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# Exploring the dynamics of South Africa's illegal abalone trade via routine activities theory

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**Abstract** The illicit trade in African wildlife has a lengthy history with devastating effect on select species. While considerable research addresses the impact of the trade on rhinoceros and elephant, the poaching of the reptiles, birds and marine life comprises a significantly greater volume of wildlife yet receives somewhat less attention. To better understand these aspects of the illegal trade, this study focuses on abalone, a highly desired and protected shellfish found off the Western Cape of South Africa and heavily targeted by poachers to meet demand in South Africa and parts of East Asia. Relying on qualitative data from field research, this study examines the nature of the illicit trade including poachers, smuggling techniques and the challenges for enforcement of the conservation laws through the lens of routine activity theory. The results indicate that routine activities theory may provide a viable theoretical construct to better understand the nature of abalone poaching and develop solutions to the problem.

**Keywords** Wildlife trafficking · Poaching · Transnational crime · International organized crime · South Africa · Abalone · Illegal wildlife trade · Routine activities theory

## Introduction

### The illegal wildlife trade

Natural resources which include flora and fauna, represent an important national asset for a country as a marketable commodity and part of its national heritage and identity. The transnational illicit wildlife trade is an extensive and highly lucrative type of natural resource offense. The species exploited in this trade include rare and

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endangered mammals, marine life, reptiles, insects, birds, timber and plants. The trade is driven by demand for products that cannot be obtained legally or at low cost, combined with weak levels of enforcement that make apprehension of offenders unlikely (Albanese 2011). While many researchers and the media focused considerable attention on the plight of the different species of African rhinoceros and elephants whose exploitation has accelerated dramatically in recent years (Orenstein 2013; World Wildlife Fund [WWF] 2015), they represent a small fraction of the total number of plants and animals illegally captured or killed and trafficked, both in their source countries and internationally. The trade more commonly includes millions of birds and reptiles shipped live to supply pet dealers with rare and unusual species; smaller mammals, both common and endangered hunted as a source of bushmeat to meet demand for protein; timber species harvested for home and commercial furnishings; plants such as cycads for use in traditional medicines and as decorative landscaping features; and marine life including shark fin, beluga caviar and abalone for exotic cuisine (Warchol et al. 2003).

Those involved include individual actors and informal and formal criminal networks (Knecht 2006; Warchol and Johnson 2009). The involvement of military units exploiting destabilized conflict zones and more recently, terrorist groups in search of revenue sources have been documented though to a much lesser extent than the previously mentioned actors (Orenstein 2013; Venter 2003). Though some poaching is for individual subsistence, motivating other offenders is the economic value of the illegal global trade in wildlife estimated at about $6 billion USD. This figure places the offense in the top three types of transnational crime behind narcotics and weapons trafficking (Moreto and Lemieux 2014; World Wildlife Fund 2015). The profit can be considerable for the various actors in this trade, that is, poacher, trafficker and retailer. While a poacher can earn a small profit, the value of wildlife increases as it moves from smuggler to wholesaler to retailer (Broad et al. 2003).

Beyond the peril to the survival of the species, the illegal trade also represents a threat to the financial stability and potentially the security of nations dependent upon natural resources for their economic growth. These include countries focusing on eco-tourism revenue (Chamley 2005; Frost and Bond 2007) or with marketable commodities for the domestic and international trade such as timber and marine life (CIA 2016; World Bank 2016). In developing nations such as Kenya, Zimbabwe or Botswana environmental tourism constitutes a significant part of their economy (Donovan 2013; Humane Society of the United States 2003). Game reserves, both public and private attract international and domestic visitors for photo safaris, employ local residents and generate tax revenue. Species decline due to illegal hunting, incidents of tourists on safari spotting animal carcasses attributed to poaching, and news reports of violent encounters between field rangers and poachers in the game reserves diminishes the lucrative eco-tourism industry. One part of wildlife tourism, the trophy hunting industry, provides an estimated $120 million USD annually in South Africa and comprises nearly 10 % of the total GDP in Tanzania and Namibia (Donovan 2013). Finally, cross border poaching operations such as those by Sudanese and Somalia criminals represent a threat to several East African nations being targeted for their wildlife resources (National Public Radio, 2003; Warchol et al. 2003).

While the poaching of some species such as elephant and rhinoceros harms tourism dependent on visitors to game reserves, other illegally harvested species represent the

loss of a valuable commodity for the legitimate domestic and international trade further weakening the economy. Common among these are timber and marine species (Schneider 2012). Included among the marine species is abalone, a highly desired shellfish existing in the wild and commercially farmed in South Africa. Abalone poaching, the offense of interest in this study, has a long history due to strong demand for this resource both in South Africa and Asia and high profits for poachers (Warchol et al. 2003). Reports indicated that individual poachers can make as much as $3000 - $4000 USC for a day's effort (Rogers 2010). During the 2010–2011 fiscal year, 590 tons of abalone conservatively valued at $15 million USC was confiscated by South Africa's Department of Marine Fisheries (International Abalone Society 2011).

More frequently researchers are examining various aspects of the illegal wildlife trade through the lenses of select criminological theories (Eliason and Dodder 1999; Herbig and Warchol 2011; Lemieux 2014; Milner-Gulland and Williams 1992; Schneider 2012). This approach is of significant value in that by identifying correlates of crime and the motivations and behaviors of the offenders, solutions can be tailored and tested. While abalone poaching has been the subject of scholarly research, few attempts have been made to apply theoretical perspectives to the offense to better understand the phenomenon. Building upon the previous research, this exploratory study applies Cohen and Felson (1979) routine activities theory to the offense of abalone poaching from protected marine areas adjacent two national parks in South Africa. The authors focused on the interaction of suitable targets (wild abalone), motivated offenders (poachers) and capable guardianship (park security) in two South African national parks to assess the efficacy of the theory in facilitating a better understanding of this natural resource crime.

## The literature

### Abalone

Abalone, scientific name *Haliotus Midae*, is a slow growing sea snail found primarily in the waters of South Africa, Australia, United States, Japan and New Zealand (World Wildlife Fund 2015). Taking about eight to ten years to reach maturity, abalone live on the rocky seafloor along shallow cold water coastal areas. Abalone has a long history of use by humans dating back thousands of years. The meat is considered a delicacy and an aphrodisiac in some cultures (World Wildlife Fund 2007), while their iridescent rounded or oval shells are used to produce decorative objects. In addition to wild growing populations, commercial abalone farming began in numerous countries in the 1960s to meet high demand, primarily in Asia. Wholesale, raw abalone sells for about $40 per kilo with the shells selling for as much as $1400 per metric ton. Retail figures have abalone priced as high as $3900 per kilo in some prime Asian markets (Chen 2012; World Wildlife Fund 2015).

South Africa's major wild abalone fisheries, the subject of interest in this research, are located along about two thirds of the countries coastline including the Eastern and Western Capes. This region sometimes referred to as the *abalone coast* (Redpath 2001) includes both wild abalone within Marine Protected Areas and commercial operations producing farmed abalone for domestic and international markets. While the wild

abalone fisheries are in decline due to high levels of illegal, large-scale harvesting (Troella et al. 2006), commercial farming operations now provide the majority of the product for domestic and international markets. Harvests of wild abalone, which is done by hand, is still allowed but controlled with permits restricting fishing locations, methods and quantities (World Wildlife Fund 2015. It was once hoped that commercial abalone farming would increase supply, reduce prices and subsequently remove incentives for black market abalone (Redpath 2001). However, the illegal harvesting of wild abalone has continued to expand to where it represents a serious threat to the future of the wild resource that South Africa hoped to maintain as a sustainable source of income (Plaganyi et al. 2011).

## The illegal trade

South Africa's abalone fisheries first established in 1940 (Tarr 1992) operated at sustainable levels until the mid-1990s when dramatic increases in illegal harvesting began to diminish the natural resource. Steinberg (2005) contends that this development was a function of several distinct phenomena in South Africa during this time period. The primary of these being the weakening of the Rand in relation to other currencies and a corresponding increase in barter systems; the end of Apartheid laws that transformed the nation's governmental organizations resulting in inefficiencies; and inadequate border controls. Also contributing were changes in fishing rights and permit allocations (Serge et al. 2009) which were still viewed as discriminatory even with the end of Apartheid (Marshall 2002). Paralleling this were the expanding Chinese economy and strong demand for abalone in Taiwan, Japan and Hong Kong, the latter of which became the epicenter of the trade (Chen 2012). During this growth period a kilo of South African abalone has retailed for as much as $3900 USC in Hong Kong. These developments contributed in part to the expansion of Chinese criminal enterprises operating in South Africa with ties to Asia organized criminals which then focused on exploiting this resource as an additional revenue source (Hauck and Sweijd 1999).

Asian criminal enterprises including Chinese Triads – well-established, organized criminal gangs consisting of local Chinese – control the majority of the lucrative trade in abalone including its shipment to end user markets in Asia (Redpath 2001; Steinberg 2005; Warchol et al. 2003). The Triads' emergence in South Africa has been dated back to the early 1920s with their first significant involvement in the illegal wildlife trade beginning in the 1970s with rhinoceros horn trafficking (Shaw 2014). South Africa became a haven for organized crime with an estimated 481 groups operating in the country by the early 21st Century (Venter 2003). These groups have been involved in a range of illegal activities including wildlife trafficking. South Africa's increasing Chinese population, combined with inefficient law enforcement and quality transportation infrastructure have all facilitated the growth of transnational crime (Hauck and Sweijd 1999; Venter 2003). Albanese (2011) adds that globalization and the opening of markets in former Communist nations have resulted in both new legal and illegal markets including natural resources.

Chinese criminal enterprises rely on local fishermen from poverty-stricken communities to obtain their abalone. Motivated by profit, local poachers were quick to exploit the resource as their main source of income (Chen 2012; Marshall 2002). Once bought from fishermen, the criminal organizations then smuggled the majority of the abalone

to Asia while also supplying some to the South African market (Hauck and Sweijd 1999). The situation was further compounded with poaching by individual sport divers exceeding their legal catch, and other larger criminal South African criminal gangs using modern diving technology and well equipped fishing boats to increase their harvest (Rogers 2010). In the past two decades the illegal trade in South African abalone evolved from localized small scale poachers to include more sophisticated criminal enterprises that are ready and willing to resort to violence to defend their harvest. News reports of violent encounters between poachers and rangers in Marine Protected Areas became more commonplace (Marshall 2002). Consequently, these developments have resulted in a highly organized and violent illegal trade in a lucrative marine resource. World Wildlife Fund (2007) contended that South Africa's abalone trade may be the most criminalized wildlife trade in Africa and might ultimately lead to the complete closure of the wild fisheries.

## Regulation and enforcement

The abalone trade is regulated in part under the 1975 Convention on the International Trade in Endangered Species (CITES) of which South Africa is one of 178 signatory nations. The Convention was developed in response to increasing threats to the survival of certain species (Albanese 2011). Given that the wildlife trade is transnational, the instrument was created to facilitate cooperation between exporting and importing nations. CITES works by using a three-tiered listing system of appendices. Appendix One lists the species that are banned from being traded for commercial purposes on the international market while Appendix Two lists species that can be traded commercially but with regulation to ensure sustainability. Appendix Three species are listed by country that needs assistance from other nations to prevent exploitation World Wildlife Fund (2015).

CITES is not an enforcement agency. Rather it requires that signatory nations agree to regulate the trade with regard to the listed species on the three appendices. CITES operates in part by relying on an export permit system for Appendix One and Two wildlife species with the former being banned from commercial trade. The species listed on the first two appendices are the result of a vote of member nations after review of proposals requesting addition to or deletion from the list. On Appendix Three (where abalone is listed), a nation can add a species without the need for an affirmative vote from the other member nations (Orenstein 2013). Albanese (2011) observes that the existence of the CITES agreement does not impact the nature of the supply or demand for the commodity. Rather it only affects the regulation and competition in the product's market. Furthermore, the effectiveness of the CITES regulations are reliant upon the individual nations willingness and ability to properly enforce them.

The South African law enforcement response to the illegal abalone trade had mixed results. While park rangers regularly seized large quantities of illegally harvested abalone and the assets of poachers via forfeiture laws, the amount of abalone lost to illegal harvesting remains substantial (International Abalone Society 2011). South African Police Services (SAPS) has encountered obvious difficulties attempting to infiltrate the highly secretive Triads and Asian gangs (Gastrow 2001) whose role is central in the illegal abalone trade. Furthermore contemporary news reports have shown the willingness of well-armed poaching gangs to readily resort to violence when

encountering park rangers in Marine Protected Areas in the Cape. Hauck and Kroese (2006) have argued that law enforcement is not the sole solution to this problem. Rather effective marine resource management must be considered to reduce abalone poaching. This was confirmed in part with the unintended consequences of SAPS' Operation Neptune in 2000 that targeted illegal fishing. A result was increased alienation of the police from the local community that depended heavily on poaching for income. Local communities refused to cooperate with the police on not only poaching but other offenses plaguing these low income areas (Redpath 2001).

## Theoretical explanations of wildlife crime

An emerging subfield of criminology known as *green criminology*, which focuses on crimes affecting the environment including humanity and animals (Beirne and South 2013), serves as a basis for theory-based research on natural resource offenses. The application of theory to explain the causes of one type of green crime - the illegal trade in wildlife - has steadily increased though is still somewhat fragmented (Herbig and Warchol 2011) detracting from a policy maker's ability to develop strategies to address the problem. Forsyth (1993) and Eliason and Dodder (1999) applied neutralization theory to explain deer poaching in the United States. They concluded that poachers employ techniques of neutralization to deny their role as criminals thereby reducing guilt among offenders. Following suit, the theory was subsequently employed to address Canadian poachers revealing how illegal hunting became part of the community's social structure (McMullan and Perrier 1997, 2002).

Forsyth and Marchese (1993) applied Walter Miller's focal concerns theory to Louisiana poachers. Miller concluded that crime and delinquency is a function of lower class culture which maintains its own unique value system in response to economically disadvantaged neighborhoods. Adapted to poaching, the authors found the theory supported long-standing subcultural norms and views about the conflict between game wardens and hunters. Milner-Gulland and Williams (1992) applied general deterrence theory to rhinoceros poaching in Africa finding that poaching operations were based on rational decisions by offenders examining patterns of wildlife and game ranger activity.

## Opportunity theory and routine activities

Contemporary research on opportunity and poaching suggests that the prevalence of wildlife theft is largely a product of the abundance and availability of the species. More specifically research by Pires and Clarke (2012) suggested that poachers, who are most frequently local residents of lower socio-economic status, preferred to poach the readily available and accessible species that bring in less profit, over the rare and more valuable species sold in open markets. Moreover, this type of opportunity poaching occurred more often where the parrot, poacher and market converged in a manner that allows for an efficient and inexpensive process for capture and sale (Pires and Clarke 2011, 2012). Similar observations were noted by Petrossian and Clarke (2014) with countries that experienced an illegal commercial fish trade. Their research suggested that the illegal fish trade was more prevalent in countries that were in close proximity to the resource and offered

the opportunity to market the catch in ports with commercial fishing processing plants. These "ports of convenience" (Petrossian 2015) allowed the illegal harvest of fish to be efficiently removed and sold with little risk to the poacher.

More contemporary work has been done by Schneider (2012) whose extensive examination of the illegal wildlife trade was via the lens of an opportunity-reduction framework. The author concluded that a solution to the illegal trade can be found by focusing on the opportunities that place wildlife at risk of exploitation. Lemieux's (2014) long-term field research in the national parks of Uganda also focused on the criminal opportunity structure of poaching. More closely related to this research, Eliason (2011) examined illegal trophy hunting in the western United States via routine activities theory. Similarly, Moreto and Lemieux (2015) relied upon the routine activities perspective to explain poaching in East Africa advancing the theory to include poaching hardware as proxy offenders.

Routine activities theory (Cohen and Felson 1979) asserts that crime is opportunistic and dynamic in nature. Routine activities are defined as "the day to day activities that characterize a particular community. In disorganized communities, the routine activities are such that they practically invite crime" (Walsh and Ellis 2007, p.66.). The theory is based on three key components: the motivated offenders, suitable targets and the lack of capable guardians of those targets. According to the theory, for crime to take place there must be the convergence of these three elements. Motivated offenders are the opportunistic criminals nearly always present in socially disorganized communities. Suitable target refers to the value or desirability of the property target, and includes access, visibility and physical size. Capable guardianship is the amount of protection afforded the target by a person such as a law enforcement officer or physical deterrent such as a fence or security system. As a result, crime rates will vary based on changes in capable guardianship and suitable targets (Felson and Cohen 1980).

The theory is based in part on the rational choice model (Cornish and Clark 1987), where one of its core assumptions is that individuals make rational decisions to commit crimes (Walsh and Ellis 2007), weighing both the benefits and risks associated with crime before deciding to engage in the event. Unlike other theories that may concentrate on the offender, routine activities treats the motivated offender as only one element of the criminal event, looking at other factors that contribute to the crime equation. First, it is premised on crime occurring in a social system (Winslow and Zhang 2008), where criminals feed on and depend upon the patterns of everyday life. It also looks at the structural conditions that may explain the distribution of crime in society. Furthermore, it is not concerned with the personal backgrounds of criminals. Rather it considers the crime's situational characteristics and the involvement of particular persons or objects and the target's degree of attractiveness in the context of levels of guardianship (Cohen and Felson 1979). Its concern with the three key elements of the criminal event has led to its extensive application to explain a variety of offenses. Wright and Decker (1994) examined residential burglary via routine activities theory. Mannon (1998) applied the theory in a study of domestic violence while Messner and Tardiff (2006) analyzed how socio-demographic characteristics in conjunction with time of day, week and month related to urban homicide via routine activities theory. Finally, studies have expanded the theory to focus on offenders, not just the nature of victimization (Gilbertson 2008; Meith and Meier 1994).

The authors contend that routine activities theory may provide a suitable theoretical framework for examining abalone poaching in the protected areas in the Western Cape of South Africa. These marine reserves are located in close proximity to large human populations that experience high unemployment and crime rates thus providing a pool of motivated offenders including well-established criminal enterprises. Furthermore, there also exists a long history of local populations previously legally accessing the abalone resource that of late has been increasingly regulated and restricted. Capable guardians refer to the park rangers and also includes any natural and man-made barriers in the marine protected areas. Finally, suitable targets are the abalone which given their lack of movement make them attractive to poachers.

## Methodology

Qualitative data collection via observation, interviews and secondary data analysis was employed in this field research to examine the efficacy of routine activities theory for identifying the causes of South Africa's illegal trade in abalone and developing strategies that protect the resource and reduce illegal harvesting. While these labor intensive and time consuming methods can and did limit the sample size and amount of data collected, they compensated for this shortfall by allowing the researchers to experience and then interpret the behaviors and interactions of the subjects of a study. One can observe and record the activities of the subjects in their social context and the meanings they ascribe to these events, i.e., poaching and trafficking abalone and the methods used to prevent and control this crime. This in turn results in a rich description and analysis of the phenomena of the illegal abalone trade.

Qualitative methods are well suited to exploratory research that seeks to ascertain the causes of events due to its focus on actors and situations and processes (Bachman and Schutt 2014). The authors chose to act as observers as passive participants, a role that allowed the researchers to interact with the subjects of the study (those charged with protecting and managing the abalone resource) in their appropriate settings accompanying them in the course of their professional duties and observing their operations. While the researchers' role was primarily focused on observing, they accompanied rangers on some patrols asking questions and photographing during their operations. Using field research on site, data were collected via semi-structured interviews and observation including the use of both notes and photography. Secondary data in the forms of official reports from both government and nongovernmental organizations were also gathered to add detail and help assess validity and reliability of the other data sources.

### Data collection locations and sampling technique

The research sites in South Africa were selected for inclusion based upon two objectives. The first was to include areas were abalone poaching was occurring. The second was to include organizations with staff familiar with the illegal trade in abalone. The data collection sites included Table Mountain and Cape Agulhas National Parks; the Ministry of Marine Fisheries in Durban; South African Police Services; Cape Peninsula University in Cape Town; University of South Africa; and Strategic Wildlife

Consultants, a conservation-focused NGO. The national parks were included given they are major locations for illegal abalone harvesting. Table Mountain National Park (TMNP) located in the Western Cape is approximately 221 mile$^2$ in size and incorporates an extensive coast line designated as a Marine Protected Are*a*. *cape* Aguhlas National Park (CANP) also located in the Western Cape to the east of TMNP. This park also includes an abalone fishery targeted by poachers. The parks are under the administration of South African National Parks (SANParks). Officials (supervisory and field rangers) with SANParks were sampled at the parks due to extensive knowledge of phenomena and active involvement in wildlife protection. The Ministry of Marine Fisheries was included since their staff are actively involved in monitoring abalone fisheries. The fourth site - South African Police Service (SAPS) - offered access to a second group of government law enforcement officers charged with controlling the illegal trade including the investigation of criminal enterprises. SAPS officers responsible for endangered species protection were included due to their specialized knowledge of abalone trafficking. The two universities included academics specializing in research on this crime. The final organization is a private wildlife conservation consultancy with extensive experience in South Africa's illegal wildlife trade.

Common with qualitative methods, this research employed purposive and snowball Sampling. *key* actors involved in studying and preventing the illegal trade in abalone were identified and contacted to obtain their cooperation with this research. Their inclusion was based on the researchers' judgement and past experience in studying wildlife trafficking and consultations with South African colleagues with similar experience. After identifying these individuals, the researchers asked for their recommendations for additional research subjects to include in the study. These additional participants were only included after employing the previous vetting techniques to select the first cohort. This sampling technique along with the collection of secondary data allowed for an assessment of the reliability and validity of the interview data.

## Interviews and observations

Interviews were conducted on site at each location. The interview sample consisted of individuals with the above-mentioned organizations actively involved in studying, assessing or working to prevent abalone poaching and trafficking at the research sites. The sample included supervisory and field rangers in both national parks (6); South African Police Service (4); Ministry of Marine Fisheries (3); Strategic Wildlife Consultants (2); Cape Peninsula University (2); and University of South Africa (3) for a final sample of 20 respondents from an estimated population of approximately 62 individuals identified as members of the above-mentioned organizations and familiar with the nature of the illegal abalone trade in the regions of interest.

Interview questions were based on the tenants of routine activities theory, a review of the literature on abalone poaching and consultation with colleagues with expertise in this area. The voluntary interviews were conducted at each site and lasted between 30 to 90 min. To protect the identities of the interviewees (respondents), the field notes were constructed without any reference to the subjects' names rather employing an alpha-numeric coding system, i.e., R-1 through R-20. Each interview was directed at the following: (1) the nature, extent and locations of abalone poaching; (2) the

motivations for poaching; (3) the operations and organization of the poachers; (4) the size, structure and operations of the ranger units at the parks; (5) the physical security at the parks; and (6) the capability of guard forces and physical security to deter poaching. Each evening, the interview field notes were reviewed and transcribed by the researchers in part to establish inter-coder reliability. We relied upon a codebook and coding system for our interview questions and responses focused on the above-mentioned themes and patterns. The interview data gathered were manually recorded and coded for later analysis. While this process is more labor intensive, the relatively small sample size in this research allowed the coding to be completed in a timely manner.

The researchers also collected observation data and secondary data in the form of official reports. Observations were recorded in field notes and photographs. These data were obtained without any interference with the activities of the rangers or managers. Some of these data included the physical security features of the park, the operations of the rangers, and equipment used by poachers and rangers. Field notes were maintained and later comprehensive notes were developed following individual observations. Photographs were taken to supplement the field notes. In total the authors spent approximately 36 h collecting observational data during the six weeks at the sites. Additional secondary data were collected from official reports and academic studies. This allowed for triangulation of the data and further assessment of its validity. The final analysis indicated a convergence with the findings from one source being substantiated with the findings from the other source.

## Results

### Suitable targets

Suitable targets are defined by Cohen and Felson as an item that has value to the offender and therefore is worth stealing (Williams and McShane 2004). Applied to this research, the suitable target is abalone, the species sought after by poachers. The findings revealed distinct characteristics of abalone that directly relate to the concept of suitable targets enhancing its desirability. The researchers have categorized these as (1) accessibility and relative ease smuggling; and (2) high economic value due to strong demand.

### Ease of access and of smuggling

The routine activities approach encompasses the concept of target attractiveness which can include accessibility of the targets of interest and their exposure to offenders (Williams and McShane 2004). Physical protection measures both natural and man-made are those features designed to detect and/or delay an offenders actions (Garcia 2008). The physical features of the sites in the study were found to influence poaching operations to a slight degree. Abalone poaching occurs in protected areas offshore of the two national parks extending two miles from the coastline. The methods used by poachers to access the parks and then the fishery were dependent on the park's infrastructure more so than the geographic features of the park. The data indicated that

two techniques were employed to access the poaching sites with both offering easy access to the fishery. The first involved individuals driving or walking into the park with diving gear. The second method required poachers to use boats to illegally access the protected offshore fisheries from adjacent waters. The interviews and observation revealed that both parks' infrastructure provides ready access to shoreline for visitors including poachers carrying diving gear. CANP, established in 1998 is about 21,000 ha in size with 30 km of shoreline. It was not fenced off separating it from the neighboring communities nor were its access roads gated to control vehicle traffic into and out of the park. Furthermore, CANP included paved or graded roads allowing for access to the shoreline. The park is directly adjacent residential areas, home to many low income people including those who have historically used the abalone resource as an income source prior to the establishment of the park. Interviewee R-2 at CANP stated: "The biggest security risk here is the public road accessing the park. You see this park is not fenced and the roads are not even gated. Guys from the local communities, they come in with their fishing gear and are not always noticed. It's too easy to come and go".

The physical infrastructure at TMNP was far more developed than at CANP. Access to the park was controlled via fencing, gates and visitor fees. Parking areas were also monitored, though mainly to prevent property crimes (theft from vehicles) rather than the detection of poachers. While these characteristics did not prevent the illegal harvesting of abalone, this method of target hardening provided a first line of defense for the marine resource from land based poachers. While TMNP, which is just slightly larger than CANP, was more secure with fencing and gates, terrestrial access for poachers was still easy. The findings revealed that poachers enter as tourists paying the visitor's gate fee, camp out in the bush and dive at night. Interviewee R-6 explained, "they [poachers] come in groups, in separate cars with the diving gear separated in different vehicles to keep it from being noticed." Once in the park they collected their equipment, accessed the coast and began diving for abalone.

Initially it appeared that natural physical features in both parks would serve as some degree of protection for abalone from illegal harvesting. These included the rugged coastlines and open ocean with strong currents and waves. However the interviews revealed that coastal areas including both rocky and sandy shorelines offered no serious deterrent to a poacher. These barriers were easily overcome as abalone is located in relatively shallow depths that can be readily accessed with scuba gear even in poor weather by motivated offenders.

While some poachers set up their operations within the park, other groups accessed the fishery from vessels. They represented a more serious threat both to the species and ranger staff given the size of their harvest and their willingness to defend it and their equipment (which is subject to asset forfeiture) with violence. The interviews indicated that most of the poachers operated from boats dive at night to limit the chance of being observed. Interviewee R-6 at TMNP described their technique: "Divers use lights on their masks with the lens covered with blue cellophane to soften the light and make it less detectable. You can hear them out there at times. They can be loud. You know, full diving gear, compressors running on the boats."

The literature, field interviews and observations further revealed that the characteristics of abalone greatly facilitated its ease of harvest by poachers. While many desired targets of poachers are mobile, located in difficult to access areas, and can be dangerous to hunt (elephant, rhinoceros, brown bear and tiger) Abalone is quite the opposite being

a stationary, slow-growing species found on the sea floor. Furthermore, the majority of South Africa's wild abalone are found in shallow coastal waters making for relatively easy access, ideally with scuba diving equipment.

Further contributing to the suitability of abalone for the poacher is its relative ease of movement through the chain of poachers, middlemen and retailers. The interviews and observation revealed that once harvested, abalone is secreted and eventually transported in a fairly uncomplicated manner. Abalone harvested by divers operating in boats is initially put in mesh diving bags, placed on the vessels and taken away for sale to local buyers. At other times if divers were concerned about detection by rangers, the mesh bags were temporarily tied to the sea floor. The poachers returned later, sometimes during bad weather which reduced the likelihood of ranger patrols, to retrieve the bags. For those operating from the shore, the bags of abalone may either be immediately moved out of the park in cars or by foot, or temporarily hidden waiting for pickup by carriers. Interviewee R-7 at TMNP described this method to the researchers: "They use carriers, black guys from the local communities, to pick up the bags and move them out of the park. We can sometimes spot them. Their pants bottoms are usually wet." During the data collection, the researchers were present when rangers found a cache of abalone while observing a truck driving slowly in the park with the driver looking at the roadside. Once investigated, the rangers recovered a green mesh nylon diving bag secreted about four meters off the road in a culvert. After booking it into evidence, it was revealed that the bag contained about 300 raw abalone.

## High economic value and strong demand

A consistent theme among the respondents was the ease of selling abalone to local buyers for a quick profit. Interviewee R-14 at SAPS stated: "They have no concerns finding buyers. The Chinese gangs recruit locals to poach or smuggle abalone out of the parks. Guys working with the gangs know the buyers are always there." The findings and the literature revealed that raw abalone wholesales for about $40 per kilo in South Africa (Rogers 2010) but the value increases steadily as it moves from middlemen to retailers. The shells are also sold, albeit for much less than the fish. The interviews revealed that the abalone moves through four or five stages before reaching a retail market in Asia. After selling the raw abalone, it is processed or dried which reduces it size to about 10 % of wet abalone. Dried abalone can last almost indefinitely and be rehydrated. Not only does this process remove its strong fishy odor, but is also allows for larger amounts to be easily moved. While at a SAPS headquarters location the researchers were shown stacks of dozens of plastic and foam coolers containing dried abalone confiscated from smugglers in previous police operations. Furthermore dried abalone is less recognizable to customs officials than wet abalone facilitating its export (Steinberg 2005). Asian buyers in South Africa may pay about $150 per kilo. After processing, the abalone is shipped by middlemen overseas to Asian wholesalers with an estimated value of approximately $350 per kilo. Abalone is sometimes transshipped from the Western Cape through Mozambique or Zimbabwe which

lack laws prohibiting the possession of this species. Once exported out of the continent to the final retail market in Asia, prices for consumers have been documented to be as high as $3900 per kilo (Chen 2012).

## Motivated offenders

Motivated and likely offenders is defined in this study as "those individuals who engage in abalone poaching." The data indicated that abalone poachers fall three general categories based on their motivations and methods of poaching. These were classified as (1) local residents and visiting tourists; (2) small-scale organized poachers; and (3) large, formal commercial operations. The number of poachers in the two research sites was high due to the close proximity of residential areas to the parks with high populations of the unemployed and poor, and historical use issues. The data also revealed some instances of limited involvement of park employees in actively poaching abalone or assisting poachers. Interviewee R-4 spoke of the problem of official corruption claiming, "the police and marine coastal guys are involved … its corruption." However, an insufficient amount of data was available to either confirm or deny this claim. As a result, it was not included among the categorization scheme used in the findings.

## Local residents and visiting tourists

Within this category are individuals from impoverished local communities adjacent the national parks who poach for both personal consumption and profit, or assist in smuggling abalone out of the park. Complicating the presence of large human populations adjacent the parks is the issue of historical use of the fishery by residents living in these communities. This was a contributing factor in CANP which was established in 1998. Prior to the creation of the national park, the abalone resource was accessed by the local community for decades providing a delicacy for personal consumption and a marketable commodity. With the establishment of the park and its protected offshore area, it was then closed off with the practice made illegal. The interviews revealed the criminalization of abalone fishing after the park was created has been a source of friction between park management, rangers and the local community. Respondent R-2 stated: "The public view is that it is mine because of past historical use. They have been fishing here for decades and can make a lot of Rand off the abalone if they choose to sell it. Now they are prohibited."

Also included in this category of poacher are what the researchers classified as *opportunistic tourists*. These are generally wealthier South African tourists visiting the parks whose motivation was to poach small numbers of abalone for personal consumption rather than for resale. To avoid detection by rangers, the opportunistic tourists may avoid using scuba diving equipment. The data indicated that their illegal harvest of abalone was low due to their methods and motivations. Similar to the previous type of poacher, this group also had a lengthy history of use of the resource. One study participant (R-19), describing his visits to TMNP with friends noted, "We always tried to take a few for dinner when we were at the Cape. They are great. We all did it when we were younger." As a result, while still violating the law this group did not represent a major threat to the abalone resource.

### Small scale organized poachers

As noted in the previous section, the abalone fishery was illegally accessed by small scale poaching operations consisting of groups of a few divers entering the park under the guise of being tourists. Unlike the above-mentioned poachers, the interviews revealed that these individuals were commercial poachers taking larger amounts of abalone for later resale to Asian middlemen. Once in the park, they operated either in daylight (if rangers were not present) or at night secreting their catch in their vehicles or in the park for pick up by carriers. The bagged abalone was generally hidden in the brush a few meters off a road in the park. The carriers were then notified of where to look for the contraband. Instances of theft among thieves was also reported to the researchers. Describing their operations, Interviewee R-8 stated: "They mark their bags with colored tape to identify ownership before they stash them in the park. Sometimes they steal from each other. There's no honor among these thieves." This type of land-based poacher was viewed as a threat, though not always as serious as those operating in boats. The sheer size of their illegal harvest was often smaller than those accessing the fishery by vessel. The risk of apprehension was greater since they needed to smuggle the abalone out of the park by vehicle.

### Commercial poachers

The concept of *commercial poachers* is operationalized to refer to groups that illegally harvested abalone strictly for profit via providing large amounts of the resource to Asian buyers. The interviews indicated these were the most sophisticated organized poachers in the two parks employing intelligence collection of ranger operations, modern fishing vessels, scuba equipment and firearms to defend their catch from both other poachers and rangers. As a result, this type of poacher represented the most severe threat to the species due to their capacity to harvest abalone in large quantities, and to park rangers because of their willingness to use violence to defend their illegal catch.

Paralleling law enforcement, the findings revealed that these well-organized gangs collect intelligence on ranger operations to facilitate their poaching and as a method of intimidation. Interviewee R-3 noted: "They observe rangers at their homes and see when they leave for work." This practice allowed them to identify the homes and working hours of rangers. It also served as a source of intimidation if poachers were confronted by rangers. Furthermore, these commercial poachers operated from vessels equipped with full diving gear. The high economic value of the illegal abalone trade allowed for these groups to both lease and buy fishing boats. Interviewee R-6 described an aspect of this practice: "Sometimes non-poachers buy vessels and informally lease them to poachers. They [poachers] eventually collect and sell enough abalone to buy the boat from the owner." During the field visits the researchers were shown confiscated poachers vessels at TMNP. Three modern, high speed twin engine fishing boats, about 25 ft in length were sitting in a storage shed at the park. The expensive watercraft were fully equipped with compressors, lights, and diving gear. Even with these losses due to asset forfeiture, the lucrative nature of the trade allowed for the poachers to obtain new craft.

Making this group the most dangerous was their willingness to use firearms and/or their vessels as weapons to defend their valuable illegal harvest. The interviewees told

the researchers that on several occasions shootouts occurred when ranger patrol boats approached poacher's vessels. Interviews and the literature indicated that at times poachers used their boats to ram ranger vessels during confrontations in the protected marine areas. While viewing the confiscated fishing boats at RMNP, the researchers observed bullet holes in the engine covers of the vessels. This was explained as the result of rangers returning fire at the poacher's vessels in an attempt to disable the engine. The use of violence was not solely against rangers. The findings revealed that these organized poaching gangs would steal from each other and there were occasional violent encounters between these groups inside and outside of the park.

## Capable guardianship

Capable guardianship is the final element of Routine Activities Theory which is defined in this study as *that which serves to deter*, *delay or detect poachers from harvesting abalone*. A lack of capable guardianship, especially in poor disorganized areas combined with the presence of motivated offenders fosters criminality (Cohen and Felson 1979). Capable guardianship in the two national parks is examined in the context of field rangers and man-made physical protection measures.

## Field rangers units

Central to the guardianship of the marine resources in the national parks are the field rangers. Each park employed a contingent of rangers, however their organization and responsibilities of these units varied across the two national park sites. This was found to be a function of the ranger's level of training, park requirements beyond anti-poaching, and the amount of infrastructure development of each park. At the time of the study, CANP was still in the process of being developed with additional staffing and infrastructure improvement planned for the future. The park was staffed by one section ranger responsible for supervising six field rangers. Even given the constant and serious problem of abalone poaching, the ability of the ranger staff to conduct anti-poaching was hindered by their ranger qualifications and extensive non-law enforcement duties. Specifically, the ranger staff's main responsibilities included biodiversity monitoring, park maintenance, and visitor assistance. At the time of the study all of the rangers at CANP lacked training qualifications for law enforcement operations outside the park which included the protected marine areas. As a result, when they observed poaching they were prohibited from confronting the suspects. Rather they were required to request the help of the police or SANParks agents. This glaring weakness greatly detracted from the guardianship capabilities of the rangers at this park. Further complicating the ability of the guard forces to detect poachers was the lack of a 24 h staff presence in the park. Combined, little effort could be made at this park to deter or apprehend abalone poachers. The interviews indicated that the situation would improve over time when ranger staffing increased and training expanded.

The situation at TMNP shared some of the guardianship deficiencies with CANP but due to it being more heavily visited, well developed and better staffed, it also provided a more effective response to poaching. Similar to CANP, Table Mountain's ranger staff was also charged with a wide range of tasks beyond law enforcement. Part of the ranger contingent was involved in biodiversity management, visitor assistance and protection,

and park maintenance. However, unlike the more recently established CANP, the ranger contingent also included a well-equipped and highly motivated law enforcement unit that focused heavily on abalone poaching in addition to property and violent crimes that may occur within the park. Interviews and observations revealed that the law enforcement unit maintained night vision and thermal imaging equipment, and several high speed patrol vessels. Furthermore, the successful use of asset forfeiture laws allowed the unit to keep seized boats, automobiles and diving gear confiscated from poachers. These assets can either be used for enforcement or sold to fund operations both sustaining and enhancing their enforcement capabilities. While abalone poaching still occurred at TMNP, the ranger contingent was actively and aggressively working to deter and apprehend poachers. The performance of this group were demonstrated by its successful abalone and asset seizures. Respondent R-14 noted: "We constantly use observation points and intel to find them. It's the best way to operate. Otherwise you are wasting time."

A second issue that influenced capable guardianship was described by supervisory rangers as *a lack of commitment* to the career among some field rangers. Supporting the findings in the contemporary literature (Moreto 2015; Ogunjinmi et al. 2008; Serge et al. 2009), the rangers noted that some recent hires viewed it as just a job and lacked dedication to conservation. Respondent R-2 noted: "… you need to get the right people into conservation. It's a way life, not a job. Get up early and work until you are finished. A lot of it is farm-like work that lacks appeal to many new rangers." Paralleling this complaint was the issue of shirking by some field rangers brought up by respondents at TMNP. Detracting from the resource guardianship were instances of rangers intentionally failing to complete their patrol, typically on days with bad weather. The supervisor noted that occasionally a ranger patrol would sit-out their tour in park shelters returning later in the day claiming they completed with rounds. The ranger inefficiencies were exacerbated by the loss of more experienced and well trained rangers to higher paying jobs in the private sector. Furthermore, the loss of these individuals limits the availability of senior rangers who can mentor and motivate new rangers and detracts from the effectiveness of the park's guard force.

## Conclusions and recommendations

A necessary step in advancing the study of the illegal trade in wildlife, a major transnational offense, is the application of theoretical explanations. While a considerable body of literature on this phenomena exists, much of it is descriptive in nature focusing on species decline, poacher and trafficker operations and enforcement efforts. More recently, researchers have applied criminological and economic theory to explain various aspects of the illegal trade and develop solutions. The objective of this study is to contribute to the previous research by examining the efficacy of routine activities theory in explaining abalone poaching and developing solutions to the problem.

While this study is exploratory in nature and of a limited scope, it builds upon the contemporary theoretical approaches to the study of the illegal trade in wildlife. The findings analyzed in the context of routine activities theory reveal unique aspects of abalone poaching including vulnerabilities in species protection and solutions. Abalone is a highly suitable target for the illegal trade. The lack of difficulty accessing the

fisheries from the parks; the relative ease of harvest; and the high economic value and strong consumer demand all contributed to the desirability of the species for exploitation. This situation is unlikely to mitigate on its own as the Chinese economy expands and its middle class increases along with a corresponding demand for exotic delicacies.

The presence of motivated offenders is clearly demonstrated in the findings. Offenders were categorized in three basic categories – local poachers, small scale commercial poachers operating from within the park, and commercial operations operating from vessels. The social issue of historic use of the marine resource prior to park's creation combined with the presence of large populations of low income South Africans living adjacent both parks combine to create a pool of motivated poachers, some of whom that do not consider abalone harvesting in protected areas a crime. This group also includes what was termed as *opportunistic tourists* who claimed a long history of taking abalone for personal use. While this group represented a threat to the survival of the species it was minor when compared to the other types of more sophisticated commercial operations. The two types of commercial operations were capable of harvesting abalone is large amounts with significant negative impact on the resource. Furthermore, the profit from large scale harvests not only encouraged them to aggressively poach but also use violence to defend their catch from rangers and other poachers.

The final element of routine activities theory - capable guardianship, the results indicated that varies in its ability to preventing abalone poaching. While the physical features of a park, both man-made target hardening and natural aspects offered some guardianship to the species, they were of limited value. Motivated offenders easily overcame these obstacles to fish. As a result the ranger units therefore provided the main line of defense. The findings identified some glaring weaknesses in ranger forces including limited training and numerous responsibilities beyond anti-poaching that precluded some from conducting enforcement operations in marine areas. Relating to the findings of previous studies (Moreto 2015; Ogunjinmi et al. 2008; Warchol and Kapla 2012), the authors found a lack of motivation and dedication to the career among some, staffing limitations in terms of size and work hours, and equipment shortages influenced guardianship effectiveness of rangers. However the data also indicated that the presence of a dedicated law enforcement unit in the ranger force offered a deterrent to poaching. Yet, while the contingent at TMNP was well equipped, trained and motivated which resulted in abalone confiscations, asset seizures and arrests, it was still faced with a serious poaching problem.

The ability of the park rangers to function as effective capable guardians was limited by the multiple expectations for the rangers with respect to park maintenance and protection of the abalone resource. Park rangers were used to not only maintain the parks' infrastructure and assist visitors, but also to protect the abalone against different types of poachers. What may be a more effective strategy is to dedicate specific guardian resources based on the threat to the abalone. Specialized units of marine officers with law enforcement status, trained and equipped to match the threat presented by the commercial poachers could potentially provide the most effective guardianship to the abalone resource.

Contemporary technology also offers solutions to the problems with guardianship though there are costs. Ranger patrols can be monitored with modern global positioning systems allowing supervisors to track in real time their

locations and progress. This is a simple and relatively inexpensive solution to the problem of rangers not completing patrols or the need to redirect them to a location where poaching is occurring. Furthermore, consumer model unmanned aerial vehicles or drones can be employed to monitor marine areas and observe suspect individuals and vessels. This is a more expensive option but would allow rangers to view these areas from remote locations and deploy rangers only if poaching is suspected.

The difficulty of attracting highly motivated conservationists into ranger careers was an issue noted at both parks. A solution may involve specialized education in the value of conservation jobs at the secondary school level combined with higher salaries and well-defined career advancement tracks for new field rangers. Park management must take a very active role in improving morale, identifying rangers with strong potential for advancement and retaining these individuals. A reward and promotion system based on ranger performance can help to motivate employees to perform well, take on additional responsibilities and stay in the career.

A major challenge for law enforcement is the threat posed by Chinese organized crime groups who smuggle abalone to mainland China. These enterprises control the majority of the illegal abalone trade and therefore should be a prime target for enforcement agencies. However infiltrating ethnic criminal enterprises with police informants and agents is very challenging with the highly secretive Chinese gangs offering a difficult target for the police. However contemporary research on market based solutions (Schneider 2012) indicates that efforts in this direction may pay the largest dividends toward reducing poaching of abalone and the corresponding species loss. Requesting assistance from law enforcement agencies in the People's Republic of China may provide a solution.

Solutions to poaching also go beyond law enforcement confirming Hauck and Sweijd (1999) who argued that policing is not the sole answer. Resource management practices need to be considered and implemented that include programs designed to foster relationship building between park rangers and the public, both tourists and local residents. Respondent R-2 noted: "People need to know that the parks are more than a holiday place. They need to know why the park is there – to protect a resource." One solution is the implement a community forum to allow for locals meet with park management, express their opinions and work together toward solutions on reducing poaching which may include limited fishing permits for community members. Legally allowing nearby residents to access the resource can help to convince them of the value of protecting abalone from rampant illegal exploitation. This may lead to more willingness among local residents to discourage potential poachers or inform on offenders.

This study is not without its limitations the first being its small sample size and use of two sites for data collection. Obviously this does detract from the generalizability of the results. However, the goal of the researchers was not to conduct a comprehensive theoretical analysis of South Africa's illegal abalone trade to influence major policy decisions. Rather it was to complete a small scale exploratory theory-based study to serve as a foundation for future research. The results demonstrate the viability of routine activities theory in addressing this type of natural resource crime, identifying unique aspects of the offense and the offenders, and suggesting policy changes to reduce or prevent poaching.

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