Crime Science

RESEARCH

Open Access

Using crime script analysis to elucidate the details of Amur tiger poaching in the Russian Far East

Allison Skidmore*

Abstract

Poaching is the most direct threat to the persistence of Amur tigers. However, little empirical evidence exists about the modus operandi of the offenders associated with this wildlife crime. Crime science can aid conservation efforts by identifying the patterns and opportunity structures that facilitate poaching. By employing semi-structured interviews and participants observation with those directly involved in the poaching and trafficking of Amur tigers in the Russian Far East (RFE), this article utilizes crime script analysis to break down this criminal event into a process of sequential acts. By using this framework, it is possible account for the decisions made and actions taken by offenders before, during and after a tiger poaching event, with the goal of identifying weak points in the chain of actions to develop targeted intervention strategies. Findings indicate poaching is facilitated by the ability to acquire a firearm, presence of roads that enable access to remote forest regions, availability of specific types of tools/equipment, including heat vision googles or a spotlight and a 4 × 4 car, and a culture that fosters corruption. This crime script analysis elucidates possible intervention points, which are discussed alongside each step in the poaching process.

Keywords: Wildlife crime, Crime script analysis, Tiger poaching, Russian Far East, Illegal wildlife trade, Situational crime prevention

Introduction

Wildlife crime, including the poaching of and the illegal trade in wildlife, can manifest in many forms. Wild animals are poached and trafficked for a variety of reasons—food, clothing, cultural/traditional practices, medicinal uses, decorative items, and as live pets. Globally, the illegal wildlife trade is becoming ubiquitous, driven by the low risk, high reward nature of the activities (Viollaz et al., 2018; Warchol & Harrington, 2016) coupled with globalization, which eases the challenge of international communications, coordination, and delivery (Van Uhm & Nijman, 2020), and persistent demand, particularly from Asian countries (Wyatt et al., 2018).

Due to conservation biology's emphasis on protecting biodiversity, much of the empirical research that addresses wildlife crime derives from this field (Kareiva & Marvier, 2012; Kurland et al., 2017). Criminological theories and methods can aid conservation efforts to address wildlife crime by approaching and analyzing these crimes in a way analogous to traditional forms of crime—i.e. identifying the characteristics of where, when and why a specific target is selected and how the crime commission process unfolds (Kurland et al., 2017). Criminologists, engaged with identifying and assessing crime risk to detect patterns and the opportunity structures involved in crime commission, can contribute to informing prevention measures to deter wildlife crime (Kurland and Pires, 2017).

This article adopts a criminological framework that employs crime script analysis to further understand the

*Correspondence: Askidmor@ucsc.edu
Environmental Studies Department, University of California Santa Cruz, 1156 High Street, Santa Cruz, CA 95064, USA

dynamic crime-commission process of a specific form of wildlife crime—the poaching of Amur tigers in the Russian Far East (RFE). Crime scripts are guides that frame our understanding of a criminal's behavior and actions. These scripts offer a framework to account for the decisions made and actions taken by offenders before, during and after committing a specific crime (Leclerc, 2017). Crime scripts turn a crime from a static event into a process of sequential acts, with the goal of identifying pinch points or weak links in the chain of actions to implement targeted intervention strategies (Moreto & Clarke, 2013; Lemieux, 2020).

The illegal wildlife trade lacks generalizability: the species/products in demand and the crime commission process all have their own distinct markets, drivers, actors, supply chains and *modus operandi* (Pires et al., 2016; Van Uhm & Siegel, 2016). Crime scripts are particularly well suited to dissect and interpret the variability and context specificity of wildlife crime. For example, Lemieux and Bruschi (2019) developed both an actor-based script to demonstrate the step-by-step process of how an individual offender hunts jaguars, as well as a product-based script to highlight the different actors and locations involved within the production process and subsequent smuggling to end market consumers of a specific product—jaguar paste. In a very different example, Viollaz et al. (2018) uses script analysis to understand the financial crimes committed by wildlife traffickers throughout the trafficking process. Despite the variation in type of crime, actors involved, focus of script, etc., both these studies demonstrate how crime scripting can be used to elucidate pinch points in the crime commission sequence for a more nuanced understanding of criminal *modus operandi* in wildlife crime.

This paper builds further on the potential of crime scripting as a model to breakdown the crime commission process of wildlife crimes with the goal of developing context specific policy interventions. The crime script presented here is actor-based and focused on those involved in the poaching of Amur tigers in the Russian Far East (RFE). A sequential criminal event is complex; most criminal decisions or acts begin in noncriminal settings and understanding the variation in choice structuring properties of criminals requires detail-oriented observational and interview data (Brent & Kraska, 2015). Therefore, for this study, an ethnographic case study approach was utilized. Data was collected from semi-structured interviews and participant observations with those directly involved—the poachers, buyers, middlemen and smugglers—in tiger poaching to understand the details of this criminal act from the viewpoint of the offenders themselves. By employing script analysis and thereby extending analysis to include all discrete acts

of the crime commission sequence, I recognize that a crime-specific approach (Cornish, 1994) is needed to understand the full range of intervention strategies to deter tiger poaching.

Although this type of fieldwork, involving continuous contact with persons involved in illegal activities, can be dangerous and difficult to conduct, the methods were essential to the research goals. Such methods have been used successfully to interview those directly involved in the illegal markets of parrots in the neotropics (Pires et al., 2016), black caviar in Russia (Van Uhm & Siegel, 2016), tigers in China (Moyle, 2009; Van Uhm & Wong, 2019; Wong, 2016), and live wildlife trade in Peru (Leberatto, 2016). Scholars have also employed other techniques to acquire related wildlife crime data, for example, interviewing NGO leaders, government officials, and scholars (e.g., Arroyo-Quiroz & Wyatt, 2019; Wyatt, 2009, 2011), law enforcement personnel (e.g., Moreto, 2016; Moreto & Lemieux, 2015; Runhovde, 2015, 2017, 2018; Warchol & Harrington, 2016), a combination of environmental experts/authorities and law enforcement agents (e.g., Sollund, 2017; Sollund & Runhovde, 2020) and end market sellers (Moyle, 2009). However, acquiring information from offenders themselves offers a firsthand account. This undiluted information is crucial and cannot be acquired with as much accuracy in any other way, thus I made the decision to interview offenders directly.

Criminological research has traditionally relied more on quantitative methods (Drury et al., 2011; Van Gelder & Van Daele, 2014). Wildlife crime studies have also favored quantitative over qualitative methods (Lynch, 2019; Moreto, 2016). This article contributes to conservation and criminological literature by providing insight into how a novel approach, criminological ethnography, can be used to conduct qualitative conservation science research from a criminological perspective to understand the opportunity structures that facilitate Amur tiger poaching in the RFE. These results are part of a larger study focused on understanding the entire illegal supply chain of Amur tigers from Russia into China. A related article (Skidmore 2021b) focuses on determining the specific drivers of poaching behavior; here the transition is made from criminal motivation to criminal intention and action. This paper begins with an examination into the theoretical framework and relevant literature for this study. Methodology is then described. Results in the form of a crime script are then presented followed by a discussion, policy interventions and a conclusion.

Theoretical framework
Crimes should be viewed as a dynamic process rather than a discreet event. This process unfolds across several distinct acts or steps that cumulatively facilitate a

criminal opportunity that offenders take advantage of (Sytsma et al., 2020). The identification of these distinct acts or steps that comprise an entire crime event was developed by Cornish (1994) and is known as crime script analysis. Cornish (1994) promoted crime scripting as a companion tool to inform situational crime prevention, a framework that details how an offender's choice to commit a particular crime can be influenced by changing the environment or situational context in which that decision takes place (Clarke, 2008). This includes reducing the opportunities for offenders to commit a crime, decreasing the number of victims or the accessibility of the victim to the offender, and increasing the level of monitoring, making crime more difficult to commit (Viollaz et al., 2018).

Script analysis offers a tool to assist with understanding criminal *modus operandi* by highlighting how opportunity and the characteristics of the immediate environment facilitate a crime. Crime scripts are predicated on being crime-specific, and are produced by creating detailed, step-by-step accounts of crimes, in the specific contexts and environments where they occur (Lemiuex 2020) and are particularly useful to understand complex crimes (Levi, 2008). Creating a crime script often relies on gathering qualitative data (Borrion, 2013) and using that data to follow a systematic methodology where the actions of the criminal event are broken down into stages. Cornish (1994) originally proposed ten stages, but more recently this has been modified into four main stages—*preparation, pre-activity, activity, and post activity* (Tompson & Chainey, 2011). Each stage includes as much information as possible about resources, equipment/tools, actors, activities, and spatial/temporal details. By highlighting the procedural nature of crime, this type of analysis offers a framework to account for the choices and decisions made by the actors of each stage before, during, and after the commission of the crime they are associated with (Leclerc, 2017; Leclerc & Wortley, 2013).

The sequential acts of a crime have inherent causality (Tompson & Chainey, 2011). Since actions along the chain of events are contingent on the ones before, intervention measures can be more acutely focused. Due to the focus on the situational context of criminal opportunities, analysis can support situational crime prevention by detecting unique intervention points that likely go undiscovered when crime is treated as a single event in time and space (Leclerc, 2017). For example, intervention measures are broadened to include not just the actors involved, but the physical environments that support crime, including spatial and temporal aspects (Clarke, 1997). Overall, the context provided by script analysis supports understanding the immediate situational

variables of criminal actions to manipulate the opportunity structures that facilitate crime. By using the 25 situational crime prevention (SCP) techniques identified by Cornish and Clarke (2003) targeted intervention strategies can then be developed.

Case selection

Tigers are one of the most exploited wildlife species due predominantly to the enduring demand for traditional medicine in Asian countries, especially China (Moyle, 2009; Wong, 2016). The past 100 years has seen the global tiger population shrink from 100,000 to approximately 3,200 mature adults today, based on the last global assessment (Goodrich et al., 2015). Population declines are due to habitat loss and fragmentation, loss of prey base, and poaching for the international trade (Miquelle et al., 2015; Robinson et al., 2015; Sharma et al., 2014). Studies have examined the last link of the poaching supply chain: the domestic markets in China (Moyle, 2009; Van Uhm, 2016; Van Uhm & Wong, 2019; Wong, 2016) and Nepal (Karmacharya et al., 2018). The first link, including the range of people involved, their motives and methods, and associated links to the commercial trade, have been examined in Bangladesh (Inskip et al., 2014; Saif et al., 2016, 2018), India (Sharma et al., 2014) and Sumatra (Risdianto et al., 2016; Shepherd & Magnus, 2004). Similar data does not exist in Russia.

The RFE is the last stronghold of the Amur subspecies. Population estimates are difficult to obtain because only 3–4% of Amur tiger range is inside of protected areas (PAs) (Carroll & Miquelle, 2006; Matyukhina et al., 2014) and tiger status outside protected sites is generally poorly known (Goodrich et al., 2015). Based on a 2014–2015 survey, there is a population of approximately 350 adults (Amur Tiger Census, 2015). Filling in the knowledge gaps about poaching is time sensitive, as poaching is the most common source of mortality for this subspecies (Robinson et al., 2015). The primary destination for tiger parts is across the border in China, however, only anecdotal information exists about the structure of the supply chain and the *modus operandi* of those involved.

Duffy et al., (2016: 346) state, "…we need to be cognizant of the fact that the illegal wildlife trade is not a singular phenomenon that requires a one-size-fits-all strategy to tackle it." Even within one species, tigers, the illegal trade is highly contextual. Product desirability varies, which will impact the steps taken to process a carcass directly after poaching. Tiger bones, whiskers, claws, canines, penises and pelts are all in demand, but in many cases for different uses in different markets with different consumers. For example, tiger bones are a consumptive good used in traditional Chinese medicine, whereas pelts are a luxury decorative item or used in ceremonial attire

(Wong, 2016). Products demand also fluctuates; prior to 2012 pelts were the primary item in demand for the illegal domestic trade, whereas bones are now the most coveted item (Risdianto et al., 2016). Environmental factors (e.g., differences in terrain and accessibility), as well as variations in subspecies characteristics (e.g., behavior and population abundance) influences poaching pressure and the methods employed by poachers vary between subspecies and range countries. For example, in Sumatra, previous work has demonstrated that the most common poaching method is wire snares (Linkie et al., 2015; Risdianto et al., 2016); in Bangladesh there is a range of methods including poison, trapping, clubbing and sometimes shooting (Saif et al., 2018); in Thailand poachers have been known to poison carcasses of wild prey to lure and subsequently kill tigers (Duangchantrasiri et al., 2016.) These examples highlight the context-specificity of wildlife crime even within a single species. Considering the ability of crime scripts to capture the nuances and intricate details of the entire crime commission process, the method lends itself naturally to understanding possible intervention points in the poaching of Amur tigers in the RFE.

The conservation of tigers in the RFE in inextricably linked to the region's geo-political situation. The region, characterized by abundant, valuable natural resources, is also one of the most remote, impoverished, and corrupt regions in Russia (Wyatt, 2014). The dissolution of the Soviet Union in the early 90s led to the collapse of the central government structure and existing regulatory systems, consequently, there was a weakening of law-enforcement systems and the emergence of criminal groups (Van Uhm & Moreto, 2018). In their book on environmental crime in Russia, Stoecker and Shakirova (2014) discuss how corruption is so endemic in Russian society that an inherent system of commonplace norms and values allowing for the inclusion of corrupt practices has permeated everyday life. These principles, legitimizing and fostering corruption, have become embedded so deeply that they are often inseparable from daily socioeconomic relations and are accepted by the citizenry on the same level as formalized laws (Ledeneva, 2013). Understanding the context of my study region prior to entry was crucial. Wildlife crime is facilitated by corruption, weak governance, and lack of enforcement (Wellsmith, 2011; Wyatt 2013; Wyatt et al., 2018; Van Uhm, 2016). In the RFE, the criminalization of many aspects of society in the post-Soviet era has engendered systemic corruption and organized crime, both of which have been shown to be associated with wildlife and environmental crimes in that region. Similar to the work of Wyatt (2009, 2011, 2014), Van Uhm and Siegel (2016) and Van Uhm and Moreto (2018) I found high levels of corruption among police and government officials within the wildlife trafficking networks in Russia.

Methodology

I collected primary data from the first-hand accounts of individuals who are directly involved in the illegal tiger trade (e.g. poachers, middlemen, buyers and smugglers). Empirical data was gathered during 5 months in the field spanning two separate trips to the Primorye region of the RFE: January–February 2019 and January-March 2020 (Fig. 1).

Criminological ethnography

I drew closely from the work of Van Uhm (2016), Moreto (2016), and Moreto and Lemieux (2015) to develop my methodology, as these studies used ethnography to explore the nuances of wildlife crime issues. Within the field of criminology, ethnography has a long tradition dating back to Thrasher's *The Gang* (1927) and Polsky's *Hustlers, Beats, and Others* (1967), however only recently has it become a more established and accepted methodology in criminological inquiry (Treadwell, 2019). Today, within the methodological literature, ethnography is defined using a variety of typologies. It is a flexible and adaptive research methodology that escapes categorization; identifying a canon can be an elusive and ambiguous task (Hammersley, 2018). I situate my research methodology within the context of criminological ethnography. As a discipline, Treadwell (2019) emphasizes that criminological ethnography should be premised on its capacity to not just study people but to also study their social-cultural contexts and the associated meanings embedded within these systems; it is not possible to dislocate the cultural structures that the individual resides within. Adding to this, Miller and Miller (2015) suggest that criminological ethnography is rooted firmly in naturalistic inquiry and that ethnographic concepts like nonjudgement positionality, contextualization of study setting, and recognition of social network and structure help a researcher with this task.

My study was not classic ethnography in terms of its length of time or full immersion, as my total time in the field for this study was five months broken between two visits. However, I did not enter the region for data collection without prior knowledge of the culture. Before beginning my research I had been to Primorye multiple times to participate in activities like The Amur Tiger Symposium in Khabarovsk in 2018 and in tiger monitoring research in Durmin in Khabarovsk Krai. Importantly, my study was centered around dedication to an ethnographic approach and methods. I believe that what is important about ethnography is dedication to capture a culture through the organic collection of data, to provide

Fig. 1 Primoyre region in the Russian Far East. Main locations of recruiting participants (blue), regional hub Ussuriysk (green) and the five points of entry for smuggling over the Chinese border (red)

a deep analysis of a social world from the members' perspectives and to maintain the integrity of the phenomenon in question. The shorter time frame can be justified in part by the length of time poachers are accessible in the taiga during the Russian winter, as well as the nature of my research—I had prior knowledge that Russian authorities did not want this research project moving forward, which became a reality when I was pursued by the FSB (Russian Secret Service). Although I was deported from Russia before my planned study length was completed, after completing 116 interviews in addition to participant observation, I feel confident I reached data saturation for this topic and I had not planned to stay longer than one extra month.

Preparation and pilot project
Due to the nature of my research, interviewing human subjects who are in some cases active criminals, I

undertook an extensive Institutional Review Board (IRB) application process (University of California Santa Cruz IRB # HS3434). Within this application, I had to explain how I would present myself to participants (overtly as a student researcher), obtain verbal informed consent, and the how I would guarantee the anonymity of willing participants (no identifying names/features would be taken, and no recording devices would be used). Based on the complexity of my study, and logistically due to the remote area and the illegal and political nature of my topic, two separate research trips were planned. To the best of my knowledge, my study would be the first detailed examination of Amur tiger poaching, so my first priority was to establish that I could, in fact, locate and speak with those engaged in this activity. I therefore went to the RFE on a shorter (and successful) pilot project before I invested considerable time and resources into my full-length research project.

During my pilot project I needed to understand and mitigate risks as much as possible. I learned from my confidential gatekeeper in Russia that having my information confiscated and being deported would be my biggest risk, due to the political nature of my topic and the government's desire to keep tiger poaching information confidential. This source informed me that acquiring a scientific exchange visa, rather than a tourist visa, would be vital. Visitors claiming to be foreign scientists can be met with skepticism bordering on paranoia; therefore, such a visa would establish my legitimacy to conduct research in Russia. I would be uncovering information I suspected would implicate the government, so I needed every type of leverage available. As I was eventually deported from Russia, this visa became critical.

I needed to establish what characteristics (personality, age, sex) of interpreter would work best for my study. I worked with three interpreters during my pilot project and decided it would be best to work with a young woman, like myself. To generalize, women are considered non-threatening and submissive in Russia. As a woman from the West, I would generally be offended by such positionality, however, in this setting, it was crucial. By appearing non-threatening to participants, my interpreter and I would have a greater chance of acquiring the information I needed. Finding the right interpreter was not an exercise I took lightly, and I spent months finding someone I knew would not only interpret but understand the importance of the work. For this type of subject, an interpreter and researcher must have a connection and comradery; my interpreter and I developed a strong bond—we had our own sense of rapport and trust—that was not only crucial for acquiring information, but also important for our safety.

Participant recruitment
Due to the covert and often unreported nature of criminal networks, finding those engaged in illegal activity can be a difficult task. The people involved are hidden populations outside the scope of conventional society, and they often purposely conceal their activities due to their illegality (Van Uhm, 2016). The RFE is remote, has one of the lowest population densities in the world, there is generally no cell coverage, the climate is extreme (often -30 C in winter), and moving from village to village requires a 4 × 4 truck. Multiple trips to Russia before the start of my research and information acquired from my confidential gatekeeper helped me develop my strategy for recruiting participants.

While all hunters are not poachers, all poachers are hunters, therefore my initial task was to locate hunters. Legal hunting occurs during the winter months, a time when hunters can be found concentrated on hunting leases, therefore the winter months were chosen as the timeframe for my research. The Primorye region is divided into about 100 large hunting leases (Fig. 2).

Every hunter has a membership on one these large swaths of land, which are each autonomously run by a manager. These hunting lease managers were my main resource to initially secure introductions with hunters. Through my confidential gatekeeper, I was able to make initial contact with a few managers of hunting leases who subsequently asked hunters if they would be willing to speak to me. These initial introductions led to a snowball sampling method (Goodman, 1961), where future participants were recruited among acquaintances of initial participants. By working through networks using the snowball sampling method, locating, and building trust and rapport with these hidden populations was possible (see Skidmore 2021a for additional description of methods). I followed this method for every new location I went, often getting references or introductions from participants to others in their network.

Interviewing and participant observation
I blended the methods of participant observations and semi-structured interviews, with a focus on the comfort and security of the participant, due to the sensitive and clandestine nature of the topic. Extensive effort and time went into building trust with participants, which included participating in sociocultural norms and activities (e.g., meal sharing, going to the *banya*,[1] going into the taiga[2] on snowmobiles/skis and drinking vodka). Participation in such activities and forming

---

[1] In Russian culture, the *banya* or sauna, is a vital part of life.

[2] The colloquial name for the boreal forest in the Russia Far East.

Fig. 2 Primorye region broken into about 100 separate hunting leases

social relationships with participants was essential to gain trust. In total, I spoke to 116 participants; these talks ranged from quick semi-structured interviews that lasted 30–45 min, to multiple day interactions that incorporated several informal interview sessions and hours of participant observations. Conversations varied from one-on-one talks to group-setting interviews, including conversations over a meal, excursions on snowmobiles into the taiga, and spending the night in a participant's residence. Interviews concentrated

on flushing out the intricate details of poacher *modus operandi*, focusing on opportunity structures that facilitate this specific crime.

At the beginning of my field work I made every attempt to get one-on-one interviews with participants. However, I quickly learned that many participants felt more comfortable speaking in a group setting, typically with their hunting partners and usually felt more

comfortable in their home. If I was introduced to a participant in a more formal setting, (i.e., an office), I actively sought invitation to a hunting base[3] or to the home of the participant for a meal or *banya.* These are social activities, where people are drinking, become more relaxed and gossip is shared. These types of participant observations can often turn into informal, spontaneous chats and during these informal settings I could note important details that I would not necessarily have access to during a formal interview. The prosaic day to day activities of my participants often led to unexpected conversations. Capitalizing on these chance encounters, chance opportunities, became an unanticipated well of opportunity for knowledge.

There is ongoing debate as to what constitutes participant observation (Adler & Adler, 1987); here, I define it similar to Van Uhm (2016), in that I participated in the everyday lives of poachers, seeking to disrupt their routines as little as possible, but did not actively participate in poaching.[4] I did, however, see the aftermath of poaching. For example, I was shown processed tiger products multiple times and taken into the forest to see a tiger carcass. DeWalt and DeWalt (2011) refer to this type of participant observation as direct, naturalistic observation and it facilitates a more in-depth understanding of the general context of the everyday lives of participants, as well as their *modus operandi*, that cannot be gleaned from interviews alone.

Hunting is an essential part of the culture—the lives of locals in the RFE are structured around it. During hunting season, friends come together, are gregarious and love to drink and gossip. I obtained much more information in informal group settings and adapted my approach to fit this reality. I would speak to 4 or 5 hunters at once, assess who knew what, develop camaraderie and then seek one-on-one conversations with those I felt could especially aid my research. I knew my prior professional background as a ranger would be helpful, and the ease at which I adjusted to the life in the RFE made it possible for me to acquire sensitive information. Participant observation in organic settings engender trust and comfortability. Because of this I was able to establish insider status, gain better access to participants and their activities, and obtain a more nuanced understanding of the phenomena I was investigating. Gaining access, establishing trust and

legitimacy was never a static development, but an ongoing and negotiated process within the study population (Berg, 2004).

I learned that if I want to know about tiger poaching, I do not begin by asking about tiger poaching. I would prompt the participant and at times steer the conversation, but I learned the most from when I let the participant talk. I would begin questioning in a passive and indirect way by asking about how and when participants learned how to hunt, what they like about being in the taiga, and personal questions about friends and family. These types of questions are critical to building trust, understanding important contextual details, and letting themes emerge naturally. I would eventually begin questioning in a spectrum of increasing difficulty, beginning with questions about poaching legal game (i.e., many hunters kill game that is technically legal to hunt but they do not have a license for it), transitioning to questions about poaching wildlife that is frowned upon but not as politically sensitive as tigers (i.e., bear, musk deer), before finally (sometimes hour or even days later) asking about tiger poaching. Similar to Van Uhm's (2016) research, my participants would often begin to tell me about a 'friend' who was involved in tiger poaching, later admitting that they themselves were also involved.

Analytic strategy

During the interviews I took extensive notes for each question, directing my interpreter to clarify specific details, expand a response, or pause for me to catch up with my notetaking when needed. Most of my notes included just the relevant details, however, verbatim quotes were also frequently recorded. During the interviews I also observed and recorded participants behavior and demeanor. These notes, both observational and interview, were reviewed, and discussions took place with my interpreter for clarity and accuracy as soon as possible following each interview. As a precaution, all data, including interviews, field notes and pictures, were transcribed, saved to the cloud and then deleted from the computer's hard drive every night. Of the 116 participants interviewed, 43 (37%) admitted to being directly involved in the poaching and/or trafficking of tigers. This can be further broken down to local buyers (n = 12) and poachers (n = 31). Of the 73 participants who did not admit to involvement, many still provided useful information and, in many cases, personally knew individuals who were involved in poaching. The information from these individuals was used to triangulate data and build the script when relevant. Data were analyzed using Nvivo and interview transcripts were coded so that different themes and acts within the poaching stage were separated and analyzed individually to find commonalities

---

[3] Hunting bases are usually located in remote areas, on hunting leases. They are permanent communal living cabins that groups of hunters will use as a base to hunt. They are used for a large portion of the winter months by the men who belong to a hunting lease.

[4] Regardless of the ethical limits imposed by the IRB, the limits of ethnography can be morally subjective, and in this case, I would have never considered poaching a tiger. Protecting tigers was the fundamental impetus of my work.

Table 1 Breakdown of coding themes by frequency

Referenced item/theme	Coding frequency (#) out of 116 interviews	Example of participant's statements
Equipment		
Heat-vision goggles	16	"Access to roads is how people kill tigers. They drive around at night until they see a tiger."
Spotlights	14	"We spotlight tigers from the road and night and shoot from the truck"
Camera trap	2	"Camera traps are used to learn the movements of the tigers."
GPS	5	"A local buyer will pay us for the GPS coordinates of tiger tracks if we come across them when hunting in the taiga."
Poaching process		
Use of roads	34	"Logging roads make the taiga more accessible, hunting is much easier."
Mention of winter	7	"Most tigers are killed in the winter. Poaching is easier then."
Motivation for poaching total: Broken down into:	31	
Elite "thrill" killing	5	"I have poached about ten tigers in my hunting career. I have two sons in the FSB. So, who will stop me?"
Poverty	19	"Unemployment drives poaching—there are no jobs here. You can get 350,000 rubles (~ $4800) for a tiger. Such money will sustain you for a long time."
Human/tiger conflict	7	"I sold the bones of one tiger after I killed it for attacking my dog. I got $4000 for it."
Theme		
Corruption, in general	27	"Yes, the government and police know about the tiger poaching—of course. The people up top are getting money from this. If I weren't talking to people in the government, I wouldn't be able to be a buyer."
Specific mention of FSB	21	
Specific mention of police	20	
Specific mention of government	14	
Chinese involvement in trade	33	"The Chinese have hidden compartments in their vehicles to smuggle goods over the border."
2013 change in law	6	"The changing of the laws (in 2013) has affected buyers more, there are fewer now. Maybe about half as many."
Rifle used to kill tiger	14	"No one uses snares. It is opportunistic killing from the road with a rifle."
Necessity of hunting license to carry a rifle	8	"Poachers will get a license to hunt any type of legal game because you have to have a hunting license to legally carry a firearm."
Importance of connections/trust within network	11	"People who know people kill tigers. Everything depends on a person's connections."
Transporting tiger products	19	"There was an instance where a tiger was killed and the carcass was found in a logging truck, buried under the logs."
Reference to supply chain stages:	24	"There are 3–4 Chinese buyers in Ussuryisk. They will hire smugglers to cross the border. Russians never cross the border, only Chinese do."
Poacher to local buyer	19	
Local buyer to regional buyer	21	
Ussuriysk	17	
Regional buyer to Chinese border		
Reference to tiger products:	16	"Bones are in demand. Things like leg joints, knee caps, canines, tail joints, head parts, claws. No ribs. No skins either—those are burned in the forest. If they (poachers) had a way to sell it, they would. But there is no demand now."
Skins (not in demand)	26	
Bones	17	
Canines	14	
Claws	3	
Whiskers	14	
Entire carcass		
Musk deer poaching[a]	15	"Musk deer are absolutely poached, it's a money game. One set of glands is worth 30,000 rubles (~ $400). Most regions you can't even get a license for musk deer, so hunters just shoot whenever they see one."

[a] I mention musk deer poaching for two reasons: it came up frequently in my interviews, as these deer are poached relentlessly for their tusks, and tiger products and musk deer products are often intermingled in the trafficking process. Linkages between the two trade warrants further investigation.

across participants. Table 1 gives a breakdown of coding themes based on respondent interviews. This information is presented to see where the data to build the script was derived from, as well as the frequency of specific codes. Coding was used to elucidate the four stages common in crime scripts: preparation, pre-activity, activity, and post activity (Tompson & Chainey, 2011). Triangulation of field notes and participant observations also contributed to stage descriptions.

Results—crime process and script

Opportunity plays the largest role in whether an individual actually *engages* in poaching. Amur tigers have a secretive, largely solitary lifestyle, occurring in low densities in regions of limited accessibility (Miquelle et al., 2007). Specific skills/knowledge or equipment, but above all, luck plays a deciding role in ability to poach. Tigers are shot opportunistically, either by those without initial intent, or by those that plan to poach. For those without initial intent, tigers are most often shot when they come into villages. In these cases, they are more frequently shot out of defense of human life, or livestock/domestic animal life. The value of tigers is common knowledge however, so even in 'self-defense' human/tiger conflict cases the tigers are almost always sold into the illegal trade after they are killed (Skidmore 2021b).

Traditional hunting of tigers rarely occurs—poachers seldom kill a tiger by finding tracks, following it, and shooting it. One poacher explained to me, "No one walks into the taiga anymore to hunt tigers." Hunters will opportunistically shoot a tiger if they encounter one in the forest during the hunting season, but for the most part, poaching is intentional and premeditated. Tigers are almost always shot from the road at night in the winter by hunters who are using heat vision goggles or a spotlight. In rare cases, hunters wait in a hidden location that has been pre-established based on camera trap photos or local knowledge of tiger movements (usually by a game trail or water source). Almost all hunters admitted that even if they had not poached a tiger, they would, if the opportunity presented itself. Simply put, as one buyer told me, "Whatever the amount of opportunities there was, that is the amount of tigers killed."

This crime script that follows is for those hunters with *intent* to poach. Respondent quotes have been used to provide additional explanatory details per stage. Locations visited during the study can be seen in Fig. 1. Table 2 summarizes the four stages of tiger poaching—preparation, pre-activity, activity, and post activity—and breaks each stage into steps. Each is described in additional detail below. Table 2 also summarizes information about who is involved in each step, as well as spatial and

temporal details. In the far column possible interventions per stage are described, which are further unpacked in Table 3.

Preparation

There are a variety of resources, equipment, and tools needed in preparation to poach a tiger which are summarized in the first column of Table 2. Connections are an essential resource within the illegal tiger trade and the first consideration for those with intent to poach. The relationship between poachers and buyers has been influenced by the introduction of stricter regulations following the Russian Government's adoption of the Strategy for Tiger Conservation in 2010, and their subsequent commitments to double the number of wild tigers by 2022 (Wikramanayake et al., 2011). Starting in 2013, new regulations on poaching, under article 258 of the criminal code, criminalized the possession of tiger parts, whereas before a suspect had to be caught in the act of poaching to be charged (State Duma, 1996/2013). However, interviews from this research project suggest that rather than decreasing the number of poached tigers, the change in law has transitioned the trade's operation structure—moving it underground, tightening up connections between those involved, and become more streamlined and efficient. Consequently, stronger links between actors were formed and the trade has become a more organized network. The number of local buyers was reduced substantially, and the network of poachers and buyers became more reliant on familiarity and trust. Evidence suggests that the change in regulations did nothing to deter tiger poaching, but simply reduced the number of actors, with fewer actors accounting for more of the trade, and moved the practice further out of sight. My findings suggest that since 2013 the change in regulations have transformed the once rather open network into an oligopoly structure. Similar to van Uhm and Wong's (2019) study in China, trust and close-knit ties are important within the context of this illegal trade.

A potential poacher must first know how to offload the tiger as quickly as possible after it is shot. A local buyer who had been in the illegal wildlife business since the early 90 s explained to me, "People who know people kill tigers. Everything depends on a person's connections." Having an 'in' (i.e., a trusted relationship that will allow transactions of illegal wildlife) with a local buyer factors heavily into an individual hunter's ability to sell a tiger after it has been shot.

The buyers within a town are usually well known, and deal in both legal and illegal products, however as the tiger trade is so clandestine, not all buyers will accept tiger products and those that do generally only do so from hunters they know. Participants explained to me,

Table 2 Crime script for poaching and trafficking Amur tigers, with possible intervention techniques

Stage	Steps	Spatial	Temporal	People	Intervention
Preparation	Hunter decides to poach a tiger and has connection with a local buyer in advance (usually poachers also sell legal game to their established buyer) OR local buyer receives order from further down supply chain (Chinese buyer/regional buyer) and actively recruits a poacher. Obtain heat vision goggles or a spotlight if cannot afford goggles. Recruit co-offenders. Gain access to vehicle (4 × 4 and preferably 2 vehicles). Buy license to hunt (for any legal species) so a firearm can be legally purchased and possessed. Buy camera traps (if not using a vehicle). Learn movements of tigers after compiling photos (Sometimes this information is sold directly to buyer who will pay for coordinates)	License purchased in hunting lease (poacher can be a 'member' of a specific hunting lease or can pay more to hunt as a non-member. Rural villages. Goggles purchased from China. Cameras traps purchased from China or the US	Anytime	Hunting lease manager. Poacher(s). Local buyer	Make hunting licenses more difficult to acquire. Better accounting for game licenses sold and what is subsequently killed. Stricter controls on firearms including more randomized weapon checks by ranger patrols. Stricter border control and monitoring on the importation of heat vision goggles from China. Mitigate human–wildlife conflict in rural villages. Link tigers to culture pride/heritage. Encourage anonymous reporting of poaching pre-activities. Generate social pressure against poaching through outreach programs. Pay communities for camera trap evidence of tiger presence
Pre-activity	Driving on roads, both main roads and secondary roads. Spotlighting or using heat vision goggles. Lie in wait in a hide up to a few days in a pre-established location	Outside of protected areas, usually hunting leases. PAs (more rare). Roads, including primary roads and secondary roads, usually logging roads	Usually in winter. Night	Poacher(s)- usually groups of poachers in two separate cars	Encourage forest regeneration programs to reduce presence of logging roads. Prohibit construction of new roads as much as possible. Set up camera traps at entrance of secondary logging roads. Increase ranger patrols to two officers to discourage intimidation. Increase ranger patrols at night. Increase ranger patrols outside of protected areas
Activity	Shoot tiger from car on road. If necessary, follow tiger into forest, shoot again. Or shoot tiger from hidden location	Outside of protected areas, usually hunting leases. PAs (more rare). Roads, including primary roads and secondary roads, usually logging roads	As quick as possible. Night. Usually in the winter	Poacher(s)	Increase ranger patrols at night. Increase ranger patrols outside of protected areas. Incentivize citizens to report suspicious behavior or vehicles parked on the side of the road at night. Pay hunters a winter stipend to reduce need for poaching revenues

Table 2 (continued)

Stage	Steps	Spatial	Temporal	People	Intervention
Post-activity	Call local buyer to give GPS coordinates for buyer pick up in forest	Location of kill	Products usually stockpiled by local buyer and a specific day of transport is arranged with regional buyer in Ussuriysk	Poacher	Increase wages of wildlife rangers to deter bribery
	OR transfer entire carcass to car	Local village		Local buyer	Rotate personnel to limit impact of corruption
	OR process carcass on site, take desired parts, burn skin	Roads	Transfer can be any time of year, but more frequently in the winter	Regional buyer	Increase effort to arrest and convict poachers
	Leave scene	Ussuriysk (or Arsenyev/Blagoveshchensk)		Smuggler	System of anonymous tipping to turn poachers in (possibly with reward incentive)
	Deliver processed parts or entire carcass to local buyer if delivery has been pre-determined	Blagoveshchensk/Heine, Kraskino, Poltavka, Pogranichny/Suifenne, Turiy Rog		Custom agents	Increase patrol efforts and roadblocks on main roads to Ussuriysk
	OR drive carcass to Ussuriysk if poacher wants to take the risk for more money and has a connection with a regional buyer				Increase wages of custom officials at Chinese border as an incentive to not accept bribes
	Local buyer drives products to regional hub and sells to regional buyer				Increase roadblocks/ vehicle checks at night
	Regional buyer organizes and bribes appropriate people to smuggle goods over Chinese border				Encourage detecting suspicious foot paths in remote forest areas
	Smuggler crosses border on a pre-determined date				

Table 3 Examples of situational crime prevention intervention strategies to tiger poaching and trafficking

Increase effort	Increase risk	Reduce rewards	Reduce provocations	Remove excuses
Target harden N/A	**Extend guardianship** Increase ranger patrols outside of protected areas (possibly using community groups) Set up cameras at entrance of secondary logging roads	**Conceal targets** N/A	**Reduce frustrations/stress** Develop alternative legal and sustainable wildlife/ natural resource economies Pay hunters a winter stipend to reduce need for poaching revenues Pay communities for proof of tiger presence (camera traps with date stamp) Pay communities to assist with reforest old logging roads	**Set rules** N/A
Control access to facilities Encourage forest regeneration programs to reduce presence of logging roads Prohibit construction of new roads as much as possible Restrict access to secondary/logging roads Close forest roads at night Increase PA coverage	**Assist natural surveillance** Incentivize citizens to report suspicious behavior or vehicles parked on the side of the road at night System of anonymous tipping to turn poachers in (with reward incentive)	**Remove targets** N/A	**Avoid disputes** Mitigate human-wildlife conflict in rural villages, including compensation programs for tigers killing livestock/domestic animals Standardize livestock reporting losses to ensure livestock reimbursement programs	**Post instructions** Signs in hunting leases saying it is against the law to hunt what you do not possess a permit for
Screen exists Increase roadblocks and vehicle checks at night, especially at the confluence of main roads and secondary/logging roads	**Reduce anonymity** Publicize arrest and conviction of poachers Automated (or manual) number plate readers at key access points	**Identify property** Use camera trapping to keep records of individual tigers to compare against seizures (although they don't use the skins) Better accounting of tiger carcasses that are killed in human/wildlife disputes	**Reduce temptation/arousal** Develop community programs to build dog kennels to reduce dog mortality by tiger Corrals/fences to prevent livestock depredation, especially in winter (reduce free ranging livestock)	**Alert conscience** Signs in villages describing fine/jail time associated with tiger poaching
Deflect offenders Increase wages of wildlife rangers to deter bribery Increase wages of custom officials at Chinese border as to deter bribery Rotate personnel to limit impact of corruption	**Use place managers** Pressure hunting lease managers to better monitor and track sell of hunting permits	**Disrupt markets** Demand reduction campaign in China Increase enforcement efforts at Russian/Chinese border	**Neutralize peer pressure** Generate social pressure against poaching through outreach programs Increase effort to stigmatize tiger poaching Link tigers to culture pride/heritage Anti-corruption units to minimize corruption in police culture	**Assist compliance** N/A

Table 3 (continued)

Increase effort	Increase risk	Reduce rewards	Reduce provocations	Remove excuses
Control tools/weapons	**Strengthen formal surveillance**	**Deny benefits**	**Discourage imitation**	**Control drugs/alcohol**
Make hunting licenses more difficult to acquire	Increase ranger patrols to two officers to discourage intimidation	Maximize efforts to enforce fines and prosecution of poachers	Increase conviction rate of arrested poachers	N/A
Better accounting for hunting licenses sold and what is subsequently killed	Encourage detecting suspicious foot paths in remote forest areas		Increase fines	
Stricter controls on firearms including more randomized weapon and license checks	Increase patrol efforts and roadblocks on main roads to Ussuriysk			
Stricter border control and monitoring on the importation of heat vision goggles from China	Increase ranger patrols at night and in winter			
	Increase police presence and raids in Ussuriysk			

"Everyone who hunts tigers sells their kill to the same man."; "The tiger poachers, it's the same ones who know each other. They have good relations with the buyer." Often tiger poachers are repeat offenders and have a firmly established relationship with a buyer. In most cases these offenders will take advantage of killing a tiger if the opportunity presents itself. However, local buyers will also get direct orders from regional buyers and in those cases, local buyers will put out requests to specific hunters for a tiger. New hunters will sometimes be allowed into this system, but it is only after a buyer has bought legal products from them, developed trust, and then will start accepting illegal goods.

Many of the steps leading up to a poaching incident are legal and can take place any time of year. This includes the acquisition of specific tools and equipment. With few to no exceptions, all poachers are already hunters and therefore have a firearm in possession. However, to legally carry a firearm on your person, a poacher needs a hunting license—this license can be purchased from a hunting lease for any type of legally hunted game. I was told by a hunting lease manager, "They need a hunting license to carry a gun, so poachers will buy any hunting license just to legally carry a firearm." Hunters usually have membership to one specific hunting lease; therefore, they would purchase a hunting license directly from the manager of that lease.

Besides a firearm, other equipment must be acquired. Depending on the amount of money available to poachers, different equipment will be purchased. If a poacher has enough money, or can recruit co-offenders to share costs, heat vision goggles are the best choice. The goggles can be a prohibitive cost however, at about 300,000 rubles (~\$4000), which are imported from China. For those that cannot afford heat vision googles, spotlights are purchased. Access to a 4×4 truck is a necessity due to the extreme winter driving conditions. Heat vision goggles were referenced 16 times during respondent interviews, followed closely by spotlights at 14, highlighting the importance of these specific types of equipment (Table 1). If possible, poachers form groups (recruit co-offenders) and go in two separate 4×4 vehicles. This is done to intimidate rangers, who usually work alone, if they are pulled over. Global Positioning System (GPS) units are also used frequently. For hunters who do not want to actively poach, a buyer will pay for the GPS coordinates of fresh tiger tracks. In rarer cases, camera traps are purchased to establish probable tiger locations.

Pre-activity
There is a very distinct temporal aspect in tiger poaching—nighttime in the winter is when most of the poaching incidents occur. Tigers are easier to spot and follow during the winter months, also hunters are staying in huts or base camps on hunting leases during this time (as it is the season for legal game hunting), so opportunity to encounter a tiger is increased due to proximity to tiger habitat. These temporal findings concur with Miquelle el at. (2005) and Goodrich et al. (2011) about Amur tigers. My findings suggest this is also a risk mitigation strategy—if hunters are stopped in the taiga this time of year, they have a legitimate reason for being there (hunting legal game with their license and legal firearm). Also, due to the frigid temperatures that rarely get above zero for months, the carcass will keep for longer, if necessary. Due to the equipment used (heat vision goggles and spotlights) and need for secrecy, poaching is done almost exclusively at night. A park ranger told me, "All the hunters drive on the roads looking for tigers and every other hunter has heat vision goggles. Even if they wanted to, rangers can't do anything about the goggles because they are legal." If heat vision goggles are too expensive poachers will use large spotlights, but the method of driving around on roads at night is the same, regardless if goggles or a spotlight is used.

There is a clear spatial aspect as well—a constantly growing road network dramatically increases the opportunity and ease of poaching. One respondent told me, "Logging roads make the taiga more accessible, hunting is much easier." Another said, "Access to roads is how people kill tigers. They drive around at night until they see a tiger." There has been a substantial increase in road density in the region, usually cut for logging. 50–80% of the logging in this region is illegal (Environmental Investigation Agency, 2013), and without a coherent natural resource agency, many of these roads are not permitted (Mol, 2009). The largest increase in road density in the RFE in the past 35 years has been within the secondary, remote forest road type (Bergen et al., 2020). Poachers use the road network, predominantly outside of PAs, to find tigers and shoot them from the car. The use of roads as a method of poaching was referenced 34 times during interviews, suggesting a vital role in the *modus operandi* of poachers (Table 1). I used OpenStreetMaps and GIS software to determine that 52% of the Primorye region is accessible to hunters/poachers from the road network (Fig. 3).

The other method to poach tigers is using camera traps to establish sites that are well-traveled by tigers, including secondary roads, game trails and especially water sources (unfrozen water is difficult to find in the winter). After establishing a location that a tiger uses frequently, the poacher will hide and wait, sometimes for days, for the tiger to pass. Since tigers frequently do use the same trails, their movements can become predictable and local

(See figure on next page.)

Fig. 3 Accessibility to taiga from road network. To determine the level of accessibility created by roads OpenStreetMaps (OSM) was used to manually locate and digitize roads that are visible on satellite images. Changes were saved under the highway = track tag, which is defined by the OSM guide to be used for roads that are used for natural resource extraction. After the digitization of all the logging roads in Primorye, GIS software was used to calculate the total length of logging roads. From the data compiled from digitizing, logging roads span about 16,000 km² in Primorye. Using the method described in Slaught et al. (2016), an addition of a 5 km buffer zone was added to all of the logging roads, which provides an accessibility level that hunters may have into the taiga (assuming a hunter can walk 10 km in one day). Upon the addition of 5 km buffers, the total accessible area increases to about 83,539 km². By dividing this value by the total area of Primorye, it can be deduced that roughly 52% of the taiga in Primorye is easily accessible to hunters/poachers

buyers will even pay hunters to give coordinates of these trails.

Activity

After finding a tiger while driving, the tiger is shot from the road. The first wound is usually not fatal, so the tiger will be tracked into taiga and shot again. Or the tiger is shot after the poacher has been lying in wait from a hidden location.

Post-activity

Figure 4 gives a graphic representation of the poaching and trafficking process. After a tiger is shot either from the road or from a location in the forest, what happens next depends on the relationship a hunter has with a buyer and the buyer's preferences based on demand and the proximity of the carcass to the regional trading hub. The first scenario is a poacher will drive the carcass to the regional hub of Ussuriysk if they have a direct connection with a regional buyer, bypassing the local buyer and receiving up to three times the amount for the tiger. A buyer told me, "Choice is (for poachers) to offload poached tigers quickly in local village or drive to Ussuriysk for a higher price." However, this increases risk for poacher. This scenario is less common but does happen, especially if the kill location is close to Ussuriysk. It happens more frequently in the winter, as the carcass will not spoil. The second scenario is that if the carcass is far enough off the road a poacher can leave the scene and give the exact coordinates via GPS to a buyer for them to come process themselves. The third option is that a poacher will remove the entire carcass out of the forest and take it to the local buyer at a pre-established location. However, the most common scenario is a poacher will process the carcass in the forest and take specific parts that are valuable to the buyer. This processes almost always involves burning the skin, which is not in demand anymore and is too easily recognizable. I was told, "Pelts are not needed right now; hunters simply burn them. Pelts were popular before, now they are not. Now the joints are the most valuable"—this sentiment was universal. There is variation to what parts a buyer will take; canines and claws are always in demand, and some buyers only want these because they are small, worth the most money and easy to conceal. Many specific bones are wanted from the carcass (kneecaps, leg joints, tail joints, neck joints and skull), as well as whiskers and the penis. Valuable parts are stripped from carcass and the rest is left or burned.

Almost all tigers, either in whole or already processed, go to Ussuriysk (Fig. 1, Fig. 4), where the regional buyers are located, before they are taken over the Chinese border (Fig. 1, Fig. 4). Ussuriysk was reference directly by 21 different participants (Table 1), indicating the importance of the city as a well know regional trading hub. Arsenyev and Blagoveshchensk are smaller hubs and are also used, but much less frequently. Local buyers will stockpile tiger products (as well as other illegal goods) and then drive the products themselves or recruit a smuggler to drive to a hub once or twice a year. A specific transfer date is established once they have a regional buyer lined up and, if necessary, a 'paid corridor'—where they have bribed the necessary people along their route in advance. One buyer described a scenario for getting tiger parts from a remote region to Ussuriysk. "Now the joints are the most valuable, and they can easily be grinded down into one bag full. You can fit it in a lady's handbag. Sit on a bus with a lady's handbag and you can smuggle 3–5 tigers." Because the smuggling has inherent risk, local buyers will only transport products when they have enough inventory and a buyer lined up. The relationship between a local buyer and a regional buyer will influence if the products are processed or not. The role of trust within criminal networks has been demonstrated to play a large role. If there is trust, usually established over a long-term relationship, the local buyer can crush bones in advance of transport; if not, then the bones must remain whole, as proof of product authenticity.

Regional buyers are Russian and Chinese. If a local buyer sells to a Russian in Ussuriysk products are always then sold to a Chinese buyer before crossing the border. If a local buyer sells directly to the Chinese, then the subsequent step is not necessary. The exchange of products in Ussuriysk further highlights the fact that despite the different ethnicities between Russians and Chinese, strong mechanisms of trust must be in place to foster
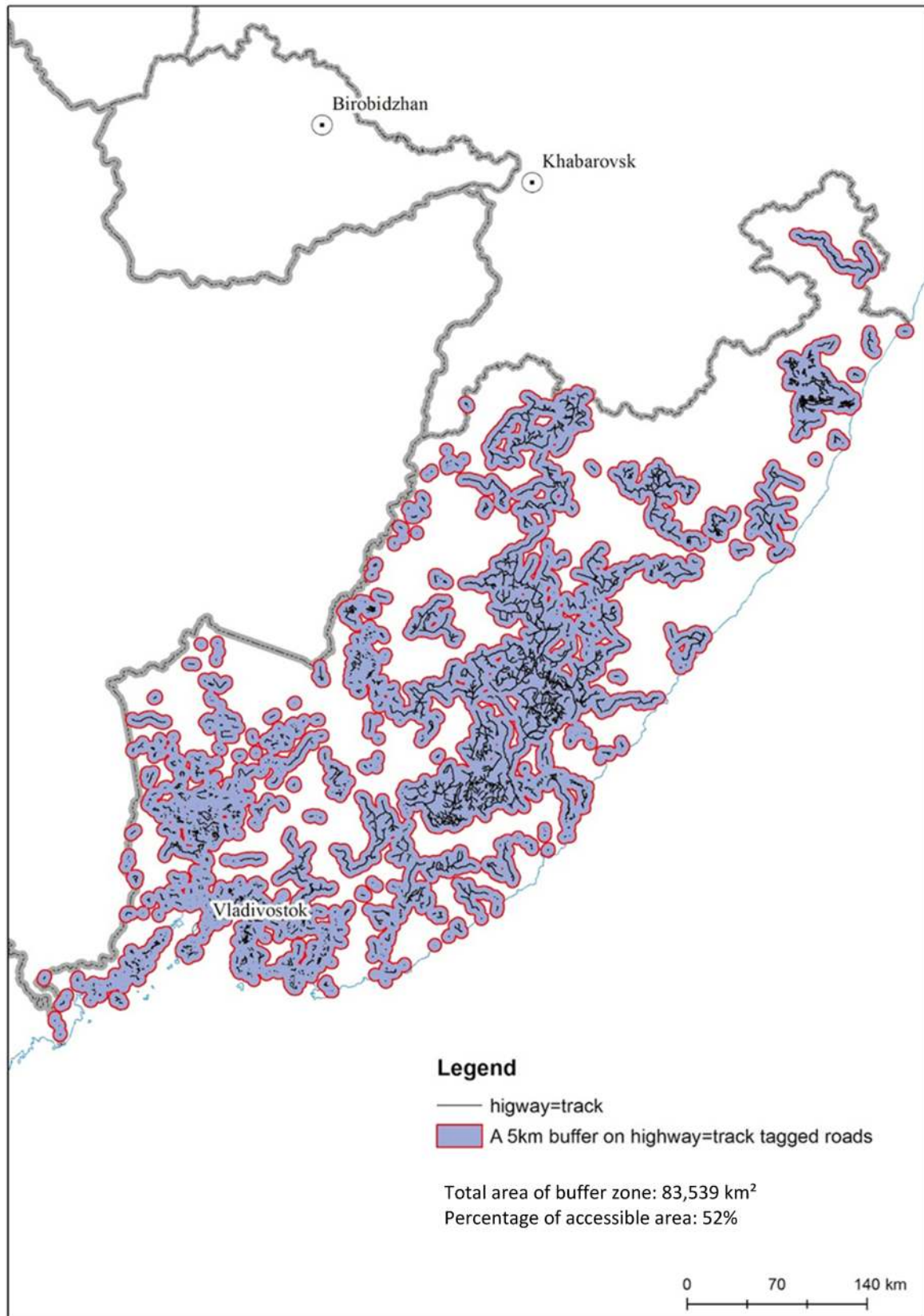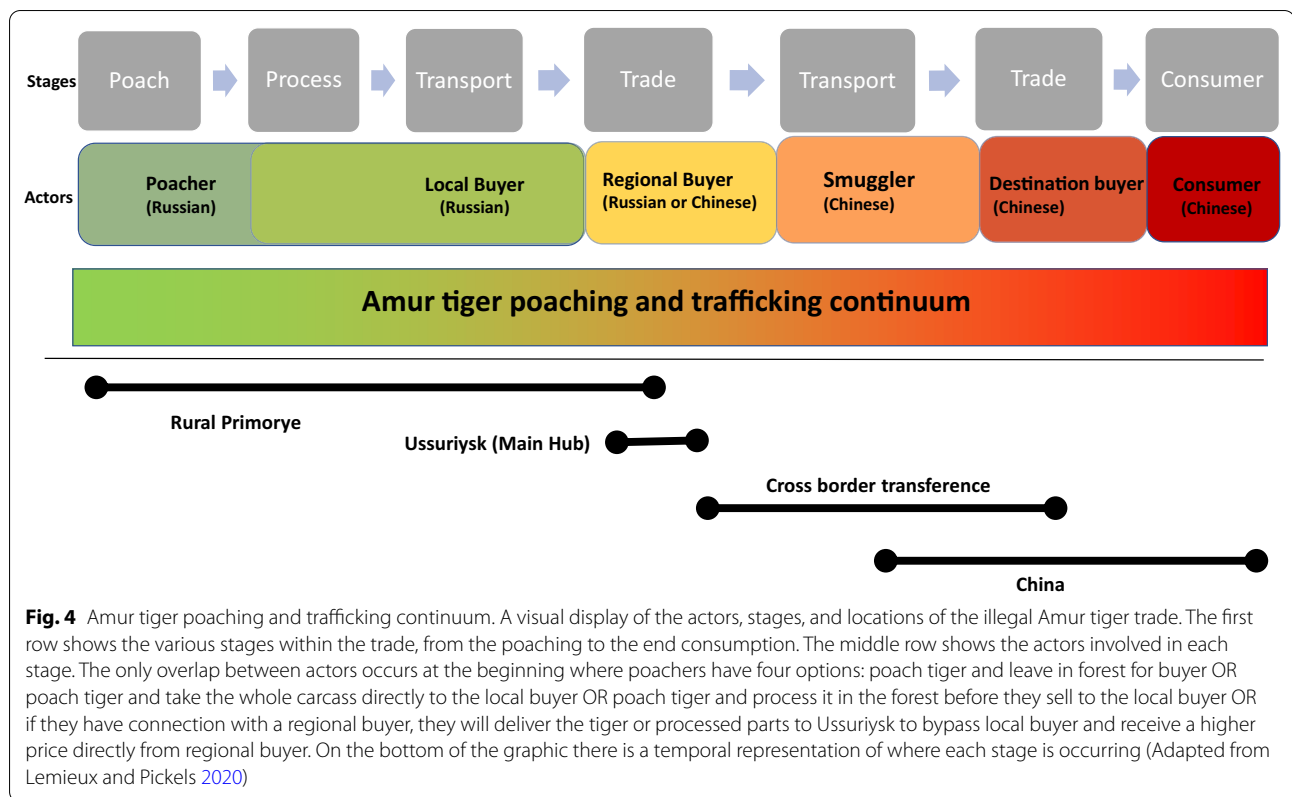
Fig. 3 (See legend on previous page.)

Fig. 4 Amur tiger poaching and trafficking continuum. A visual display of the actors, stages, and locations of the illegal Amur tiger trade. The first row shows the various stages within the trade, from the poaching to the end consumption. The middle row shows the actors involved in each stage. The only overlap between actors occurs at the beginning where poachers have four options: poach tiger and leave in forest for buyer OR poach tiger and take the whole carcass directly to the local buyer OR poach tiger and process it in the forest before they sell to the local buyer OR if they have connection with a regional buyer, they will deliver the tiger or processed parts to Ussuriysk to bypass local buyer and receive a higher price directly from regional buyer. On the bottom of the graphic there is a temporal representation of where each stage is occurring (Adapted from Lemieux and Pickels 2020)

these exchanges. Interestingly, when interviewing one local buyer in the northern region of Primorye, he told me that when he was in Ussuriysk he has been 'ratted out' to the police by another Russian buyer, due to the competition between buyers. He was arrested, although no charges were brought against him. He said, "The Chinese are generally fair. The Russians can be untrustworthy, but yes, the Chinese are mainly trustworthy people. They are businessmen, their goal is to move products." This sentiment, although just one example, is interesting and hints at the Russians trusting the Chinese more than they trust each other.

Russians do not smuggle goods across the Chinese border, this is done exclusively by the Chinese. Five border crossings are used: Blagoveshchensk/Heine, Kraskino, Poltavka, Pogranichny/Suifenne, Turiy Rog (Fig. 1). Smuggling dates are pre-established and custom officers are bribed in advance for about $50–$60. Tiger parts and derivatives are transferred over the border either in hidden compartments within a truck or hidden within shipments of other goods. For example, I came across multiple instances when trucks transporting nuts or logs were used to hide tigers. Below are some quotes from two different buyers to describe this border crossing:

"Everything crosses the border openly, because it's their own people manning the post. Everything is paid for beforehand, so there's no need for secrecy. The secrecy that does exist is just for show. Usually everyone works together—the Chinese and Russians."
"Here everything is bought by us (Russians), but then it goes to China. Their mafia is very serious, their organization. Here in Russia, everybody works to sell, the police, the FSB (Russian secret service)— they all want to sell. Everything passes the border with ease. Whenever someone gets stopped, that's just for show. Just to show that 'yeah, the police are doing their job.'"

Discussion

Poaching tigers with traditional hunting skills is almost nonexistent. Poaching using poison, traps, and snares— used frequently in other tiger range states—is also very uncommon. Poaching is facilitated by the ability to acquire a firearm, presence of roads that enable access to remote forest regions (Fig. 3), availability of specific types of tools/equipment, including heat vision googles or a spotlight, a 4×4 car, and a culture that fosters corruption. The theme of corruption was overwhelming in interviews; it was mentioned in some capacity by 82 of

the 116 participants or 70% (see Table 1 for a breakdown of corruption themes). Situational crime prevention can provide a framework to target intervention strategies. Select examples are discussed below. A full list of potential interventions based on the 25 techniques of situation crime prevention (SCP) (Cornish & Clarke, 2003) are listed in Table 3. These interventions are based on opportunity reduction strategies as well as addressing offender motivation (described in Skidmore 2021b).

Increasing the effort

The road network, including presence and density, appears to be the largest variable influencing tiger mortality. Roads have a negative influence on carnivore survivorship is not novel—roads are a serious threat to many large carnivore populations because they facilitate human access. Road networks have been associated with increased access for hunters and have been linked to high mortality for jaguars in the Amazon (Espinosa et al., 2018), wolves in Finland (Suutarinen & Kojola, 2017) and tigers in Malaysia (Mailley, 2014), to list a few examples. In the RFE, previous work has demonstrated that roads increase tiger mortality due to poaching and vehicle collisions (Kerley et al., 2002). Findings from this study further support the link between roads and poaching. Intervention measures must focus on *controlling access to facilities*, by decreasing access to remote tiger habitat. This could include reforesting abandoned logging roads, preventing the construction of new roads, and restricting access to secondary roads *Screening exits* could be achieved by increasing roadblocks and vehicle checks at night along known access points to suspected poaching routes and forest area exit routes within the taiga.

The endemic corruption found in this region amongst government officials, rangers, custom officials, police and the FSB has been shown to be associated with wildlife and environmental crimes (Usov 2012; Matejova et al., 2018; Wyatt, 2009, 2011, 2014; Skidmore, 2021b). This research builds on these claims, finding these individuals to be frequently involved in tiger poaching and/or covering up these incidents. 'Elite' poaching of tigers (Skidmore, 2021b), where poaching occurs because of the impunity/status of the perpetrator is one example of this. Corruption also occurs due to low salaries of those tasked with protection. One respondent emphasized, "The inspectors (rangers) get paid so poorly, so poorly. It is bad! I do not know one that is not corrupt in some way or another." Based on interviews, rangers make between $230-$375 dollars a month—a very low salary, which increases the need/desire to accept bribes.[5] At the

Russian/Chinese border custom officers take bribes of only about $50-$60 dollars. This small amount suggests they have low salaries as well, as they are willing to accept so little to turn a blind eye towards smuggling tiger parts across the border. By paying rangers and custom officials a higher salary, this could *deflect offenders* and disrupt poaching networks, as corrupt officials may be less willing to accept bribes. Also, by rotating these officials within posts/regions, offenders must increase their effort to constantly find another person willing accept a bribe.

Tighter *control on tools/weapons* needed to poach is one way to deter poaching well before the crime is committed. Increasing the effort required to acquire a hunting permit, as well as requiring subsequent documentation/accounting for game killed with hunting permit are options. Currently, a hunting permit can be purchased for any legal game, giving a hunter the legal right to carry a weapon, however there are no mechanisms in place to follow that permit to make sure the correct species was hunted. Tighter monitoring of firearms through a more accountable registration system and increased oversight of heat-vision googles entering the country via China are also possible options.

Increasing the risks

Law enforcement monitoring (LEM), a tool of situation crime prevention, is being used increasingly to improve anti-poaching efforts worldwide. Hötte et al. (2016) implemented a framework for evaluating the success of law enforcement efforts to increase tiger numbers in four PAs in the RFE. This study demonstrated the value of having defined goals and specific indicators of success and noted clear increases in patrol effort and a partial reduction in threats to tigers at the select sites. Other studies have had success using similar LEM tools within PAs (e.g., Johnson et al., 2016; Moreto et al., 2014; Stokes, 2010). However, so little of Amur tiger range lies within PAs (3–4%), consequently, intervention measures beyond the boundaries of PAs is necessary. This could include *extending guardianship* by installing cameras at the entrance of secondary roads, which are used to access the more remote parts of the taiga, or increasing patrol effort outside of PAs, possibly with the assistance of community groups. *Strengthening formal surveillance* could be achieved by increasing surveillance and roadblocks along known routes to hubs, as well as increasing patrol effort at night, or increasing ranger patrols to two officers to discourage intimidation.

However, due to the corruption in the region increasing resources for better law enforcement monitoring may not be the best option. Increasing pay may offset some corruption, but this is unlikely to happen given the region's lack of institutional support from regional or federal

---

[5] For refence, in Russia GNI (Gross Domestic Income) is $11,260/year or $938/month making the average salary per ranger about 25–40% of the national average (World Bank 2019).

conservation agencies (Hötte et al., 2016). Funding could be acquired from international NGOs, but due to Russia's notoriety for barring and/or marginalizing NGOs within Russia, organizations they label and require to register as 'foreign agents', this may prove difficult (Amnesty International, 2016; Matejova et al., 2018). Increased law enforcement monitoring will most likely only work if the underlying problem of corruption is addressed.

Another option to *strengthen formal surveillance* could be to focus enforcement efforts in Ussuriysk. The regional hub is key in the illegal tiger trade: products exchange hands between local buyers and regional buyers (which is sometimes two steps if the local buyer sells to a Russian regional buyer who subsequently must sell to a Chinese regional buyer), then products exchange hands again to the smuggler. Van Uhm and Wong (2019) noted that within oligopoly network structures, as is the case in the RFE, enforcement efforts could be concentrated locally, rather than trying to combat the overarching structure. With the concentration of actors and products in Ussuriysk, this would be a natural location to concentrate efforts.

The presence of informal guardians, (i.e., ordinary citizens whose mere presence could deter poaching), appears to be absent in the region. Locals, out of fear of the police, retaliation, or due to community loyalty, almost never turn a known poacher in. More research is needed to further investigate the motivations for this behavior. If there were a system of anonymous tipping, in which people could report poaching confidentially and without fear of discovery, this could *assist natural surveillance* and subsequently increase the risks associated with poaching. A reward for tips about poaching would most likely incentivize this behavior further. The effectiveness of this measure has been demonstrated in another range country, Sumatra, where anonymous informant tip-offs significantly increased patrol effectiveness between 40–50% (Linkie et al., 2015).

Reduce provocations

Motivation for poaching is also important when considering intervention techniques. Poaching for monetary gain and killing out of genuine self-defense of humans or livestock are very different problems requiring different solutions (Mailley, 2014). Inskip and Zimmerman (2009) highlight how a lack of standardized reporting in human-felid conflicts have impacted the lack of cognition on successful prevention techniques. My research supports this trend in the RFE. A more consistent method for villagers to report livestock loss would help managers understand regional trends and ensure timely and ethical distribution of livestock reimbursement animals to *avoid disputes.* Such compensation-based programs have proven

affective for other large felids including lions (Hazzah et al., 2014) and snow leopards (Mishra et al., 2003).

However, range-wide, there is ample evidence that villagers will use self-defense or defense of livestock as an argument to poach tigers to sell into the illegal market (Karanth and Gopal 2005; Johnson et al., 2006; Goodrich et al., 2011; Saif 2018; Skidmore 2020b, among others). This behavior has been demonstrated in lion poaching as well (Everatt et al., 2019). In these instances, rooting out true motive could be difficult, therefore confounding intervention measures. 19 of 31 (61%) of admitted poachers cited economic poverty as their primary motivation (Table 1). The value of a tiger on the black market far outweighs the cost of livestock (Johnson et al., 2006); my research provides evidence that a hunter can expect to receive between $3300-$5000 for an entire tiger carcass, depending on the size and sex of the animal. In the RFE, Goodrich et al. (2011) demonstrated how poachers take advantage of human-tiger conflict situations and that almost 50% of human-tiger reported conflicts in the RFE were a direct result of human provocations, generally resultant from a poaching attempt. Strategies that aim to mitigate human-wildlife conflict will most likely have limited impact if poaching for monetary gain is the ultimate driving force of a motivated offender killing a tiger.

Human-tiger conflict is also driven by tiger depredation on dogs, a frequent occurrence due to the practice of keeping dogs staked outside overnight, usually in insecure locations. Goodrich et al. (2011) demonstrated that dogs in this region were killed much more commonly by tigers than other domestic animals (63% of 254 animals in the study) and that this behavior provokes a strong response and has been shown to be a primary reason for retaliation killing. To *reduce temptation/arousal*, community projects to build secure dog kennels could offer an inexpensive method to greatly reduce this conflict. Participants told me "Tigers have killed many of my dogs—I have gone through so many dogs!"; "Villagers kill tigers for safety and because they kill our dogs." My research concurs with Goodrich et al. (2011), in the recommendation that livestock is generally managed well in Russia, and the focus should be on securing dogs. By adequately securing dogs and subsequently reducing attacks, there would be less incentive to put villagers in the situation where there is the opportunity to kill a tiger.

Dramatic reductions in international demand for sable fur has caused prices in the RFE for these animals to fall rapidly—a wildlife market many hunters traditionally have relied on for income. There is evidence these hunters are transitioning to illegal hunting, including tiger poaching to offset lost income (Skidmore, 2021b). Further research on how the crash in the sable market has affected tiger poaching, local attitudes towards tigers, and

connections between poverty and tiger poaching could elucidate further how provocations could be reduced. *Reducing frustrations/stress* and could be achieved by providing alternative forms of income. For example, communities could be incentivized to protect tigers through payment for proof of tiger presence (camera traps with date stamp), or communities could be paid to help reforest old logging roads. These are examples of Payments for Ecosystem Services (PES) (Kurland et al., 2017), where locals get monetary incentives with the dual goal of providing income and reducing incentives to poach, therefore *extending guardianship*. Programs like these would also help *neutralize peer pressure* to poach.

Other countries have had success with the conservation of large felids by appealing to the pride and heritage of the locals, thus stigmatizing poaching (Nugraha & Sugardjito, 2009) and *neutralizing peer pressure*. The people of the RFE define themselves based on being separate from the rest of Russia—they harbor strong beliefs about their adaptability, resilience, and ability to survive. By appealing to their innate pride, the tiger could be marketed as a powerful metaphor for their own character and fortitude, something that has been done successfully with jaguars in Argentina (Caruso and Parez 2013).

Policy recommendations

Based on my research there are some SCP measures I do not think would be currently beneficial; looking at Table 3, many of the 'remove excuses' techniques are not applicable to the RFE's current situation. I did not find a lack of awareness of regulations about tigers being illegal to kill, contrarily, everyone I interviewed was very aware that tigers were illegal to kill. They are equally aware that while there are large fines associated with poaching, the likelihood of being caught and charged is very low. Arrest and prosecution rates will need to increase before the laws create the desired deterrence effect.

The illegal tiger trade highlights the variability in wildlife crime. For example, in Bangladesh snares are the most common method of poaching, which means that foot patrols will be the best method to detect poaching effort (Linkie et al., 2015; Risdianto et al., 2016). This is not the case in the RFE, where the tiger territories are much larger, and I did not find a single occurrence of snares being used to poach tigers. Linkie et al. (2015), found that frequency and duration of patrol effort was most effective in preventing tiger poaching rather than factors like distance patrolled. However, evidence in this study suggests that due to the large range of tiger territories, the methods employed by poachers in the RFE, and the distinct temporal aspect of poaching, patrol efforts that concentrate efforts on covering long distance, and

focusing more effort at night and in the winter, would have a greater impact.

Kurland et al. (2017) urge the need to implement complementary techniques, and I believe there are numerous policy interventions that would prove effective. Below I have highlighted a few specific management options that are the most appropriate and should be implemented concurrently:

1. Address fragmentation by road network. Besides corruption, roads as a mechanism that aids poaching, were cited more frequently than any other theme (34/116 or 30% of participants, Table 1) during interviews. The road network has made 52% of the taiga accessible to poachers (Fig. 3). Restricting access/reforesting old logging roads and preventing the creation of new roads is essential to reduce accessibility.

2. Poverty is the most frequently cited motivation for tiger poaching (Table 1); therefore, any management decisions must address this. In a Payments for Ecosystem Services (PES) model locals should be incentivized to protect resident tigers by monetary schemes, i.e., camera trap proof of their occurrence. This would need to be monitored closely to make sure the money reaches all the appropriate people. Locals could also be paid to reforest old logging roads, which would improve tiger habitat, reduce access for poachers, and provide income.

3. Due to the inherently large territories of Amur tigers, relying solely on PAs or increasing PA size in the hope of retaining viable populations within these zones is not possible (Miquelle et al., 2010). As only 3–4% of Amur tiger range is within these areas, efforts to increase patrol effort outside of PAs is essential. For example, check points/roadblocks could be set up in pinch point locations or forest road exit points. Patrol effort should be increased at night and in the winter, due to the distinct temporal elements of poaching activity.

4. Corruption, either generally or within a specific agency, was referenced by a staggering 82/116 (71%) of the participants. It is an embedded issue that, along with poverty, fosters much of the poaching culture in the RFE. Corruption manifests in many forms: officials taking bribes by poachers at road checks or at the Chinese border crossing, 'elite' poaching or involvement in buying/smuggling of tigers by police/FSB/government members (Table 1) and covering up or lack of enforcement over poaching arrests. These examples of corruption are similar to other studies of corruption and wildlife trafficking (Van Uhm & Moreto, 2018; Wyatt & Cao, 2015; Wyatt et al., 2020). Programs that seek to neutralize corruption,

for example anonymous tipping/whistleblowing, must be implemented. This could have many benefits including: providing monetary income to locals through incentivizing tiger protection, neutralize peer pressure anonymously in a very tight-knit community, and also help root out corruption. Additionally, more research is needed to determine if increasing wages of officials would decrease susceptibility to accept bribes.

5. Target law enforcement efforts in Ussuriysk. Many of the supply chain steps and actors facilitating the steps converge here in a 'bottleneck'. Targeted intervention measures should be directed here.

6. Tigers killing dogs should be addressed urgently. Building dog kennels and shelters, coupled with informative discussions about the importance of securing dogs, should be implemented.

Conclusion

There are some limitations to this research. It is baseline data; as the first data collected on poaching within the Primorye region of Russia, there is nothing to compare it to. Information regarding trends is therefore impossible to make. Also, my research was focused on Russians, however, the involvement of the Chinese was referenced 33 times. There is no doubt Chinese nationals are a huge part of the trade as regional buyers in Ussuriysk, and then most likely the only ones involved in the transborder smuggling process. Interviewing Chinese involved in this trade would be beneficial for a more complete account of the illegal trade continuum. My research focused specifically on the poaching and trafficking of Amur tigers in Russia. Other research has focused on the destination markets in China (Moyle, 2009; Wong, 2016; Van Uhm, 2018; Van Uhm & Wong, 2019). Besides data on the 5 most common smuggling routes between Russia and China (Fig. 1), there is a lack of information on the transborder transference. Interviewing the Chinese involved in the trade would help elucidate these gaps. Additionally. studies have demonstrated that organized crime is involved in the timber trafficking in the RFE (EIA 2013; Wyatt, 2014). Organized crime, tiger poaching and the trade of other illegal natural resources have been found in other locations (Risdianto et al., 2016). During interviews I came across multiple instances where logging trucks were being used to smuggle tiger products over the Chinese border. Future research should look more closely at examining the intersection between organized crime and the links between other environmental/wildlife products.

Amur tigers are under increasing pressure from poaching, which is a complex phenomenon involving poverty in the RFE, demand in China, endemic corruption, and fragmented habitat that poachers take advantage of. Many of these threats are intercorrelated and SCP, by way of crime scripting, has help elucidated how a combination of multiple management techniques can help reduce poaching pressure.

References
Adler, P. A., & Adler, P. (1987). The past and future of ethnography. *Contemporary Ethnography, 16*(1), 424.

Amnesty International. (2016). Agents of the People: Four Years of 'Foreign Agents' Law in Russia, Consequences for the Society. November 17. https://www.amnestyusa.org/reports/agents-of-the-people-four-years-of-foreign-agents-law-in-russia/. Accessed 15 April 2021.

Amur Tiger Census. (2015). In coordination with Amur Tiger Center, WWF and the Far Eastern Branch of the Russian Academy of Sciences. https://amurinfocenter.org/upload/iblock/1fd/leaflet_tiger_2015_census_with_flag_interactive.pdf. Accessed 20 April 2021.

Arroyo-Quiroz, I., & Wyatt, T. (2019). Wildlife trafficking between the European Union and Mexico. *International Journal for Crime, Justice and Social Democracy, 8*(3), 23–37.

Berg, B. L. (2004). *Qualitative Research Methods for the Social Sciences* (5th ed.). Pearson.

Bergen, K. M., Loboda, T., Newell, J. P., Kharuk, V., Hitztaler, S., Sun, G., et al. (2020). Long-term trends in anthropogenic land use in Siberia and the Russian Far East: a case study synthesis from Landsat. *Environmental Research Letters., 15*, 105007.

Borrion, H. (2013). Quality assurance in crime scripting. *Crime Science, 2*(1), 6.

Brent, J. J., & Kraska, P. (2015). Criminology's theoretical incarceration: qualitative methods as liberator. In H. Copes & J. M. Miller (Eds.), *Handbook of qualitative methods* (pp. 22–31). New York: Routledge.

Carroll, C., & Miquelle, D. (2006). Spatial viability analysis of Amur tiger *Panthera tigris altaica* in the Russian Far East: The role of protected areas and landscape matrix in population persistence. *Journal of Applied Ecology, 43*, 1056–1068.

Clarke, R. (1997). *Situational crime prevention: Successful case studies*. Harrow and Heston.

Clarke, R. V. (2008). Situational crime prevention. In R. Wortley & L. Mazerolle (Eds.), *Environmental criminology and crime analysis* (pp. 178–194). Willan Publishing.

Cornish, D. B. (1994). The procedural analysis of offending and its relevance for situational prevention. *Crime Prevention Studies, 3*, 151–196.

Cornish, D. B., & Clarke, R. V. (2003). Opportunities, precipitators and criminal decisions: A reply to Wortley's critique of situational crime prevention. *Crime Prevention Studies, 16*, 41–96.

DeWalt, K. M., & DeWalt, B. R. (2011). *Participant Observation: A Guide for Field-workers* (2nd ed.). AltaMira Press.

Drury, R., Homewood, K., & Randall, S. (2011). Less is more: The potential of qualitative approaches in conservation research. *Animal Conservation, 14*(1), 18–24.

Duangchantrasiri, S., Umponjan, M., Simcharoen, S., Pattanavibool, A., Chaiwattana, S., Maneerat, S., Kumar, N. S., Jathanna, D., Srivathsa, A., & Karanth, K. U. (2016). Dynamics of a low-density tiger population in Southeast Asia in the context of improved law enforcement. *Conservation Biology, 30*, 639–648.

Duffy, R., St John, F. A. V., Büscher, B., & Brockington, D. (2016). Toward a new understanding of the links between poverty and illegal wildlife hunting. *Conservation Biology, 30*, 14–22.

Duma S. (1996/2013). The Criminal Code of the Russian Federation. No. 63-FZ OF June 13, 1996. Article 258 'Illegal Hunting'. Available at https://www.wipo.int/edocs/lexdocs/laws/en/ru/ru080en.pdf Accessed 13 April 2021.

Environmental Investigation Agency (2013). Liquidating the forests: hardwood flooring, organized crime and the world's last Siberian tigers. https://eia-global.org/reports/liquidating-the-forests-report. Accessed 21 November 2020

Espinosa, S., Celis, G., & Branch, L. C. (2018). When roads appear jaguars decline: Increased access to an Amazonian wilderness area reduces potential for jaguar conservation. *PLoS ONE, 13*(1), e0189740.

Everatt, K. T., Kokeš, R., & Lopez Pereira, C. (2019). Evidence of a further emerging threat to lion conservation; targeted poaching for body parts. *Biodiversity Conservation, 28*(14), 4099–4114.

Goodman, L. A. (1961). Snowball sampling. *Annals of Mathematical Statistics, 32*(1), 148–170.

Goodrich, J., Lynam, A., Miquelle, D., Wibisono, H., Kawanishi, K., Pattanavibool, A., et al. (2015). Panthera tigris. In: The IUCN Red List of Threatened Species 2015: p.e.T15955A50659951. https://dx.doi.org/https://doi.org/10.2305/IUCN.UK.2015-2.RLTS.T15955A50659951.en. Accessed 15 November 2020.

Goodrich, J. M., Seryodkin, I., Miquelle, D. G., & Bereznuk, S. L. (2011). Conflicts between Amur (Siberian) tigers and humans in the Russian Far East. *Biological Conservation, 144*(1), 584–592.

Hammersley, M. (2018). What is ethnography? Can it survive? Should it? *Ethnography and Education, 13*(1), 1–17.

Hazzah, L., Dolrenry, S., Naughton-Treves, L., Edwards, C. T., Mwebi, O., Kearney, F., et al. (2014). Efficacy of two lion conservation programs in Maasailand Kenya. *Conservation Biology, 28*(3), 851–860.

Hötte, M. H. H., Kolodin, I. A., Bereznuk, S. L., Slaght, J. C., Kerley, L. L., Soutyrina, S. V., Salkina, G. P., Zaumyslova, O. Y., Stokes, E. J., & Miquelle, D. G. (2016). Indicators of success for smart law enforcement in protected areas: A case study for Russian Amur tiger (Panthera tigris altaica) reserves. *Integrative Zoology, 11*, 2–15.

Inskip, C., & Zimmermann, A. (2009). Human-felid conflict: A review of patterns and priorities worldwide. *Oryx, 43*(1), 18–34.

Inskip, C., Zubair, F., Tully, R., Roberts, T., & MacMillan, D. (2014). Understanding carnivore killing behaviour: Exploring the motivations for tiger killing in the Sundarbans, Bangladesh. *Biological Conservation, 180*, 42–50.

Johnson, A., Goodrich, J., Hansel, T., Rasphone, A., Saypanya, S., Vongkhamheng, C., & Venevongphet, & Strindberg, S. . (2016). To protect or neglect? Design, monitoring, and evaluation of a law enforcement strategy to recover small populations of wild tigers and their prey. *Biological Conservation, 202*, 99–109.

Johnson, A., Vongkhamheng, C., Hedemark, M., & Saithongdam, T. (2006). Effects of human–carnivore conflict on tiger (*Panthera tigris*) and prey populations in Lao PDR. *Animal Conservation, 9*, 421–430.

Karanth, K. U., & Gopal, R. (2005). An ecology-based policy framework for human-tiger coexistence in India. In R. Woodroffe, S. Thirgood, & A. Rabinowitz (Eds.), *In People and Wildlife, Conflict or Coexistence?* (pp. 373–387). Cambridge University Press.

Kareiva, P., & Marvier, M. (2012). What is conservation science? *BioScience, 62*(11), 962–969.

Karmacharya, D., Sherchan, A. M., Dulal, S., Manandhar, P., Manandhar, S., Joshi, J., et al. (2018). Species, sex and geo-location identification of seized tiger (Panthera tigris tigris) parts in Nepal—a molecular forensic approach. *PLoS ONE, 13*(8), e0201639.

Kerley, L. L., Goodrich, J. M., Miquelle, D. G., Smirnov, E. N., Quigley, H. B., & Hornocker, M. G. (2002). Effects of Roads and Human Disturbance on Amur Tigers. *Conservation Biology, 16*, 97–108.

Kurland, J., & Pires, S. F. (2017). Assessing U.S. wildlife trafficking patterns: How criminology and conservation science can guide strategies to reduce the illegal wildlife trade. *Deviant Behavior, 38*(4), 375–391.

Kurland, J., Pires, S. F., McFann, S. C., & Moreto, W. D. (2017). Wildlife crime: A conceptual integration, literature review, and methodological critique. *Crime Science, 6*(1), 4.

Leberatto, A. C. (2016). Understanding the illegal trade of live wildlife species in Peru. *Trends in Organized Crime, 19*, 42–66.

Leclerc, B. (2017). Crime scripts. In R. Wortley & M. Townsley (Eds.), *Environmental criminology and crime analysis* (pp. 119–141). Routledge.

Leclerc, B., & Wortley, R. (2013). The reasoning criminal: Twenty-five years on. In B. Leclerc & R. Wortley (Eds.), *Cognition and Crime: Offender decision-making and script analyses* (pp. 1–11). Routledge.

Ledeneva, A. V. (2013). Russia's practical norms and informal governance: The origins of endemic corruption. *Social Research, 80*, 1135–1162.

Lemieux, A. M. (Ed.). (2020). The Poaching Diaries (vol. 1): Crime scripting for wilderness problems (pp. 108–109). Phoenix, AZ: Center for Problem Oriented Policing, Arizona State University.

Lemieux, A M, Pickels, R. S. A. (2020). The Poaching Diaries (vol. 1): Crime Scripting for Wilderness Problems. Phoenix, AZ. Center for Problem Oriented Policing, Arizona State University, pp 108–109.

Lemieux, A. M., & Bruschi, N. (2019). The production of jaguar paste in Suriname: A product-based crime script. *Crime Science, 8*, 6. https://doi.org/10.1186/s40163-019-0101-4

Levi, M. (2008). Organized fraud and organizing frauds: Unpacking research on networks and organization. *Criminology & Criminal Justice, 8*(4), 389–419.

Linkie, M., Martyr, D. J., Harihar, A., Risdianto, D., Nugraha, R. T., Maryati, N., Leader, W., & Wong, W. M. (2015). EDITOR'S CHOICE: Safeguarding Sumatran tigers: evaluating effectiveness of law enforcement patrols and local informant networks. *Journal of Applied Ecology, 52*, 851–860.

Lynch, M. J. (2019). Green criminology and environmental crime: Criminology that matters in the age of global ecological collapse. *Journal of White Collar and Corporate Crime, 1*(1), 50–61.

Mailley, J. (2014). Can the Problem Analysis Module (PAM) help us imagine new preventative solutions to a specific tiger poaching issue. In A. M. Lemieux (Ed.), *Situational crime prevention of poaching* (pp. 62–81). New York, NY: Routledge.

Matejova, M., Parker, S., & Dauvergne, P. (2018). The politics of repressing environmentalists as agents of foreign influence. *Australian Journal of International Affairs, 72*(2), 145–162.

Matyukhina, D. S., Miquelle, D. G., Murzin, A. A., Pikunov, D. G., Fomenko, P. V., Aramilev, V. V., et al. (2014). Assessing the influence of environmental parameters on Amur tiger distribution in the Russian Far East Using a MaxEnt Modeling Approach. *Achievements in the Life Sciences, 8*(2), 95–100.

Miller, J. M., & Miller, H. V. (2015). Edge ethnography and naturalistic inquiry in criminology. In H. Copes & J. M. Miller (Eds.), *The Routledge Handbook of Qualitative Methods* (pp. 88–102). New York: Routledge.

Miquelle, D. G., Goodrich, J. M., Smirnov, E. N., Stephens, P. A., Zaumyslova, O. Y., Chapron, G., Kerley, L., Murzin, A. A., Hornocker, M. G., & Quigley, H. B. (2010). The Amur tiger: A case study of living on the edge. In D. W. Macdonald & A. J. Loveridge (Eds.), *Biology and Conservation of Wild Felids* (pp. 325–339). Oxford University Press.

Miquelle, D. G., Nikolaev, I., Goodrich, J., Litvinov, B., Smirnov, E., & Suvorov, E. (2005). Searching for the coexistence recipe: A case study of conflicts between people and tigers in the Russian Far East. In R. Woodroffe, S. Thirgood, & A. Rabinowitz (Eds.), *People and Wildlife, Conflict or Coexistence?* (pp. 305–322). Cambridge University Press.

Miquelle, D. G., Pikunov, D. G., Dunishenko, Y. M., Aramilev, V. V., Nikolaev, I. G., Abramov, V. K., et al. (2007). 2005 Amur Tiger Census. *Cat News, 46*, 14–16.

Miquelle, D. G., Smirnov, E. N., Zaumyslova, O. Y., Soutyrina, S. V., & Johnson, D. H. (2015). Population dynamics of Amur tigers (Panthera tigris altaica) in Sikhote-Alin Biosphere Zapovednik: 1966–2012. *Integrative Zoology, 10*, 315–328.

Mishra, C., Allen, P., McCarthy, T., Madhusudan, M. D., Bayarjargal, A., & Prins, H. H. T. (2003). The role of incentive programs in conserving the snow leopard. *Conservation Biology, 17*(6), 1512–1520.

Mol, A. P. J. (2009). Environmental Deinstitutionalization in Russia. *Journal of Environmental Policy & Planning, 11*(3), 223–241.

Moreto, W. D. (2016). Avoiding the tragedy of the (un)common knowledge. Reflections on conducting qualitative criminological research in conservation science. *Qualitative Research., 17*(4), 440–456.

Moreto, W. D., & Clarke, R. V. (2013). Script analysis of the transnational illegal market in endangered species. dream and reality. In B. Leclerc & R. Wortley (Eds.), *Cognition and Crime: Offender decision-making and script analyses* (pp. 209–220). New York: Routledge.

Moreto, W. D., & Lemieux, A. M. (2015). Poaching in Uganda: Perspectives of law enforcement rangers. *Deviant Behavior, 36*, 853–873.

Moreto, W. D., Lemieux, A. M., Rwetsiba, A., Guma, N., Driciru, M., & Kirya, H. K. (2014). Law enforcement monitoring in Uganda. In A. M. Lemieux (Ed.), *Situational Prevention of Poaching* (pp. 82–101). Routledge.

Moyle, B. (2009). The black market in China for tiger products. *Global Crime, 10*(1), 124–143.

Nugraha, R. T., & Sugardjito, J. (2009). Assessment and Management Options of Human-Tiger Conflicts in Kerinci Seblat National Park, Sumatra. *Indonesia. Mammal Study, 34*(3), 141–154.

Pires, S. F., Schneider, J. L., & Herrera, M. (2016). Organized crime or crime that is organized? The parrot trade in the neotropics. *Trends in Organized Crime, 19*, 4–20.

Polsky, N. (1967). *Hustlers Beats and Others*. University of Chicago Press.

Risdianto, D., Martyr, D. J., Nugraha, R. T., Harihar, A., Wibisono, H. T., Haidir, I. A., Macdonald, D. W., D'Cruze, N., & Linkie, M. (2016). Examining the shifting patterns of poaching from a long-term law enforcement intervention in Sumatra. *Biological Conservation, 204*, 306–312.

Robinson, H. S., Goodrich, J. M., Miquelle, D. G., Miller, C. S., & Seryodkin, I. V. (2015). Mortality of Amur tigers: The more things change, the more they stay the same. *Integrative Zoology, 10*, 344–353.

Runhovde, S. R. (2015). Seizures of inconvenience? Policy, discretion and accidental discoveries in policing the illegal wildlife trade at the Norwegian border. *Crime, Law and Social Change, 64*(2), 177–192.

Runhovde, S. R. (2017). Comparing discourse to officer perceptions: The problems of war and militarization in wildlife crime enforcement. *Critical Criminology: An International Journal, 25*(2), 275–91.

Runhovde, S. R. (2018). Merely a transit country? Examining the role of Uganda in the transnational illegal ivory trade. *Trends in Organized Crime, 21*(3), 215–234.

Saif, S., Rahman, H. M. T., & MacMillan, D. C. (2018). Who is killing tigers and why? *Oryx, 52*(1), 46–54.

Saif, S., Russell, A. M., Nodie, S. I., Inskip, C., Lahann, P., Barlow, A., Barlow, C. G., Islam, A., & MacMillan, D. C. (2016). Local usage of tiger parts and its role in tiger killing in the Bangladesh Sundarbans. *Human Dimensions of Wildlife, 21*(2), 95–110.

Sharma, K., Wright, B., Joseph, T., & Desai, N. (2014). Tiger poaching and trafficking in India: Estimating rates of occurrence and detection over four decades. *Biological Conservation, 179*, 33–39.

Shepherd, C.R, & Magnus, N. (2004). Nowhere to Hide: The trade in Sumatran tiger. Report TRAFFIC Southeast Asia. https://www.traffic.org/site/assets/files/4016/nowhere_to_hide.pdf Accessed 24 January 2021.

Skidmore, A. (2021a). Uncovering the nuances of criminal motivations and modus operandi in the Russian Far East: A wildlife crime case study. *Methodological Innovations*. https://doi.org/10.1177/20597991211022015

Skidmore, A. (2021b). Amur tiger poaching in the Russian Far East: motivations fostering a poaching subculture *(In review)*.

Slaght, J.C., Miquelle, D.G., & Tukhbatulin, G.A. (2016). Logging Roads and Amur tigers in Russia: demonstrating the threat and proposing solutions. *Proceedings of the International Conference on the Amur Tiger: Population Status, Problems, and Conservation Prospects.* 13–15 December 2015. Institute of Biology and Soil Science, Vladivostok, Russia.

Sollund, R. A. (2017). The use and abuse of animals in wildlife trafficking in Colombia: Practices and injustice. In Goyes D. Rodríguez, H. Mol, A. Brisman, & N. South (Eds.), *Environmental Crime in Latin America*. Palgrave Macmillan, London: Palgrave Studies in Green Criminology.

Sollund, R. A., & Runhovde, S. R. (2020). Responses to wildlife crime in post-colonial times. Who fares best? *British Journal of Criminology., 60*, 1014–1033.

Stoecker, S., & Shakirova, R. (2014). Envisaging environmental crime in Russia: Past and present realities. In S. Stoecker & R. Sharkirova (Eds.), *Environmental Crime and Corruption in Russia: Federal and Regional Perspectives* (pp. 7–19). Routledge.

Stokes, E. J. (2010). Improving effectiveness of protection efforts in tiger source sites: Developing a framework for law enforcement monitoring using MIST. *Integrative Zoology, 5*, 363–377.

Suutarinen, J., & Kojola, I. (2017). Poaching regulates the legally hunted wolf population in Finland. *Biological Conservation, 215*, 11–18.

Sytsma, V. A., Connealy, N., & Piza, E. L. (2020). Environmental predictors of a drug offender crime script: A systematic social observation of Google street view images and CCTV footage. *Crime and Delinquency, 67*(1), 27–57.

Thrasher, F. M. (1927). *The Gang*. The University of Chicago Press.

Tompson, L., & Chainey, S. (2011). Profiling illegal waste activity: Using crime scripts as a data collection and analytical strategy. *European Journal of Criminal Policy and Research, 17*(3), 179–201.

Treadwell, J. (2019). *Criminological Ethnography: An Introduction*. New York: SAGE Publications.

Usov, Y. (2012). The Role of NGOs and Civil Society in Environmental Protection. In S. Bobylev & R. Perelet (Eds.), *Sustainable Development in Russia* (pp. 113–119). Russian-German Environmental Information Bureau.

Van Gelder, J. L., & Van Daele, S. (2014). Innovative data collection methods in criminological research: Editorial introduction. *Crime Science, 3*(1), 1–4.

Van Uhm, D. P. (2016). *The illegal wildlife trade: inside the world of poachers, smugglers and traders*. New York: Springer International Publishing.

Van Uhm, D. P., & Moreto, W. D. (2018). Corruption within the illegal wildlife trade: A symbolic and antithetical enterprise. *British Journal of Criminology, 54*(4), 864–885.

Van Uhm, D. P., & Nijman, R. (2020). The convergence of environmental crime with other serious crimes: Subtypes within the environmental crime continuum. *European Journal of Criminology*. https://doi.org/10.1177/1477370820904585

Van Uhm, D. P., & Siegel, D. (2016). The illegal trade in black caviar. *Trends in Organized Crime, 19*, 67–87.

Van Uhm, D. P., & Wong, R. W. Y. (2019). Establishing Trust in the Illegal Wildlife Trade in China. *Asian Journal of Criminology, 14*, 23–40.

Viollaz, J., Graham, J., & Lantsman, L. (2018). Using script analysis to understand the financial crimes involved in wildlife trafficking. *Crime, Law & Social Change, 69*, 595–614.

Warchol, G. L., & Harrington, M. P. (2016). Exploring the dynamics of South lion's illegal abalone trade via routine activities theory. *Trends in Organized Crime, 19*, 21–41.

Wellsmith, M. (2011). Wildlife crime: The problems of enforcement. *European Journal on Criminal Policy and Research, 17*(2), 125–148.

Wikramanayake, E., Dinerstein, E., Seidensticker, J., Lumpkin, S., Pandav, B., Shrestha, M., Mishra, H., Ballou, J., Johnsingh, A., Chestin, I., Sunarto, S., Thinley, P., Thapa, K., Jiang, G., Elagupillay, S., Kafley, H., Pradhan, N. M. B., Jigme, K., Teak, S., … Than, U. (2011). A landscape-based conservation strategy to double the wild tiger population. *Conservation Letters, 4*, 219–227.

Wong, R. W. Y. (2016). The organization of the illegal tiger parts trade in China. *British Journal of Criminology, 56*, 995–101.

Wyatt, T. (2009). Exploring the organization of Russia Far East's illegal wildlife trade: Two case studies of the illegal fur and illegal falcon trade. *Global Crime, 10*(1), 144–154.

Wyatt, T. (2011). The illegal trade of raptors in the Russian Federation. *Contemporary Justice Review, 14*(2), 103–123.

Wyatt, T. (2014). The Russian Far East's illegal timber trade: An organized crime?. *Crime, Law and Social Change, 61*(1), 15–35.

Wyatt, T., & Cao, A. N. (2015). *Corruption and wildlife trafficking: A U4 anti-corruption resource Centre issue paper*. Bergen.

Wyatt, T., Johnson, K., Hunter, L., George, R., & Gunter, R. (2018). Corruption and wildlife trafficking: Three case studies involving Asia. *Asian Journal of Criminology, 13*, 35–55.

Wyatt, T., van Uhm, D., & Nurse, A. (2020). Differentiating criminal networks in the illegal wildlife trade: Organized, corporate and disorganized crime. *Trends in Organized Crime., 23*, 350–366.

Publisher's Note