in which the illegal commodity chains of cocaine and the IWT intersect. The geographies and networks of the IWT and cocaine trade overlap and intersect, but in ways that are more indirect than anticipated. Four key themes emerged from this qualitative analysis: 1) narco-traffickers demand for exotic animals increases the IWT, 2) drug trafficking drives land-use change that makes wildlife vulnerable, 3) drug trafficking creates “territories of impunity” where many illicit activities thrive, and 4) direct connections between cocaine and wildlife trafficking. My research concludes that the movement of cocaine facilitates the movement of wildlife to markets in the U.S. where both commodities are in high demand.

I. INTRODUCTION

The illegal wildlife trade (IWT) is the world's fourth largest illicit trade sector after drug trafficking, human trafficking, and arms dealing (Zimmerman 2003; UNODC 2015). The scale of wildlife trafficking is difficult to estimate due to its clandestine nature, but most estimates put the value (excluding timber and fisheries) around \$8-10 USD billion annually (TRAFFIC 2012; UNODC 2014). The intensification of wildlife trafficking over the past decades poses a significant threat to global biodiversity (Kurland et al. 2017). Central America encompasses 0.5 percent of the world's total land surface but is home to more than 7 percent of the planet's biodiversity (USFWS 2016a; WCS 2021). Despite the abundant biodiversity value of the Mesoamerican region, assessments of the scale and impact of the IWT have focused primarily on South America (UNODC 2016). Furthermore, conservation organizations and the media tend to focus on favored species that are routinely poached and traded (e.g. elephants, tigers, and whales), while countless other flora and fauna are also heavily exploited (e.g. insects, crocodiles, and rosewood) and receive comparatively less attention (Pires 2012). The current nature of the trade suggests the impacts are threatening the survival of endangered species and ecosystems of Central America (Reuter et al. 2018).

However, the IWT is just one illicit trade contributing to environmental degradation in the Central American corridor. Cocaine trafficking is another key driver of illegal deforestation and environmental degradation (McGinley and Cabbage 2011; Devine et al. 2021). Drug trafficking organizations (DTOs) contribute to illegal deforestation to launder drug money in agro-industries and to claim and establish drug smuggling routes (McSweeney et al. 2017). This "narco-deforestation" is concentrated in

protected areas of Central America where drug traffickers evade interdiction in remote and forested areas (McSweeney et al. 2014). Narco-deforestation is responsible for an estimated 30-60% of forest cover loss within protected areas of Guatemala, Honduras and Nicaragua (Sesnie et al. 2017). In remote national parks of countries with weak centralized governments, drug cartels have fostered a systemic culture of impunity in their territories through the use of violence and corruption, which enables wildlife trafficking to thrive (Tellman et al. 2020).

Emerging research on global environmental change and conservation crime suggests that drug and wildlife smuggling networks overlap in practice (INTERPOL 2015). These networks often utilize similar transportation routes and methods to smuggle illicit commodities, including money laundering or the falsification of legal permits regulated by international conventions (Gorder 2019). This characterizes recent research on crime convergence that signals how organized crime, particularly those controlled by the drug cartels, diversify into illegal trades in natural resources such as minerals, wildlife, and timber trafficking, and use similar smuggling methods to transport commodities (van Uhm and Nijman 2020). However, little research focuses explicitly on the intersection between drugs and wildlife, especially within the Central American transit zone. In Latin America more broadly, the high reward for exotic species and low risk of punishment by authorities have made IWT an attractive additional revenue stream for drug cartels (Reuter et al. 2018). Despite widespread recognition that illicit trades are a key threat to global environmental sustainability (UNODC 2016), illicit economies and their links to environmental change remain poorly understood because these activities are often dangerous for researchers to study directly (Hall 2013).

Therefore, the objective of my thesis is to uncover the nature of this relationship between the illegal cocaine and wildlife trades in Central America by conducting multi-sited research of protected areas in Costa Rica and Guatemala. My research asks: What are the spatiotemporal and species patterns of wildlife trafficking in Costa Rica and Guatemala from 2000-2014? And, what relationship, if any, exists between wildlife trafficking and cocaine trafficking in the region?

There are several factors that contributed to my decision to choose Costa Rica and Guatemala as the sites for my analysis. Although both countries are found within the Mesoamerican biodiversity hotspot and possess some of the largest remaining wild areas of Central America, as shown in Figure 1 (WCS 2016), they differ in their responses to transnational crime and the legislating environmental protection (Gluszek et al. 2020). The global perception of these countries was another component: Costa Rica is well-known for its biodiversity and centralized protected area system (DeClerck et al. 2010), while Guatemala is seemingly plagued with corruption and weak legal systems (McGinley and Cabbage 2011). Moreover, Costa Rica and Guatemala are positioned at different ends of the illegal cocaine transit spectrum (McSweeney 2016; Wrathall et al. 2020). Their differing governance structures impacts the ways in which forest and endangered species protections are managed and enforced (DeClerck et al. 2010). Guatemala is historically one of the oldest nodes in Central America, while Costa Rica is one of the youngest (Herlihy 1997). Furthermore, I am utilizing the 2000-2014 time period because it captures the emergence of drug trafficking through the Central American corridor in the early 2000s.



Figure 1. The 5 Largest Remaining Wild Areas of Central America

Source: USFWS 2016b

To answer my research questions, I employed a mixed methodology utilizing qualitative and quantitative analyses to uncover the species patterns of the IWT, and relationship linking cocaine and wildlife commodity chains. This included a quantitative analysis of species entering the United States from Costa Rica and Guatemala using the LEMIS database, a quantitative Spearman’s Rho correlation statistic comparing cocaine and wildlife flows, and a qualitative analysis of 13 interviews I conducted with protected area stakeholders. The results of my findings revealed that insects were the most common species shipped from Costa Rica, while reptiles, birds, and mammals were the prevalent

species shipped from Guatemala. Next, my non-parametric Spearman's Rho correlation produced a positive, statistically significant correlation between cocaine seizures and wildlife shipments (both legal and illegal) from Costa Rica, and a moderately positive correlation from Guatemala. Finally, my 13 interviews provided further empirical insights into the ways in which the illegal commodity chains of cocaine and the IWT intersect. Four key themes emerged from this qualitative analysis: 1) narco-traffickers demand for exotic animals increases the IWT, 2) drug trafficking drives land-use change that makes wildlife vulnerable, 3) drug trafficking creates "territories of impunity" (Devine et al. 2021) where many illicit activities thrive, and 4) examples of direct connections between cocaine and wildlife trafficking.

Through my findings, my research argues that the commodity chains of the illegal cocaine and wildlife trades do intersect, however, in ways that are more indirect than I initially anticipated. In addition, I contend that narco-driven degradation is severely impacting biodiversity and wildlife populations in protected areas of Central America. Furthermore, I conclude that the intensifying movement of cocaine is facilitating the movement of wildlife to markets in the United States.

II. HISTORICAL BACKGROUND

The Meso-American Biological Corridor

Three million years ago, the narrow strip of land or “isthmus” connecting the North American and South American continents, which eventually became Central America was created (Webb 1997; DeClerck et al. 2010). This land bridge enabled a unique biological process known as the “Great American Faunal Interchange” to occur, whereby temperate flora and fauna from the northern hemisphere and tropical species from the Amazon basin began migrating to the isthmus (Herlihy 1997). This area now comprises seven countries: Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama (DeClerck et al. 2010). Central America encompasses a wide variety of biomes from tropical rainforests to mountainous grasslands, and is part of the Mesoamerican biodiversity hotspot, which extends from northern Guatemala to central Panama (Foster 2009a). While Central America encompasses only 0.5 percent of the world’s total land surface, it is home to more than 7 percent of the planet’s biodiversity (USFWS 2016a; WCS 2021). In fact, this region contains more species of birds than currently exist in both the United States and Canada (Herlihy 1997; FAO 2011). Today, as shown in Figure 2, roughly 10.7% of Central America is under some category of protection for biodiversity conservation. These protected areas (PAs) are regionally integrated, at least on paper, into a single functional conservation area called the Mesoamerican Biological Corridor (DeClerck et al. 2010). Historically, Central America is not new to the trade in wildlife. However, there is a stark contrast in the manner and scale of wildlife trading that was conducted in the Pre-Colombian Era compared to Post-Spanish Colonialization (Myers and Tucker 1987).

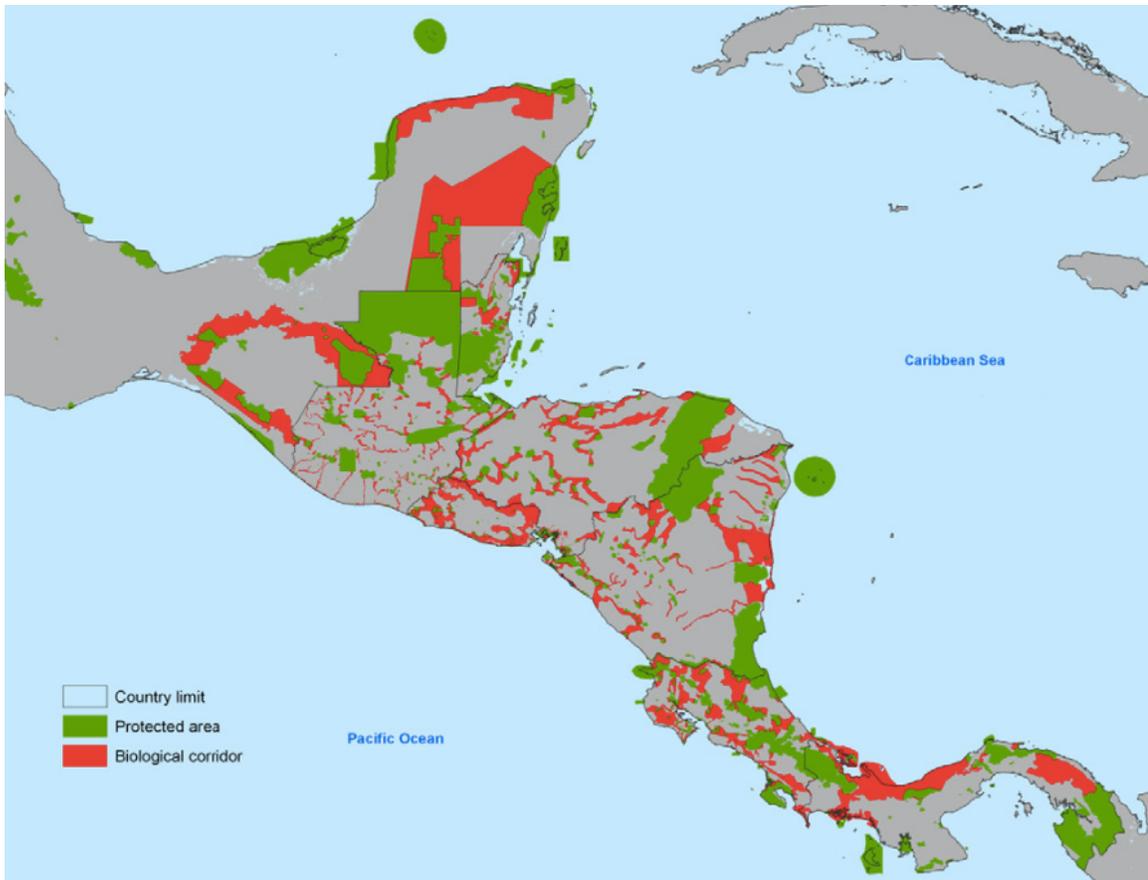


Figure 2: Map of Mesoamerica representing protected areas (green) and the Mesoamerican Biological Corridor areas (red) attempting to establish structural connectivity between the protected areas. Source: DeClerck et al. 2010

During the Classic Period (250-900 AD), the Mayan Civilization dominated trade across ancient Mesoamerica (Herlihy 1997; Foster 2009b). The practices of hunting and trading wildlife were widespread throughout the isthmus. The Mayan peoples utilized fauna for a variety of functions: as a source of protein, materials for clothing, ornamentation, pets, jewelry, and for spiritual and medicinal purposes (Reuter et al. 2018). For instance, the largest feline in the Americas, the jaguar (*Panthera onca*) was culturally significant to Indigenous communities throughout Central and South America

as symbols of strength, courage, ferocity, and nobility (Cooke 1997; Saunders 1998). As a result of this symbolism, jaguars were hunted for their pelts and teeth (Arias et al. 2020). Likewise, parrots (*Psittaciformes*) have been taken from the wild for hundreds of years. In addition to serving as vibrant and lively companions, they were also eaten and their feathers collected to adorn ceremonial clothing and decorations (Pires 2012). However, these human-environmental dynamics were disrupted with the arrival of the Spanish and commercially-driven poaching and international trade (Reuter et al. 2018).

By the 17th century, colonization and conquest by the Spanish and other Europeans had radically altered the landscape of Central America (Cooke 1997). In addition to enslaving Indigenous peoples, the Spanish disrupted native crop cultivation practices (Schwartz 1990), engaged in massive deforestation projects to produce farmland for cash crops (Myers and Tucker 1987), and dramatically increased the harvesting and exchange of plants and animals (Heckadon-Moreno 1997). As one of the oldest nodes in Central America (Herlihy 1997), Guatemala witnessed the proliferation of mercantile trade in natural resources such as ores, minerals, lumber, and wildlife (Schwartz 1990). This was because Guatemala City was the official seat of Spanish royal power and oversaw the movement of internal and external trade throughout the Spanish colonial Empire (Heckadon-Moreno 1997). In the early 1820s, the Latin American wars for independence had severely weakened the region's economy. The new regimes and upper classes of Central America were eager to purchase luxury goods from Europe and attract foreign capital to develop their commercial economies (Myers and Tucker 1987). Throughout the 19th and 20th centuries, technological advancements and improved transportation routes enabled the large-scale commercial trade of flora and fauna from

Latin America to flourish (Reuter et al. 2018). A variety of animal and plant products were involved in this transnational exchange, including parrot feathers for the Victorian and Edwardian Era fashion industry (Doughty 1975), live primates for the emerging biomedical field (Robinson and Redford 1991), and mahogany for the furniture industry (Myers and Tucker 1987). The early 20th century witnessed the most active commodity chains from Central America with skyrocketing demand for furs and skins as luxury items in Europe and the United States (Reuter et al. 2018). Although the wildlife trade is not a new phenomenon in Central America, the exponential nature of this large-scale commercial trade was a contributing factor in the development of international environmental treaties to control and in some cases prohibit the commercial sale of certain species (Wijnstekers 2011).

CITES and the International Pet Trade

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a binding international treaty signed in 1973 with a mission to regulate the worldwide commercial trade in wild animals and plant species (CITES 2019). The convention was signed by 183 governments who voluntarily adhere to its resolutions and its listings known as Appendix I, II, and III, which encompass roughly 36,000 species (CITES n.d.).

Appendix I includes species threatened with extinction and trade in these species is permitted only in exceptional circumstances. Examples of Appendix I species include the giant pandas, gorillas, Asian elephants, and all tiger species. Appendix II species are those not “immediately” threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival (Wijnstekers 2011). The vast

majority of species, roughly 95 percent, are listed under Appendix II (CITES n.d.). Appendix III contains species that are protected in at least one country and other CITES parties are asked to assist in controlling the trade (CITES 2019).

Although the treaty was intended to prevent the over-exploitation of wild animals and plant species, CITES has been criticized for doing little to curb the illegal international trade of fauna and flora, and the skyrocketing exotic pet trade (Nuwer 2018). Unlike the fur and feather trades of the 19th and 20th centuries, consumers of the international exotic pet trade in Europe and the U.S. covet and commodify birds, small mammals, and reptiles as “lively capital” (Collard 2020). This term coined by Rosemary-Claire Collard in *Animal Traffic* (2020) characterizes how humans fetishize the idea of owning exotic pets both as commodities and as lively objects. However, consumers ignore how the process of capturing and selling animals severs the ties to their complex socio-ecological networks in ways that make them appear as if they do not have lives of their own (Collard 2020). CITES currently monitors fewer than ten percent of known reptiles and eight percent of known birds (Nuwer 2018). Compounding this, many wild-caught species are traded under falsified captive-bred documentation (Nijman 2010). This is captured powerfully by Guatemala conservation leader, Sr. Ruiz who described wildlife trafficking as:

All economic activities concerning animals that do not include a permit. Permits will allow anything— sport hunting, subsistence hunting, timber extraction, animal trading... CITES is a trade organization that manages the movement of plants and animals but does not impede their exchange. (Sr. Ruiz)

As Sr. Ruiz articulated, CITES is fundamentally a trade organization concerned with the lawful exchange of species and not their preservation. Central America is uniquely threatened by this defaunation as it does not possess large charismatic mega-fauna that draw the public's attention. The species that are in abundance such as macaws, small mammals, reptiles, and insects remain threatened by unfettered trade (Collard 2020). In addition, often ignored is how this escalation in the extraction of species from Central America coincided with decades of socio-political turmoil spurred by U.S. military intervention throughout the region.

CIA Intervention in Guatemala

The ten years of the “Democratic Spring” (1944-1954) in Guatemala came to an end after President Jacobo Arbenz passed Decree 900 in 1952 (Jonas 2000). This law compelled the largest landowner in the country, the American United Fruit Company, to sell its idle lands back to the government for redistribution to poor and Indigenous peasants. The CIA responded to the decree by funding and executing a military coup in 1954 that overthrew Arbenz and installed the first of dozens of military dictatorships that maintained power in Guatemala until 1985 (Schlesinger and Kinzer 2005).

In 1982, US-backed General Rios Montt enacted a genocidal “scorched earth campaign”, which resulted in the deaths of over 200,000 people and displaced millions during Guatemala's 36 year-long civil war (1960–1996) (Jonas 2000). Many people fled to Mexico as refugees, passing through Guatemala's northern province of the Petén while others decided to permanently settle in the Petén's forests (Schwartz 1990). Meanwhile, revolutionary guerilla forces used the rainforests of northern Petén to evade the Guatemala army and Indigenous Mayan communities occupied these territories as well

(Ybarra 2012). Government forces did not distinguish between guerilla fighters and local Indigenous communities and during the genocide entire communities, including in the Petén, were massacred (Schirmer 1998). The Guatemalan peace process (1985-1996) brought the first civilian to the executive branch in over thirty years. President Cerezo identified the creation of a national protected area system as another priority and defining feature of his administration (Nations 1996).

Conservation, the National Parks System, and Ecotourism

While Costa Rica and Guatemala established their own protected area (PA) systems, their respective paths to conservation management were influenced by their complex historical and political differences (Janzen and Hallwachs 2019). Furthermore, though these conservation management models may appear similar with both managing national parks and biological reserves, Costa Rica and Guatemala differ on their exact use of multiple zones, and how much territory contains human inhabitants.

Until the 1960s, the lowland Petén region of Guatemala was home to only a handful of small forest villages and timber companies dependent upon the extraction of forest resources such as mahogany or *chicle* to produce chewing gum (Radachowsky et al. 2012). However, in response to public concerns regarding rising deforestation rates in Latin America, Guatemalan state officials, national conservationists and their global allies created the *Consejo Nacional de Áreas Protegidas* (CONAP) in 1989 and the Maya Biosphere Reserve (MBR) in 1990 (McGinley and Cubbage 2011). It is important to note that the Guatemalan peace process, following the 36-year civil war, unfolded in tandem with the creation of the national protected area systems (Jonas 2000).

The MBR spans over two million hectares and covers more than half of the department of Petén, almost twenty percent of the national territory, and is the largest protected area in Guatemala's National Protected Areas System (Nations 1996; CEMEC 2004). Forty percent of the reserve is a “multiple-use zone” where the state permits sustainable forest extraction in the east and residency for Indigenous and peasant communities established prior to 1990 (Hodgdon et al. 2015). Thirty-six percent of the reserve is a “core zone” made up of national parks such as the ancient Mayan site of Tikal where research and tourism are allowed, but residency and other forms of livelihood are not permitted. The Laguna del Tigre National Park is the largest core zone with twenty-four percent designated as a “buffer zone” with few land use restrictions (Nations 1996). Today the MBR is emblematic of Indigenous, environmental, resource and land-use struggles unfolding throughout Latin America (Devine 2018). However, recent scholarship has revealed how the weakly governed remote areas of the MBR offer the ideal conditions for traffickers to evading interdiction (Devine et al. 2020b).

By contrast, Costa Rica was not marred by a three-decades-long civil war and genocidal “scorched earth campaign” funded by the U.S. government. Initially, like many of its neighbors, Costa Rica’s economy and natural resources were exploited by the United Fruit Company (Schlesinger and Kinzer 2005). However, following the “Great Banana Strikes” of the 1930s, the United Fruit Company was required to sign a collective agreement with its laborers in 1938, which eventually led to the formation of trade unions. In addition, Costa Rica under José Figueres Ferrer successfully abolished the military in 1948, earning it the title “the Switzerland of Central America” (Evans 1999; Rankin 2012). Equally important is the fact that most Costa Rican coffee growers, the

country's main crop (DeClerck et al. 2010), was farmed on small, family-owned *cafeteras* rather than large-scale plantation monocultures (Evans 1999). These social and economic advantages along with a stable democracy enabled a middle class to emerge in Costa Rica (Rankin 2012).

However, by the early 1970s, Costa Rica was witnessing massive rates of deforestation in its wilderness areas due to unchecked agricultural development and cattle raising (Boza 1993). This came to be known as “the grand contradiction” due to the paradox of Costa Rica developing its extraordinary national park system while simultaneously engaging in massive deforestation (Evans 1999). To combat this, the Costa Rican government began limiting the financial resources available to outside donors and allocated federal funds into new conservation programs (DeClerck et al. 2010). This influenced the development of a national system of protected areas which began in the 1970s, and today encompasses twenty-seven percent of the national territory (Vaughan et al. 1998; Rankin 2012).

In 1991, Costa Rica created the *Sistema Nacional de Áreas de Conservación* Costa Rica (SINAC) based on the biosphere reserve concept, consisting of a multiple-use conservation area with a manipulative (buffer) and natural (core) zones which united seventy-three of the seventy-eight wilderness areas (Garcia 1992; Vaughan 1994). By 1994, tourism, in particular ecotourism had become the primary source of foreign currency in Costa Rica, replacing the traditional three major exports of coffee, bananas, and cattle (Rankin 2012). The Costa Rican network of national parks and wildlife reserves covers approximately 622,000 hectares or 12.2% of the country's territory. Due

to its remarkable biological wealth and variety, Costa Rica has become a major destination for ecotourists, naturalists, and scientific researchers (Boza 1993).

Although Central America is familiar with the commercial trade of wildlife, the industrial-scale extraction of flora and fauna during the 19th and 20th centuries nearly decimated the region's wildlife populations. The subsequent founding of CITES was intended to regulate the international trade of threatened and endangered species, however many have argued that it has done little to curb the growing illegal pet trade, which fetishizes wildlife as commodities and lively objects. Simultaneously as animals were being extracted from Central America, Guatemala was enduring socio-political turmoil beginning with the U.S. funded military coup in 1954 and an over three-decades-long civil war that killed thousands of people and displaced hundreds of thousands. Costa Rica by contrast, had abolished its military in 1948 and was able to diversify its economy from coffee to ecotourism thereby supporting the growth of a middle class. While both Guatemala and Costa Rica established their own PA systems, their complex historical and political lineages influenced the ways in which they manage their national parks and biological reserves, and provide an explanation for the corruption and exploitation of PA by illicit economies.

III. LITERATURE REVIEW

This thesis draws on and contributes to literature examining the environmental impacts of wildlife trafficking, drug trafficking, and crime convergence analysis of illicit activities. The current trend in illicit economies scholarship is to attempt to understand the drivers and characteristics of each illicit network separately (Reuter and O'Regan 2017). As such, scholarship analyzing the clandestine connections and overlapping networks between the illicit markets such as the drug and wildlife trade is scarce. To examine the links between these two trades, I separately analyze and compare the existing literatures within the cocaine and wildlife trafficking sectors and then analyze the emerging research on crime convergence.

Wildlife Trafficking in the Americas

The trafficking of wildlife is increasingly recognized as a specialized area of organized crime and a significant threat to existing flora and fauna species (Duffy 2016). While there are international instruments defining other forms of organized crime, including drug trafficking, human trafficking, firearms trafficking, and smuggling of migrants, there is no equivalent agreement defining transnational wildlife crime. Therefore, there is no universally accepted definition of what this study describes as “wildlife trafficking” (Wyatt et al. 2020). Non-governmental organizations have broadly characterized wildlife trafficking as the criminal activity resulting from the removal, possession, and exploitation of wild flora and fauna – covering the entire supply chain from poaching and transportation to processing and selling – that violates national and international laws protecting threatened or endangered species (Wittig 2016). According to Phelps et al. (2016), debates on the science and policy of the IWT generally

concentrate on a few high-profile species (tiger, rhinos, and elephants) and synthesize the available evidence on IWT across taxonomies and contexts into a typology-based framework. Since wildlife populations are dynamic, most wildlife protection laws are at the behest of executive branches of the government to issue regulations determining when and how wildlife can be harvested. Species can be added and removed from protected species lists, licenses issued allowing the legal taking of wildlife, and quotas established to ensure sustainability (UNODC 2016). Furthermore, as a consequence of more wildlife being poached from the wild and trafficked to illicit markets around the world, conservationists and criminologists have become increasingly interested in quantifying the loss of species' populations to poaching (Warchol 2004). In addition, no comprehensive crime database exists at the regional or global level detailing poaching incidents by species. In the absence of a comprehensive crime database, much conservation literature details methodologies that quantify the numbers of specific species poached in the wild at the local and national levels (Kurland and Pires 2017).

As the single most biologically diverse region of the world, Latin America has experienced the commercial trade of its wildlife species, their products and derivatives for hundreds of years, circulating throughout domestic and transcontinental markets for both the legal and illegal trade (Arias et al. 2020). Animals of particular importance include birds, reptiles, and amphibians for the growing pet trade, and primates, turtles, and ungulates (hoofed mammals) for the meat markets. Amongst live animals, birds are the most frequently trafficked in Latin America and are in high demand in domestic pet and collector markets (Reuter et al. 2018).

In Central America, Scarlet Macaws (*Ara Macao*), once widespread across the region, have been reduced to fewer than 1,000 individuals. Guatemala and Belize have been especially hard-hit by macaw poaching (Gluszek et al. 2020). In Guatemala, there are approximately 300 scarlet macaws left in the wild, while in Belize, there are fewer than 250 (Reuter et al. 2018). Latin American markets for wild birds now source animals both from within the region and internationally. For example, Mexico is probably the most significant importer of wild birds in Latin America, with some 50,000 birds per year imported not only from other Latin American countries but also from Africa (FAO 2011). There has been little systematic documentation of the trade at a regional scale, but it is clear that there has been a transition away from sustainable, Indigenous subsistence hunting to unsustainable commercial smuggling that quickly depleted local wildlife populations (WCS 2021). Traffickers move wildlife along paths of least resistance, and for wildlife, as compared to other contraband such as narcotics, this movement does not require sophistication, since most reports find that smugglers most commonly use existing public transportation routes (UNODC 2016). For example, a recent global analysis of publicly reported seizures of wildlife traveling through sea and airports found the most common routes for illicit products follow common air passenger routes, from hub airports near supply markets in the Southern Hemisphere to hub airports near demand markets in the Northern Hemisphere (Reuter et al. 2018).

Cocaine Trafficking in Central America

Cocaine is trafficked through the same air, maritime, and land infrastructure as wildlife. The United States has spent \$3 trillion disrupting the trafficking of drugs since declaring the “War on Drugs” in the 1970s (Brodzinsky 2017). However, as people are

producing and consuming illicit drugs at record levels, drug cartels are wealthier and more powerful than ever before (Devine et al. 2020a). Central America has facilitated this movement of cocaine due to its position as a transit corridor in the supply chain, connecting Colombian exporters with Mexican cartels. In 2010 alone, 330 tons of cocaine made its way through Guatemala and 128 tons through Costa Rica (McSweeney 2016). The value of this cocaine was \$4.046 billion (US) for the Guatemala shipments and \$896 million (US) from Costa Rica (McSweeney 2020a). These statistics exemplify the vast quantities of cocaine traveling through the isthmus. However, Central America was not always the preferred route for the exporting of cocaine. Originally, Colombian cocaine destined for the U.S. traveled through the Caribbean along a variety of sea and air routes to the Miami transportation hub. Military interdiction as a result of the U.S. War on Drugs is responsible for the balloon effect that pushed cocaine traffickers away from the Caribbean and into Central American rainforests (McSweeney et al. 2014).

The War on Drugs

The U.S.-led War on Drugs, beginning in earnest in the 1980s was intended to curb the global demand and curtail supply of narcotics, but failed spectacularly at both endeavors (McSweeney et al. 2017). Through drug interdiction tactics, or initiatives designed to delay, disrupt or destroy drugs as they are shipped from production zones to markets, militarized operations focused on so-called “transit zones” in South America, Central America, and the Caribbean (Magliocca et al. 2019). For decades, the U.S. harnessed the drug interdiction mandate to equip, fund, train, and coordinate directly with military units in most countries within this zone (McSweeney 2020b). This intensification in the monitoring of maritime routes throughout the Caribbean facilitated the balloon

effect that re-routed principal transportation of cocaine into Central America (Magliocca et al. 2019). This transition, according to McSweeney et al. (2014) successfully transformed drug traffickers into opportunistic non-state actors, capable of adapting their investment options and conditioning their spatial mobility.

The first fundamental failure of the U.S. Drug Enforcement Administration (DEA), as Kenney (2007) argues, was their misunderstanding of the Colombian drug trade by focusing their attention on the mythical monopoly power of cocaine kingpins and a handful of massive, vertically integrated cartels. The second failure scholars have examined is the orthodox “supply-side” strategies, including interdiction and drug crop eradication (McSweeney et al. 2014). The third failure was the militarization of drug interdiction, which reproduced and exacerbated violence and environmental destruction in the countries designated along the cocaine transit corridor (Tellman et al. 2020). In addition, interdiction programs push traffickers into remote areas where they intensify existing pressures on forests and find new opportunities for money laundering and illegal enrichment through forest conversion (Radachowsky et al. 2012). As scholars of the illicit have critiqued, sustained counter-narcotic support from Washington provides Central American governments with the resources and justification for militarizing rural spaces while scapegoating Indigenous peoples and smallholders as drug-trafficking criminals (Devine et al. 2020a).

Despite the clear failure of the War on Drugs, the US Office of National Drug Control Policy still spends 55 percent of its annual budget fighting the supply of drugs. Scholars have suggested that intensified ecological devastation across trafficking zones can be added to the long list of negative unintended consequences borne by poor

countries as a result of the overwhelming emphasis on supply-side drug reduction policies (McSweeney et al. 2017; Magliocca et al. 2019; Tellman et al. 2020).

Illicit Drivers of Environmental Change

For nearly forty years, researchers have criticized U.S. eradication policies that push coca (opium poppy and marijuana) growers into ever more ecologically sensitive zones such as protected areas and national parks to evade interdiction operations (McSweeney et al. 2014). Vandergeest and Peluso (2015) coined the dimension of power relations imposed on forests as “political forests”. The authors argue that forests are political as well as biological beings and are the result of interconnected ecological processes, governance practices and relations of power. Therefore, in political forests, hegemonic governing actors manage resources, people, and territory by distinguishing between forest and non-forest spaces, species and appropriate land uses (Devine et al. 2020a). According to Devine et al. (2020a), DTOs known locally as “powerful ranchers” and their investors utilized remote forested regions in Central America by violently exerting power not only over the landscapes but also over residents and workers within the political forests. This concept is foundational to the IWT, as I argue that DTOs also exercise power over wildlife and resources within political forests and are key actors in driving biodiversity loss and defaunation.

Although there is increasing recognition that drug activities are a threat to ecologically protected areas, the environmental impacts of cocaine transit zones remain poorly understood (Devine et al. 2020a). Existing cocaine research has drawn a link between DTOs and rates of deforestation in Central America. According to McSweeney (2020b) as much as sixty percent of total deforestation between 2000 and 2014 in the

protected areas of the Mesoamerican Biological Corridor (MBC) can be linked to the international cocaine trade. It is estimated that cocaine trafficking related activities can account for 30-60 percent of deforestation in Nicaragua, Honduras, and Guatemala (Sesnie et al. 2017). As McSweeney et al. (2014) explain, there are three interrelated mechanisms by which forest loss follows the establishment of a drug transit hub: forests are felled for clandestine roads and landing strips, DTOs intensify already existing pressures on weakly governed frontiers, and DTOs are incentivized to convert forests into agriculture or pasture to generate launderable profits.

This “narco-deforestation” is concentrated in political forests and in remote, protected areas often along international boundaries. According to McSweeney et al. 2017, deforestation patterns in protected areas can be linked to global demand for commodities, such as cattle ranching, and oil palm that are grown in large-scale industrial farms. Utilizing a case study example of the Laguna del Tigre National Park in Guatemala’s MBR, Devine et al. (2020a) argued DTOs began to launder their money through cattle ranching operations and looked to the northern department of the Petén’s as a territory on the margins of state control. The cattle industry is particularly advantageous for DTOs. In the deregulated Central America common market, DTOs exploit a loophole. In Central America, the purchase and sale of cattle does not require receipts and is not taxed and regulated like other commodities. Rather, cattle are sold to Mexican buyers and narco-capitalized ranchers receive a legal receipt that hides their illicit origins (Devine et al. 2020a).

Crime Convergence

Although the phrase “crime convergence” has existed in the lexicon of criminology literature for several decades, the growing awareness of the connection between the IWT and other forms of transnational organized crime, in particular drug trafficking, is eliciting academic and public attention. However, the limited academic research examining the ways in which the IWT and illegal cocaine trade converge either overemphasizes the comparison aspect, neglecting to investigate how their commodity chains intersect, or approach the analysis from an entirely criminological or biological standpoint. Whereas a geographical approach utilizes spatial perspectives, integrating both human and environmental perspectives

Cook et al. (2002), in their foundational report connecting the illegal wildlife trade and other forms of organized crime, contend that while the international trade in wildlife is legal, by instituting bans and prohibitions on the trade of certain species, negotiations like CITES created the opportunity for a parallel illegal trade to flourish. This symbiosis of the illicit trade alongside the legal one was easily exploited by powerful DTOs that utilize wildlife trafficking as a subsidiary trade (Cook et al. 2002). This research suggests that there are many shades of gray regarding (il)legality; wildlife legally imported to the US may have been illegally captured, bred, or purchased disingenuously for museum, zoo, and other conservation purposes. Although Cook et al. (2002) did not examine the overlapping supply chains of the illegal cocaine and wildlife trades, they did examine how DTOs use legal shipments of wildlife to conceal drugs and wildlife as part of the laundering of drug traffic proceeds.

The criminology literature maintains that DTOs are increasingly entering the IWT due to the secondary activity's low-risk and high-reward (Wittig 2016.). South and Wyatt (2011) conducted a comparative study analyzing the similarities and differences between the IWT in Russia and the illegal drug trade in Western Europe. They corroborated the secondary activities premise, examining how European drug operations are “business sideliners” and “criminal diversifiers” (South and Wyatt 2011). However, they do not consider the ways in which drug trafficking fuels environmental degradation, like many interdiction and criminology approaches; focusing their attention on the hierarchical structures of drug and wildlife syndicates rather than integrated supply channels.

There is growing interest within the global conservation community to broaden understanding of how alternative dynamics shape conservation-related policies. Masse et al. (2020) analyzed the conservation-crime convergence discussed at the 2018 London IWT Conference. They reveal how the conservation policy landscape increasingly promotes and privileges responses to IWT that are based on legal and judicial reform, criminal investigations, intelligence gathering, and law enforcement technologies (Masse et al. 2020). Thereby, a criminology standpoint is the prevailing approach in the on-going conservation of crime convergence. This framework casts the model of investigating illicit extraction and trafficking of flora and fauna as a “serious crime” due to the response being based “in criminological, logistic and law enforcement thinking in practices” (Masse et al. 2020).

This research advances the three bodies of literature described above in three important ways: First, there is little examination of the overlap in the Mesoamerican Biological corridor and the Cocaine Transit Zone. Second, drug trafficking is a threat to

global biodiversity. Third, it argues that national security and conservation policies are intertwined, but the interdiction policies and the War on Drugs is negatively compounding these interconnected markets.

Furthermore, Central America receives considerably less attention from transnational conservation agencies than Africa, Asia or even South America, since the region does not possess the large megafauna that garner both public and governmental attention like the elephant or the tiger (Reuter et al. 2018). Instead, Central America's flora and fauna are more exploitable by internal and external trade (Gluszek et al. 2020). This is compounded by the fact that biodiversity in Central America is under-inventoried by biologists and conservationists (DeClerck et al. 2010). Therefore, biodiversity and wildlife are being lost before we know what is occupying the area. This research also continues the literature on narco-deforestation and narco-degradation in ecologically sensitive areas and how international drug policies need to be treated equally as conservation policies (McSweeney et al. 2014). By adding to the growing literature, I situate my research within the wider spectrum of illicit cross-border trading, as well as to studies of drug trafficking and its relationship with other forms of organized criminal enterprise.

IV. METHODS

I applied a mixed methodology, utilizing qualitative and quantitative analyses to uncover the patterns and relationship linking the cocaine and wildlife commodity chains. This included a quantitative analysis of species entering the United States from Costa Rica and Guatemala, a quantitative Spearman's Rho correlation statistic comparing cocaine seizures and wildlife shipment cases, and a qualitative analysis of 13 interviews I conducted with protected area stakeholders.

Data Collection

To estimate cocaine flows through Central America, I used the Consolidated Counterdrug Database (CCDB). The CCDB is a U.S. government dataset created by the Government Accountability Office (GAO); an independent, non-partisan entity vetting and recording nearly fifty years of known cocaine trafficking seizures conducted within the Western hemisphere's transit zone, including Mexico, Central America, and the Caribbean (McSweeney 2016). Created in the 1990s, the CCDB curates data from a variety of sources produced by the twenty-six U.S. agencies and twenty foreign partners involved in cocaine-specific transit zone interdiction (McSweeney 2020a). Therefore, the CCDB offers a highly reliable, yet conservative estimate of cocaine trafficking through the Central America corridor. I obtained the CCDB from a colleague, Dr. Kendra McSweeney, due to her extensive research utilizing the database.

For this research, the seizure data from the CCDB served as a proxy for cocaine flows. First, I collected the rows containing the departments (provinces) located in Costa Rica and Guatemala. I acquired seizure data from four total departments: the Peten and Alta Verapaz in Guatemala, and Puntarenas and Limon in Costa Rica. Then I retained the

data columns containing the “Total number of trafficking events verified to have occurred in/out of that location” and the “Total kg seized in location”. Then I summed up the total number of trafficking events by year, and the total kilograms seized per year. The result was the annual total kilograms of cocaine seized and the total number of seizure events for both countries between 2000 and 2014.

To estimate wildlife trafficking flows from Central America, I used the United States’ Fish and Wildlife Service’s Law Enforcement Management Information System (LEMIS) database to uncover species trends for Costa Rica and Guatemala. In the United States, imported and exported wildlife had to be declared to the USFWS. This information on live animals and animal products collected from 72 air- and seaports was then transcribed and inputted into the LEMIS database (Livergood et al. 2014; Kurland et al. 2017). I acquired the LEMIS data via a Freedom of Information Act (FOIA) request. The dataset included all declared imported wildlife shipments from Costa Rica and Guatemala from January 1st, 2000 to December 31st, 2014. For this thesis, the LEMIS datasets served as a proxy for wildlife flows. However, in contrast to the CCDB, which provided solely illicit cocaine seizures, the LEMIS database provided data on both legal and illegal shipments to the United States.

Using the LEMIS data tables, I collected the information listed under the column “country origin” with the acronyms “CR” indicating Costa Rica and “GT” indicating Guatemala from 2000 to 2014. To match the variables collected from the CCDB, I retained the data columns containing the “unit” amount of wildlife for each shipment. On the LEMIS database, each row represented a single shipment case. Then, I summed up the total number of shipment cases by year, and the total amount of wildlife per year. The

result was the annual total wildlife products and the total number of shipment cases for both countries between 2000 and 2014.

To capture the species' patterns, I used the column "generic_name" in the LEMIS database to gather information on the species types for each shipment. I manually-coded the generic taxonomy types using my own personal coding matrix (shown in Table 1). The category "other" was used to categorized animals and products that did not already fall into the other five taxonomy types.

Table 1. LEMIS Taxonomy Codes

Taxonomy Type	Code #
Insects	0
Mammals	1
Birds	2
Reptiles	3
Fish (general)	4
Amphibians	5
Other	6
Unclassified	7

From September 2020 to February 2021, I conducted semi-structured interviews via Zoom with PA stakeholders in Costa Rica (n=5), Guatemala (n=6), Colombia (n=1), and the United States (n=1) for a total of 13 interviews (shown in Table 2).

Table 2. List of Interview Participants

Name:	Country:	Occupation:	Date of Interview:
1. Sr. Gomez	Guatemala	Member of a Conservation Organization	September 4 th , 2020
2. Sr. García	Guatemala	Conservation Organization Leader	September 4 th , 2020
3. Sr. Fernández	Guatemala	Conservation Organization Leader	September 11 th , 2020
4. Dr. Sánchez	Costa Rica	Conservation Organization Leader	September 17 th , 2020
5. Sr. Ruiz	Guatemala	Conservation Organization Leader	September 17 th , 2020
6. Sra. Moreno	Colombia	Conservation Organization Leader	September 25 th , 2020
7. Sr. Suarez	Costa Rica	Animal Sanctuary Founder	September 26 th , 2020
8. Dr. Ramírez	Costa Rica	Administrative Conservation Organization Leader	September 26 th , 2020
9. Dr. Martinez	Costa Rica	Conservation Organization Leader	October 2 nd , 2020
10. Sr. Ortiz	Guatemala	Conservation Organization Leader	November 10 th , 2020
11. Srta. Gonzalez	Costa Rica	Administrative Conservation Leader	December 16 th , 2020
12. Dr. Navarro	Costa Rica	Administrative Conservation Leader	December 18 th , 2020
13. Dr. Smith	The United States	American Researcher	February 9 th , 2021

In each case, I interviewed conservation stakeholders across sectors (i.e. government, NGOs, private initiatives), and across different sociopolitical levels (i.e. national, regional, local). I used snowball sampling (Stratford and Bradshaw 2016) to identify interview participants based on their knowledge and experience with the IWT or DTOs in and around Central America. I used pseudonyms for all interviewees to protect their identities.

Data Analysis

I used a Spearman's Rho to run a correlation statistic. The Spearman's Rho is a non-parametric equivalent of the Pearson's r correlation statistic. A Spearman's Rho test is used to measure the strength of association between two dichotomous variables, where

the value $r = 1$ means a perfect positive correlation and the value $r = -1$ means a perfect negative correlation (Townsend 2020). However, unlike the Pearson's r , Spearman's Rho is based on ranks rather than the original values (JMP 2019). In addition, the Spearman's Rho was the statistic for this research due to its use of small sample sizes ($n < \text{or} = 20$). My research timeline encompassed fourteen years of data in which every year is a distinct variable, yielding a sample size of 14 ($n < 20$).

The Spearman's Rho was used to analyze two relationships: first, the total kilograms of cocaine seized with the total number of wildlife products, and second, the total number of cocaine seizure events with the total number of wildlife shipment cases. The result was four correlation statistics. If there is no relationship between the rankings, rho (r_s or ρ) will be near 0 (similar to a Pearson's r). To run the correlation statistics, I used the software JMP 14.

For the interview data, I used semi-structured coding techniques (Cope 2016) to identify common themes throughout the interview transcripts, in particular ones that related to how the commodity chains of the illegal wildlife trade and cocaine trafficking intersected. My inductive analysis produced four themes, which are presented in section four.

Limitations

The clandestine nature of illicit economies is the principal limitation that complicates the availability of reliable seizure datasets. While the CCDB and LEMIS databases are useful tools for approximating trends, these databases are incomplete and underestimate trafficking volumes (McSweeney 2016). The reliability of data depends on the accuracy of reporting. The samples of collected crime data reflect only a fraction of

the existing market because a large portion of the illegal trade remains unreported and undiscovered (Coleman and Moynihan 1996; Petrossian et al. 2016)

The CCDB data are considered highly accurate because of the stringent review process required to incorporate an observation into the dataset (GAO 2002). These checks are conducted by the drug interdiction agencies that submit cocaine seizure reports including the Department of Defense, the Coast Guard, U.S. Customs, U.S. law enforcement agencies and foreign law enforcement agencies. In addition, agency representatives are able to discuss discrepancies in the data and vote on their validity (McSweeney 2016). Although the CCDB has several measures in place to validate information in each agency's database, it is not designed to prevent agencies from counting the same seizure multiple times in their own database. Furthermore, the data are conservative estimates of actual cocaine flows because interdiction agencies focus on non-commercial marine and air traffic routes, excluding overland movements along commercial routes within Central America (Tellman et al. 2020). Furthermore, counter narcotics data suffer from a bias known as the "spotlight effect". Due to limited resources, interdiction agencies focus their collection on areas with already established trafficking routes. Thus they increase their likelihood of apprehension but ignore newly established smuggling routes (Crewe et al. 2016).

The LEMIS database is another reputable interagency data source, in this case explaining the general wildlife import trends to the United States (Rice and Moore 2008). However, the LEMIS data also had limitations to their use. First, both legal and illegal wildlife shipments were compiled into the database rather than exclusively seizures. Second, shipment descriptions were not always captured accurately. Hundreds of rows

were missing taxonomic information (i.e. order, family, and genera), while other available taxonomic ranks were misplaced within the dataset (Petrossian et al. 2016). A possible explanation proposed by Kurland and Pires (2017) was the difficulty involved with identifying species, in particular products manufactured using wildlife parts (i.e. skin, shells, fur, bones, etc.). They argued that while officials could identify that certain luxury items were created using reptile skin, they often failed to recognize the exact type of reptiles (Kurland and Pires 2017). Therefore, the missing taxonomic data hindered my ability to provide detailed descriptions of the species patterns from Costa Rica or Guatemala. Lastly, as the LEMIS database was not permanently archived by the USFWS, independent parties acquiring LEMIS data may obtain subtly different datasets depending on the date and specifics of their FOIA requests.

Although other internationally-cooperative databases tracking the IWT exist, they contain little to no data on wildlife from Central America (UNODC 2016). In addition, the availability of both legal and illegal shipments was, in fact, valuable for this research for several reasons: First, as I previously described, data on illegal wildlife seizures are notoriously incomplete or insufficient for conducting statistical analyses (UNODC 2016). Therefore, having access to a dataset lacking in information is preferable to no dataset. Second, scholars of the illicit have revealed the binary between legal and illegal products is not as distinct as previously thought. This is due to the fact that fraudulent permits can be forged to provide proof that a wild-caught individual was legally obtained or captive-bred (Wyatt 2013). Third, I am interested in analyzing overall defaunation from Central America. Therefore, both legal and illegal shipments provide a more comprehensive examination of the movements of wildlife.

Finally, the dangerous nature of studying illicit economies limits my access to the ethnographic knowledge of individuals and communities directly impacted by DTOs and militarized counter narcotic interventions.

V. DISCUSSION AND FINDINGS

Snakes on Planes: Patterns of Wildlife Flows

The results of the manually-coded species taxonomies revealed that wildlife imported from Costa Rica and Guatemala between 2000-2014 were intended for slightly different markets in the United States. For Costa Rica (shown in Figure 3) out of the 13,848,530 animal products uncovered, 89.3% of the species recorded were categorized as “insects”. The next common taxonomies were “fish” (5%) followed by “reptiles” (1.5%). Meanwhile, for Guatemala (shown in Figure 4) out of the 963,822 animals, “reptiles” (36%) were the most common type, followed by “birds” (23%) and “mammals” (10%)

Though taxonomic information was missing from a number of shipment cases, the data available revealed butterflies (generic name) were the most frequently recorded

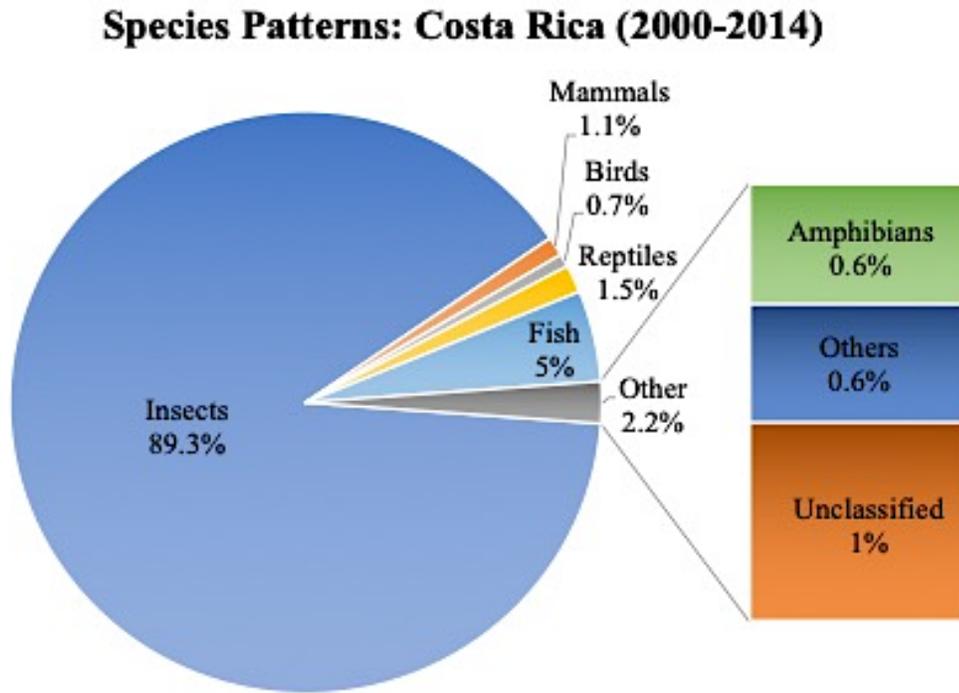


Figure 3. Species Patterns: Costa Rica (2000-2014)

Species Patterns: Guatemala (2000-2014)

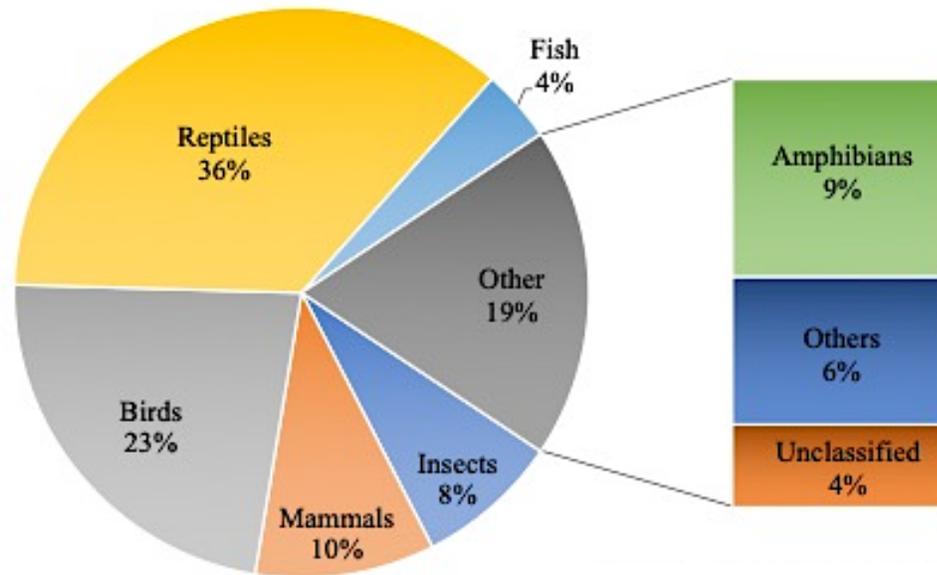


Figure 4. Species Patterns: Guatemala (2000-2014)

insects followed by beetles and spiders. While insects are not the primary fauna commonly associated with the IWT, recent raids in Costa Rica have demonstrated a growing interest in butterflies, beetles, and spiders for the international black market (Gorder 2019). Conservation organization leader, Dr. Ramírez explained how insects are very popular with smugglers because of their portability. Their small size enables hundreds of specimens to be transported at a single time with minimal risk of detection compared to larger fauna. This observation highlights why butterfly trafficking is flourishing in areas like Puntarenas because its low risk and high reward. According to another Costa Rican conservation leader, Dr. Sánchez, “Insects are bought by collectors and hobbyists abroad. Attractive morphos (butterflies) like the Costa Rican blue morpho are collected and dried for ornaments.” In the book *Winged Obsession*, author Jessica

Speart described how “obsessive collectors are willing to spend \$60,000 on especially rare butterflies.” (Speart 2011). Other participants expressed that the interest surrounding insects is the result of their aesthetic appeal as decoration. These ornaments, Dr. Sánchez continued, can vary from the large glass display cases owned by private collectors or museums to pocket sized souvenirs and accessories purchased by tourists.

The next two categories, fish and reptiles, stakeholders argued, were animals intended for the exotic pet trade. According to a conservation organization leader, Dr. Martinez, reptiles such as snakes, lizards, and freshwater turtles and all manner of tropical fish are highly sought after not as traditional *mascotas* (pets), but rather as colorful decorations for restaurants or homes. The intention is not to interact with the fish or reptile like one would a domesticated animal, but instead to admire its unusual or striking appearance.

While these species patterns displayed some of the most prominent wildlife dynamics emerging from Costa Rica, this quantitative analysis failed to capture the demand for other animals and animal products such as amphibians and shells. As Dr. Martinez explained, “Amphibians are also very popular pets, especially *las ranas de vidrio...*” These transparent miniature frogs also known as “glass frogs” are threatened in the wild, because their unique translucent epidermis and diminutive size make them attractive pets in North America and Europe. Another hot commodity not represented by these figures is the overlooked market of shells (i.e. mollusk shells). Dr. Ramírez expressed how, “Shells are not part of the wildlife confiscation effort– they’re considered natural materials not wildlife. But they are collected by tourists as souvenirs or mementos of their vacations.” In Figure 3, both taxonomies described represented together 1.2% of

the total species documented from Costa Rica (2000-2014), further illustrating how crime data reflects only a fraction of the existing hidden market.

Similarly for Guatemala, taxonomic details were sparse for the three most recorded animals: reptiles, birds, and mammals. However, for reptiles the most common types listed were anoles, snakes, lizards, and freshwater tortoises. An Insight Crime report in collaboration with the ARCAS wildlife rescue center exposed how Guatemalan beaded lizards, a unique species native only to Guatemala, can fetch anywhere from \$26-\$2,000 abroad (Batres 2015). Identical to reptiles from Costa Rica, Guatemalan reptiles are targeted for sale in the exotic pet trade. In fact, all three species: reptiles, birds, and mammals are intended for the international pet trade. According to the UNODC (2016), “About one quarter of all commercial live animal exports permitted under CITES in 2013 were declared as wild sourced, with most involving species of birds, amphibians, or reptiles prized in the pet trade.”

There are four main genera of birds found in the neo-tropics: Parrotlet, Parakeet, Amazon, and Macaw (Pires 2012). With only 250 individuals recorded in Guatemala, Scarlet Macaws (*Ara Macao*) are one of the most threatened bird species in Central America by poaching for the IWT (WCS 2021). As Guatemalan biodiversity leader, Sr. Gomez explained, “You cannot overstate the popularity of scarlet macaws as pets— their intelligence, ability to speak, lively personalities, and bright red feathers are attractive characteristics...” Although possession of a Scarlet Macaw is prohibited under Guatemala’s Protected Area Laws, these birds are valued around \$3,000 per individual on the black market (Batres 2015). The third category “mammals” was most represented by monkeys such as Spider and Howler monkeys. Due to the fact that these animals are

difficult to catch, poachers often shoot mothers carrying their babies and collect the infants once they have fallen to the ground (Collard 2020). These cruel methods of capture reveal an important dynamic in the exotic pet trade. As Sr. Gomez continued, “They do not traffic in the adult animals— monkeys, *guacamayas*, serpents...” Smugglers and buyers prefer young animals that can more easily be domesticated and trained (Pires 2012; Collard 2020).

Lastly, interviewees expanded on the unconventional methods and routes animal smugglers use to transport fauna outside of Central America. The prevailing notion, encouraged by newspaper headlines, is that illegal wildlife are most frequently transported via public airlines (ROUTES 2018). However, administrative leader in conservation, Srta. Gonzalez argued, “In Liberia and San Jose wildlife trafficking is happening more through the maritime routes and at international borders because airport security has become more secure.” Furthermore, the techniques used in the capture and movement of fauna is less sophisticated than the elaborate transportation of rosewood or narcotics. As Costa Rican sanctuary owner, Sr. Suarez claimed, “Poaching is not very technical. They will use anything— bags, bottles, boxes, whatever is available because they have no knowledge of how to provide an environment for transporting animals.” This statement signals another horrific behavior observed in wildlife trafficking, which is commonly recognized as artificial scarcity. This is the process by which animal traffickers increase the scarcity of the species they are selling by purposely allowing most of the quarry to perish during transit, thereby increasing the animals’ value and price (UNODC 2016).

Overlapping Flows of Cocaine and Wildlife: Correlation Statistics

After totaling the relevant CCDB cocaine data and LEMIS wildlife data, the outcome was as follows: between 2000-2014, there were 77,826 kilos of cocaine seized during 511 seizure events from Costa Rica (shown in Figure 5), and 12,280 kilos of cocaine seized during 68 seizure events in Guatemala (shown in Figure 5). For the LEMIS wildlife data, 13,848,530 animal products were reported over 40,071 shipment cases from Costa Rica (shown in Figure 6), and 963,822 animal products were reported over 3,666 shipment cases from Guatemala (shown in Figure 7).

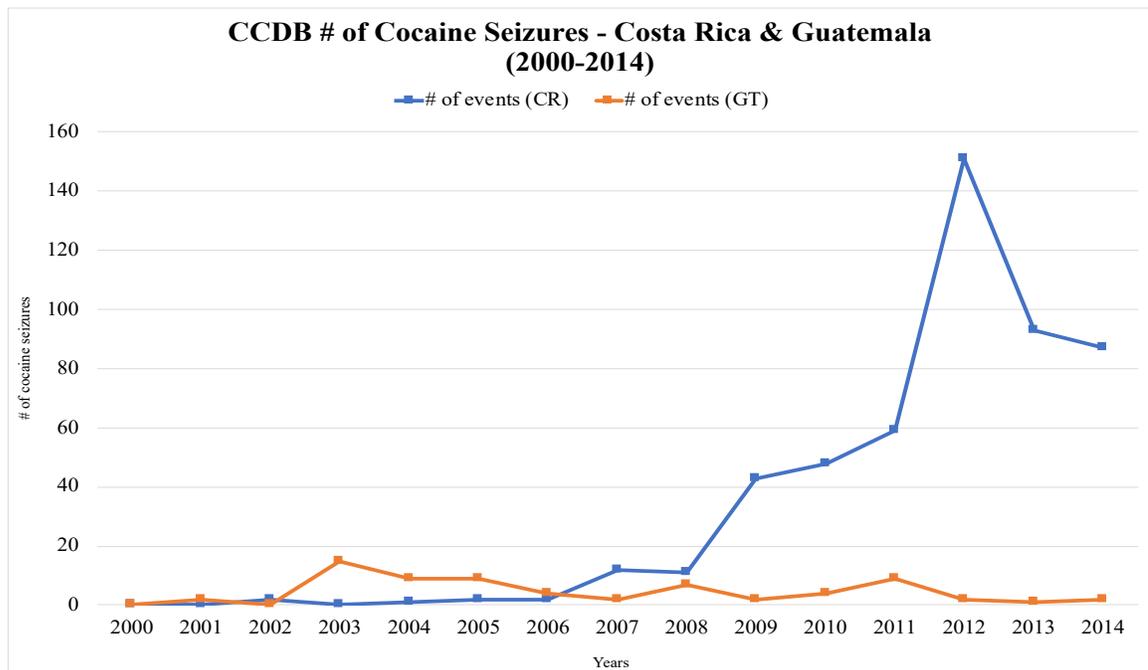


Figure 5. CCDB # of Cocaine Seizures – Costa Rica and Guatemala (2000-2014)

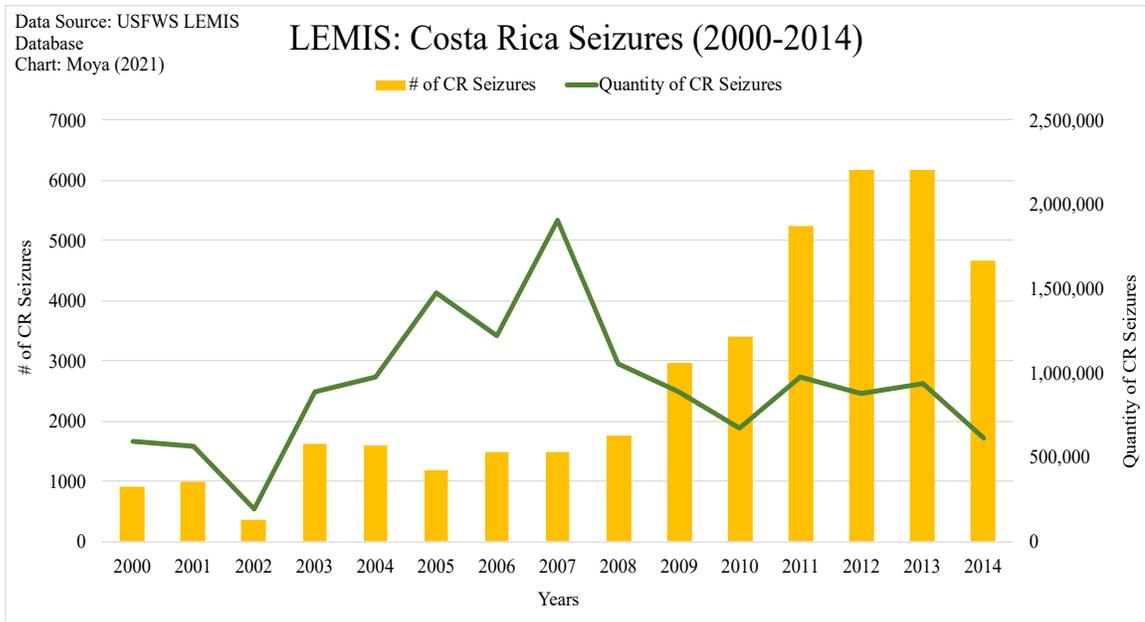


Figure 6. LEMIS: Costa Rica Seizures (2000-2014)

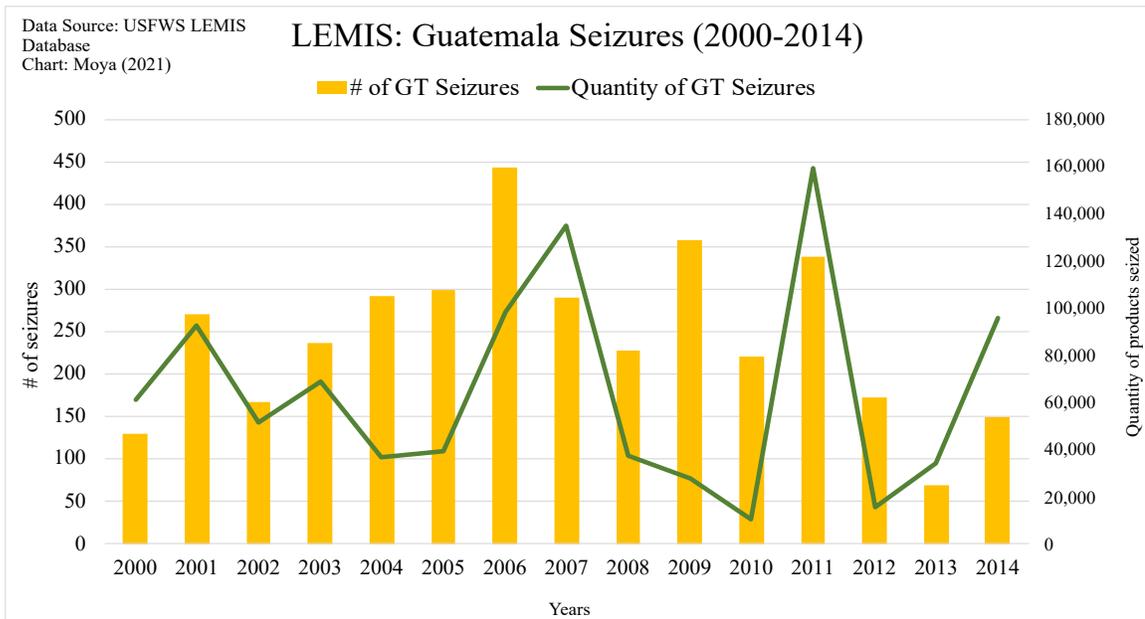


Figure 7. LEMIS: Guatemala Seizures (2000-2014)

The Spearman's Rho statistic was used to analyze the correlation between the flows of cocaine and wildlife. The first result analyzed the kilograms of cocaine seized and the quantity of animal products. The second result analyzed the number of cocaine

seizure events and the number of animal shipment case. These statistics were calculated for both Costa Rica and Guatemala for a total of four correlation statistics. The results of the first test revealed a moderately positive correlation for Costa Rica (shown in Figure 8) with a Spearman's ρ of 0.3893, and a negligible correlation from Guatemala (shown in Figure 9) with a Spearman's ρ of 0.0786. The results of the second test revealed a positive, statistically significant correlation from Costa Rica (shown in Figure 10) with a Spearman's ρ of 0.8489, and a moderately positive correlation from Guatemala (shown in Figure 11) with a Spearman's ρ of 0.4340.

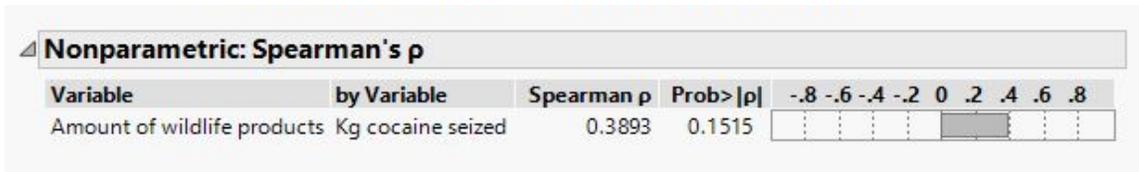


Figure 8. Spearman's Rho: Kilograms/Animal Products (Costa Rica)

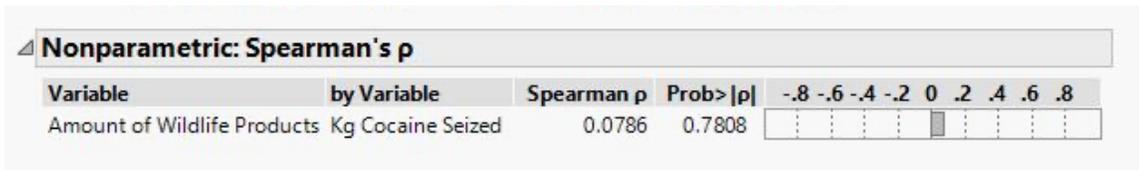


Figure 9. Spearman's Rho: Kilograms/Animal Products (Guatemala)

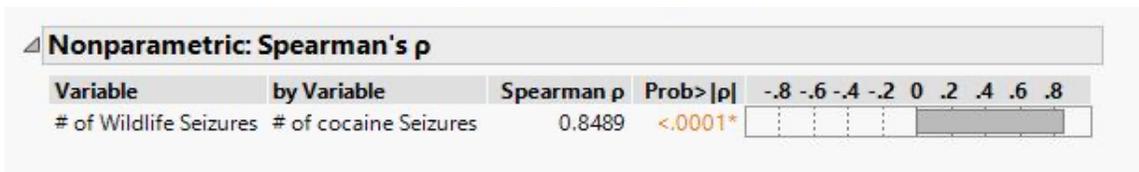


Figure 10. Spearman's Rho: Seizure Events/Shipment Cases (Costa Rica)

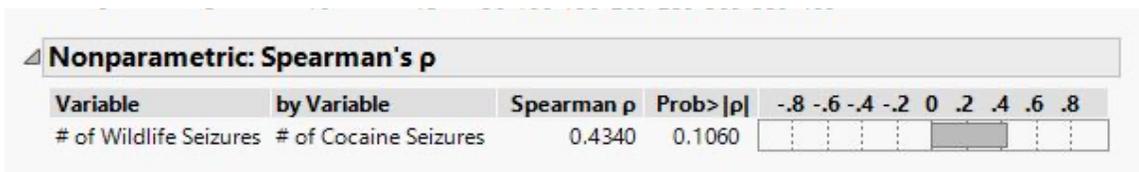


Figure 11. Spearman's Rho: Seizure Events/Shipment Cases (Guatemala)

Each of the four correlation results have corresponding p-values (or Prob > ρ) right of the Spearman's ρ . The p-value is an observed significance level, meaning it provides the likelihood that your results did not occur by chance. For example, a p-value of 0.05 means that there is a 5% chance that the relationship emerged randomly and a 95% chance that the relationship is real (Townsend 2020). In this case, the lower the p-value, the higher the likelihood that the coefficient or Y-Intercept is valid (JMP 2019). The results of the second test indicate a p-value < 0.0001 for Costa Rica and p-value of 0.1060 for Guatemala, indicating that the likelihood that these correlations occurred due to chance are negligible to low. Therefore, there is a statistically significant correlation between the flows of cocaine and wildlife to the united states.

Clearing the Forests and Reefs Along the Narco Trail

Building on research examining the illicit drivers of environmental impacts, the thirteen interviews with protected areas stakeholders produced four key themes that revealed the relationship unfolding between cocaine and wildlife trafficking in Costa Rica and Guatemala. These four themes included: 1) what I call “Narco-biophilia” or the demand created by narco-traffickers to surround themselves with exotic animal trophies increases the IWT; 2) Narco-driven land-use changes by means of deforestation and cattle ranching that increases the presence of humans in protected areas and intensifies the vulnerability of wildlife; 3) “territories of impunity” (Devine et al. 2021) or areas where the financial power of drug trafficking and the violence used to reinforce that authority enables multiple illicit markets and corruption to thrive; and 4) direct crime convergence between cocaine traffickers and wildlife traffickers, in particular illegal rosewood harvesting and shark-finning along the Pacific coast. These themes uncovered

how the commodity chains of illegal cocaine and wildlife overlap directly and indirectly, and how defaunation in Central America is exacerbated by and conducted alongside the cocaine trade.

Narco-Biophilia

The first theme, described by Dr. Martinez as “narco-biophilia”, is the apparent tendency of narco-traffickers to own exotic pets and endangered species. This phenomenon occurs when kingpins and high ranking DTO members want to surround themselves with animal trophies, alive or dead (Arias et al. 2020), and keep them either as pets or part of private collections (Ramsey 2011; Barth 2017). This behavior has been influenced by centuries of *machismo* and symbolism conflating man’s power over nature with animal ownership (Saunders 1998). However, this dynamic also reveals how drug traffickers purchase exotic animals as a means of unburdening their dispensable income. Furthermore, it exposes how narco-traffickers directly intensify the IWT.

According to participants, this desire to own exotic pets is wrapped up in the concept of *machismo*, or toxic male chauvinism within the Latinx culture (Ortiz 2019). As conservation organization leader, Sr. García explained, “Narcos are creating the demand for pets like big cats to stand out and show off, but also as displays of their status and power.” While all manner of large megafauna have been documented at the former estates of cocaine kingpins (Rosenberg 2009), big cats (i.e. lions, tigers, panthers, jaguars, etc.) are especially popular with drug traffickers because they conflate the feline’s size and aggression with symbolisms of “strength” (Saunders 1998). Recent research has shown that drug trafficking is the fourth most-cited driver of the jaguar trade, particularly in Guatemala. A majority of the Guatemalan respondents in the study

strongly believed that drug traffickers are involved in the trade because jaguar trophies are a symbol of status (Arias et al. 2020). As American researcher, Dr. Smith commented, “This phenomenon of surrounding one’s self with animal trophies is fundamentally about taming wilderness and nature... it’s also wrapped up in the settler aesthetic— taming nature and killing threats to domesticated animals— traffickers take these motifs and inflate them.” By displaying the skins of animals they have hunted or owning animals that are beautiful, rare, or difficult to obtain, drug traffickers demonstrate their mastery over nature. There is precedent for this type of behavior in many societies around the world. According to Srta. Gonzalez, “There is a long history of gifting the most exotic and rare animals to kings and men in power... I would use this to explain that narcos want to feel special and look for these exotic species like bears or lions as symbols of the animals power.” Drug traffickers embrace and exaggerate these imageries as a means of demonstrating to others their affluence and power.

The private collections of drug traffickers can become so massive that they are considered private zoos (Barth 2017). One notable example participants discussed was the private zoo owned by notorious Colombian kingpin Pablo Escobar at his estate, the *Hacienda Nápoles*, northwest of Bogotá. At one point Pablo Escobar was thought to be the world’s richest man and he spent part of his fortune on a large assortment of exotic animals from several different continents (Duarte 2021). After Escobar’s death in 1993, the Colombian government had to donate most of the animals to other zoos because the cost of maintaining the estate was too expensive (Barth 2017; Duarte 2021). However, the Colombian authorities were unsuccessful at resettling the handful of hippopotamuses left on the property. When these hippos escaped, they spread to nearby lakes and river

channels (Kaplan 2021). Now the nearly forty feral hippopotamuses currently inhabiting the area around the former Escobar estate have created a massive ecological disaster. These invasive African animals have no natural predators in South America and their aggressive behavior pose a threat to public safety (Duarte 2021; Kaplan 2021).

However, this dynamic of drug traffickers spending their fortunes on exotic animals also demonstrates the logistical issue of using illegally obtained capital. As Sr. Gomez commented, “Rich narcos are not prohibited from buying animals because they have the dispensable income... they have to spend their money on something.” This observation underpins the issue of money laundering for DTOs. DTOs accumulate massive amounts of illicit capital in the movement and sale of narcotics, but aside from laundering the money or hiding it in warehouses it is difficult to spend. Therefore, drug traffickers spend their illicit wealth on likewise illegally obtained wildlife. Regardless of the motives behind the purchase of exotic species, it is understood that kingpins and DTO members who engage in this type of behavior increase the IWT.

Narco-driven Land-Use Changes

The second theme is narco-driven land-use changes. Narco-driven land use change poses a significant threat to the ecological landscapes of protected areas such as the MBR in Guatemala and Corcovado National Park in Costa Rica. Established research on the illicit drivers of environmental change in Guatemala has demonstrated that DTOs deforest in protected areas to smuggle their drugs and launder their money through cattle-ranching operations (Devine et al. 2020b). However less apparent is how land-use changes generated by drug trafficking activities impacts endangered species. Evidence gathered from participants shows that narco-degradation is increasing wildlife trafficking

because DTOs are hiring people to clear forests and tend to cattle, which increases the human presence in these conservation spaces, and the forest fires and clear cutting concentrates more wildlife in the remaining pockets of forested areas (Sesnie et al. 2017). Furthermore, participants argued the exact nature of drug trafficking activities on biodiversity populations differs between Costa Rica and Guatemala.

Interviewees expanded on previous observations that forest cover loss in the MBR was the result of *narco-ganaderos* or narco-cattle ranching operations. Guatemalan conservation leader, Sr. Fernández expanded on this concept by explaining the different levels of impacts narco-cattle ranching has on the landscape. “There is the primary impact– where you land the plane and the land destroyed is proportionally very little. The secondary impacts putting in the airstrip, using fires to clear forests, hiring cattle ranchers... those impacts are pretty big...” As Sr. Fernández explained, the primary impacts of landing private airplanes that can transport the weight of 15-20 people are relatively low when compared to the secondary impacts of clearcutting rainforest to create pastureland.

The impacts of these activities on wildlife are twofold: first, the loss of rainforest cover decreases the amount of habitable land; and second, the increased presence of humans also increases the likelihood of human-animal interactions and opportunities for poaching and illegal hunting. The act of creating pasture for cattle out of once-forested land increases the vulnerability of wildlife because it forces many species to occupy overcrowded territories, building pressure on the landscape to sustain larger populations. According to Juan H., “before clearing an area... some ranchers will take advantage of the vulnerable animals such as scarlet macaws, and capture macaw chicks after killing the

parent birds or felling the tree with the nest.” This connection with macaws is particularly salient because the timber harvesting period and seasonal fires used to clear the top soil coincide with the macaw breeding season. According to Sr. Fernández, “Parrots are most vulnerable when they are nesting... from February to July is when the parrots nest, and this timber poaching happens when it is dry enough they can get vehicle through. They cut the timber walking in with chainsaws.” With only 250 individuals left in the wilderness of Guatemala, narco ranchers will sell orphaned Scarlet Macaw hatchlings to the IWT.

This was not the only interaction interviewees discussed between cattle ranchers and wildlife in the MBR. According to Juan H., “The cattle ranching tradition is to kill jaguars that threaten your livestock.” Since these illegal cattle operations are conducted in the natural habitat of jaguars, the cattle are easy prey. However, either preemptively or in retaliation, cattle ranchers will hunt down and kill any jaguars found around their *ganaderos*.

In Costa Rica, this dynamic between jaguars and farmers is more pronounced. According to interviewees, the biological reserves and national parks of Costa Rica experience significantly lower rates of deforestation compared to Guatemala. However, the deforestation that does occur happens along the boundaries of national parks. These incidents are often the result of illegal encroachment by peasant cattle ranchers and farmers. As Dr. Sánchez commented, “In national parks like Corcovado, deforestation does occur just along the outside boundary.” This infiltration into the country’s biological reserves leads to more violent encounters with jaguars. According to Sr. Suarez, “Jaguar killings are not only an issue in Guatemala, in Costa Rica there is a co-existence problem

between farmers and jaguars.” Jaguars will pursue any prey located in and around their habitat including livestock. According to participants, these peasant farmers fail to understand how their trespassing endangers not only themselves and their livestock, but these critically endangered species as well.

Although the national parks of Costa Rica are not deforested for cattle ranching operations as in Guatemala, according to Srta. Gonzalez, “The protected areas have turned in to warehouses for drugs... if you look at the maps of the trafficking of drugs... Costa Rica is a half way point, there are many cases, the channels through Corcovado for example... it is a warehouse— there have been confrontations between park guards and the people who are protecting the drugs.” This “warehousing” description was echoed by other Costa Rican participants and will be elaborated on in the next section.

Finally, a concept participant briefly discussed was how the increased presence of humans in these biotopes also presents a risk for creating and spreading Zoonotic diseases. Zoonotic diseases are those that can be transmitted from animals to humans, including Swine flu, bird flu, SARS, and, most recently COVID-19 (Gluszek et al. 2020). The transmission of these diseases from illegal cattle ranchers in the MBR or farmer trespassing in biological reserves in Costa Rica present a danger to the public health.

Territories of Impunity

The third theme revealed was “territories of impunity” (Devine et al. 2021) or areas where the financial power of DTOs and the violence used to reinforce their authority, enables multiple illicit markets and corruption to thrive. Although drug cartels utilized remote and inaccessible rainforests to avoid detection and arrest from authorities, they can also foster a systematic culture of impunity and corruption beyond the

biospheres and national parks they control. In Guatemala, this unregulated expansion of multiple illicit markets is permitted due to systematic corruption at all levels of the government from the DIPRONA (the green police) to elected officials. Meanwhile, Costa Rica's centralized government has prevented drug cartels from controlling sizeable territories and towns, but has been unsuccessful at stopping "warehousing" within its national parks.

According to Sr. Gomez, "The systemization of impunity across all institutions created a situation in which all illegal activities can thrive... they use the same transportation networks..." In Guatemala, these illicit activities that can flourish alongside the illegal drug trade, include human trafficking, illegal arms trafficking, human smuggling, wildlife trafficking, and the trafficking of antiquities. As Colombian conservation organization leader Sra. Moreno continued, "The narcos have created a culture in which the public condones illegal activity... where corruption allows wildlife trafficking to occur..." This statement underpins how the nearly four decades of instability in Guatemala created a sociopolitical situation that DTOs could not only exploit, but normalize. In relation to the IWT, Sr. Gomez concluded, "The corruption of the green police in Guatemala is normalized because Guatemala privatized the police so there is no pressure from the government to not take Narco bribes and many in the government are accomplices in the corruption." Although the DIPRONA were intended to support in anti-trafficking patrols with CONAP, due to a lack of funding and the massive size of the national parks, large portions of the reserve are unprotected and controlled by DTOs. In addition, several participants noted many green police are compelled to work for the drug cartels due to inadequate pay. As Guatemalan

conservation organization leader, Sr. Ortiz commented, “The police in charge of protecting the environment, DIPRONA– they are either not doing their jobs or they are trying to do their job, but it is difficult to resist bribes from the drug cartels...” Furthermore, it is not only the green police that engage in bribery and corruption. According to Sr. Fernández, “... the first female Vice President, she was engaging in [wildlife] trafficking... she was taking animals out of the MBR, and took scarlet macaws to her house...” Amidst the corruption allegations, environmental investigators discovered two Scarlet Macaws in the former Vice President’s residence. Although corruption convictions in Guatemala are few and far between, this trial along with the conviction of a former CONAP official in 2015 (Soberanes 2018) demonstrate the links between government officials, DTOs and the IWT .

In Costa Rica, DTOs likewise threaten PA governance, but not to the same degree or intensity as in Guatemala. With its strong centralized government, Costa Rica is often perceived as being impervious to the corruption seemingly endemic to other Central American countries (Evans 1999). However, as Dr. Sánchez remarked, “Costa Rica is not immune to the power, violence, or wealth of DTOs.” This was echoed by Srta. Gonzalez who added, “In Costa Rica there are corrupt individuals but the entire system isn’t corrupt because of its institutional strength...” Although drug traffickers have not managed to create a culture of impunity throughout Costa Rica, the country’s national parks are threatened by DTOs using the areas as warehouses in the transportation of drugs. These activities in and around national parks pose a threat to species who inhabit these biospheres by encouraging illegal hunting and poaching.

According to Dr. Sánchez, “there is almost no part of the country that is inaccessible including national parks and reserves. This is what drug trafficking organizations take advantage of. While there are no territories or towns controlled by the cartels, they have recently found airstrips in the mountains of national parks.” Similar to Guatemala, drug traffickers use national parks as layover points in the drug transit process. According to Costa Rican conservation leader, Dr. Navarro, “In Corcovado National Park we were able to document that drug traffickers come from Colombia by boat to the beaches of Corcovado. They make big holes, put the drugs in, put sand on top, and then they email or send the coordinates to people local people in *Puerto Jimenez*. I have seen this, a little guy on a little motorcycle comes at night at *Carate*... that is where you can park by rode walk with GPS and puts in the three or four packages in a backpack and goes to the market...” This statement powerfully captures how DTOs are “warehousing” or using national parks to conceal and store drugs, and provides further evidence that Costa Rica is a node in the transportation of cocaine. However, these are not overland networks traveling through the interior of Central America from production zones in Colombia through the Darien Gap of Panama and into Costa Rica. Rather as Administrative Conservation Leader, Dr. Navarro commented, “Drugs are not coming through the airport...it is the ocean by boat or by helicopters or little planes or illegal planes...”

These activities within the boundaries of national parks have encouraged other exploitative pursuits such as illegal poaching. According to Sr. Suarez, “Hotspots for poaching and smuggling are the same protected areas where park rangers are encountering armed men protecting drugs... In hotspots like Limón human activities like

poaching and illegal hunting are putting biodiversity at risk.” Since these drug traffickers make use of maritime routes, this influences the type of species they encounter and capture. According to interviewees, drug traffickers traveling along the coast are a particular threat to endangered sea turtles and their eggs, which fetch a high price on the black market (UNEP 2002).

Direct Crime Convergence

The fourth and final theme involves examples of direct crime convergence between cocaine traffickers and wildlife traffickers. The most prominent examples participants described involved illegal rosewood harvesting and shark-finning along the Pacific coast. These specific instances of crime convergence demonstrate how DTOs have metastasized other illicit economies and their commodity chains throughout Central America.

Although the term “Rosewood” is actually a broad trade name referring to a number of species (UNODC 2016), rosewood is the world’s most trafficked wild product by volume and price, and is a highly sought after material in the construction of high-end furniture and musical instruments (Reuter et al. 2018; Zain 2020). Illegal logging is one of the most destructive wildlife crimes, as it threatens not just a single species, but entire habitats.

The harvesting of rosewood has been observed in connection with DTOs in the northern MBR. According to Sr. García, “There is a big network of illegal logging passing illegal lumber on the border with Belize. They take advantage of established networks in trafficking wildlife because the roads between Belize and Guatemala are a popular route for the movement of scarlet macaws from the Laguna del Tigre and Sierra

del Lacandón.” This statement speaks to the developing interconnectedness between environmental crime and drug traffickers. In addition, it reveals how the traditional lines of separation between these markets are no longer suitable for understanding and combatting the complexities of organized crime. Furthermore, rosewood trafficking demonstrates how these “separate” trades utilize the same routes and mechanisms for the movement of their goods. According to Sr. Fernández, “Timber (rosewood) trafficking is the biggest and most obvious link with drug trafficking because there is physical evidence of their removal in northern Guatemala.”

Although several types of Central American rosewood, *Dalbergia granadillo* (*granadillo*), *Dalbergia retusa* (*cocobolo*), and *Dalbergia stevensonii* (Honduran rosewood), are listed under CITES Appendix II, it has not halted the illegal felling and movement of rosewood. According to UNODC (2016), the vast majority of CITES-listed rosewood is intended for markets in China. Furthermore, there is evidence that this trafficking of timber is authorized through the issuing of fake licenses (INTERPOL 2015).

The second example of direct crime convergence, is the apparent connection between cocaine traffickers and illegal shark-finning. Shark finning is the practice of removing shark “fins” and discarding the rest of the shark back into the ocean. The fins are then sold for consumption in Asia (Clarke et al. 2012; Mundy and Sant 2015). This has become a salient issue off the waters of Central America because the industrial scale of removal by Chinese fishing vessels is threatening the survival of many shark species (Clarke et al. 2012). Both CITES and non-CITES shark species have been overharvested by Chinese fishermen, resulting in a sharp decline in their populations, in particular off

the Pacific coast of Costa Rica (Mowbray 2015). According to Sr. Fernández, “Shark finning that is a huge problem... you have these vessels that are run by Chinese organizations and they recruit cheap Asian labor, they trap these individuals on these vessels for months at a time. They de-fin the sharks, destroy the animal... mining them out of the environment while they keep these people on these boats...”

Participants discussed how most cocaine traffickers utilize maritime transportation routes to ship illegal drugs from South America. Therefore, in addition to utilizing speedboats and submarines, cocaine traffickers from Colombia have engaged in a cooperative relationship with shark-finning vessels to get their shipments of cocaine past the U.S. Coast Guard. According to Dr. Ramírez, “Drug cartels are capitalizing on this relationship with fishermen because the Pacific Ocean fishing vessels already have the permits.” Furthermore, participants argue that like rosewood and wildlife trafficking, cocaine and shark finning occupy similar networks. As Sr. Ruiz argued, “Shark fin trafficking is exclusively linked to cocaine because wildlife and cocaine use the same routes and mechanisms.”

However, it is not immediately clear by what means do these vessels avoid detection by the US Coast Guard as they transfer packages of cocaine along the Pacific Coast of Central America. According to Sr. Ruiz, “The sharks are stuffed with blocks of cocaine. These packages are thrown into the water to be collected by people on the shore. Shark finning is part of the commodity chain of cocaine trafficking.” They accomplish this by packaging blocks of cocaine into “Tulas” or hollowed out shark carcasses, and throw the shark overboard when they have reached their destination along the northern

Guatemalan coast. From there they are collected by people waiting on the shore or in speedboats.

This relationship between Chinese fishing vessels and the drug cartels is particularly advantageous for DTOs since these fishing fleets frequently stay year around in the Pacific Ocean and their activities are not disrupted by the US Coast Guard who attempt to intercept the cartels shipments. As Srta. Gonzalez commented, “The nexus between the fishing sector and narco trafficking...they hide the drugs inside the sharks. But these CITES-protected sharks are being caught outside of the protected areas.” Although many of these animals are listed under CITES, because their extraction is occurring outside of the juridical waters of Costa Rica, authorities are not required to intercept these practices.

Although the four themes varied in their prevalence throughout Costa Rica and Guatemala, they uncovered how the commodity chains of the illegal cocaine and wildlife trades overlap in multiple ways, some of them more indirectly than previously thought. In addition, participants observations and arguments uncovered the apparent tendency of DTOs to absorb other illicit economies with already established networks and routes to better facilitate the movement of narcotics. Furthermore, these interviews demonstrate an overall growing trend of defaunation in Central America exacerbated by and conducted alongside the cocaine trade.

VI. CONCLUSION

The Central American isthmus is an essential ecological and economic corridor connecting North and South America. In addition to containing an immense concentration of uncatalogued biodiversity, it is a transit zone in the movement of cocaine. However, there are only a handful of studies that address the impacts of the IWT and cocaine trafficking on the ecological landscape—and, importantly, the ways these illicit trades do or do not converge (South and Wyatt 2011). As such, this study asked: What are the spatiotemporal and species-specific patterns of wildlife trafficking in Costa Rica and Guatemala from 2000-2014? And, what relationship, if any, exists between wildlife trafficking and cocaine trafficking in the region?

First, this research uncovered different species patterns of wildlife trafficking in Costa Rica and Guatemala. The LEMIS database and a manually-coding of the species taxonomies revealed that, of the over 40,000 animals imported from Costa Rica, insects made up an overwhelming percentage (89.3%), followed by fish (5%) and then reptiles (1.5%). Meanwhile, in Guatemala, of the roughly 3,600 animals seized, reptiles (37%) were the most common, followed by birds (23%), then mammals (10%). Although there was the commonality of reptiles represented in both country's seizures, the results demonstrated the contrasts in the type of wildlife extracted from Costa Rica and Guatemala, and possibly how they respond to the IWT. The explanation for the immense number of insects from Costa Rica highlights how butterflies and other rare insects are sought-after by collectors, hobbyists, or museums abroad for the purpose of display. The physical size of insects also helps to explain the enormous quantity of specimens seized by US officials since their small stature makes them relatively easy to transport and hide.

However, the number of seizures from Guatemala was considerably smaller than those in Costa Rica and represented species most commonly associated with the IWT from South America. Reptiles and birds are notoriously popular wildlife for the exotic pet trade. In North America, colorful and charismatic macaws are in demand as treasured companions and reptiles such as snakes or lizards are procured for a similar reason, to serve as lively capital as pets.

Second, through my quantitative spearman's rho statistic revealed a positive, statistically significant correlation from Costa Rica with a Spearman's ρ of 0.8489, and a moderately positive correlation from Guatemala with a Spearman's ρ of 0.4340. In other words, as cocaine seizures increased between 2000-2014 there was a direct correlation with the increase in the number of wildlife seizures at the same time. In addition, because the p-values were low, this indicates that the likelihood that these correlations occurred due to chance are negligible. Therefore, there is a statistically significant correlation between the flows of cocaine and wildlife to the United States. However, this statistically significant correlation was not the only evidence of a relationship between cocaine and wildlife.

The thirteen interviews conducted with protected area stakeholders from Central America also produced evidence of links between cocaine and wildlife trafficking in Costa Rica and Guatemala. The interview findings produced four key themes: 1) "Narco-biophilia" or the demand created by narco-traffickers to surround themselves with exotic animal trophies increases the IWT; 2) Narco-driven land-use changes by means of deforestation and cattle ranching that increases the presence of humans in protected areas and intensifies the vulnerability of wildlife; 3) "territories of impunity" or areas where the

financial power of drug trafficking and the violence used to reinforce that authority enables multiple illicit markets and corruption to thrive; and 4) direct crime convergence between cocaine traffickers and wildlife traffickers, in particular illegal rosewood harvesting and shark-finning along the Pacific coast. These themes uncovered how the commodity chains of illegal cocaine and wildlife overlap directly and indirectly, and how defaunation in Central America is exacerbated by and conducted alongside the cocaine trade.

According to interviewees, the culture of what I call “narco-biophilia” describes the apparent tendency of narco-traffickers to own exotic pets and endangered species. This occurs when kingpins and high ranking DTO members want to surround themselves with animal trophies, alive or dead. The outcome for this behavior manifests in a demand for exotic animals to keep them either as pets or part of their private collection. The desire to own these valuable species is also wrapped up in the concept of machismo, or the Spanish word for toxic male chauvinism, to demonstrate one’s power over nature. Sometimes these collections can be so extensive that the kingpins end up with their own private zoos such as Pablo Escobar’s Hacienda Napoles Estate.

The second theme of Narco land-use changes argues that drug trafficking leads to environmental degradation because the narcos deforest in protected areas to smuggle their drugs and launder their money through cattle-ranching. The evidence I gathered from participants shows that narco-degradation is increasing wildlife trafficking because the narcos are hiring people to clear the forests and tend to cattle, which increases human presence in these conservation spaces, and the forest fires set concentrate more wildlife in the remaining pockets of forested areas. One powerful example of this is degradation are

the seasonal fires and timber harvesting that coincide with the scarlet macaw breeding season. Fire from narco-activities concentrate wildlife, making them easier to poach and that the advancements of the agro-industrial frontier employs all kinds of people in a position to poach and hunt illegally.

The third theme of “territories of impunity” suggests there are areas where the financial power of drug trafficking and the violence they use to back up their authority, enable multiple illicit markets to thrive. This unregulated expansion of multiple illicit markets is permitted due to systematic corruption at all level of the government as witnessed in Guatemala. Participants discussed how people from government officials all the way to members of the green police, who are responsible for monitoring protected areas and species, will take bribes from the DTOs. However, interviewees from Costa Rica made it clear that although the country has the perception of being the greenest country in the world that Costa Rica is not immune to this type of multilateral corruption. Furthermore, there is increasing evidence that DTOs make use of Costa Rica’s protected areas as “warehouses” to conceal and store drugs before moving the shipment.

The fourth theme, examples of direct crime convergence between cocaine traffickers and wildlife traffickers revealed how rosewood harvesting and shark-finning along the pacific coast are entangled in cocaine trafficking. Rosewood is the world’s most trafficked wild product by volume and price, and is a highly sought after material in the construction of furniture and musical instrument. However even rosewood poaching networks follow the same networks from Guatemala to Mexico as illegal wildlife through the Green Corridor. Next, participants discussed how on top of utilizing speedboats and the submarines, cocaine traffickers from Colombia have created a cooperative

relationship with shark-finning vessels to get their shipments of cocaine past the U.S. Coast guard. They accomplish this by packaging blocks of cocaine into “*tulas*” or hollowed out shark carcasses, and then these vessels throw the *tulas* overboard when they have reached the shores of Guatemala to be picked up in the water. These themes uncovered how the commodity chains of the illegal cocaine and wildlife trades overlap and uncovered the apparent tendency of DTOs to absorb other illicit economies with already established networks and routes to better facilitate the movement of narcotics.

Together the evidence gathered paints a different picture of crime convergence than what has been previously described in the literature. Although drug cartels often utilize wildlife trafficking as a secondary activity due to its low-risk and high-reward, this argument fails to recognize the principal role of DTOs in propagating the systematic defaunation of Central America’s forests. This research argues that cocaine trafficking fuels the growth of extractive activities such as wildlife trafficking, and erodes the territorial control of conservation institutions.

The species patterns and statistical analysis here demonstrates a net flow of biodiversity being extracted from supercharged wilderness spaces in Central America where cocaine is also being transported and into foreign markets. This research points to an overlap between legal and illegal trades that although many imports have illegal origins, there is no sharp distinction between illegal and legal markets. Finally, my research substantiates how drug trafficking activities in the context of the War on Drugs fuels biodiversity loss in Central America. The cat and mouse game defining interdiction during the War on Drugs has systematically undermined conservation efforts in protected areas.

This research advances the literature of wildlife trafficking in the Americas, cocaine trafficking in the Americas, and the emerging scholarship of conservation-crime convergence in three important ways. It analyzes Central America as its own node within the IWT, it expands on narco-degradation research by demonstrating how DTOs severely impact biodiversity and wildlife populations in protected areas, and argues that DTOs are the principal actors in driving the IWT in Central America. This research also advances the literature on narco-deforestation and narco-degradation in ecologically sensitive areas and how international drug policies need to be treated as conservation policies as well. By adding to the growing literature, I situate my research within the wider spectrum of illicit cross-border trading.

Future research should analyze crime convergence of cocaine and wildlife commodity chains at the hemispheric scale, integrating cocaine production zones, transit regions, and ecological niches throughout the Americas. Additional future research could also examine similar routes and networks between South America and Europe or South America and Asia to incorporate other consumer destinations.

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