Hunting and Wildlife Trade in the Alexander Skutch Biological Corridor, Costa Rica: Species, Motivations, and Governance

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Abstract

This study explores hunting and wildlife trade in Costa Rica, with a geographical focus on the Alexander Skutch Biological Corridor (ASBC). I conducted semi-structured interviews with 38 individuals regarding: a) the nature of hunting and wildlife trade, b) enforcement of the new Wildlife Conservation Law, and c) opinions about hunting, hunting laws, and conservation. Participants included hunters, ex-hunters, and concerned residents in the ASBC, along with wildlife professionals from protected areas, the Ministry of Environment and Energy (MINAE), wildlife centres, and environmental non-governmental organizations. Hunting has declined due to decreased dependence on hunting for subsistence, increased awareness, local protection, and law enforcement. Nevertheless, hunting continues in the region. The main motivation for hunting appears to be sport; however, participants in this study believed that there are various other overlapping motivations, including: for bushmeat, to capture wildlife for pets, for profit from selling bushmeat or captured animals, for subsistence, out of tradition, and in response to conflict with wildlife. The species hunted most often include: white-tailed deer (*Odocoileus virginianus*), paca (*Agouti paca*), collared peccary (*Tayassu tajacu*), agouti (*Dasyprocta punctata*), and tapir (*Tapirus bairdii*). Birds are captured for use as pets, principally the black-faced solitaire (*Myadetes melanops*). Recommendations include improved public communication from MINAE, increased enforcement of the Wildlife Conservation Law, and environmental education.

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Foreword

In this degree, I sought to bring various disciplines into conversation with each other in order to study wildlife conservation practice that is just, both for human and non-human beings. As such, my MES Plan of Study combined the two interdisciplinary fields of conservation biology and political ecology, with the aim of informing a critical understanding of wildlife conservation practice that bridges the divide between the sciences and the social sciences and humanities. Conservation biology is a crisis discipline based in the biological sciences that aims to study and preserve biological diversity (Soulé, 1985; Sutherland et al., 2009). While conservation is usually conceived as benign and apolitical, political ecology asserts that conservation is political and pays attention to conservation practice within the broader political, economic, and social structures and how conservation may change or reinforce these structures (Adams & Hutton, 2007; Neumann, 2014).

This paper explores wildlife use and governance in Costa Rica, allowing me to gain a deeper understanding of wildlife use and governance in a biodiverse country praised internationally for its environmental commitments. Analyzing wildlife use and governance requires not only understanding the risks that wildlife harvesting and trade pose to wildlife and ecosystems but it also requires understanding the social, economic, and political factors associated with wildlife use. Therefore, this paper draws from the two main components of my Plan of Study, conservation biology and political ecology. It also includes elements of environmental education, which was another important element of this degree as I took courses towards the Environmental/Sustainability Education Diploma. In order to further my understanding of issues pertaining to the study region, I have worked towards fulfilling requirements for the Centre for Research in Latin America and the Caribbean (CERLAC) Graduate Diploma, which includes this major paper.

Acronyms

ACLA-P – Amistad Pacific Conservation Area

APREFLOFAS – Association for the Preservation of Wild Flora and Fauna

ASBC – Alexander Skutch Biological Corridor, referring to the biological corridor

CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora

CoBAS – Corredor Biológico Alexander Skutch, referring to the group that manages the corridor

COVIRENAS – Committee for the Vigilance of Natural Resources

ENGO – Environmental non-governmental organization

IMAS – Mixed Institute for Social Assistance

NDF – Non-Detriment Finding

MINAE – Ministry of Environment and Energy

PNCB – National Biological Corridor Program

SINAC – National System of Conservation Areas

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1 - Introduction

1.1 – Global wildlife declines

Globally, 322 terrestrial vertebrate species have gone extinct since 1500, and of those remaining, there is an average decline in population abundance of 25% (Dirzo et al., 2014). Contemporary extinction rates are one thousand times higher than background extinction rates (Pimm et al., 2014). Since 1970, population levels of vertebrates exploited for food have declined by at least 15% (Butchart et al., 2010). The extinction risk for wild mammals, birds, and amphibian species used for food and medicine has increased at an accelerating rate, with 23% to 36% of those species threatened with extinction (Butchart et al., 2010). Of the bird species traded internationally, largely for the pet trade, 8% are threatened with extinction (Butchart et al., 2010). Hunting is cited as one of the greatest threats to tropical ecosystems (Bennett, 2002; Bennett et al., 2002; Laurance et al., 2012; Nasi et al., 2008; Redford, 1992; Sodhi, Brook, & Bradshaw, 2007; Wilkie, Bennett, Peres, & Cunningham, 2011). As such, hunting and wildlife trade have reduced wildlife populations throughout Central America (Obando & Herrera, 2010).

1.2 – Costa Rica

Costa Rica is located in one of 25 global biodiversity hotspots, Mesoamerica, and is one of the top 20 most biodiverse countries in the world (Myers, Mittermeier, Mittermeier, da Fonseca, & Kent, 2000; Obando & Herrera, 2010). Despite being a small country that takes up only 0.3% of the world's land surface, it contains over 90,000 species, representing approximately 5% of the known species globally and 3.6% of projected global biodiversity (MINAE, 2015). The country also has the highest species density of vertebrates and plants in Central America (Obando & Herrera, 2010). Costa Rica has a reputation for being the "green" country in Latin America, due to its aforementioned high biodiversity as well as its efforts towards environmental protection and sustainable development (Evans, 1999; Vandermeer & Perfecto, 2013). The country has an extensive protected area system, thriving ecotourism industry, and progressive environmental legislation (Campbell, 2002b; Evans, 1999; Miller,

2012; Utting, 1994). Civil society is also highly engaged in environmental conservation (Elbers, 2011; Obando & Herrera, 2010), as will be elaborated throughout this paper. Nevertheless, 14% of the country's vertebrate and plant species are threatened with extinction (Obando & Herrera, 2010).

Hunting, combined with habitat loss, has reduced wildlife populations in regions throughout Costa Rica (Altrichter & Almeida, 2002; Altrichter & Carbonell, 2013; Carrillo, Wong, & Cuarón, 2000; Romero, O'Neill, Timm, Gerow, & McClearn, 2013; Salom-Pérez, Carrillo, Sáenz, & Mora, 2007; Timm, Lieberman, Lieberman, & McClearn, 2009). There is also a strong domestic wildlife trade (Abarca Morales, 2005; Drews, 2003; Molina Murillo & Huson, 2014). As a result of wildlife declines and increasing concern for conservation, there is a high level of negative attitudes towards hunting in Costa Rica, particularly towards hunting for sport and commercial purposes (Drews, 2002; Wong, 2014). Consequently, there was a civil society movement to ban hunting and wildlife trade, which was spearheaded by the Association for the Preservation of Wild Flora and Fauna (APREFLOFAS). This ban occurred in the form of a new Wildlife Conservation Law (N° 7317) that was passed in 2012 (Section 3.5). These changes were brought about as a Law of Popular Initiative, through which citizens can submit laws to congress provided they have the signatures of 5% of eligible voters (McKinney, 2012).

1.3 – Knowledge gaps

Data on the exploitation and trade of wildlife is limited and largely inaccurate, making it challenging to assess the impact of exploitation on wildlife populations (Blundell & Mascia, 2005; Broad, Mulliken, & Roe, 2003). There is also a lack of understanding of the drivers behind hunting (Duffy, St John, Büscher, & Brockington, 2015). Wildlife resources can play an important role in livelihoods and as such, hunting bans could have negative socio-economic consequences (Rowcliffe, 2002). Prohibitions of wildlife use can also lead to violent conflict and a decrease in support for conservation (Campbell, 2002a; Isla, 2015; Utting, 1994). Therefore, it is important to study the dynamics of hunting and the enforcement of laws regulating wildlife use in order to better inform wildlife conservation policies and initiatives.

Wildlife exploitation bans can also have negative impacts on conservation. Wildlife trade bans have the potential to push trade into black markets without curtailing trade quantity, having little impact on conservation yet decreasing trade monitoring (Challender & Macmillan, 2013; Rivalan et al., 2007). Bans can also increase the prices of banned products, leading to increased hunting (Challender & Macmillan, 2013; Courchamp et al., 2006; Rivalan et al., 2007). Furthermore, wildlife regulations have little impact if they are not enforced effectively (Arias, Pressey, Jones, Alvarez-Romero, & Cinner, 2016; Carrillo et al., 2000; Utting, 1994). As such, an important knowledge gap to address is how conservation regulations, such as the new Wildlife Conservation Law, are being enforced and what constraints exist for their enforcement.

1.4 – Research objectives

The aim of this research is three fold. Firstly, this research explores the motivations for hunting in Costa Rica and how this has changed over time. Secondly, this research investigates what species are hunted in Costa Rica (for consumption or sale, either alive or dead). Thirdly, this research studies the governance of wildlife use, with a particular focus on the Wildlife Conservation Law. Recognizing the vast number of species hunted and traded, this research focuses on terrestrial fauna. The research questions are as follows:

1. What are the motivations for hunting?
2. What species of fauna are hunted, to what extent, and for what purposes?
3. How is wildlife use being governed?
    a. How is the Wildlife Conservation Law being enforced?
    b. What constrains enforcement of the Wildlife Conservation Law?
    c. How has the Wildlife Conservation Law impacted people whose livelihoods depend on hunting?

1.5 – Theoretical framework

I approach wildlife use and conservation from an interdisciplinary lens that incorporates both political ecology and conservation biology. As such, where possible, I incorporate information on the conservation of the species that are hunted and traded and the ecological implications of declines in their populations. I also incorporate social, political, and economic dimensions of wildlife use and conservation in the Alexander Skutch Biological Corridor (ASBC) and Costa Rica in general.

1.5.1 – Political ecology

While conservation is usually conceived as benign and apolitical, political ecology asserts that conservation is political; conservation efforts have, at times, had negative socio-economic consequences and failed at meeting conservation objectives as a result (Robbins, 2011). In the words of Adams and Hutton (2007), "The field of political ecology explicitly addresses the relations between the social and the natural, arguing that social and environmental conditions are deeply and inextricably linked" (p. 149). Furthermore, the very way nature is conceptualized is political and has political implications (Adams & Hutton, 2007; Lorimer, 2015; Robbins, 2011).

In Costa Rica and elsewhere, the romanticized notion of natural areas void of people, or wilderness, has allowed for communities to be erased from the imagination of a place, or "unimagined", and then subsequently displaced or dispossessed (Adams & Hutton, 2007; Isla, 2015; Nixon, 2011; Utting, 1994). In reality, the forests imagined and presented as pristine nature throughout Central America were likely long shaped by indigenous agroforestry systems and continue to exist alongside human presence (Grandia, 2007; Rivers-Moore, 2007). In order to create protected areas, some communities have been forcefully evicted (Isla, 2015; Utting, 1994). In other cases, what has manifested is a type of slow violence that Nixon (2011) calls "displacement without moving" (p. 19), when communities are dispossessed of the land and natural resources they once had access to without being directly removed.

Campbell (2002) labels this type of conservation in Costa Rica the "traditional narrative", which: "describes wildlife populations in developing countries as threatened directly with extinction by human exploitation, and indirectly by habitat degradation and fragmentation that results from increased human populations and their demands for development" (p. 30). The result is a conception of nature that privileges non-extractive activities, such as tourism or bioprospecting, over local resource use (Campbell, 2002b; Isla, 2015; Utting, 1994). This narrative has material consequences for local communities as the beneficiaries of these "non-extractive" are more likely to be local elite or foreign entities than local peoples; meanwhile, access to land and natural resources is constrained (Section 3) (Campbell, 2002b; Horton, 2009; Isla, 2015).

1.5.2 – Terms used

I use the term hunting as it is defined in Costa Rica's Wildlife Conservation Law (N° 7317): action, for any purpose, to injure, detain, capture, or kill wild animals (Asamblea Legislativa de la República de Costa Rica, 2012). I avoid using the term poaching unless I am quoting someone else due to the value-laden nature of the term. In the words of Collard (2013), the term poaching, "carries with it problematic assumptions about who has access to what resources, where, and how, as well as who decides these thing" (p. 93). When specifically referring to the act of catching and keeping or selling a wild animal, I use the term capture (Collard, 2013).

To explore the governance of wildlife, I use the concept of environmentality, which is the way in which the state and other actors govern natural resource use (Section 5.7.1). Foucault (2008) defined governmentality as "the way in which one conducts the conduct" of others (p. 186). Agrawal (2005) built upon this concept of governmentality, defining a specific governmentality that governs human behaviours in relation to the environment. In the words of Agrawal (2005), environmentality is the "creation of new subjects concerned about the environment" (p. 166). Governmentality (or environmentality) is "the means by which the state (as well as other actors) exercises biopower" (Fletcher, 2010, p. 175), which is "the right to make live or let die" (Foucault, 2003, p. 241). In terms of wildlife conservation, human uses of natural resources and wildlife are governed in ways that dictate which species are made to live or left to

die. Lorimer (2015) built on Foucault's concept of biopolitics as it relates to wildlife conservation; he defined biopolitics as "a modern form of governance that seeks to secure the future of a valued life (both human and nonhuman) at the scale of the population" (Lorimer, 2015, p. 13).

Fletcher (2010) described four distinct environmentalities, which can co-exist and interact: discipline, sovereign, neoliberal, and truth. Discipline environmentality internalizes societal and ethical norms; this can be achieved by law enforcement, the threat of penalties, social stigma around certain behaviours, and environmental education. Sovereign environmentality is when "resource preservation is enacted through the creation and patrol of so-called protected areas" (Fletcher, 2010, p. 177). Neoliberal environmentality seeks to incentivize people to choose environmentally friendly behaviours rather than instil societal norms. Truth environmentality refers to governance "with particular conception of the nature and order of the universe" (Fletcher, 2010, p. 177).

2 – Hunting and Wildlife Trade

2.1 – Ecological impacts of hunting

Defaunation, the loss of wildlife species and populations as well as declines in abundance, can have significant impacts on entire ecosystems, not just the populations of species harvested (Ceballos & Ehrlich, 2002; Dirzo et al., 2014; Galetti & Dirzo, 2013). The main causes of defaunation include habitat destruction, invasive species, climate change, human introduced pathogens, and overexploitation (Dirzo et al., 2014). While this research focuses on exploitation of wildlife, it is important to note that these stressors may interact with each other and have synergistic effects (Dirzo et al., 2014). For example, new roads and forest fragmentation allow hunters to access previously inaccessible parts of forests (Peres, 2001; Wilkie, Bennett, Peres, & Cunningham, 2011). Furthermore, forest fragmentation decreases the possibility of repopulation from non-harvested populations of the same species (Peres, 2001). Some conservation biologists have voiced concern that overexploitation can lead to "empty forests", essentially forests destroyed from within (Redford, 1992; Wilkie et al., 2011).

Defaunation can affect many ecosystem processes, including: pest control, pollination, seed dispersal, nutrient cycles, water quality, and disease regulation (Cardinale et al., 2012; Dirzo et al., 2014; Galetti & Dirzo, 2013). Population decreases in one species can also lead to the extinction of another before its own extinction (Säterberg, Sellman, & Ebenman, 2013). In neotropical regions, many species hunted for bushmeat are common species that are not threatened with extinction (Nasi, Taber, & van Vliet, 2011). Nevertheless, significant population declines, even if the species are not threatened, can have great ecological impacts (Ceballos & Ehrlich, 2002; Gaston & Fuller, 2007). In the Amazon, medium-sized animals such as large rodents, peccaries, and deer make up the majority of harvests, along with tapir (*Tapirus bairdii*), although to a lesser degree (Nasi et al., 2011). All of these species are important seed dispersers and changes in their population levels can significantly alter forest composition (Nasi et al., 2011). In addition, when prey species decrease in numbers, such as paca (*Agouti paca*), attacks on livestock can increase, resulting in human-feline conflict and the killing of felines (Burgas, Amit, & Lopez, 2014).

While larger animals, such as top predators, are less often sought out by hunters, they are usually hunted when encountered (Nasi et al., 2011). Large-bodied, long-lived animals with low rates of population increases, such as primates and large carnivores, tend to be less resistant to hunting pressure, and populations decrease rapidly if hunting increases (Nasi et al., 2011). These animals tend to play important roles in ecosystems and are often keystone species (Nasi et al., 2011). Top predators, such as big cats, make resources such as carrion available to other species as well as control the populations of their prey (Nasi et al., 2011). When predators are removed, the abundance of their prey can increase, leading to declines in the prey of these species, and ultimately to changes in the ecosystem (Nasi et al., 2011). Evidence also suggests that population declines of large-bodied seed dispersing mammals can lead to changes in forest composition that could diminish long-term carbon storage potential (Poulsen, Clark, & Palmer, 2013).

2.2 – Ecological impacts of wildlife trade

The global trade in wildlife has been identified as contributing greatly to species declines and extinctions (Bush, Baker, & Macdonald, 2014; Gastañaga et al., 2011; González, 2003; Nijman, 2010; Regueira & Bernard, 2012; Wright et al., 2001). Wildlife trade refers to the trade of animals and plants for a variety of purposes including, but not limited to, use as pets, food, ornamentation, and medicine (Baker et al., 2008; Broad et al., 2003). There is not enough information to describe the international wildlife trade, legal or illegal, with accuracy (Blundell & Mascia, 2005; Broad et al., 2003). Nevertheless, Engler (2008) found that international legal wildlife trade increased by 70% between 1995 and 2005, reaching an estimated value of almost $61 billion USD, if timber and fisheries commodities are excluded. The scope of illegal wildlife trade is also difficult to assess, as it goes largely undocumented save for reported seizures and confiscations; nevertheless, evidence suggests that illegal trade is substantial (Broad et al., 2003; Regueira & Bernard, 2012; Rosen & Smith, 2010). The illegal trade in endangered wildlife products alone is worth upwards of $10 billion USD annually (Wyler & Sheikh, 2013). Domestic wildlife trade could also make up a significant portion of the global wildlife trade, however this is difficult to quantify as records on domestic trade are sparse (Broad et al., 2003; Shirey & Lamberti, 2011).

Wildlife trade poses a number of ecological threats beyond population declines in exploited species. Wildlife trade can facilitate disease transmission both to species traded and to other species, which can pose serious risks to endangered wildlife, particularly if combined with other threats such as overexploitation or habitat loss (Macdonald & Laurenson, 2006; Smith, Acevedo-Whitehouse, & Pedersen, 2009). Mass declines in amphibian species have been attributed partially to disease transmission from the global trade in amphibians (Daszak, Cunningham, & Hyatt, 2003; Gratwicke et al., 2010). The trade of wildlife around the world has also been recognized as a vector for introducing non-native species that can pose great threats to native biodiversity (Pimm et al., 2014; Smith, Behrens, et al., 2009). Introduced species can threaten native wildlife through competition, predation, parasitization, and disease transmission (Smith, Acevedo-Whitehouse, et al., 2009; White et al., 2008). Considering the risks of disease transmission and invasive species, surveillance and reporting of traded wildlife is lacking (Pavlin, Schloegel, & Daszak, 2009; Smith et al., 2012)

Not only does the trade in wildlife pose threats to wildlife and ecosystems but it is also an important security concern. The illegal trade in wildlife may be amongst the top 10 most lucrative illegal activities in the world and evidence suggests that organized crime is heavily involved with this trade (Challender & Macmillan, 2013; Douglas & Alie, 2014). Furthermore, wildlife trade poses a serious threat to human health as it facilitates the outbreak of zoonotic diseases (Smith et al., 2012; Swift, Hunter, Lees, & Bell, 2007).

2.3 – Socio-economic dimensions of hunting and wildlife trade

Wildlife is exploited for a variety of purposes including for use as pets, food, ornamentation, and medicine, among others (Broad et al., 2003; Nasi et al., 2008). Our understanding of hunting and its cultural and socio-economic dimensions is limited (Duffy et al., 2015; Nasi et al., 2011). Nevertheless, many people rely on wildlife for subsistence consumption, income, and as a safety net for difficult times, such as crop failure (Bennett, 2002; Isla, 2005, 2015; Nasi et al., 2011; Rowcliffe, 2002). Overexploitation of wildlife populations can put the people who depend on these resources at risk (Bennett, 2002; Dirzo et al., 2014). In Central

America, poor communities depend on natural resources the most (Obando & Herrera, 2010). While only 1.4 to 2.2% of the population in South America regularly consumes bushmeat (Rushton et al., 2005), those who depend on hunting are usually the most marginalized (Bennett, 2002; Rushton et al., 2005). It has also been noted that the line between commercial and subsistence hunting is often blurred for people who depend heavily on wildlife resources as they may use wildlife for both food and income (Duffy et al., 2015; Nasi et al., 2008). Hunting can also have great cultural significance (Isla, 2005; Nasi et al., 2011; Obando & Herrera, 2010; Sylvester, Segura, & Davidson-Hunt, 2016).

Protected areas have become a cornerstone of wildlife conservation and have expanded in size and number considerably over the last few decades (Geldmann et al., 2013; Le Saout et al., 2013; Meir, Andelman, & Possingham, 2004). Many protected areas have been exclusionary, displacing and dispossessing local peoples in a myriad of ways and consequently, some have failed at meeting their conservation objectives (Adams & Hutton, 2007; Brockington, 2004; Duffy, 2010; West, Igoe, & Brockington, 2006). Legislation and international agreements have also attempted to control hunting and wildlife trade outside of protected areas, such as the Wildlife Conservation Law in Costa Rica. Considering the socio-economic importance of wildlife resources in livelihoods, Rowcliffe (2002) attests that a ban on hunting is neither feasible due to monitoring difficulties nor ethical when people rely on wildlife for sustenance or income. It has also been argued that some species and ecosystems can handle higher hunting pressures (Nasi et al., 2011; Robinson & Bennett, 2004; Rowcliffe, 2002). Moreover, if governments do not recognize the needs and wants of local people, regulations may be ignored (Bennett, 2009; Wilkie et al., 2011). Restrictions in resource use without compensation can also lead to conflict, which has occurred in Costa Rica (Campbell, 2002b; Isla, 2005; Schelhas & Pfeffer, 2010).

2.4 – Hunting and wildlife trade in Costa Rica

In Costa Rica, hunting occurs inside and outside of protected areas, in forests and across agricultural landscapes (Carrillo et al., 2000; Daily, Ceballos, Pacheco, Suzán, & Sanchez-

Azofeifa, 2003; Wong, 2014). Wildlife has long been hunted for subsistence and people continue to hunt out of tradition, even if they do not require bushmeat for subsistence (Daily et al., 2003; Isla, 2005; Vaughan, 2012; Vaughan & Rodriguez, 1991; Wong, 2014). The sale of wildlife contributes substantially to the income of some households (Isla, 2005, 2015; Molina Murillo & Huson, 2014). In the Osa Peninsula, hunting is most often for personal consumption but selling hunted wildlife is also important (Wong, 2014). Wong (2014) noted that some people living in the Golfo Dulce Forest Reserve are vulnerable due to lack of land tenure, necessitating hunting and selling meat. People also kill animals due to conflict, such as tapirs when they destroy crops (Wong, 2014) or felines if they attack livestock (Amit, Rojas, Alfaro, & Carrillo, 2009).

Historically, hunting has impacted many species in Costa Rica (Romero et al., 2013; Timm et al., 2009). While only a small portion of households hunt currently, the total number of individual animals hunted can be great and impact population levels (Drews, 2002, 2003; Molina Murillo & Huson, 2014). For example, Molina Murillo and Huson (2014) estimated that in communities near Carara National Park, 145 pacas are hunted each month. Altrichter and Carbonell (2013) found that subsistence hunting in the Talamanca Bribri-Cabécar Indigenous Reserve lowered wildlife abundances, particularly white-lipped peccary (*Tayassu pecari*), tapir, and spider monkey (*Ateles geoffroyi*) populations. Carrillo et al. (2000) also found that commonly hunted species were significantly less abundant outside of the Corcovado National Park where there was less protection from hunting; these species included the tapir, white-lipped peccary, collared peccary (*Tayassu tajacu*), brocket deer (*Mazama Americana*), paca, and agouti (*Dasyprocta punctata*).

Costa Rica has an active trade in wildlife, both legal and illegal (TRAFFIC North America, 2009). The country has not traditionally exported wildlife for the pet market (Drews, 2003). There is evidence of a large domestic demand for wild pets (Abarca Morales, 2005; Arévalo, 2010; Drews, 2001; Molina Murillo & Huson, 2014), but this may be declining (Schan, 2011). While a wide variety of wildlife species are kept as pets, birds make up the majority (Drews, 2001; Schan, 2011). Black-faced solitaires (*Myadetes melanops*) are highly sought after birds because of their song (Carvajal & Villalobos, 2001; Menacho Odio & Pérez, 2013). The domestic demand for pets could put some species at risk. It was estimated that between 25,000

and 40,000 parrots are caught annually to meet local demand (Drews, 2000). This estimate does not take into account the mortality rates of birds before reaching the market; in Peru, mortality during harvest ranged from 14.3% to 48.4% for macaws and up to 8% for amazons, depending on the species (González, 2003).

3 – Conservation in Costa Rica

Conservation was not of wide-spread concern in Costa Rica until later in the 20th century, when the country was experiencing intense environmental destruction in the form of rapid deforestation and an active wildlife trade (Boza, 1993; Evans, 1999; Miller, 2012; Schelhas & Pfeffer, 2005; Vandermeer & Perfecto, 2013). In the second half of the 20th century, Costa Rica had one of the highest deforestation rates in the world (Arturo Sánchez-Azofeifa, Daily, Pfaff, & Busch, 2003). This deforestation has been attributed to logging, export agriculture, pasture, and settlement, all of which had synergistic effects (Arturo Sánchez-Azofeifa et al., 2003; Sader & Joyce, 1988; Sanchez-Azofeifa, Harriss, & Skole, 2001; Vandermeer & Perfecto, 2013).

3.1 – Protected areas

Costa Rica responded to this deforestation crisis by establishing protected areas that prohibited resource use and settlement (Evans, 1999; Vandermeer & Perfecto, 2013). The country is now considered to have one of the best protected area systems in Latin America (Elbers, 2011). The number and geographical extent of protected areas grew considerably in little more than a century since the idea of protected areas surfaced in the country (Campbell, 2002b). Costa Rica now has over 190 protected areas that cover approximately 26% of its terrestrial territory and 17% of its marine territory (González-Maya, Víquez-R, Belant, & Ceballos, 2015; SINAC, 2010). Private protected areas have played a large role (Langholz, Lassoie, & Schelhas, 2000), accounting for approximately 11% of the country's protected areas (SINAC, 2010).

It is important to note that some protected areas in Costa Rica were created by displacing people, creating hardship as they were no longer allowed to use land or natural resources for subsistence (Campbell, 2002b; Isla, 2005, 2015, Schelhas & Pfeffer, 2005, 2010; Utting, 1994; Vaughan, 2012). There was a lack of consultation or even notification prior to establishment of some protected areas as well as a lack of compensation for lost land and resource access (Campbell, 2002b; Evans, 1999; Schelhas & Pfeffer, 2010; Utting, 1994). In some cases, there was a lack of available land or land prices rose after the protected areas were established

(Horton, 2009; Isla, 2015; Utting, 1994). Isla (2015) argues that this vulnerability, combined with neoliberal policies that have eroded social welfare, has forced people off their lands and into the low-wage labour market. Consequently, people found themselves in situations where they needed to illegally enter protected areas to collect natural resources and/or squat on land for subsistence agriculture, facing legal penalties and social stigma (Horton, 2009; Isla, 2015; Utting, 1994; Wong, 2014). The government has also provided private protected area owners with assistance to deal with squatters (Langholz et al., 2000). As such, Langholz (2000) cautioned that, "In protecting them from squatter invasions by the country's poorest people, the national government may be supporting the elite" (p. 1741).

As a result of the displacement and dispossession of local people, protected areas have faced resistance, which has sometimes been violent (Alvarado, Cortés, Esquivel, & Salas, 2012; Campbell, 2002b; Isla, 2015; Langholz et al., 2000; Utting, 1994). Yet, Isla (2005) contends that, "the Costa Rican government refuses to accept the survival claim of subsistence hunters and instead criminalizes their retaliation" (p. 56). Allowance of industries and tourism in protected areas that local people were displaced from has intensified this conflict (Campbell, 2002b; Grandia, 2012; Isla, 2015; Meletis & Campbell, 2007; Schelhas & Pfeffer, 2005; Utting, 1994). In some cases, regulations were not enforced to avoid conflict and this, coupled with limited resources and personnel, made some protected areas "paper parks", only really existing on paper (Alvarado et al., 2012; Campbell, 2002b; Langholz et al., 2000; Utting, 1994).

3.2 – Ecotourism

Ecotourism has been promoted as a way to remedy some of the negative social impacts of protected areas, pay for conservation initiatives, and promote a conservation ethic among both locals and tourists (Campbell, 2002b; Hunt, Durham, Driscoll, & Honey, 2014). Tourism has brought improvements to infrastructure, public services, education, and wages to some regions (Broadbent et al., 2012; Isla, 2015; Koens et al., 2009). Worker wages are significantly greater near national parks; however, wage increases are only experienced near park entrances where tourism is concentrated (Robalino & Villalobos, 2015), meaning that people living near parks but

far from entrances may be experiencing declines in access to natural resources and land without increases in wages. Furthermore, evidence suggests that people who migrate from other regions are more likely to find employment and receive higher salaries than people who have lived in the area longer (Broadbent et al., 2012; Robalino & Villalobos, 2015; Vandegrift, 2008; Zambrano, Broadbent, & Durham, 2010). Local benefits from ecotourism are also constrained by foreign corporations that compete with local businesses and receive tax breaks (Braun, Dreiling, Eddy, & Dominguez, 2015; Campbell, 2002a; Fletcher, 2012; Horton, 2009; Hunt et al., 2014). In some areas, tourism has led to increases in land and product prices, waste and pollution, prostitution, and drug and alcohol use (Almeyda, Broadbent, Wyman, & Durham, 2010; Broadbent et al., 2012; Isla, 2015; Koens et al., 2009; Stem, Lassoie, Lee, & Deshler, 2003).

3.3 – Beyond protected areas

It has been asserted that it is necessary not only to focus wildlife conservation efforts and monitoring on protected areas, but on the surrounding areas (Laurance et al., 2012) as well as the larger landscape (Gaston & Fuller, 2007; Nasi, Christophersen, & Belair, 2010). Overall, protected areas have been successful at preserving forest habitat and slowing rates of extinction, although there are examples of species going extinct within protected areas (Butchart et al., 2012; Geldmann et al., 2013; Watson, Dudley, Segan, & Hockings, 2014). Nevertheless, forest loss has continued in the areas surrounding tropical protected areas (DeFries, Hansen, Newton, & Hansen, 2005). Moreover, ecological conditions of protected areas largely depend on not just the protected area itself, but the buffer zones around the protected areas (Laurance et al., 2012). In Costa Rica, by the 21st century forest cover had decreased to less than 25% of the country, little of which existed outside of protected areas (Sanchez-Azofeifa et al., 2001; Vandermeer & Perfecto, 2013). There was also significant forest loss in the 10 km buffer zones around the protected areas (Arturo Sánchez-Azofeifa et al., 2003; Sanchez-Azofeifa et al., 2001). As such, Vandermeer & Perfecto (2013) warned that if conservation in Costa Rica continued to be primarily focused on protected areas, "what we expect to see, in the short term, a sea of devastation with islands of 'pristine' rainforest, and in the long term nothing but the sea of devastation" (p. 14).

Protected areas may also not be adequate in their representation of biodiversity or sufficient enough in size and connectivity to protect the biodiversity that is found within their borders (Arturo Sánchez-Azofeifa et al., 2003; Powell, Barborak, & Rodriguez S., 2000). While the protected area system in Costa Rica represents mammal species richness well, 25% of mammal species found in protected areas are underprotected in terms of range coverage; of these species, 55% are endemic and 23% are threatened with extinction (González-Maya et al., 2015). There is evidence, however, that many species can survive outside of protected areas in agricultural landscapes, particularly coffee plantations that are contiguous with small forest patches (Daily et al., 2003). As such, Perfecto and Vandermeer (2008) have argued that conservationists should look to agricultural landscapes for biodiversity conservation in the neotropics. Within this context, biological corridors such as the ASBC can play an important role in wildlife conservation.

Costa Rica has taken strides towards including areas outside of official protected areas in conservation planning. In the 1990s, the Costa Rican protected area system underwent a process of decentralization; the Forestry, National Parks, and Wildlife departments were merged into the National System of Conservation Areas (SINAC), which divided the country into 11 conservation areas that include various categories of public and private protected areas (Figure 1) (Evans, 1999; Isla, 2015). Some believe that this new system allows for greater involvement of local actors in decision making and conservation (Campbell, 2002b; Elbers, 2011). Others, however, have argued that instead of increased local control, the new system actually allows for greater external influence and decreased regulation in order to increase profits from protected areas (Evans, 1999; Herrera-Rodriguez, 2013). Isla (2015) contended that in the Arenal-Tilaran Conservation Area (ACA-T), priority has been placed on profit over local welfare or even conservation; as such, she defines the new Costa Rican conservation area as “a designated domain where private and public activities are interrelated in order to manage and conserve the area’s nature for capital accumulation” (p. 5).

3.4 – Biological corridors

As part of the movement to decentralize the protected area system and engage areas outside of protected areas in conservation, Costa Rica established the National Biological Corridor Program (PNCB) in 2006 as part of the Mesoamerican Biological Corridor (SINAC, 2009). The goal of the program is to promote conservation and sustainable use of biodiversity and strengthen conservation areas by improving habitat connectivity amongst private property and protected areas (SINAC, 2008). In collaboration with SINAC, the corridors are designated and managed by local committees; these committees are made up of community leaders and representatives from environmental non-governmental organizations (ENGOs), the agricultural sector, institutions, and municipalities (SINAC, 2009). There are 37 biological corridors that cover approximately 34% of the national territory (Figure 1) (SINAC, 2009).

3.5 – Wildlife laws

Internationally, wildlife trade is regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which Costa Rica was the first country in Central America to join (Evans, 1999). Appendix I of CITES lists species threatened with extinction that are or may be affected by international trade (CITES, 1973). Trade in wild specimens of these species for commercial purposes is banned except under exceptional circumstances (CITES, 1973). Appendix II lists species that may become threatened with extinction unless international trade is regulated (CITES, 1973). In order to trade species listed in the two main CITES Appendices, the impact of the trade on wild populations needs to be assessed through a Non-Detriment Finding (NDF) (Smith et al., 2011). National legislation is expected to implement CITES domestically and have Scientific Authorities evaluate the threat of trade on species through NDFs (Smith et al., 2011). Costa Rica has 1,768 species listed in the CITES appendices (Obando & Herrera, 2010).

In Costa Rica, hunting and wildlife trade were largely prohibited as of 2012 under the amended Wildlife Conservation Law (N° 7317). It is important to note that this new law was

only possible due to the high level of negative attitudes towards hunting in Costa Rica, particularly towards hunting for sport and commercial purposes (Drews, 2002; Molina Murillo & Huson, 2014; Schelhas & Pfeffer, 2005; Wong, 2014). These changes were brought about as a Law of Popular Initiative, through which citizens can submit laws to congress provided they have the signatures of 5% of eligible voters (McKinney, 2012). Hunting is now only permitted in cases of population control, scientific research, and subsistence hunting, all of which needs to be approved by the Ministry of Environment and Energy (MINAE) (Asamblea Legislativa de la República de Costa Rica, 2012). Subsistence hunting is defined as use for personal or family consumption; still, subsistence hunting cannot include species at risk or occur in protected areas. Indigenous people are allowed to hunt on their territory. The commercial trade of wildlife is largely prohibited, except in government-approved programs such as the Ostional egg harvest (Campbell, Haalboom, & Trow, 2007). Penalties were also increased for violations of the Wildlife Conservation Law. For example, under Article 93(a), those who are caught harming wildlife that has been declared at risk of extinction or with reduced populations in any part of the national territory may have their hunting equipment confiscated and be sentenced for one to three years in prison. Similarly, Article 95(a) states that those who are caught illegally trading wildlife at risk of extinction or with reduced populations can be fined between 10 and 40 times their base salary and be sentenced for one to three years in prison.

4 – Methodology

4.1 – Study area

This study focused on hunting and wildlife trade in the South Pacific region of Costa Rica. Most of the research took place within the ASBC, found on the Pacific slope of the Talamanca mountain range within the La Amistad Pacific Conservation Area (ACLA-P) (Figure 1). This biological corridor is located just east of San Isidro de El General, the capital of the Pérez Zeledón region. The ASBC borders Chirripó National Park to the northeast, which in turn connects with La Amistad International Park, an international biosphere reserve that extends into Panama (Figure 2). Pacific slope habitats between 500 and 1500 metres above sea level are one of the most threatened and simultaneously least represented ecosystems in the Mesoamerican Biological Corridor (Powell et al., 2000). The ASBC ranges in elevation from 600 to 1500 metres above sea level and as such, the corridor is found within an ecologically significant part of the Mesoamerican Biological Corridor (Daugherty, 2005; Rapson, Bunch, & Daugherty, 2012).

The variety of altitudes and microclimates within the Talamanca mountain range have created a variety of ecosystems, which has resulted in high biodiversity and endemism (Chaverri Polini, 2008; Desanti, 2005). The region is also inhabited by a variety of species at risk, including the Endangered tapir and jaguar (*Panthera onca*) (Chaverri Polini, 2008; Daugherty, 2005; Desanti, 2005; Mooring et al., 2015). Other feline species found in the region include: puma (*Puma concolor*), ocelot (*Leopardus pardalis*), jaguarondi (*Herpailurus yaguarondi*), oncilla (*Leopardus tigrina*), and margay (*Leopardus wiedii*) (Mooring et al., 2015). A variety of other mammals are also found in the region, such as: coyote (*Canis latrans*), nine-banded armadillo (*Dasypus novemcintus*), white-tailed deer (*Odocoileus virginianus*), brocket deer, northern tamandua, white-faced capuchin monkey (*Cebus capucinus*), agouti, paca, and collared peccary, among others (Chaverri Polini, 2008; Desanti, 2005; Mooring et al., 2015). Over 260 species of amphibians and reptiles have been observed in La Amistad International Park (Desanti, 2005). In addition, more than 300 bird species are found within the ASBC alone, some of which are endemic to the region (Montoya & Maria Martinez, 2015).

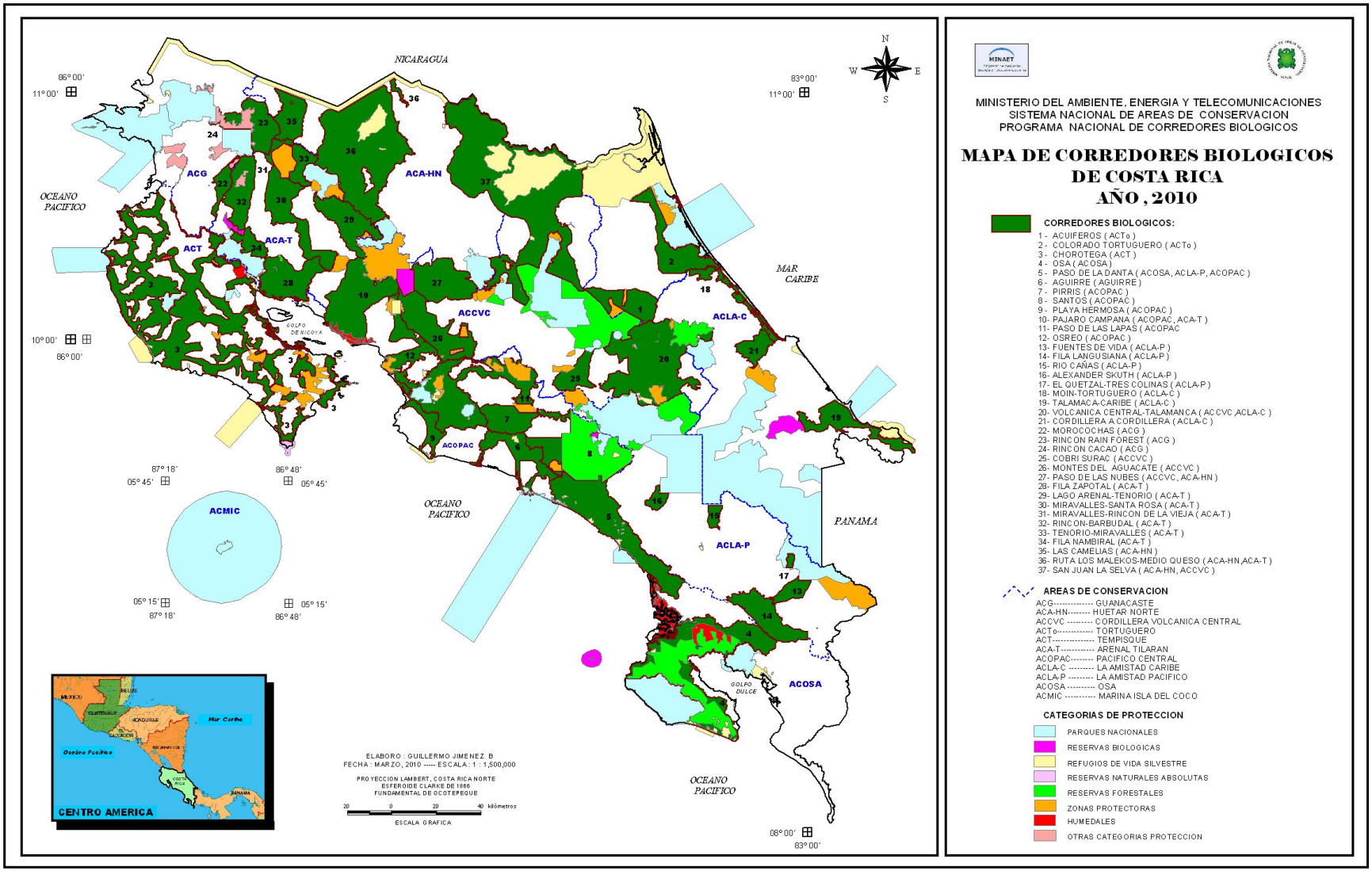

Figure 1. Map of the Biological Corridors in Costa Rica. The ASBC is number 16, found within the La Amistad Pacific Conservation Area (ACLA-P) (Arauz-Beita & Arias-Navarro, 2016)

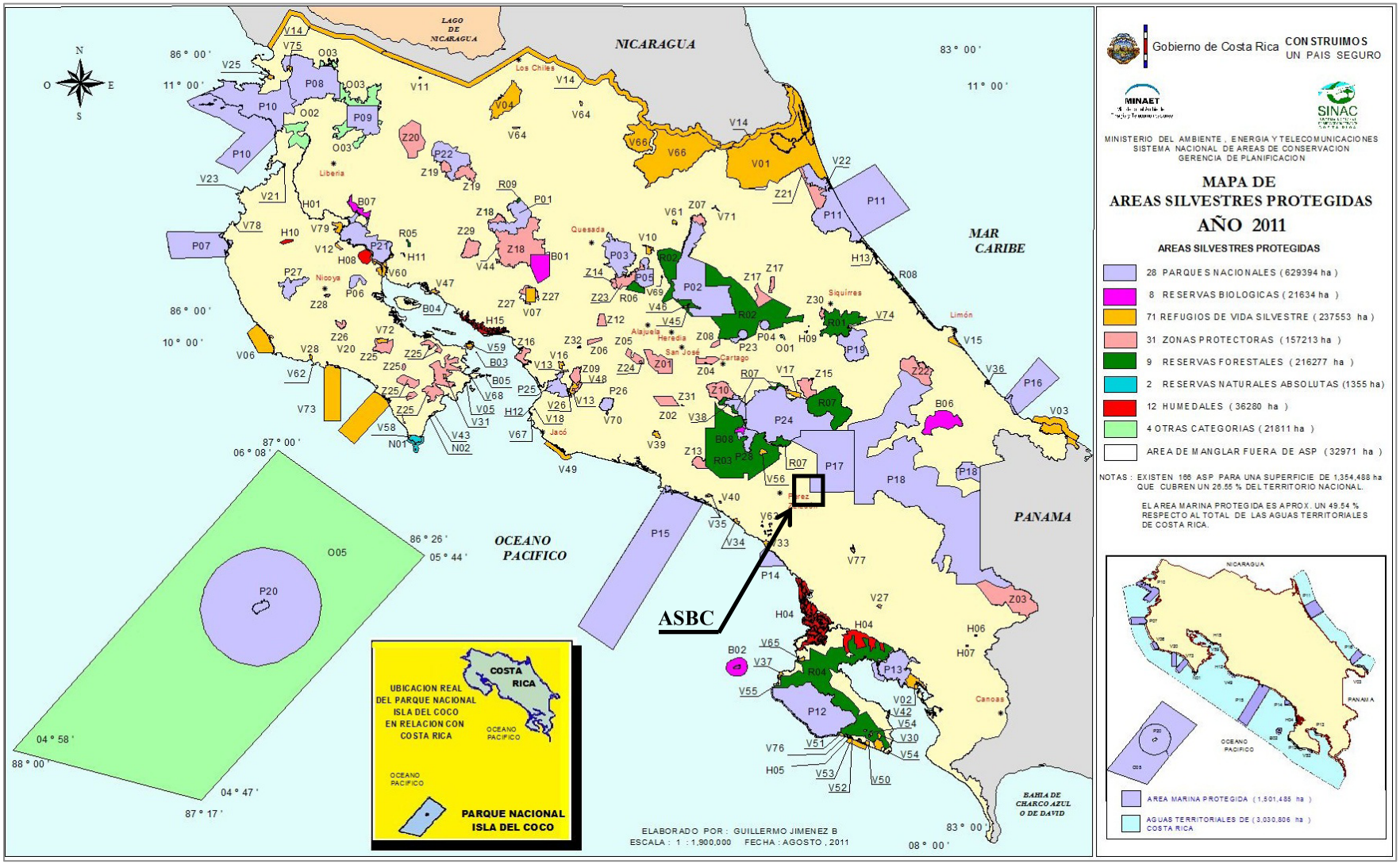

Figure 2. Map of Protected Areas in Costa Rica. The ASBC connects to the southeast corner of Chirripó National Park (P17), which in turn connects to La Amistad International Park (P18) (SINAC, 2015).

The biological corridor is named after Dr. Alexander Skutch, a renowned ornithologist who established a homestead at the southern end of the corridor in 1941; this 77-hectare forest patch is now Los Cusingos Bird Sanctuary, which is run by the Tropical Science Center (Montoya & Maria Martinez, 2015; Rapson et al., 2012). The Las Nubes Biological Reserve, where York University's EcoCampus is located, is a 124-hectare area of montane forest that was donated to York University by Woody Fisher in 1998 (Montoya & Maria Martinez, 2015). The ASBC was formed with the goal of maintaining and restoring biological connectivity between Los Cusingos at the southern end of the corridor and Las Nubes and Chirripó National Park at the northern end (Figure 3) (Montoya & Maria Martinez, 2015; Rapson et al., 2012).

The corridor was established collaboratively by the Tropical Science Center, York University, and community organizations (Montoya & Maria Martinez, 2015; Rapson et al., 2012). The idea of the ASBC started to form in 1998 but was not formally established until 2005 (Rapson et al., 2012). The corridor is managed by CoBAS (Corredor Biológico Alexander Skutch), which is made up of representatives from the local community and MINAE. A range of conservation initiatives have been undertaken in the ASBC, such as reforestation, environmental education, ecotourism, and wildlife monitoring (Montoya & Maria Martinez, 2015). A main goal of the ASBC is to simultaneously improve livelihoods and ecological integrity in the ASBC (Montoya & Maria Martinez, 2015).

As of 2005, there were almost 2,200 people living within the ASBC, a third of which were living in Santa Elena (Desanti, 2005). Agricultural activities in the region include sun and shade-grown coffee, pasture for livestock, and pineapple and sugar cane plantations (Ortiz-Imlach, 2014; Rapson et al., 2012). People also supplement their income with wage labour, particularly in urban centres, and income from community-led tourism, including housing university students (Ortiz-Imlach, 2014). While tourism remains limited, Ortiz-Imlach (2014) found that people in the ASBC were excited about the potential of it expanding and wildlife populations are thought to play an important role in attracting tourism to the area.

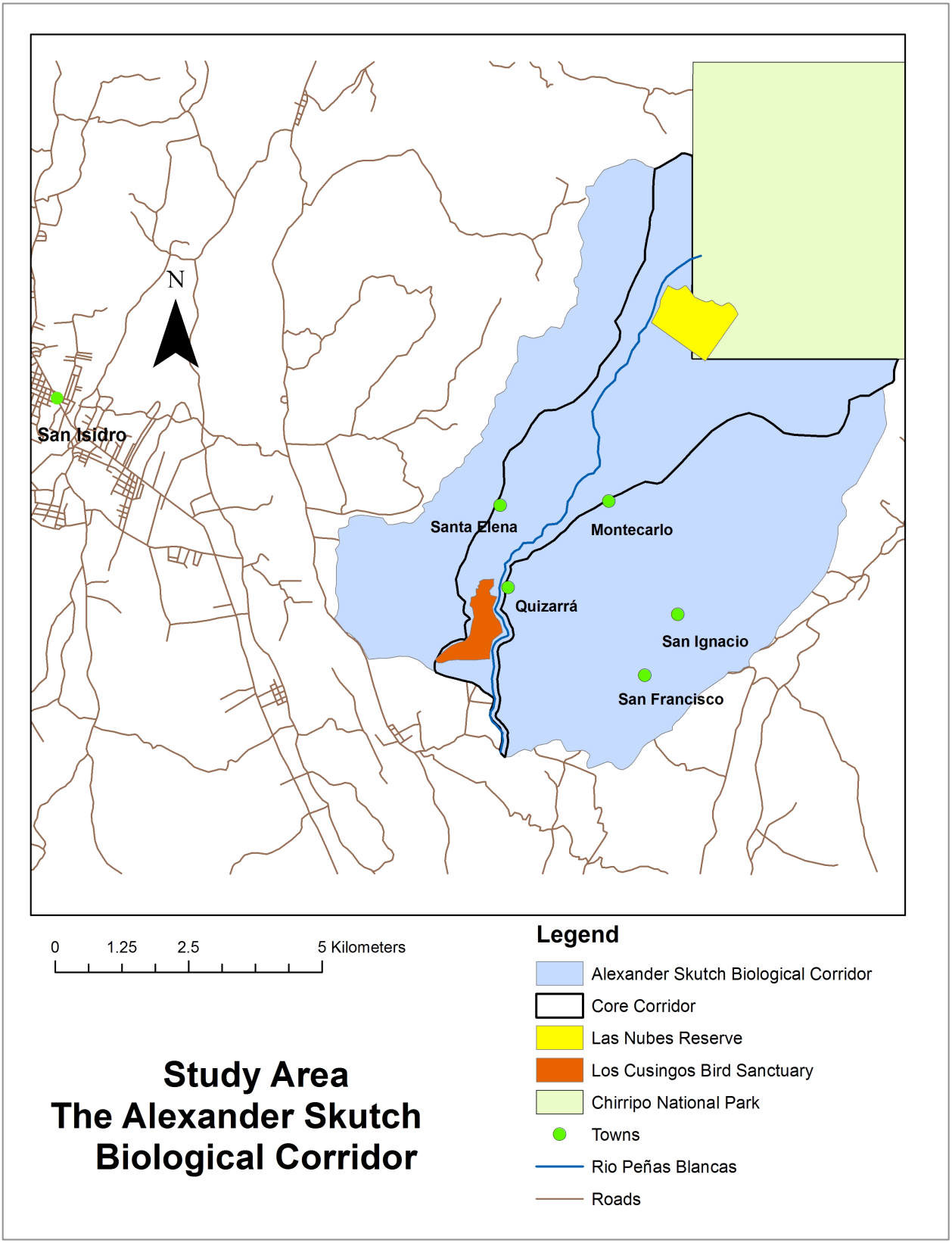

Figure 3. Map of the Alexander Skutch Biological Corridor (Rapson, 2008).

4.2 – Data collection

This research mainly relied on interviews, which occurred between June and September 2016 in Costa Rica. Interview participants were recruited using snowball sampling, which involves finding initial participants and then asking participants for recommendations of other individuals to invite to participate (Berg, 2009). This method was employed in order to find participants with relevant experiences and knowledge. This method was also important to ensure my personal safety while conducting research on illegal and contentious activities. Others researching hunting and wildlife trade have used similar methods (Fernandes-Ferreira, Mendonca, Albano, Ferreira, & Alves, 2012; Leberatto, 2016; Natusch & Lyons, 2012). Initially, I contacted individuals that I had met in the region during the 2015 Faculty of Environmental Studies field course in Costa Rica and people recommended by professors and a fellow Masters student conducting research in the ASBC. I also contacted wildlife centres, MINAE, protected areas, and ENGOs.

Semi-structured interviews were conducted with 38 participants. The majority of interviews were conducted in Spanish and a few were conducted in English. Each participant was asked questions about: a) the nature of hunting and wildlife trade in the region; b) enforcement and the impact of the Wildlife Conservation Law; and c) their opinions about hunting, hunting laws, and conservation. While I prepared a list of questions for each interview (Appendix 1), the semi-structured format allowed for casual conversations to develop. Depending on the interview, some questions were omitted or other questions pertinent to the conversation were added. Participants were encouraged to add any additional comments. Schelhas and Pfeffer (2005) contend that long semi-structured interviews are important as they that allow participants to add what they feel is relevant to the discussion, rather than just initial responses to interview questions. I also offered the participants field guides to use for species identification if needed (Montoya & Maria Martinez, 2015; Wainwright, 2012, 2014, 2015; Wainwright, Dean, Brown, Leal, & Suárez, 2016). Interviews lasted between 9 and 135 minutes, with an average of 50 minutes. The majority of participants (82%) were male; 31 males and 7 females were interviewed. Ages of participants ranged from 30 to late 70s. The majority of participants (76%) were from towns in the ASBC (Table 1). These participants included current

and ex-hunters, protected area employees, and concerned residents. Individuals interviewed outside of the ASBC were people with professional expertise in wildlife conservation, which I refer to as wildlife professionals; this group included employees from protected areas, MINAE, wildlife centres, and ENGOs.

Table 1. Locations of study participants.

Location	Participants	%
Montecarlo	11	29
Quizzará	10	26
Santa Elena	5	13
San Francisco	2	5
San Ignacio	1	3
Outside of the ASBC	9	24
Total	38	100

All interviewees were made aware of the goal of the project and were ensured that their participation would remain confidential. Most interviewees signed a consent form (Appendix 2); however, a few participants expressed hesitation to signing the form and preferred to give verbal consent (Appendix 3). This research was reviewed and approved by the FES Research Committee at York University and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. Most interviews were audio-recorded but notes were taken instead when interviewees preferred not to be recorded. Interviews were generally conducted one-on-one. Two couples preferred to be interviewed together, which allowed for interesting discussions to develop during the interviews. In addition, Luis Angel and Patricia Sanchez Nuñez occasionally assisted me in finding research participants and sometimes the interviewees invited them to be present during the interview, which helped with translation and species identification.

Data collected during interviews were complemented with participant observation during relevant events and meetings as well as visits to wildlife rehabilitation centres. To learn more about wildlife trade in Costa Rica, I toured three wildlife rehabilitation centres: the Alturas

Wildlife Sanctuary, located near Dominical, the Kids Saving the Rainforest Wildlife Sanctuary, located near Quepos, and the Osa Wildlife Sanctuary, located next to the Piedras Blancas National Park. I also attended a panel discussion on fighting wildlife trade in Costa Rica during the 7th Environmental Fair in San José. In order to better understand wildlife conflict, I attended a meeting in Chimirol on human-feline conflict around Chirripó National Park, hosted by Gente y Fauna, a group focused on co-existence with felines and engagement with farmers impacted by feline conflict. In the ASBC, I attended the 10th Environmental Fair attended by all the schools in the corridor, CoBAS meetings, and a variety of community events. Myself and two other students also organized a two-day environmental conference at the Lillian Meighen Wright Centre (Appendix 4), which included a day of talks that 45 people attended and a half-day hike in the Las Nubes Biological Reserve that 12 people participated in. Finally, at the end of my field research from September 12th to 16th, I attended the 2nd Latin American Congress on Socio-environmental Conflict at the University of Costa Rica.

4.3 – Data analysis

Interviews and field notes were translated while transcribing and then coded using NVIVO qualitative data analysis software. A priori codes were developed before data analysis based on research questions and findings from literature review; however, inductive coding was used and a priori codes were altered to allow new codes to surface from the data (Denzin & Lincoln, 2005). Coding was redone to ensure consistency of coding throughout the dataset (Appendix 5). Findings are illustrated using anonymous direct quotes.

4.4 – Research limitations and challenges

Since hunting is a contentious and largely illegal activity in Costa Rica, it is possible that participants lied about their knowledge about or participation in hunting and wildlife trade (St. John, Edwards-Jones, Gibbons, & Jones, 2010). In attempt to mitigate this, I tried not to express negative sentiments about hunting during interviews and inquired about hunting and wild pets at the community level, unless the participant offered to discuss their personal activities. Of course,

however, participants were aware of my association with York University, which is known for conservation efforts in the area and therefore, may have assumed that I hold a negative opinion towards hunting. Schelhas and Pfeffer (2005) also maintain that it is important to try not to express personal opinions while conducting interviews on natural resource use and environmental values. Some participants expressed that they were nervous about conflict with hunters if they told me about local hunting activities. As such, I did not ask participants to identify hunters. I also assured participants that their participation and responses would remain confidential. There were a few participants who initially downplayed their knowledge at the beginning of the interview and provided the most pertinent information at the end, once they were more comfortable.

Considering the conflict around hunting activities, I did not directly seek out hunters both for my personal safety and to not put pressure on participants. As such, I was only able to interview one current hunter, who was introduced to me by another participant. I was, however, able to interview eight ex-hunters who openly discussed their past hunting activities, including one who had very recently stopped hunting. Discussing illegal activities requires trust and it takes time to build a rapport. If I had the opportunity to extend my field research, I may have been able to safely find more hunters to interview. In particular, I would have liked to interview people who hunt for subsistence to better understand the socio-economic implications of the new Wildlife Conservation Law. This was not possible in the given time frame because subsistence hunting is no longer commonplace and is usually done clandestinely in Costa Rica. Furthermore, the findings here are based on a small sample size due to time constraints; as such, I draw upon other literature, particularly studies conducted in the region, when possible.

5 – Hunting and Wildlife Trade in the ASBC

5.1 – History of hunting in the ASBC

In the late 1930s, the region known today as Pérez Zeledón only had about five thousand inhabitants; a few hundred people were living near the centre, San Isidro de El General, and the rest were scattered on farms around the valley (Skutch, 1992). There were still large tracts of forest between cleared areas and vast forested areas outside of the agricultural settlements that continued up into the Talamanca mountain range (Skutch, 1992). When the Pan-American highway was constructed between Cartago and San Isidro de El General in the late 1940s, migration increased from the densely populated capital southward (Chaverri Polini, 2008; Skutch, 1992). In the 1950s, the population in Pérez Zeledón doubled, resulting in great deforestation along the slopes of the Talamanca mountain range as settlers cleared forests for their homesteads and farms (Chaverri Polini, 2008).

In the 1940s, people looked towards land that is now within the ASBC to settle. Skutch (1992) wrote that at the time, Quizarrá was "talked about as a land of promise" (p. 142). Settlers cleared forest to farm, relying to a certain extent on natural resources. Hunting was common as a form of subsistence or protein supplement. In the ASBC, 76% (n=29) of participants in this study believed that hunting used to be more prevalent and almost half (48%) stated that it was for subsistence. Over a third of participants (38%) discussed the hardships of homesteading in the ASBC and how there used to be less access to meat. Places to purchase meat were fewer and further away and they were harder to access due to less developed road networks and limited access to means of transportation. Furthermore, there were fewer sources of employment and economic resources to purchase meat. Participant 35, a 78 year old ex-hunter, talked about hunting for food for his family while growing up even though he did not like bushmeat himself because, in his words, "We were really poor and had a lot family so if someone wanted to eat a bit of meat, it had to be from the forest." Schelhas and Pfeffer (2005) also interviewed participants who described the difficulty of frontier life near La Amistad International Park, necessitating hunting. In the ASBC, many different species were hunted for meat during this

time (Table 2); six participants stated that the norm used to be to hunt everything they could eat. Participant 14 talked about white-tipped dove being the only meat she ate growing up:

> This is the only meat that we ate because my father could not buy it… he did not do it for sport... it wasn't all the time but now and again he went and brought it to my mom to make and give to us because there was no other way to obtain it.

Table 2. Past species hunted in the ASBC region.[1]

Species[2]
Mammals
Central American agouti (*Dasyprocta punctata*)
Coati (*Nasua narica*)
Collared peccary (*Tayassu tajacu*)
Deer
Brocket (*Mazama Americana*)
White-tailed (*Odocoileus virginianus*)
Feline
Ocelot (*Leopardus pardalis*)
Puma (*Puma concolor*)
Monkey
Central American Spider (*Ateles geoffroyi*)
Nine-banded armadillo (*Dasypus novemcintus*)
Paca (*Agouti paca*)
Raccoon (species unspecified)
Birds
Crested guan (*Penelope purpurascens*)
Gray-headed chachalaca (*Ortalis cinereiceps*)
Gray-headed wood rail (*Aramides cajaneus*)
White-tipped dove (*Leptotila verreauxi*)

1 – Participants talked about these species in the context of hunting between the 1940s and 2000.
2 – Common local names translated based on Henderson (2002), Montoya and Maria Martinez (2015), and Wainwright (2007).

Deforestation, land-use changes, and hunting in the ASBC have led to concerns about wildlife populations (Desanti, 2005; Rapson et al., 2012; Schan, 2011). In this study, 72% of participants in the ASBC discussed how there used to be more wildlife. By 2008, only 37.8% of the ASBC was covered in forest, having decreased by 19% since 1998 due to agricultural

expansion (Rapson et al., 2012). The average forest patch size had also decreased by 15% over the same time period (Rapson et al., 2012). Coffee plantations, which support higher species richness than crops cultivated without canopy cover (Daily et al., 2003), have also decreased due to conversation to pasture, sugarcane, and pineapple plantations (Rapson et al., 2012; Shaver et al., 2015). As a result, Skutch (1992) remarked that pumas, jaguars, tapirs, and peccaries had all disappeared by the time he arrived in 1941 and that by the 1970s, brocket deer, coatis, and tayras had disappeared as well. Participant 1 described the change in hunting over time from a means of subsistence to more of a tradition, meanwhile wildlife populations continued to decline:

> Before in my grandparents' time… Life was harder… From the countryside to the city was very different. There was no means of transportation to bring meat and these things. They had pigs, cows, and chickens but besides these domestic animals, they hunted paca for other food… but there were many, there were many animals… But the population started to grow and people started to come to the mountains to create houses in the mountains. And so the population was growing and they were eating the animals…. this continued and became part of their routine… becoming a custom…. until some species almost disappeared and some types of animals did completely.

5.2 – Motivations for hunting

Participants often mentioned multiple overlapping drivers for hunting (Figure 4 & Table 3). For example, participants explained that people might hunt for sport, which they consider a tradition, but also enjoy the bushmeat and sell any leftovers; Hammerschlag (2012) also noted this in the ASBC. Participant 35, an ex-hunter in the ASBC, explained this phenomenon, "They make a sport out of hunting paca. Maybe they cannot eat it, so they sell it in pieces." Duffy et al. (2015) also argued that drivers for illegal hunting often overlap as people hunt both for subsistence and income.

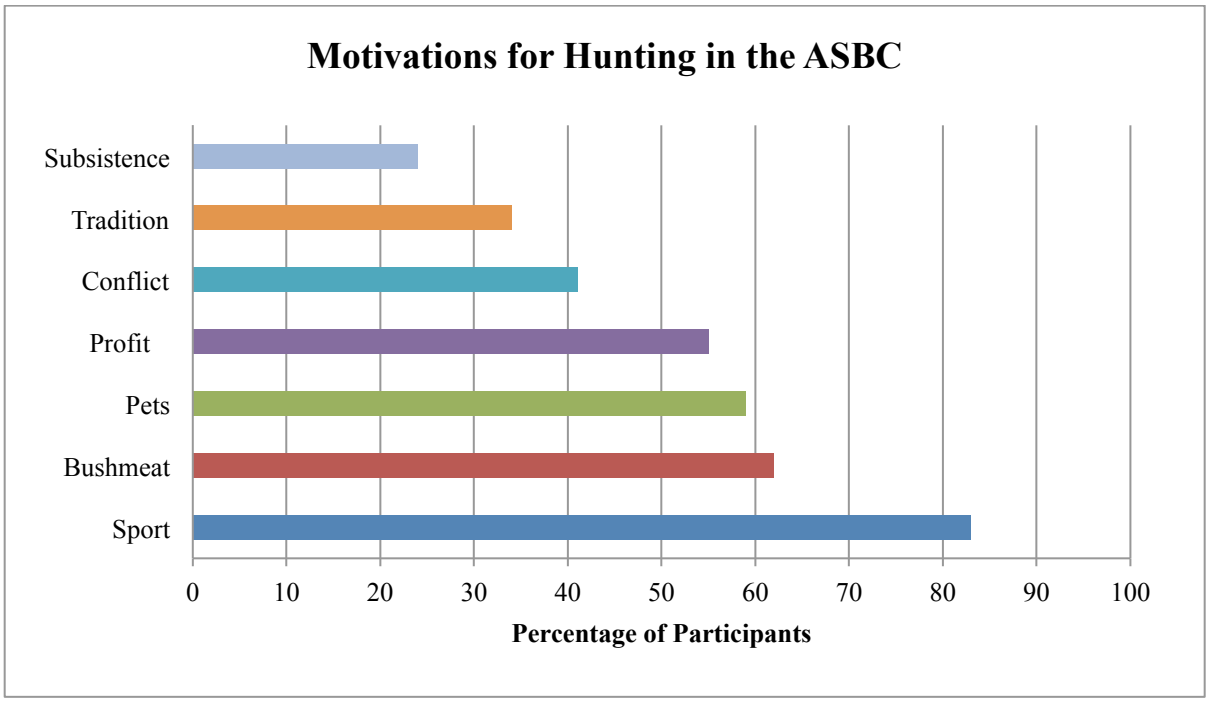

Figure 4. Motivations for hunting in the ASBC, as stated by 29 participants in the ASBC.

Table 3. Motivations for hunting in the ASBC.

Reasons	Participants[1]	%[2]
Sport	24	83
Bushmeat	18	62
Pets	17	59
Profit	16	55
Conflict	12	41
Tradition	10	34
Subsistence	7	24

1 – Includes participants located in the ASBC.
2 – Percentage out of the 29 participants in the ASBC.

5.2.1 – Sport

When asked why people hunt in the ASBC, participants most often stated that people hunt for sport (83% of participants). Eight out of the nine hunters, former and current, interviewed in the corridor believed that sport is one of the motives for hunting. Likewise, eight

out of the nine wildlife professionals interviewed outside of the corridor stated that people hunt for sport in Costa Rica. Chaverri Polini (2008) also noted that sport hunting occurs in Chirripó National Park. Participants in this study often expanded on what attracts people to hunting for sport. Some explained that hunters love watching the dogs chase after animals, particularly paca, as Participant 4 elaborated:

> People love it. They get excited. The dogs start barking when they get on the trail and the hunters get excited and they start yelling at the dogs and the closer the dogs get to the paca, paca is what they usually hunt, the louder they bay and the hunters yell louder… it is all a great big game and they love it.

Considering that watching dogs chase after animals is a drive for sport hunting, a few participants suggested that hunters should raise pacas and use them for sport instead as this would alleviate pressure from wild populations. Participant 7 argued that because hunters have not switched their sport from wild to captive pacas, the real drive for hunting is to kill wild animals. Other participants echoed this belief that people hunt just for the pleasure of killing an animal. For example, Participant 32 argued that, "They kill the animals because they like it and for the luxury of killing an animal." In addition, five individuals in the ASBC talked about hunters shooting at deer and leaving them to run off wounded, which made them believe that hunters were killing just to kill. The fact that sometimes hunters do not consume the meat of their kill appeared to add to their frustrations with sport hunting. For example, when Participant 14 was questioned as to why people hunt, he stated: "they do it to do the harm… more than once they shot one of these animals and left it there… and you go there and you see the vultures eating it." Other researchers have also noted the high level of negative attitudes towards sport hunting in Costa Rica (Drews, 2002; Schelhas & Pfeffer, 2005).

A few participants believed that some people are attracted to hunting because it is illegal and that they make a sport out of avoiding detection. Participant 35 explained how this makes it particularly difficult to control: "Hunting is something that no one can ever eliminate… because the more it is prohibited, the more they want to do it." The ACLA-P MINAE official echoed this

sentiment by stating: “There are some who do follow the law and there are others who are rebels. They don not like that they are told what to do so they continue to insist on hunting.”

Two participants from the ASBC believed that hunting for sport has mental health benefits. Participant 27 explained that he catches birds as a way to de-stress as it allows him to escape his daily routine and spend time outdoors in the mountains. Similarly, Participant 32 stated that another man in the ASBC catches birds as a way to manage depression. A MINAE official from ACLA-P also indicated that there are people who hunt for sport as a way to de-stress.

5.2.2 – Tradition

Hunting appears to continue as a sport that is also regarded as a tradition or cultural activity; 10 participants (34%) believed tradition to be a driver of hunting in the ASBC. Participants often talked about hunting as a social occasion, occurring in groups of friends and family. A few participants also talked about hunting happening around holidays and certain meats, such as peccary and paca, being traditional and desired for holidays or festivities. For some, hunting is regarded as a tradition passed down through generations; fathers and grandfathers take their children and grandchildren out to hunt. Two participants from outside of the ASBC described hunting as a right of passage into manhood. Other researchers have also found that tradition is an important driver for hunting in Costa Rica (Molina Murillo & Huson, 2014; Wong, 2014). In the ASBC, some hunters lived through a time when hunting was necessary and passed these skills onto their children, as Participant 13 explained:

> I think that it is dragging a culture from before and I think it is hard to change it because it is not for survival. Before it was because resources were very scarce so they used the meat for consumption. Now it is like between a sport and a culture from their fathers that lived in the past.

5.2.3 – Bushmeat

Many participants talked about hunting for sport or as a traditional activity but also to consume the meat, which itself might be viewed as a tradition (Section 5.2.2). As such, 62% of participants in the ASBC talked about hunting, at least in part, for the meat. According to participants in this study, bushmeat is considered a delicacy. Certain meats are highly desired; participants mentioned meat from paca most often, followed by deer and peccary. Others have noted that paca is considered a delicacy in Costa Rica (Hammerschlag, 2012; Wainwright, 2007). As such, some participants said that these meats are sought out specifically for celebrations, holidays, and social gatherings. A few participants in the ASBC specified that people hunt for these meats not because they need to, but because they desire the meat.

5.2.4 – Pets

Keeping pets, including wildlife, is a part of Costa Rican culture (Drews, 2001). In 1999, Drews (2001) estimated that one-fifth of households in the country kept wild animals as pets, the majority of which were birds. Molina Murillo and Huson (2014) also found almost one-fifth of households in communities around Carara National Park kept wild pets at some point. In the ASBC, 17 participants (59%) knew someone who captured wild animals to keep in captivity and 18 individuals (62%) stated that there are people who currently have wild birds as pets. Three participants had birds themselves. Participants listed a variety of birds captured for pets in Costa Rica (Table 5). Black-faced solitaires were mentioned the most often by participants in the ASBC (32%) as a sought after species (4.5.6). Conversely, in a national survey, Drews (2001) found that parrots were the most common bird kept as a pet and less than 1% of the study sample kept black-faced solitaires. While most participants discussed people catching birds locally, a few came from elsewhere; one red-lored parrot (*Amazon autumnalis*) came from San Vito (Figure 5), some black-faced solitaires came from Orosi, and a yellow-crowned parrot (*Amazona fochrocephala)* came from Panama.

Figure 5. 15-year-old Red-lored parrot (*Amazon autumnalis*) kept as a pet in the ASBC.

While birds are the most common wild animals kept as pets in the ASBC and in Costa Rica generally, people do keep other species as well (Abarca Morales, 2005; Drews, 2001; Schan, 2011). In the ASBC, eight individuals talked about people keeping pacas in captivity for breeding and/or as pets. Participant 8 described his relationship with the pacas that he used to have before he sold them; he would sleep with them, play with them, and take them to parties where they would let dogs chase them for sport. In addition, three individuals knew someone with a white-tailed deer in captivity.

5.2.5 – Profit

In the ASBC, 16 participants (55%) believed that people hunt or capture wildlife for profit. Out of these participants, 12 stated that people sell bushmeat. As some bushmeats are considered delicacies, people are willing to pay a lot for them and this demand can drive hunting. Only deer and paca were mentioned as meats that are hunted for profit in the ASBC. According to participant responses, paca is the most expensive meat and is sold for upwards of ¢25,000 CRC per kilo (approximately $45 USD). Deer meat is also valuable; Participant 16 had recently been offered a deer leg for ¢15,000 CRC (approximately $27 USD). Participant 1 believed that hunting in the ASBC has become increasingly commercialized because of this demand. Four

participants stated that there are people in the ASBC who will hunt on demand for meat, as described by Participant 13:

> There are specific people. Let's say there are people who, I do not know, have money and it gives them pleasure to eat a paca. Well, they pay, I do not know, X quantity for each kilo. And this is what is generating the problem.

Since it is illegal to sell bushmeat or wildlife in Costa Rica, it is sold through clandestine networks. Eight participants in the ASBC stated that hunters sell meat through personal networks, both to people in the ASBC and other regions. Bushmeat is also sold under the table at bars and restaurants, if one knows where to look and who to ask. Three participants stated that there are specific people that buy and sell paca meat in San Isidro de El General, the closest urban centre. Another three participants talked about people selling bushmeat from the ASBC to people in the capital region. Hammerschlag (2012) also noted that bushmeat from the corridor is sold to someone in San Isidro de El General who profits by selling it to restaurants in San José at a greater price. An ex-hunter, Participant 8, stated that bushmeat is sold all over Dominical, the closest coastal town. Two wildlife professionals interviewed near Dominical also indicated that bushmeat is sold in bars and restaurants in the area.

There are also people in the ASBC who capture and sell wildlife, mostly birds; eight participants stated that they know people who sell wildlife. In Montecarlo, there is a group of men that capture birds for sport and to keep some as pets. While one of these hunters, Participant 27, stated that they do not sell them, five other individuals in the town believed that they sell black-faced solitaires to people from San José. One MINAE official stated that wildlife is trafficked from rural areas to the capital to meet the high demand there. Participant 19 in the ASBC estimated that black-faced solitaires are normally sold for upwards of ¢50,000 CRC each (approximately $90 USD) but certain individuals that sing a lot can be worth up to ¢400,000 CRC (approximately $713 USD). Participant 21 stated that valuable individuals could be worth upwards of $1000 USD. These birds may be worth more in the capital region. In communities near Tapantí National Park, black-faced solitaires were worth between ¢54,000 CRC and ¢162,000 CRC, going for an average of ¢108,000 CRC (Pérez & Menacho Odio, 2013). In

communities surrounding Poas Volcano National Park, they were sold for between ¢100,000 and ¢500,000 CRC (Arévalo, 2010).

Most participants talked about Costa Rican wildlife being sold within the country, supporting previous findings that the country has a strong domestic demand for wildlife (Drews, 2001, 2003). A MINAE official and an APREFLOFAS employee stated that more wildlife is trafficked within the country than internationally. Another MINAE official believed that more wildlife is trafficked into Costa Rica from neighbouring countries than is exiting. Still, some participants mentioned species commonly trafficked out of Costa Rica, most of which were frogs; four participants stated that poison dart frogs are traded internationally, including the blue jeans frog (*Oophaga pumilio*) and granular poison frog (*Oophaga granulifera*). A few participants also mentioned birds being traded internationally, such as parakeets and macaws.

Only three participants thought that people might sell wildlife out of need in the ASBC. Eight participants believed that people elsewhere in Costa Rica might hunt and sell bushmeat or wildlife out of economic need. The ACLA-P MINAE official interview also indicated that some hunters in the region have stated that they sell bushmeat in order to pay for their bills. One wildlife professional described this situation: "There are people that have really hunted because they were poor and they need to eat or they had to catch and kill a paca, for example, and sell it to a bar for income." Other researchers have also found that some people in the country sell wildlife to make ends meet (Molina Murillo & Huson, 2014; Wong, 2014). Regardless, it is illegal to sell bushmeat in Costa Rica.

Some participants commented that people sell wildlife and wildlife products to make some money not necessarily because they really need to but because it is easier and more enjoyable than other work. When asked if people might hunt out of need, Participant 16 disagreed: "No, no, no, no. Pure laziness. Maybe to not work." Schelhas and Pfeffer (2005) also noted the belief that some people hunt because they are too lazy to work. Participant 13 explained that you could make a week's salary or more by selling one black-faced solitaire. One of the wildlife professionals outside the ASBC echoed this sentiment:

> Well, they do not depend on it. They could get a job but it is more fun to hunt and it probably pays more. I mean they can get about $60 USD for one paca and doing an honest day's work, they would get about $20 USD. It would be very difficult to get a paca everyday but they use it to supplement their income.

5.2.6 – Subsistence

While some participants believed that people do hunt for subsistence (34% of total), the majority did not; 61% of all participants interviewed specifically stated that subsistence hunting no longer exists in Costa Rica. The ACLA-P MINAE official interviewed argued that while people may claim that they hunt for subsistence, it is not true. One recent ex-hunter in the ASBC echoed this belief and stated that it is a lie that anyone needs to hunt in order to eat. Seven participants argued that it is unlikely that people hunt for subsistence because the equipment, such as guns and ammunition, is expensive. Buying and taking care of hunting dogs is also costly. As such, 17 participants argued that it is cheaper for people to buy meat or raise livestock than to hunt. Meat has also become more accessible than in the past, as Participant 31 explained:

> Before, if they went to hunt one of these animals it was because they had need because it was hard to get meat here but now, no. Now there are meat shops all over and people have more means of buying a piece of meat.

Chaverri Polini (2008) noted that some people from towns around Chirripó National Park hunt to provide additional protein for their families. This did not seem to be prevalent in the ASBC. While seven participants in the ASBC thought that some people hunt for subsistence in Costa Rica, only four of these stated that they knew people in the ASBC who hunt for subsistence. All of these participants specified that there are not many people who find themselves in this position. Participant 14 talked about people in poorer neighbourhoods outside of San Isidro de El General who hunt for subsistence in patches of forest around there. She explained, "They go there and hunt small animals in order to be able to bring a piece of meat to the family. But I also know that it is because of poverty that they do it."

Six of the nine wildlife professionals interviewed outside of the ASBC believed that there are people in Costa Rica who need to hunt for subsistence. One MINAE official argued that subsistence hunting only really happens in very rural areas where there are limited places to purchase meat. One private protected area manager speculated that even though he does not believe people hunt out of need in the region, if anyone did they would go unnoticed. Another private protected area manager described families that might find themselves in a position to hunt for subsistence:

> Maybe they are families that lack resources. The father's job doesn't suffice to feed all of his family so if they live in a place with mountains and they have the possibility of hunting, they will go and look for food for their family, right?

5.2.7 – Conflict

Some species are killed out of conflict, either because they instil fear or because they do damage. When asked about killing wildlife out of conflict, participants most often mentioned snakes; 13 participants said that they or others kill venomous snakes for protection. For example, nine participants talked about killing fer-de-lances (*Xenodon rabdocephalus*). Three participants stated that some people kill all snakes immediately, which can lead to the killing of non-venomous snakes. For example, two participants talked about accidental killings of the false fer-de-lances (*Xenodon rabdocephalus*). Four participants mentioned that people kill boa constrictors (*Boa constrictor*) because they eat their chickens. Two participants stated that they kill tayras (*Eira barbara*), from the weasel family, for the same reason.

Conflict also occurs with felines out of fear for personal safety and in response to feline attacks on livestock; as a result, some people kill felines (Amit et al., 2009). While feline conflict a problem elsewhere in Costa Rica (Amit, Gordillo-Chávez, & Bone, 2013; Amit & Jacobson, 2017), particularly with jaguars and pumas (Figure 6), ASBC participants did not think it was an issue. Six participants in the ASBC thought it might be a problem further up in the mountains. The only three participants that had heard of feline conflict were located in Montecarlo. None of these conflicts resulted in killings; there were a few attacks on livestock and then the felines disappeared. Participant 16 had refused to kill a puma that attacked livestock on the farm where

he works: “It ate three of our calves and my boss told me to kill it and I said I will not kill it and the feline never came back to harm us… but in another place yes, it ate some animals.”

Figure 6. Puma (*Puma concolor*) in the ASBC (Las Nubes Project, 2013a).

5.3 – Species hunted

While people in the ASBC hunt a variety of species (Table 4), the majority of participants mentioned deer (76%) and paca (69%), followed by collared peccary (28%), agouti (24%), and tapir (24%). Hammerschlag (2012) found that paca was the most hunted species in the ASBC, followed by deer and peccary. Nevertheless, deer populations have been augmenting in the ASBC, which could have increased their popularity as a game species. In terms of species captured live, black-faced solitaires were mentioned most often (32% of participants).

Table 4. Species currently hunted in the ASBC region[1].

Species[2]	#	%
Mammals		
Central American agouti (*Dasyprocta punctata*)	7	24
Coati (*Nasua narica*)	4	14
Deer		
Brocket (*Mazama Americana*)	1	3
White-tailed (*Odocoileus virginianus*)	22	76
Kinkajou (*Potos flavus*)	1	3
Monkey		
Unspecified species	1	3
Nine-banded armadillo (*Dasypus novemcintus*)	4	14
Paca (*Agouti paca*)	20	69
Peccary		
Collared (*Tayassu tajacu*)	8	28
White-lipped (*Tayassu pecari*)	2	7
Rabbit (species unspecified)	2	7
Raccoon (species unspecified)	1	3
Tapir (*Tapirus bairdii*)	7	24
Reptiles		
Iguana (species unspecified)	5	17
Birds		
Unspecified species	2	7
Great curassow (*Crax rubra*)	1	3
Great tinamou *(Tinamus major*)	3	10
Gray-headed chachalaca (*Ortalis cinereiceps*)	1	3
Gray-headed wood rail (*Aramides cajaneus*)	2	7

1 – Does not include species captured (Table 5) or hunted due to conflict.
2 – Common local names translated based on Henderson (2002), Montoya and Maria Martinez (2015), and Wainwright (2007).

5.3.1 – White-tailed deer (Odocoileus virginianus)

White-tailed deer, or venado colablanca in Spanish, were abundant in the 19th century before they were heavily hunted for meat, hides, and antlers (Janzen, 1983; Ortega-S et al., 2011). During the 1940s, 10,000-40,000 individuals were hunted in Guanacaste alone and their meat was less expensive than beef (Janzen, 1983). As are result, white-tailed deer were rare in Costa Rica by the 1960s (Janzen, 1983). Despite the decline, white-tailed deer continued to be an important game species (Timm et al., 2009; Vaughan & Rodriguez, 1991). Prior to the 2012

amendments to the Wildlife Conservation Law, the bag limit was two bucks per year for Costa Rican citizens (Ortega-S et al., 2011); however, the number of illegal hunters far exceeded legal hunters and bag limits were frequently surpassed (Vaughan & Rodriguez, 1991).

Deer have become an important game species in the ASBC and were mentioned the most often (76%) in this study (Figure 7). Still, deer populations have been increasing in the corridor (Hammerschlag, 2012; Mooring et al., 2015), and participants in this study noted this increase. Agricultural settlement and the resulting deforestation in the ASBC have led to an increased in secondary forest and forest edges (Rapson, 2008), which are important habitats for white-tailed deer, and this increase in habitat may have contributed to their increased population (Mooring et al., 2015; Ortega-S et al., 2011; Vaughan & Rodriguez, 1991; Weber & Gonzalez, 2003). The decrease in predator populations, such as jaguars and pumas, may have also contributed to this increase (Mooring et al., 2015; Vaughan & Rodriguez, 1991; Wainwright, 2007).

Figure 7. White-tailed deer (*Odocoileus virginianus*) in the ASBC (Las Nubes Project, 2013b).

5.3.2 – Paca (Agouti paca)

Paca, or tepezcuintle in Spanish, is the largest rodent in Costa Rica (Henderson, 2002) and an important seed disperser (Beck-King, von Helversen, & Beck-King, 1999). Paca is considered the best tasting bushmeat in the country, making it a highly targeted species (Henderson, 2002; Timm et al., 2009; Wainwright, 2007). Wong (2014) found that paca is the

most commonly hunted species on the Osa Peninsula. Paca was also the most commonly targeted species in communities around Carara National Park (Molina Murillo & Huson, 2014). As a result of hunting and habitat loss, paca populations have declined throughout Costa Rica and they have become rare in parts of the country (Timm et al., 2009; Wainwright, 2007).

Paca populations are easily wiped out because they have low reproductive rates and are easily hunted (Wainwright, 2007). Pacas den in burrows under the ground that have a main entrance and one or more hidden exits that they conceal with leaves (Wainwright, 2007). When a predator, such as a hunting dog, comes in through the entrance, they run out of the concealed exit (Wainwright, 2007); however, they only run a short distance and then freeze or run in circles in their home range, which makes them an easy target (Smythe, 1983; Wainwright, 2007). They also create well-used trails, which can make spotting their dens easy (Wainwright, 2007). In addition, they demonstrate little fear towards humans in pristine habitat (Wainwright, 2007).

In the ASBC, paca is hunted for sport and their meat is considered a delicacy; in this study, paca was the second most mentioned game species (Figure 8). Hunting dogs are an important part of hunting pacas and a few individuals even stated that the best part of hunting is watching dogs chase these animals. A few individuals in the corridor have had pacas in captivity for their company and to breed for their meat. While locals believe that paca populations have declined in the ASBC, pacas are still frequently observed by camera traps and this belief may be a result of their nocturnal behaviour (Hammerschlag, 2012; Mooring et al., 2015).

Figure 8. Paca (*Agouti paca*) in the ASBC (Las Nubes Project, 2012a).

5.3.3 – Agouti (Dasyprocta punctata)

Agoutis, or guatusas in Spanish, play an important role in seed dispersal in Costa Rican forests as they collect and bury seeds (Kuprewicz, 2013); they are unlikely to collect all their buried seeds and the remaining seeds can germinate and grow (Wainwright, 2007). Agouti are desired for their meat and are easily hunted, as they run around in circles when pursued (Wainwright, 2007). Nevertheless, high reproductive rates make agouti more resilient to hunting pressures than paca (Wainwright, 2007). Despite local beliefs that agouti populations have diminished, they are frequently observed on camera traps in the ASBC (Figure 9) (Mooring et al., 2015). While no participants in this study discussed the trade of agouti bushmeat, Hammerschlag (2012) noted that this occurs in the ASBC.

Figure 9. Agoutis (*Dasyprocta punctata*) the ASBC (Las Nubes Project, 2012b).

5.3.4 – Collared peccary (Tayassu tajacu)

Collared peccary, or saíno in Spanish, populations have experienced great hunting pressure, which has reduced their numbers outside of protected areas in Costa Rica (Carrillo et al., 2000; Henderson, 2002; Timm et al., 2009). They are easily targeted as they travel in single file, leaving noticeable trails (Wainwright, 2007). Still, they are less vulnerable to hunting than white-lipped peccaries because they travel in smaller herds, meaning less are hunted at once, and they require smaller expanses of pristine habitat (Daily et al., 2003; Peres, 1996; Wainwright, 2007). Nevertheless, hunting can impact their abundance, which has wider impacts on the

ecosystem. Peccaries alter soil and leaf litter structure during their foraging activities, which creates important habitat for some amphibians and reptiles; consequently, their declines may negatively affect these species (Reider, Carson, & Donnelly, 2013). In addition, they are important predators for some seeds and dispersers for others, which impacts forest composition (Kuprewicz, 2013).

Peccaries are found in the forested mountains at the north end of the corridor (Mooring et al., 2015) and in the protected areas that connect to the corridor, including Chirripó National Park (Chaverri Polini, 2008) and La Amistad International Park (SINAC, 2012). In Montecarlo, Participant 16 speculated that more peccaries are coming to the area to consume crops, such as bananas. Collared peccaries will consume a variety of crops, however, they do not roam far from their suitable habitat to do so (Wainwright, 2007). According to participants, peccaries are also found and hunted in and around the Las Nubes Biological Reserve; Participant 2 stated that people used to hunt a lot of peccaries in that area.

5.3.5 – Tapir (Tapirus bairdii)

Baird's tapir, or danta in Spanish, is the largest land mammal in the Neotropics (Tobler, 2002). For most of the 20th century, tapirs were hunted for meat, hides, and for sport (Timm et al., 2009; Wainwright, 2007). Hunting of tapirs has declined because they have become rare outside of protected areas (Carrillo et al., 2000; Timm et al., 2009) and their meat and hides have little economic value (Wainwright, 2007). Despite a decline in hunting pressures, their populations have not recovered because of late sexual maturity and low reproductive rates (Wainwright, 2007). As a result of hunting and habitat destruction, they are listed as Endangered on the International Union for Conservation of Nature Red List (Garcìa et al., 2016) and there are only a few hundred left in Costa Rica (Wainwright, 2007). Tapirs inhabit the Talamanca mountain range north of the corridor (Mooring et al., 2015), where they are found in greater abundance further away from human settlements and activities (Tobler, 2002). They are found within Chirripó National Park (Chaverri Polini, 2008) and La Amistad International Park (SINAC, 2012). As such, participants from the ASBC stated that people go up into the mountains to hunt tapirs.

5.3.6 – Black-faced solitaire (Myadetes melanops)

Black-faced solitaires, or jilgueros in Spanish, are endemic to the mountains of Costa Rica and western Panama (Menacho Odio & Pérez, 2013). Due to their beautiful song, they are one of the most desired birds to have in captivity in Costa Rica (Menacho Odio & Pérez, 2013). Near Tapantí National Park, 84% of hunters interviewed by Carvajal and Villalobos (2001) stated that black-faced solitaires were their preferred species to hunt and 42% only targeted this bird. Capturing and selling these birds has been illegal since 2010 but keeping them in captivity was not prohibited until the recent Wildlife Conservation Law (Menacho Odio & Pérez, 2013). Regardless, the practice of capturing, keeping, and/or selling them has continued (Menacho Odio & Pérez, 2013; Pérez & Menacho Odio, 2013).

This study provides evidence that the black-faced solitaire is also sought after in the ASBC; while a number of bird species are captured in the corridor (Table 5), black-faced solitaires were mentioned the most often (32% of participants). The only bird hunter interviewed as part of this study, Participant 27, stated that they release most birds. Menacho Odio (2013) also found that those who hunted birds for sport released most of the birds that they caught. The majority of hunters interviewed (74%) near Tapantí National Park caught three or more individuals per hunting trip (Carvajal & Villalobos, 2001). In contrast, Menacho Odio (2013) found that individuals who make a business of selling black-faced solitaires usually have around 20 birds at once and some have upwards of 50. Comparably, one MINAE official in this study knew of a family near the capital that went hunting three times a week, capturing three birds at a time to sell. Hunting of black-faced solitaires could have a negative impact on their populations but there have been no studies to evaluate this (Arévalo, 2010; Pérez & Menacho Odio, 2013).

Table 5. Birds species captured in the ASBC region.

Species[1]
Birds
Euphonias
Elegant euphonia (*Euphonia elegantissima*)
Spot-crowned euphonia (*Euphonia imitans*)
Yellow-crowned euphonia (*Euphonia luteicapilla*)
Finches
Lesser goldfinch (*Spinus psaltria*)
Thick-billed seed finch (*Sporophila funerus*)
Yellow-bellied siskin (*Spinus xanthogastra*)
Manakins
Red-capped manakin (*Pipra mentalis*)
Parakeets
Crimson-fronted parakeet (*Psittacara finschi*)
Orange-chinned parakeet (*Brotogeris jugularis*)
Parrots
Red-lored parrot (*Amazon autumnalis*)
Tanagers
Summer tanager (*Piringa rubra*)
White-collared seedeater (*Sporophila torqueola*)
Yellow-bellied seedeater (*Sporophila nigricollis*)
Yellow-faced grassquit (*Tiaris olivaceus*)
Thrushes
Black-faced solitaire (*Myadetes melanops*)

1 – Common local names translated based on Henderson (2002) and Montoya and Maria Martinez (2015).

5.4 – Hunting locations

5.4.1 – Quizarrá

All 10 participants interviewed in Quizarrá stated that hunting occurs in the area. In addition, two participants from other towns in the ASBC talked about hunting occurring in Quizarrá. Seven participants in Quizarrá stated that they protect their land from hunters, either by reporting or confronting them. Nevertheless, hunting occurs throughout the area in forest patches and on farmland.

In Quizarrá, there are a few farms with forest patches that connect to the Los Cusingos Bird Sanctuary, a 77-hectare protected area made up of mature and secondary forest (Rapson, 2008). This patches connect to a private property, La Escondida, with approximately 45 hectares of secondary forest (Hammerschlag, 2012). This property connects to a few other family farms with secondary forest patches that they protect; Participant 13 estimated that this area, including Los Cusingos, might total 500 hectares of forest. Six participants talked about hunting happening in this area, and three of these participants specified that hunting takes place in Los Cusingos. Hammerschlag (2012) found that hunters follow the Peñas Blancas River to hunt in this area, which cuts between the private farms and Los Cusingos. The Peñas Blancas River originates in Mount Chirripó and flows down through the corridor, traversing Las Nubes, Santa Elena, Montecarlo, and Quizarrá (Figure 3). The hunters follow the Peñas Blancas River for navigation and because more wildlife is found near the water (Hammerschlag, 2012).

An ex-hunter, Participant 35, stated that there is a large area of pasture in Quizzará that has been left to reforest and as a result wildlife populations have increased, attracting hunters. Another hunter, Participant 8, said that hunting happens on pastures and coffee farms in Quizzará, where paca and deer are concentrated. There are also two foreign-owned farms where four participants believed hunting is concentrated, particularly because these are large properties with large forest patches and few people on them. Two participants who live next to one of these farms expressed frustration with people hunting on the farm and both of their families have confronted and reported hunters. Participant 29 works on the other farm and sometimes actively patrols the farm (70 hectares), confronting and reporting hunters.

5.4.2 – San Ignacio and San Francisco

The only participant interviewed in San Ignacio, Participant 32, talked about how small family farms from one of the foreign-owned farms in Quizarrá all the way up to his own have agreed to protect their land from hunting; even though hunting still occurs on their farms, he believed that hunting is concentrated on the larger farms because there are less people to report and/or confront hunters.

Only two individuals were interviewed from San Francisco. One of these individuals, Participant 31, believed that there is very little hunting that is currently happening. The other, Participant 30, has experienced people hunting on his farm for agouti, birds, and deer.

5.4.3 – Santa Elena

Three participants who live near Las Nubes Biological Reserve stated that they used to see and hear a lot of hunting but that it has decreased over the last two years. Hunters used to come up along the Peñas Blancas River towards the reserve with hunting dogs, as Hammerschlag (2012) also noted. Six participants in this study attributed the decline in hunting around Las Nubes to the presence of Canadian and American expats who live near the reserve; some of these expats confront and/or report hunters and employ a security guard, all of which discourages people from hunting. Nevertheless, three participants that live in Quizarrá but spend a lot of time around the Las Nubes Biological Reserve stated that hunting still happens in and around the reserve; two of these participants heard of hunters carrying a dead peccary out the forest at the beginning of July, 2016 and of hunters being reported on a farm near Las Nubes in May, 2016. Further down the mountain, Participant 2 lives on a large family farm with forest patches near the Peñas Blancas River and stated that he sometimes catches people hunting on his land.

5.4.4 – Montecarlo

Out of the 11 people who were interviewed in Montecarlo, nine stated that there was hunting currently happening in the area. Six participants talked about people going into the mountains above Montecarlo to capture black-faced solitaires. There is one individual who is known for confronting bird hunters in the area. Five participants said that people hunt deer on farms in the area, including Finca Berninas, which is a large coffee farm. According to Participant 25, Finca Berninas has a policy against hunting and this has discouraged their employees from hunting there.

5.4.5 – Mountains

In the ASBC, 16 participants (55%) talked about people going up into the mountains to hunt, away from the more densely populated areas in the ASBC and where desired wildlife can

be found, such as peccaries, tapirs, and black-faced solitaires. Four participants from the ASBC specified that people from the area hunt in Chirripó National Park. Hammerschlag (2012) also noted that people hunt in forest patches in and around where Chirripó adjoins with Las Nubes. Participant 8 stated that his friends go to hunt in the park because there are few guards and it is easier than hunting in the ASBC, where there are lots of people who confront or report hunters. Chaverri Polini (2008) also noted that hunting is a problem in sectors of Chirripó National Park that are close to towns but far away from the park office and main entrance, which are located in San Gerardo de Rivas. Participants noted a few other locations for hunting in the mountain range. Participant 8 stated that people go to hunt in Cedral, a town located east of the corridor. Two participants said that people hunt around Cerro de la Muerte, the highest point of the Pan-American highway on the road to San José, where there is a large tapir population.

5.5 – Decline in hunting

5.5.1 – Alexander Skutch Biological Corridor

Over the last few decades, hunting has been on the decline in Costa Rica (Chaverri Polini, 2008; Schelhas & Pfeffer, 2005; Timm et al., 2009). In the ASBC, 90% (n=29) of participants agreed that hunting is less than it used to be for a variety of reasons (Figure 10, Table 6). The biological corridor, which was officially established in 2005, may have contributed to this decrease in hunting. Out of those who stated hunting has declined, 85% (n=26) agreed that the corridor designation has contributed to this decline. Participants suggested that this might be due to an increase in environmental education from corridor related activities and a belief that wildlife should be protected in a biological corridor. To that effect, Participant 2 stated, “Instead of killing, we protect.” Some participants expressed greater intolerance for hunting particularly due to the biological corridor designation. Participant 21 expressed her outrage that neighbours were catching birds in a biological corridor that she believed to be focused on bird conservation.

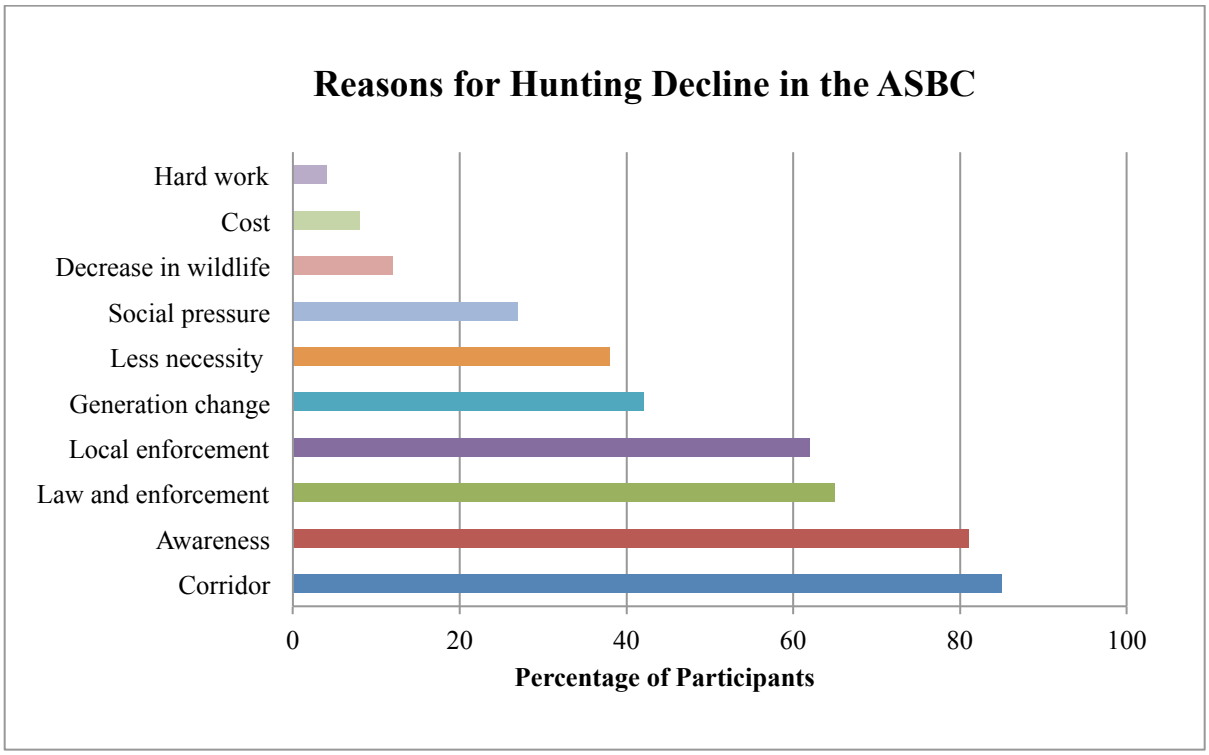

Figure 10. Reasons for the hunting decline in the ASBC, as stated by the 26 participants who believed hunting has declined in the corridor.

Table 6. Reasons for hunting decline in the ASBC.

Reasons	Participants[1]	%[2]
Corridor	22	85
Awareness	21	81
Law and enforcement	17	65
Local enforcement	16	62
Generational change	11	42
Less necessity	10	38
Social pressure	7	27
Decrease in wildlife	3	12
Cost	2	8
Hard work	1	4

1 – Includes participants located in the ASBC.

2 – Percentage out of the 26 participants who stated hunting has declined in the ASBC.

5.5.2 – Awareness

The majority of participants in the ASBC (81%) attributed the decline in hunting to greater environmental awareness and concern about the impact of hunting on wildlife populations. Some participants credited this increased concern to their personal observation of declines in wildlife. For example, Participant 15 discussed a growing intolerance for hunting in the ASBC and when questioned as to why, he responded:

> Animals are becoming scarce. Now you do not see a paca. You do not see an agouti like before in the past… They will be dying instead of reproducing and this breed of animals will be going extinct… The people like me who are a bit old, we worry about children knowing what an agouti is… Not that they see it on a cellphone or in Google. No, that they see it in real life.

When wildlife populations were more abundant people were less concerned about the impact of hunting. Participant 32 talked about hunting forty years ago for sport and to bring meat home but not being aware of the impact it was having on wildlife: "We hunted because no one said that we must conserve or take care; no one said anything." As wildlife populations declined, people have become more concerned about hunting; 55% of participants in the ASBC talked about hunting decreasing wildlife populations. As a result, seven participants had hunted at some point and stopped, at least in part, because of the negative impact of hunting on wildlife populations. Schelhas and Pfeffer (2005) also found that people in towns near La Amistad International Park were concerned about declining wildlife population and attributed past environmental "destruction" to a lack of understanding of the impacts; in that case, personal observations of environmental destruction as well as environmental education created a shift in values. This change in perception led to negative opinions about hunting (Schelhas & Pfeffer, 2005), which has also happened in the ASBC.

Participants also attributed increased environmental awareness to environmental education from a variety of sources. Participants mentioned environmental education in schools, programs about wildlife on television and the radio, talks from MINAE in the ASBC about

hunting, activities associated with the biological corridor, an influence from tourists and York University students. Three participants discussed environmental festivals associated with the biological corridor as important sources of environmental education. Three participants in the ASBC expressed that awareness of benefits from conservation have contributed to a decline in hunting. Wildlife benefits mentioned included profit and employment from tourism, enjoyment of seeing wildlife, and environmental services such as clean water. Schelhas and Pfeffer (2005) found similar beliefs about the benefits of forests near La Amistad International Park. Environmental education is also having an important impact on youth in the ASBC, as described by Participant 32: "It [environmental education] is important because it is changing the culture of the youth most of all. Maybe there also one or two that teach them how to hunt and kill but hunting is starting to disappear."

5.5.3 – Law and enforcement

Law and enforcement also appear to have had an impact on hunting; 62% of participants in the ASBC believed that hunting has declined due to the prohibition of hunting and out of fear of being caught and penalized. Six participants attributed this decline specifically to the recent prohibition of hunting under the amended Wildlife Conservation Law. Participant 8, who said that he recently stopped hunting, stated that MINAE was seen patrolling the ASBC a few months beforehand and as a result, people stopped hunting for a while out of fear. Participant 23 elaborated as to why the presence of MINAE has an impact on hunting:

> For a peasant, I am speaking for myself, it is very scary to get involved with the law. Peasants are scared of jail, of police... The majority of peasants avoid in every way getting involved with problems.

Schelhas and Pfeffer (2005) also found that enforcement of environmental laws was important to changing behaviours near La Amistad International Park. It is important to note, however, that the primary driver for environmental law enforcement is via reporting by residents in the ASBC. A MINAE official out of the regional office in San Isidro de El General confirmed that they only do patrols outside of official protected areas when someone reports hunting.

Moreover, neither private protected area in the corridor has park guards. Instead, they rely principally on neighbours or employees with other job titles to confront or report hunters.

5.5.4 – Local enforcement

Concern for wildlife has led some people in the ASBC to take direct action to curtail hunting. Individuals have attempted to stop hunting on their land by reporting and confronting hunters. As a result, 62% of participants credited the decline in hunting to this type of local enforcement. Participant 8, who had recently stopped hunting himself, stated that everyone in the ASBC is against hunting and do not allow people to hunt on their land. Participant 15 explained this phenomenon:

> Because the people, the neighbours, are more worried about the well being of the animals so they hear dogs and they call. They call the police or the authorities to come and see who it is. They have caught many [dogs].

In the ASBC, 79% of participants had either reported hunting to MINAE themselves or knew someone that had. In the past, there was a committee associated with the ASBC to coordinate efforts to combat hunting. While it appeared that this committee was no longer active during this study, four participants had participated at some point and have continued the protection of their properties. Nine participants from the ASBC told stories of confronting hunters themselves; most of these participants asked the hunters to leave their property and reported them if they refused or returned. Participant 11 would fire a shotgun into the air every time he heard hunters and thought this had discouraged hunters from returning. Participant 29 described patrolling his land for hunters:

> I always take care here. Sometimes I go around in the mountain. If I hear dogs, I go. But not like before, right? It did not matter to me to go catch them at midnight to throw a dog out. Alone. Until one day they told me, “Do not go along alone because it is dangerous.” They could fight me, right? So I started to go with my wife. At midnight we would go down, go around all over the mountain… with a flashlight and a lamp and a knife, nothing more.

5.5.5 – Less necessity

Increased ability to purchase meat has also decreased the need for hunting and 10 participants (38%) in the ASBC thought this has contributed to the decline of hunting. Schelhas and Pfeffer (2005) also found this to be the case near La Amistad International Park. Based on participant responses, the situation changed between 1975 and 2000 as meat became more accessible for a few reasons. First, there were more stores selling meat in the region. For example, Rojas Castillo (2015) interviewed an ex-hunter who asserted his family was not negatively affected by the prohibition of hunting when Chirripó National Park was established in 1975 due to an influx of butcher shops around the same time. Second, improvements in transportation in the ASBC increased access to these stores; by the 1960s, roads became passable by car during the wet season and a bus service was offered three times a day (Skutch, 1992). Finally, income increased in the ASBC allowing people to purchase meat, as Participant 18 explained:

> They tell me that 35, 40 years ago this was really really really small… people who came here to colonize had to live off of killing a paca, a collared peccary, a crested guan, whatever was there, but there came a time when there were sources of work so it is not necessary…

5.5.6 – Generational change and social pressure

As hunting has become less necessary for subsistence and more regulated over time, the level of hunting has declined amongst new generations; 37% of participants described a generational change whereby long-time hunters have been dying out and youth are not interested in hunting. Four wildlife professional interviewed outside of the ASBC also agreed that hunting is declining with new generations. Participants attributed this lack of interest to a change in circumstance, loss of tradition, alternative forms of entertainment, education, negative perceptions of hunting, and the prohibition of hunting. Participant 31 summarized this change: "Look, there is very little hunting here. It is very little. It is almost finished. Those who did it have been dying and now hunting almost doesn't exist." Likewise, one of the MINAE officials interviewed listed the multiple factors leading to this generational change:

> "I think that it is a tradition that will start to disappear or exist at a really low percentage. On one side, it is socially penalized. On another side, it is punished legally. And on another side, one gets old and my kids do not even want to come with me. And it is expensive. So I retire."

As the above quote indicates, families and friends are also pressuring each other to stop hunting; this is both because they are concerned about declining wildlife and hunting is no longer viewed as necessary. Seven participants in the ASBC told stories of people pressuring family and friends to stop hunting. Three of the wildlife professionals outside of the ASBC also thought that social pressure was an important factor in the decline in hunting. Most of these stories were about children pressuring their parents or grandparents to stop hunting, as Participant 13 elaborated: "Children are very smart. Some, depending on the school that they go to, well, they are going to say: 'Papa, do not hunt. Why are you going to hunt the animals?'" Participant 1 said that she made her husband stop hunting by threatening to report him to the police.

5.5.7 – Difficulty

Some participants also thought that hunting has declined because it has become more difficult in a variety of ways. Participant 17 stated that hunting pacas is hard work, making people less interested. Three participants thought that people hunt less in the ASBC because there is less wildlife to hunt. Two participants believed that the cost of equipment has prohibited some people from hunting.

5.6 – Decline in wild pets

While the majority of wild animals kept as pets in Costa Rica are birds, some participants stated that people used to keep other species such as monkeys, squirrels, and raccoons. Schan (2011) also noted someone who used to keep primates as pets in the ASBC. In the corridor, 19 participants (66%, n= 29) stated that more people used to keep more wildlife as pets (Figure 11, Table 7). Nine of these participants (47%, n=19) attributed the decline in this custom to the Wildlife Conservation Law's prohibition on keeping wildlife; six of these participants (32%) also

talked about MINAE confiscating wildlife, which discourages people from keeping wild pets. Participant 8 had multiple wild birds and stated that he was considering switching to captive-bred birds in order to avoid problems with MINAE. As such, seven participants (37%) also attributed the decline in keeping wild birds to the availability of captive-bred birds. At least two individuals breed and sell non-native birds in the ASBC. Another seven participants (37%) attributed the change to increased awareness of the impact of hunting on wild populations and concern for animal welfare; Participant 17 described this change:

> Before this [keeping birds] was really common. Even I caught birds to keep them in captivity [laughing]… in the end I came to think, what am I doing with this? The poor animal there in a prison getting old, living in a cage… for nothing… what foolishness I was doing.

This awareness has also led to social pressure against keeping birds; two participants had previously kept birds but their wives asked them to stop because they preferred to see birds out of cages. Another two participants believed that children were telling their parents to stop keeping birds in cages. A MINAE official interviewed also believed that it has become socially penalized to have wildlife in the house, especially since the Wildlife Conservation Law was passed and MINAE started campaigns advertising the new prohibition.

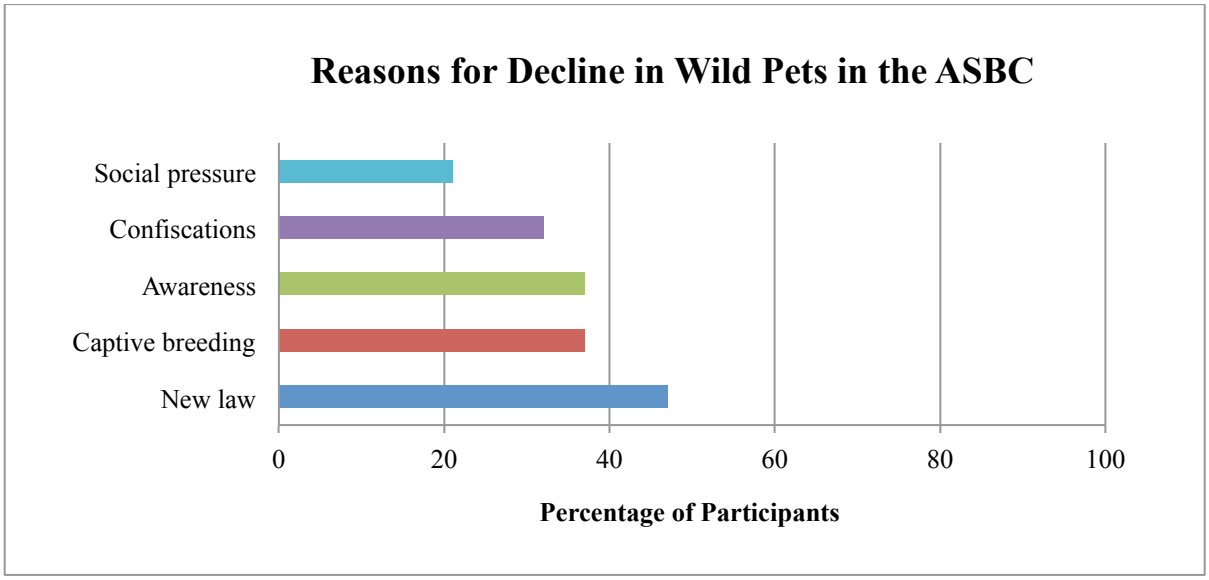

Figure 11. Reasons for the decline in wild pets in the ASBC, as stated by the 19 participants who believed that wild pets have declined in the corridor.

Table 7. Reasons for decline in wild pets in the ASBC.

Reasons	Participants[1]	%[2]
New law	9	47
Captive breeding	7	37
Awareness	7	37
Confiscations	6	32
Social pressure	4	21

1 – Includes participants located in the ASBC.

2 – Percentage out of the 19 participants who stated wild pets have declined in the ASBC.

5.7 – Governance

5.7.1 – Environmentalities

Environmentality is the way in which the state and other actors govern natural resource use (Section 1.5.2). Fletcher (2010) described four distinct environmentalities, all of which coexist and interact in the ASBC: discipline, neoliberal, sovereign, and truth. Discipline environmentality internalizes societal and ethical norms, which can be achieved by environmental education, law enforcement, threat of penalties, and social stigma around certain behaviours. Environmental education delivered by state and non-state actors teaches societal norms surrounding wildlife use, discourages exploitation of natural resources, and encourages wildlife conservation (Fletcher, 2010). In the corridor, environmental education occurs in the form of school curriculum, environmental festivals, workshops, committees, research, and educational materials. In Costa Rica, the Wildlife Conservation Law and associated penalties also serve as a way to discipline people not to hunt, keep, or trade wildlife. In this context, punishment is "a means (at least in part) to compel criminals to internalise societal norms" (Fletcher, 2010, p. 175). Residents also help discipline resource use by pressuring family to stop hunting and reporting hunters to MINAE.

Neoliberal environmentality seeks to incentivize people to choose environmentally friendly behaviours rather than instil societal norms (Fletcher, 2010). A key incentive for conservation in Costa Rica is the potential for tourism (Isla, 2015; Schelhas & Pfeffer, 2005). This is also the case in the ASBC; for instance, Participant 13 believed that more tourism in the corridor would lead to increased support for conservation: "The people that have their little farms will be protecting them because they know that it [wildlife] will bring tourists to their cabins that want to see animals closer." Sovereign environmentality is defined as when "resource preservation is enacted through the creation and patrol of so-called protected areas" (Fletcher, 2010, p. 177). Sovereign environmentality has been decentralized in the ASBC, as the corridor is collaboratively managed by MINAE and CoBAS, a committee made up of community members. Governance has also been privatized in the form of private properties in the corridor that enforce the Wildlife Conservation Law, such as private farms and private protected areas (Los Cusingos and Las Nubes). Truth environmentality refers to governance "with particular conception of the nature and order of the universe" (Fletcher, 2010, p. 177), such as the intrinsic value of wildlife or the idea of pristine wilderness. This type of environmentality was apparent in the ASBC in the way that many participants talked about the inherent right for wildlife to exist without being disturbed by humans.

In the ASBC, these four environmentalies co-exist and reinforce each other in various ways. For example, environmental education, threat of penalties, and social stigma, which are means of discipline environmentality, help to govern wildlife use in designated conservation spaces in the corridor, which are conceived as part of sovereign environmentality. Moreover, truth environmentality, or conceptions of nature and wildlife, reinforces and is reinforced by environmental education and the presence of conservation spaces. Additionally, the presence and promise of tourism, a vehicle for neoliberal environmentality, reinforces particular conceptions of wildlife and appropriate resource use and incentivizes the designation and enforcement of conservation spaces.

5.7.2 – Enforcement constraints

Enforcement of environmental laws in Costa Rica is constrained by a lack of MINAE personnel and resources (Román Barzuna, 2016). Even within national protected areas, there is a

lack of personnel and resources to enforce hunting prohibitions (Carrillo et al., 2000; Miranda, 2016; Román Barzuna, 2016). According to one of the MINAE officials interviewed, when the Wildlife Conservation Law was initially proposed, MINAE asked for more resources to be able to enforce the law. As a result of these discussions, an article was included that directed more resources to MINAE but this article was removed before the law was approved. As such, MINAE was left with a lack of resources to protect existing protected areas, let alone enforce a hunting ban in the entire country. In the ASBC, 25 participants (86%) noted issues with enforcement of the Wildlife Conservation Law, including: lack of MINAE presence, delayed responses to reports of hunting, and lenient penalties, among others. A few participants expressed frustration that the government passes new environmental laws without effective implementation; for example, Participant 1 stated: "I feel like the law should be enforced more. They make the laws but do not enforce them."

According to an ACLA-P MINAE official, MINAE has stopped patrolling regions outside of national protected areas due to limited personnel. As a result, 19 participants (66%) in the ASBC either stated that they had not seen MINAE in a long time or that they should come more often. Participant 26 expressed that the lack of MINAE presence might explain why people continue to hunt despite the hunting prohibition: "If they came, no one would go and catch birds or anything because well… they do not come so the people are going to hunt." Since MINAE no longer patrols the region, enforcement of the Wildlife Conservation Law outside of protected areas principally relies on residents to report hunting. This enforcement method faces a number of challenges, including: 1) limited ability for MINAE to respond in time, 2) lack of confidence in MINAE, and 3) fear of reporting hunting.

First, most hunting occurs during nights, weekends, and holidays when people are off work but the MINAE offices are closed. Out of the 18 participants in the ASBC who commented on when hunting occurs, 16 (89%) believed that hunting occurs at night. The ACLA-P MINAE office in San Isidro de El General, which is the office closest to the ASBC, is open Monday to Friday between 8 a.m. and 4 p.m. On evenings and weekends, hunting has to be reported to the Chirripó National Park office in San Gerardo de Rivas and it takes at least an hour for them to reach the ASBC. Participant 13 explained why this is an issue for reporting hunting:

> Hunting in this part in the south happens mostly at night. At that time, there are not any MINAE personnel. You have to do it through Chirripó National Park and even though you call, when they arrive at the spot, hours have already passed and maybe the hunters are not there anymore.

Second, some participants expressed a lack of confidence in MINAE for various reasons, which has resulted in reservations about reporting hunting. Nine participants in the ASBC expressed frustration that MINAE officials do not respond promptly when they call to report hunting. Four participants stated there were multiple occasions that they had called to report hunting but no one came to investigate; two of these participants stated that they would not call MINAE anymore because of these experiences. The ACLA-P MINAE official interviewed maintained that a lack of personnel in their San Isidro de El General office and in Chirripó National Park constrains their ability to respond promptly to reports of illegal activities; their inability to respond promptly, if at all, was also noted as an issue by Hammerschlag (2012). Six participants also expressed concern that some MINAE officials are corrupt; participants told stories of officials confiscating wildlife for their personal use or helping hunters to avoid getting caught.

Third, some participants expressed that they did not feel comfortable or safe denouncing hunters; 17 participants (59%) in the ASBC stated that there could be conflict between hunters and the people who report them. Hammerschlag (2012) also noted that people in the ASBC did not want to report hunters, particularly if the hunters were friends or relatives. While most participants stated that hunters might get angry and be unfriendly towards them, a few were concerned about property damage or physical assault. Participant 7 explained why people in the ASBC do not want to report hunting: “They do not want problems with hunters. Also, they have firearms. So because of this many people say: ‘I want to call and tell but I do not want problems.’” Participant 13, who has confronted and reported hunters, confirmed this fear: “This is what has happened. If he [the hunter] knows that someone took away his dog, if he finds out, first he fights and if not, he does damage to a cow or the fences or something. They get even and then they are enemies afterwards.” Even though reports to MINAE are supposed to be confidential, people were worried that hunters might still find out through word of mouth. A few

participants talked about a few ongoing animosities between hunters and people that are known for reporting hunters. Participant 8 stated that at the time of the study, a bird owner was angry with someone who he mistakenly believed had his birds confiscated by MINAE. Eight out of nine wildlife professionals interviewed outside of the ASBC also stated that there are sometimes conflicts between hunters and the people who report or confront them.

5.7.3 – Evading law enforcement

In the ASBC, 21 participants (72%) expressed frustration that it is difficult to catch and prosecute hunters. Participants noted a variety of tactics that hunters employ to avoid detection and arrest. Participant 9 explained this challenge:

> The poachers are known poachers. But they have to catch them and they poachers stay one step ahead of them... You physically have to catch them with the animal and the gun on them and everything, and yeah. The chances are not good of that happening.

Six participants believed that people hunt at night because they are less likely to get caught, either because MINAE takes a long time to respond or because people are less likely to notice and identify them in the dark. For example, Participant 1 described hunting that happens around her property:

> You hear their weapons. You hear their dogs. You hear them and you know that there are people but you do not know who they are… You do not see them because they hunt at night… So that people do not see them because they know that it is prohibited. It is illegal.

A few participants stated that hunters have also changed their hunting methods to avoid detection. Participant 26 believed that people have stopped using dogs and Participant 35 thought that they have trained the dogs not to bark. Three ex-hunters mentioned a hunting method that does not require dogs, as described by Participant 32:

> They put food out and they attract them with a lantern… the lantern makes the animals stay like stunned. They cannot see well because of the light from the lantern and they kill them… This is what they do now… they are much more effective for hunting. And they hunt easily at night.

Some participants believed that hunters study the areas where they hunt to evade law enforcement. To avoid detection, participants thought that hunters avoid using main roads or passing by security at a housing development near the Las Nubes Biological Reserve. In case MINAE is called, they have alternative exits planned. Participants also noted that friends and family sometimes call to warn hunters when MINAE shows up. Participant 13 explained how these strategies pose a challenge for law enforcement:

> The police arrived, they were there two hours in the place, and because they did not see anything, the police left. And half an hour later the hunters went by on a motorcycle. If the police had done a round, they would have found them. But they were hidden. Because there are many spots where you can see everything. And they were hidden. They grab and leash the dogs.

Due to citizens reporting hunting on private property, some participants believed that hunters have gone to hunt in protected areas where there are only a few park guards. Participant 15 explained that the hunters study where the park guards patrol to avoid being caught. A MINAE official also stated that hunters sometimes light fires to distract park guards while they hunt.

Hunters also hide their identities in a variety of ways. Participant 34 stated that someone who hunts near her property covers their license plate so she has not been able to identify and report them. Hunters have also stolen camera traps, which are used to study wildlife, so as to not be identified. Six participants stated that they know someone that protects their farm or the farm where they work from hunting but hunt there themselves. Participant 20 expressed frustration with hunters who pretend to be conservationists so that they are not suspected of hunting: “On

one side they tell you that they are nature lovers and they are conservationists and then someone tells you that they are liars, they go around hunting."

People with wild pets also employ various tricks to evade the law. Three wild bird owners expressed concern that MINAE would come and confiscate their birds one day. Participant 8 stated that he keeps his birds inside the house so that MINAE will not see them. Participant 27 also stated that he does not keep his bird catching cages visible at his home and therefore MINAE would only be able to catch him if he was caught in the act of capturing a bird. A few participants also believed that bird hunters pretend that they have had their bird for a long time so they are not suspected of capturing and selling new ones.

5.7.4 – Prosecution constraints

Even if MINAE is able identify and charge illegal hunters, it is difficult to reach a conviction. Both MINAE officials that were interviewed stated that they often do not have sufficient evidence. Furthermore, it is challenging to obtain search warrants for wildlife; judges require evidence or witness testimonies in order to give a warrant, which are difficult to acquire. As such, the ACLA-P MINAE official expressed frustration with citizens who often do not want to collaborate as witnesses; however, as stated above, some people fear for their safety when reporting hunting and wish to do so anonymously. Arias et al. (2016) found similar difficulties with then enforcement of fishing regulations in Cocos Island National Park, where low the probability of arrest and inefficiency of prosecution make convictions for illegal fishers rare.

Participants in this study were also concerned about lenient penalties; 13 participants (45%) believed that the penalties for hunting are not strict enough. Some of these individuals said that known hunters continue to hunt, which they believed to be illustrative of this problem. Thus, a few participants believed that the greater penalties in the 2012 Wildlife Conservation Law have not made an impact yet because people have not been fined; Participant 13 elaborated on this: "It is that there are some hunters that do not care… It is not because they have enough to pay. It is because they say that they are not going to catch them so they take advantage of that."

5.7.5 – Subsistence permits

Bushmeat can be an important source for livelihoods, particularly for people who are marginalized (Carrillo et al., 2000; Isla, 2005, 2015; Obando & Herrera, 2010; Rushton et al., 2005; Wong, 2014). While subsistence hunting does not appear to be a primary driver for hunting in the ASBC, researchers have documented the prevalence of subsistence hunting in other parts of the country. In communities around Carara National Park, Molina Murillo and Huson (2014) found that subsistence was the second most common motivation for hunting, after selling or trading. Wong (2014) also found that personal consumption was the main driver for hunting on the Osa Peninsula. As such, Carrillo et al. (2000) contended that, "Enforcement of hunting restrictions in the Osa Peninsula is difficult, perhaps unrealistic, and perhaps even socially undesirable, as long as the current socioeconomic conditions persist" (p. 1590). Likewise, Isla (2015, 2005) argued that neoliberal economic and conservation policies in Costa Rica have forced people off their land and into vulnerable situations yet those who use natural resources, such as bushmeat, to make ends meet face legal prosecution.

The new legislation allows for subsistence hunting; however, there is no mechanism currently in place for applying for such a permit. The two MINAE officials interviewed stated that the procedure has not been finalized yet and explained that MINAE has yet to receive any inquiries for this permit. One of these officials stated that it would involve a visit from a social worker from the Mixed Institute for Social Assistance (IMAS) to prove living conditions necessitating subsistence hunting; the other official noted that it might be difficult to prove this. Next, the applicant would have to find a place to hunt; they would have to own land on which to hunt or get permission from a private landowner. They would not be allowed to hunt in protected areas or any land that is part of Costa Rica's Payment for Environmental Services program. Once they found a site to hunt, MINAE would have to determine what species they could hunt and how many individuals. Both MINAE officials believed that people would rather continue to hunt illegally than go through this process.

During fieldwork, I sought out public promotions of the new Wildlife Conservation Law to see how the law is being publicized, including: signs promoting the hunting ban (Figure 12),

commercials on social media (Acéptelo es ilegal, 2017), and other promotional materials (Figure 13, Appendix 6). None of these materials stated that subsistence hunting is allowed. The campaign promoting the new law, a collaborative effort between MINAE and APREFLOFAS, is titled "Acéptelo es ilegal", Accept that it is illegal in English. Correspondingly, during a panel discussion on fighting wildlife trade in Costa Rica during the 7th Environmental Fair in San José, the Minister of Environment and Energy, Dr. Edgar Gutiérrez Espeleta, stated "hunting is illegal, period". As such, it could be possible that people are not aware that they can apply for a permit for subsistence hunting. While indigenous people have the right to hunt on their territory, Sylvester et al. (2016) found that some Bribri people were not sure if they were allowed to hunt anymore because they had received mixed messages about what is legal. Their findings highlight the importance of clear communication regarding the legality of wildlife use. In this study, a spokesperson for APREFLOFAS expressed concern that if they advertised that subsistence hunting is permitted, people would claim that they were hunting for subsistence when charged for hunting illegally. They contended that MINAE or ENGOs should put on workshops to explain the details of the new law in person but currently funding is too limited.

Figure 12. Sign promoting the Wildlife Conservation Law in Drake Bay on the Osa Peninsula: "Wildlife Conservation Law. Those who hunt wildlife or destroy their nests will be sanctioned with one to three years in prison. Law 8689 and 7317."

Figure 13. Sticker promoting the Wildlife Conservation Law distributed by an ACLA-P official at the 10th ASBC Environmental Festival: "Avoid hunting and wildlife trade."

5.8 – Recommendations

5.8.1 – Increased enforcement

All participants were asked what they thought could be done to further reduce hunting in the area. The most common response in the ASBC (76%) was increased enforcement of the Wildlife Conservation Law. Some participants believed that MINAE should patrol the corridor and that simply their occasional presence might decrease hunting. Hammerschlag (2012) also thought that MINAE was lacking presence in the ASBC. Similarly, in a study by Guilcapi-Luna (2013), 20% of participants thought that environmental laws are not enforced in the corridor. If MINAE did do patrols, it would be important that their patrols are not at the same time every week or people would just learn not to hunt at that time. Additionally, shifts for MINAE personnel in the San Isidro de El General office on nights and weekends, when most hunting occurs, would allow them to respond faster to hunting reports. This would increase the likelihood

of catching hunters and foster confidence in MINAE, which would encourage people to continue reporting illegal hunters.

Ten participants believed that people in the corridor should put in greater effort to control hunting themselves by reporting and confronting hunters. Some of these participants also wanted to re-establish the former committee that attempted to control hunting. Hammerschlag (2012) found a high level of support for this idea as well. Establishing this group could help others in the community to feel more comfortable reporting hunting. It could also be a point for collaboration with MINAE in the corridor. If the group officially registered with MINAE as a Committee for the Vigilance of Natural Resources (COVIRENAS), it could receive support from MINAE in the form of training, equipment, and funds (MINAE, 2016). Collaboration between CoBAS, Los Cusingos Bird Sanctuary, and Las Nubes Biological Reserve could also help strengthen the group. Hernández-Hernández (2010) also suggested that Los Cusingos should have a protection program to prevent hunting on the reserve and that this should be done in collaboration with other groups in the corridor working towards the same goal.

5.8.2 – Increased MINAE communications

Participants expressed a variety of concerns with MINAE personnel. Some also feared that reports to MINAE would not be kept anonymous and that they would face retribution from hunters. Meanwhile, MINAE officials stated that they need more collaboration from local communities to be able to catch and prosecute illegal hunters. More outreach and communication from MINAE could build trust and promote collaboration. It would be important for MINAE to seriously consider and respond to safety concerns surrounding the reporting process.

Outreach regarding the new Wildlife Conservation Law might also be beneficial as not all participants in this study were clear about what is now legal. Communication on the legality of subsistence hunting has been limited (Section 5.7.5). A few participants thought that people would rather illegally hunt for subsistence or raise pacas go through the complicated and potentially expensive permit processes. Increased communications between MINAE and communities could help clarify the details of the law and encourage people to apply for the

necessary permits. This would help people that need to hunt to do so legally and give MINAE a better idea of the level of subsistence hunting and its impact on wildlife populations.

5.8.3 – Environmental education and outreach

Environmental education should be continued and expanded in the ASBC to raise interest in wildlife conservation. Increased awareness was a key contributing factor to the past decline in hunting (Section 5.5.2). There is environmental education in the school curriculum and multiple annual environmental festivals, including one for the schools in the ASBC. People in the corridor also get environmental information from television and radio programs and outreach from CoBAS, MINAE, and York University. Other researchers have also found that media is an important source of environmental information in Costa Rica (Schan, 2011; Schelhas & Pfeffer, 2010). This is all part of the environmental discourse in Costa Rica, which has pursued policies that promote conservation in order to attract ecotourism (Evans, 1999; Isla, 2015; Schelhas & Pfeffer, 2005). As such, the promise of tourism in the corridor, and Costa Rica more generally, contributes to the desire to conserve wildlife. Ortiz-Imlach (2014) also noted that parents and grandparents share information about their environment with children on family outings in the corridor. As a result, Ortiz-Imlach (2014) noted a high level of environmental awareness and an affinity for animals in the corridor.

Despite already existing environmental education strategies, 18 participants (62%) thought more environmental education would decrease hunting further. Desanti (2005) wrote that environmental education is fundamental for the ASBC to meet its objectives. Environmental education is part of the strategic plan for the ASBC (CoBAS, 2014), but a CoBAS representative stated that it has yet to be actualized outside of the festivals. According to Hernández-Hernández (2010), Los Cusingos Biological Reserve should also improve their outreach and establish environmental education programs. A few participants in this study said that there should be more environmental content in the school curriculum. Environmental education in schools can lead to changes throughout the community; a few participants told stories of children asking their fathers and grandfathers to stop hunting. Outreach amongst adults is also important, considering that youth are less interested in hunting and most participants described hunters as older individuals. Hammerschlag (2012) also suggested that more environmental education amongst

adults could decrease hunting. Moreover, Schan (2011) noted that people aged 61 to 91 are more inclined to keep wild pets than younger generations and argued that environmental education needs to be expanded to include older generations. Awareness of declining wildlife populations has already had an impact on hunters in the ASBC; seven people in this study stopped hunting when they became aware of the impact of hunting on wildlife populations.

Environmental education in ASBC could focus on the goals and importance of the biological corridor. Arauz-Beita & Arias-Navarro (2014, 2016) argued that outreach should be improved to strengthen local awareness of and interest in the corridor. Environmental education content could also focus on local wildlife and threats to wildlife in the ASBC (Hammerschlag, 2012; Schan, 2011). A few participants were excited about the potential of using the camera trap images collected by York University for education about wildlife in the corridor. Citizen engagement with the camera trap project could help build interest in local wildlife and ecological research (Mooring et al., 2015). Interestingly, a few participants that caught and kept wild birds as pets held disdain for hunters that kill animals, as they were concerned with animal welfare and wildlife populations. As such, communication about the impact of catching birds on bird populations and animal welfare issues surrounding keeping wild pets could decrease the prevalence of this custom. Information about the Wildlife Conservation Law and reporting process should also be included (Section 5.8.2); this could be done in collaboration with MINAE, which could help improve their relationship with people in the ASBC.

6 – Conclusion

Hunting has been on the decline in the ASBC since around 1975 for a variety of reasons. Hunting used to be necessary for those who settled in the region but over time, improved transportation networks and employment opportunities have decreased the dependence on bushmeat. Simultaneously, environmental education and personal observations of declining forests and wildlife, in tandem with international and national environmental discourse, have increased awareness of declining wildlife populations. Participants in this study also expressed concern for the welfare of wild animals injured or killed by hunters and for those kept in captivity as pets. Furthermore, the availability of birds bred in captivity has increased, which is taking the pressure off of wild species that are sought out for use as pets. As such, many have stopped hunting and keeping wildlife themselves and have pressured others to stop as well. Moreover, new generations are less interested in these activities.

Due to increasing concern for wildlife and a belief that hunting is no longer necessary, participants in this study expressed a growing intolerance for hunting in the ASBC. Nationally, this anti-hunting sentiment resulted in a civil society movement to ban hunting and wildlife trade; over 5% of eligible voters signed a petition spearheaded by APREFLOFAS to bring a stricter Wildlife Conservation Law before congress. When the new Wildlife Conservation Law (N° 7317) was passed in 2012, hunting was made largely illegal except for in limited circumstances, such as subsistence, which need to be approved by MINAE and penalties for violations were increased substantially. Consequently, in this study participants believed that the fear of penalties for being caught hunting or keeping wildlife has also contributed to a decline in these activities, particularly since the new Wildlife Conservation Law was passed. Interestingly, 85% of the participants in this study believed that the biological corridor designation has contributed to the decline in hunting in the area, despite the fact that this designation does not come with any increased legal protection for wildlife and has not resulted in an increased presence of MINAE. It does appear, however, that the biological corridor designation has led to stronger feelings against hunting in the region and fostered local community efforts to prohibit hunting.

While hunting has declined, people do continue to hunt in the ASBC. The main motivation for hunting appears to be sport; however, there are various overlapping motivations. People hunt as a social activity that is viewed as a tradition passed down through the generations. Hunters also enjoy bushmeat, which is considered a delicacy and may be shared at social events. Wild animals, particularly birds, are captured for use at pets. Both bushmeat and wild pets are sold through clandestine networks. In the ASBC, people principally hunt white-tailed deer, paca, collared peccary, agouti, and tapir; however, participants listed many other species as potential game. Participants in this study believed the black-faced solitaire to be the most popular bird to capture and keep or sell for use as a pet. Conflict with wildlife can also lead people to kill wild animals that they fear or believe to be responsible for killing their livestock.

There are a number of factors that constrain the ability to enforce the new Wildlife Conservation Law. Presently, MINAE lacks the resources and personnel to effectively respond to reports of hunting or patrol for hunters, both inside and outside of protected areas. Moreover, hunting occurs the most during nights and weekends, when staff is limited even further. Currently, MINAE principally relies on reports of hunting for law enforcement. Yet, people in the ASBC expressed resistance to reporting hunting. Some participants lacked confidence in MINAE, mostly because they had reported hunting before but no one responded or they took a long time to arrive. Participants in this study also expressed fear of conflict with hunters, even if it would just be passive aggression, and were worried that their reports would not remain confidential. Adding to the challenge of enforcing the Wildlife Conservation Law, hunters employ a number of tactics to avoid being caught, such as: hunting in the dark without dogs, pretending that they are not hunters, and hunting in regions where they are less likely to be caught. For example, due to the growing level of intolerance for hunting in the ASBC, some hunters have chosen to hunt in Chirripó National Park because they are less likely to be caught there than in the corridor. Even if MINAE is able identify and charge illegal hunters, it is difficult to reach a conviction because evidence is often insufficient.

In order to more effectively enforce the Wildlife Conservation Law, I have recommended here that MINAE increases its presence in the region and responds more promptly to reports of hunting. Shifts for MINAE personnel in the San Isidro de El General office on nights and

weekends, when most hunting occurs, would allow them to respond faster to hunting reports. This would increase the likelihood of catching illegal hunters and foster confidence in MINAE, which would encourage people to continue reporting hunters. Participants in this study also supported the idea of a local committee to control hunting, which could be registered with MINAE as a COVIRENAS to receive institutional support. Overall, improved communications between MINAE and people in the ASBC would improve local understanding of the new Wildlife Conservation Law and hopefully allow for greater collaboration. Moreover, MINAE should address safety concerns regarding reporting hunters if they want people to continue coming forward. Additionally, communication on the legality of subsistence hunting from MINAE has not been clear. Considering the fact that those that hunt for subsistence are usually the most marginalized, and that ignoring livelihood concerns in the face of conservation has led to conflict in Costa Rica, I contend that the process for applying for these permits should be more effectively communicated to the public.

Since participants in this study believed increased awareness to be a principal driver behind the decrease in hunting in the ASBC, environmental education should also be continued and expanded in order to reduce hunting further. It would be important to extend outreach to adults, as most of the people currently hunting are older individuals. Moreover, a number of adults in this study had stopped hunting themselves when they became aware of the impact hunting has on wildlife populations. There is also potential to engage the ASBC community in citizen science monitoring of wildlife populations using camera trap images, which would contribute to awareness of local wildlife.

Future research on hunting in the region should focus specifically on people who hunt for subsistence in order to evaluate the impact of the new Wildlife Conservation Law on their livelihoods and the barriers they might face in obtaining subsistence permits. Some participants in this study expressed frustration that the Wildlife Conservation Law has increased the requirements for obtaining permits to breed paca to the point where it has become prohibitively expensive and complicated. Considering that wildlife farming is often suggested as an alternative to hunting (Nogueira & Nogueira-Filho, 2011), it would be important to explore how the Wildlife Conservation Law has constrained the ability to breed wildlife and how this has

impacted those that farm wildlife for consumption and/or sport. A few wildlife professionals interviewed as part of this study expressed concern that in response to the Wildlife Conservation Law, some people are just releasing their wild pets; future research could study this phenomenon, particularly to investigate what impacts this might be having on the ecosystems the pets are released into. Likewise, some wildlife professionals were concerned about the increasing wildlife in wildlife rehabilitation centres that have limited space and resources and as such, this issue could be investigated further. Lastly, hunting in the ASBC has been constrained by local residents reporting hunters and enforcing prohibitions of hunting on their private farms. As a result, some hunters have chosen to hunt in less densely populated regions such as protected areas where wildlife populations, particularly species at risk, are also more abundant. It would be important to study whether or not the same phenomenon is occurring elsewhere in order to better understand the hunting pressures impacting protected areas and threatened species in Costa Rica.

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Appendices

1 – Interview questions

The questions in this interview will focus on wildlife hunting, trafficking, and the new 2012 Ley de Conservación de la Vida Silvestre. While I have specific questions, please feel free to bring up anything else you think is relevant.

- How long have you lived in this area?
- Do you know if people hunt in this area?
    - What animals do people hunt?
    - What do you think is the motivation for hunting?
    - Has hunting changed over time?
        - If so, how?
        - Has the level changed?
        - If it has decreased, why?
        - Have the motivations changed?
    - Do people depend on wild meat for subsistence?
        - If so, do you know if it is legal to do so?
    - Do people depend on the money from selling wildlife or wildlife products?
    - Do people kill wildlife that is dangerous for people or their livestock?
- Do people in the area sell or buy wild animals?
    - What animas are sold?
    - What is the motivation for buying wildlife or wildlife products?
    - What is the motivation for selling wildlife?
    - How much are the animals or products worth?
    - Do you know where or how it would be possible to buy a wild animal or the meat from a wild animal?
    - Does the wildlife traded stay in the area or is it trafficked elsewhere?
- In this area, do people keep wild animals in their homes as pets?
    - How common is this practice?
    - What kinds of animals?
    - What is the motivation?
    - Where do they get wild animals?
- What impact do you think that the wildlife conservation law has on the exploitation of wildlife?
    - Are people aware of the new strict laws found in the 2012 conservation law?
    - Are the laws enforced?
        - How are the laws enforced?
        - Have you seen MINAE patrol this area?
        - Are there any problems with the enforcement of the law?
        - Do you think the laws are successful at reducing wildlife exploitation?
    - If the laws are strict, what drives people to continue to exploit wildlife?

    - Are people here involved with enforcing the wildlife conservation law?
        - Do you call MINAE to report hunting?
        - Do you know if others here call MINAE to report hunting?
        - What do you think about involving local people in enforcing conservation laws?
        - Does this ever create conflict between hunters and those who confront or report them?
- In general, what do you think about having strict laws on wildlife use?
    - Do you think it is a good idea to have strict laws on wildlife use? Why or why not?
    - Do you think these laws have any unintended consequences or negative impacts on people?
    - Why do you think it is important to conserve wildlife?
- Do you have ideas about other actions that could be taken to reduce the hunting and trading of wildlife?
- (In the ASBC) Do you think biological corridor has had an impact on the level of hunting?
- Do you have any other comments about what we have been discussing?
- Do you have any recommendations of other people to talk with?

2 – Informed written consent form

Informed Written Consent Form

Researcher:
Brittany Maguire, maguireb@yorku.ca, (Costa Rican phone number)
Masters in Environmental Studies Candidate, York University

Study name: Political Ecology of Wildlife Conservation in Costa Rica

Purpose of research:
My name is Brittany Maguire and I am a graduate student in the Faculty of Environmental Studies at York University in Toronto, Canada. I am completing this research as part of my Masters degree and will use this data to write a research paper, which I may try to publish. I will be conducting interviews to learn more about wildlife use, management, and conservation in Costa Rica.

What you will be asked to do in the research: I would like to conduct a one-on-one interview with you that would take up to an hour of your time. I may bring a translator to ensure clarity as Spanish is my second language.
The interview questions will explore three themes:

- The harvesting and trading of wildlife (for consumption or for sale) in Costa Rica;
- The governance of wildlife use, with a particular focus on the 2012 Wildlife Conservation Law; and
- The impact of wildlife governance and the 2012 Wildlife Conservation Law on people that harvest wildlife.

Risks and discomforts: Some questions in the interview may make you uncomfortable but you have the right not to answer any of them.

Benefits of the research: I hope that this research will offer you the opportunity to express your opinion and concerns about wildlife use, management, and conservation in Costa Rica. By participating in this research, you will be contributing to a greater understanding of wildlife use and conservation in Costa Rica as well as the impacts of conservation laws on people.

Voluntary participation: Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the nature of your relationship with the researcher, study staff, or York University either now, or in the future.

Withdrawal from the study: You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with York University or myself. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

Confidentiality: *Unless you choose otherwise*, all information you supply during the research will be held in confidence. Unless you specifically indicate your consent, your name will not appear in any report or publication of the research. I will take notes during the interview and if you consent, I may audio-record the interview. All physical notes will be coded to avoid identifying participants. All digital data will be safely stored in password-protected files on an external hard-drive and no one else will have access to this data. After transcribing the audio-recorded interview, the audio file will be deleted. Five years after the completion of this thesis, I will destroy all remaining data. Confidentiality will be provided to the fullest extent possible by law.

Questions about the research? If you have questions about the research in general or about your role in the study, please feel free to contact myself, Brittany Maguire, by e-mail at maguireb@yorku.ca or by telephone at (Costa Rican phone number), the Faculty of Environmental Studies Program Office by telephone at (416) 736-5252, or my supervisor Dr. Leesa Fawcett by e-mail at lfawcett@yorku.ca. This research has been reviewed and approved by the FES Research Committee, on behalf of York University, and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Sr. Manager & Policy Advisor for the Office of Research Ethics, 5th Floor, Research Tower, York University by telephone at (416) 736-5914 or by e-mail at ore@yorku.ca.

Legal Rights and Signatures:

I,_____, consent to participate in this study (Political Ecology of Wildlife Conservation in Costa Rica) conducted by Brittany Maguire. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My signature below indicates my consent.

Signature _____ **Date** _____
Participant

Signature _____ **Date** _____
Principal Investigator: Brittany Maguire

If you consent to the follow, please check one or all of the following boxes with a ✓.

I, _____
☐ consent to be audio-recorded
☐ consent to be quoted by name in the report or publication of this research
☐ I would like you to send me the finished paper at this e-mail address: _____

I am aware that I may withdraw this consent at any time without penalty.

Signature _____ **Date** _____
Participant

3 – Informed verbal consent form

Informed Verbal Consent Form

Researcher:
Brittany Maguire, maguireb@yorku.ca, (will add Costa Rican phone number)
Masters in Environmental Studies Candidate, York University

Study name: Political Ecology of Wildlife Conservation in Costa Rica

Purpose of research:
My name is Brittany Maguire and I am a graduate student in the Faculty of Environmental Studies at York University in Toronto, Canada. I am completing this research as part of my Masters degree and will use this data to write a research paper, which I may try to publish. I will be conducting interviews to learn more about wildlife use, management, and conservation in Costa Rica.

What you will be asked to do in the research: I would like to conduct a one-on-one interview with you that would take up to an hour of your time. I may bring a translator to ensure clarity as Spanish is my second language.
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- The impact of wildlife governance and the 2012 Wildlife Conservation Law on people that harvest wildlife.

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Voluntary participation: Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the nature of your relationship with the researcher, study staff, or York University either now, or in the future.

Withdrawal from the study: You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with York University or myself. In the event you

withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

Confidentiality: *Unless you choose otherwise*, all information you supply during the research will be held in confidence. Unless you specifically indicate your consent, your name will not appear in any report or publication of the research. I will take notes during the interview and if you consent, I may audio-record the interview. All physical notes will be coded to avoid identifying participants. All digital data will be safely stored in password-protected files on an external hard-drive and no one else will have access to this data. After transcribing the audio-recorded interview, the audio file will be deleted. Five years after the completion of this thesis, I will destroy all remaining data. Confidentiality will be provided to the fullest extent possible by law.

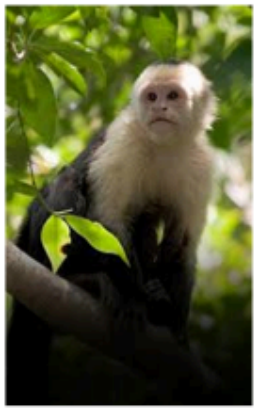
Questions about the research? If you have questions about the research in general or about your role in the study, please feel free to contact myself, Brittany Maguire, by e-mail at maguireb@yorku.ca or by telephone at (Costa Rican phone number), the Faculty of Environmental Studies Program Office by telephone at (416) 736-5252, or my supervisor Dr. Leesa Fawcett by e-mail at lfawcett@yorku.ca. This research has been reviewed and approved by the FES Research Committee, on behalf of York University, and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Sr. Manager & Policy Advisor for the Office of Research Ethics, 5th Floor, Research Tower, York University by telephone at (416) 736-5914 or by e-mail at ore@yorku.ca.

4 – Las Nubes environmental conference poster

Primer Congreso Ambiental de Las Nubes

29-30 Julio, 2016
Las Nubes Cloud Forest Reserve, Pérez Zeledón

Charlas
Talleres
Discusiones
Arte y Música
Feria Ambiental
Caminata



28 Julio	29 Julio	30 Julio
Bienvenidos al corredor	Congreso ambiental en York University's eco-campus	Caminata en el bosque nublado
Conocer a sus familias de hospedaje	Reunión social en La Carambola	Feria Ambiental de AMACOBAS

¡Les invitamos a compartir sus conocimientos y pasiones!
Escríbanos sus ideas antes del 22 Julio

Aaron Albrecht Montoya
acalbrecht@email.wm.edu
7174 4275

Precio del congreso: ¢1500
Precio del hospedaje: ¢5000/noche

5 – Data analysis codes

Animal welfare		
Breeding		
Community development		
Conservation conflict		
Conservation law	Attitude towards hunting law	
	Awareness of conservation law	
	Enforcement	Arrest
		Evading law
		Indifference
		Lack of enforcement
		Local enforcement
		Patrolling
		Prosecution
		Penalties
	Impact of conservation law	
	MINAE	Denouncing
		Fear of MINAE
		Inefficiency of MINAE
Human-wildlife conflict	Feline conflict	
	Killing snakes	
	Weasel conflict	
Hunting	Attitude towards hunting	
	Decrease in hunting	Alternatives
		Corridor
		Decrease in wildlife
		Environmental education
		Generational change
		Hard work
		Protection
		Ways to decrease further
	Hunter identities	
	Hearing hunting	
	Hunting locations	Alexander Skutch Biological
		Private property
		Protected area
	Hunting methods and equipment	
	Hunting times	
	Indigenous hunting	
	Motivation for hunting	Bad habit
		Bushmeat
		Capture
		Human-wildlife conflict

		Illegal activity
		Masculinity
		Profit
		Sport
		Subsistence
		Tradition
	Past hunting	
	Species hunted	
	Sustainable hunting	
Interviewee recommendation		
Tourism		
Wildlife	Wildlife populations	
	Importance of wildlife	
	Bushmeat	Selling bushmeat
		Taste of bushmeat
	Motivation for trading wildlife	
Wildlife trade	Wild pets	Care for wild pets
		Decrease in wild pets
		Motivation for wild pets
		Wild pet species
	Trade network	
	Wildlife prices	

6 – ACLA-P brochure promoting the Wildlife Conservation Law

TALA ILEGAL DE NUESTROS ÁRBOLES Y ESPECIES FORESTALES

Toda persona física y jurídica que desee extraer productos del bosque y en terrenos de uso agropecuario, debe contar con la respectiva autorización para la corta, aserrío y transporte de madera, por parte de las respectivas Oficinas Subregionales de las Áreas de Conservación del SINAC/MINAE.

Solamente el 85% de la madera que abastece el mercado nacional proviene del bosque, de plantaciones forestales y de terrenos de uso agropecuario, donde la corta es respaldada por un permiso autorizado.

La Tala ilegal está penada por la Ley Forestal Nº 7575.

CACERÍA, VENTA Y TRANSPORTE DE ANIMALES SILVESTRES

Costa Rica ha realizado un gran esfuerzo por conservar nuestra rica biodiversidad; por medio del establecimiento de las Áreas Silvestres Protegidas como Parques Nacionales y Refugios de Vida Silvestre, entre otros.

Sin embargo, personas inescrupulosas le sustraen a la naturaleza sus riquezas por medio de la cacería ilegal de especies silvestres.

Esta actividad ha provocado que animales silvestres como el Jaguar, la Danta, el Saíno, Chancho de Monte, estén en peligro de extinción o con poblaciones reducidas.

Por favor, no sea usted responsable de la desaparición de las especies de nuestros ecosistemas naturales. Absténgase de extraer, comprar, transportar y utilizar animales o plantas silvestres, sus productos y subproductos, que han sido capturados o cazados de manera ilegal.

DENUNCIE LA CACERIA O VENTA DE ESPECIES SILVESTRES.

Actualmente existen en el país 17 especies de aves, 13 de mamíferos, 2 de anfibios y 8 de reptiles en vías de extinción.

ÁREA DE CONSERVACIÓN LA AMISTAD PACÍFICO
De la Dirección del Tránsito, 600 mts sur, 75 al este y 100 sur, contiguo al Consejo Nacional de Rehabilitación.
Teléfonos (506) **2771-3155 • 2771-5116 • 2771-4836**
Fax (506) **2771-3297**

Material impreso con fondos de la causa penal #13-000842-0219-PE

BOLETÍN INFORMATIVO

Contribuya con la protección de los ***RECURSOS NATURALES***

LA TENENCIA Y COMERCIALIZACIÓN DE FLORA Y FAUNA SILVESTRE

Tel: (506) 2770-1711