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The Islamic Petroleum State:
A Study of US-Led Airstrikes Against ISIS's Oil Network in Iraq and Syria

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ABSTRACT

This dissertation will explore the US-led coalition's strategy for disrupting ISIS's oil network in Iraq and Syria. Scholars have debated the desirability of third-party interventions and strategies for countering financing structures of violent non-state actors. However, remarkably limited research exists on ISIS's estimated largest source of revenue during the existence of its caliphate: the production and distribution of petroleum. This study will therefore introduce a framework for analysing the military response enacted by the US-led coalition between September 2014 and October 2017. It will do so through a mixed method study that includes the first-hand generation and analysis of a dataset containing 5,768 unique data points that present both an insight into the strategy behind the strikes and vulnerabilities in ISIS's oil network. Findings demonstrate how the coalition was able to exploit vulnerabilities specifically in the production, transportation, and refinement stages of the production chain. It will be argued that, as the campaign proceeded, the coalition became increasingly willing to take risks of collateral damage as a means of improving effectiveness. These are findings that have implications for academic debates in two fields: that of terrorism studies and the field of conflict studies. This dissertation will, therefore, make use of an inter-disciplinary approach and demonstrate the often-neglected desirability of integrating both disciplines – as they complement and can build upon each other.

Keywords: ISIS • oil financing • strategy-making
third-party interventions • United States

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ABBREVIATIONS

AQI	al-Qaeda in Iraq
b/d	barrels per day
CENTCOM	Central Command
COIN	counter-insurgency
CT	counter-terrorism
DoD	Department of Defense (United States)
FATF	Financial Action Task Force
FWT	Financial War on Terrorism
GOSP/V	gas and oil separation plant/vessel
IRA	Irish Republican Army
IS	Islamic State
ISAF	International Security Assistance Force
ISF	Internal Security Forces
ISIL	Islamic State of Iraq and the Levant
ISIS	Islamic State of Iraq and Syria
LTG	lieutenant general
MAJ GEN	major general
mln	million
OTWII	Operation Tidal Wave II
p/d	per day
QUAL	qualitative
QUAN	quantitative
TPI	third-party intervention
UK	United Kingdom
UN	United Nations
US	United States
VNSA	violent non-state actor

CHAPTER 1: INTRODUCTION

§1.1 · Background

ISIS, IS, ISIL, and Daesh. These acronyms refer to an organisation that, according to Ryder (2018: 84), should be regarded as one of the world's best-funded terrorist groups to date. Scholars have acknowledged the relevance of trying to understand financing structures of violent non-state actors like this one. Jonsson and Cornell (2007: 69) note that research on terrorism financing specifically is vital for the implementation of effective counter-terrorism practices. After all, discovering how these organisations fund themselves is at the core of the implementation of effective policies designed to counter them. Without money VNSAs cannot function, and terrorist organisations specifically cannot conduct any terrorist attacks (Freeman, 2012: 3). Navias (2002: 57) describes countering terrorism financing as a form of 'economic warfare,' an attempt to undermine terrorist organisations' key pillars of political will and fighting power. However, this dissertation will demonstrate that the academic field of terrorism financing suffers from empirical gaps – primarily resulting from hardships in analysing often-classified government material and the sophisticated, underground funding routes these organisations employ nowadays. In sum, scholars in this field are torn between two forces: one that points out the pertinence of generating new knowledge, and one that refrains them from doing so due to these hardships.

Although this dissertation acknowledges the latter consideration, it will demonstrate that valuable academic knowledge can well be generated through the introduction of a new theoretical framework that will fill several empirical gaps. It will do so by studying the Islamic State of Iraq and Syria, or ISIS, in particular. Green (2017: 42) notes that the group's largest source of income came from its petroleum industry. In 2014 ISIS took control over an oil production and distribution network in Iraq and Syria, and thereby enabled itself to earn up to an estimated US$1mln per day through this natural resource (Tierney, 2017: 165). Despite this remarkable sum, ISIS's oil network and subsequent state responses to its petroleum funding have been subjected to a considerably limited number of academic studies. Notably, the United States – together with twelve coalition members – engaged in the conduct of military airstrikes to disrupt the network from September 2014 onwards. However, yet little is known about what this strategy entailed: what the US-led coalition regarded as vulnerable targets and locations in the network, the underlying strategy behind the airstrikes, as well as how ISIS responded to them – if at all.

On an academic level, this research gap requires an inter-disciplinary approach that combines the field of terrorism studies with that of conflict studies. Specifically, a study of a third-party intervention against ISIS cannot be disaggregated from the broader Syrian and Iraqi conflicts. Le Billon and Nicholls (2007: 630) note that, for the field of conflict studies, the generation of knowledge on the context in which conflict termination instruments are enforced by third parties can contribute to their future effectiveness. For the field of terrorism studies, Tierney (2017: 169) states that more research ought to be dedicated to the 'counter terrorism side of IS funding,' while Kiourktsoglou and Coutroubis (2015: 13) similarly argue in favour of the urgent need to study the ins and outs of ISIS's oil financing in particular. Although the group has lost its strongholds by the time of writing this dissertation, the value in studying this case lies in the fact that ISIS presented a unique set of circumstances that eliminated the possibility to use a standardised approach – or a 'silver bullet' – to disrupt its financing (Ryder, 2018: 88). As a result, valuable insights can be drawn by studying the implemented strategy to disrupt ISIS's oil network: as a key example of how an unconventional threat was attempted to be countered.

§1.2 · Research Questions & Findings

Based on the explained relevance of the topic at hand, this dissertation will answer the following research questions: How did the US-led coalition attempt to disrupt ISIS's oil network through airstrikes conducted in Iraq and Syria between September 2014 and October 2017? And why was this strategy chosen? Drawing on an original dataset compiled and coded by the author of this dissertation, an answer to these questions leads to new insights on two levels. First, it presents an insight into US-led strategy-making, specifically the underpinnings which have directed the coalition towards certain target choices. Consequently, one can identify if participating members opted for a population-centric approach, thereby accounting for the potential of collateral damage, or an enemy-centric approach. These concepts will be outlined in Chapter 2 in the light of the academic debate surrounding proportionality. Second, one can perceive how this strategy led to changes in ISIS's behaviour – if any. This presents an insight into, first, airstrike effectiveness and, second, ISIS's funding model and adaptation efforts. These findings also enable one to learn how groups like ISIS can finance themselves through natural resources: a topic that has often been overseen by scholars.

Resulting from this unexplored state of being, this dissertation will introduce a new approach to the study of this phenomenon. It will do so through a mixed method research design

consisting of a qualitative and quantitative part. As for the former, a quantitative content analysis will be conducted that involves the first-hand creation of an original dataset containing 5,768 unique data points – each of which I have captured and coded manually. These data points represent airstrike hits conducted by the US-led coalition on ISIS's oil targets within the mentioned timeframe. This dataset is, as far as I am aware, the first of its kind and thereby presents a unique perspective on the US-led strategy for countering the oil network. For the qualitative part, a secondary research method that involves the analysis of documents will be presented. This analysis will triangulate potentially biased data of the quantitative part, provides its variables, and enables the illustration of a framework for the interpretation of quantitative data. This framework concerns Ocakli and Scotch's (2017) stages of the oil production chain, which will be elaborated upon in Chapter 4. Finally, analysing the US-led strategy between September 2014 and October 2017 provides two advantages. First, this is the full timeframe in which airstrikes on oil targets took place, which circumvents the need to rely on samples. Second, it contributes to the empirical gap identified by Tierney (2017: 168) concerning a lack of research on changes in ISIS's funding over time.

In short, this dissertation will argue that the US-led coalition started the airstrike campaign by strongly attempting to limit collateral damage in Iraq and Syria, but that – as the campaign proceeded – it became increasingly willing to give up this commitment in order to improve airstrike effectiveness. As such, over the course of this study's timeframe the coalition's strategy moved steadily towards an enemy-centric approach: one that perceives the physical destruction of the oil network as principal, as opposed to a population-centric approach that would aim to reduce collateral damage to the fullest extent possible as a means to success. At the start of the timeframe, the coalition was unable to immediately reduce ISIS's oil production numbers, as it hit the wrong targets: those that could be repaired within an estimated 24 to 72 hours. Subsequently, as time proceeded, coalition members started to both increase the intensity of their strikes, while also increasing their variety in target choices. Concerning the latter, ISIS's lack of technological know-how in the extraction and refinement stages of the oil production chain made them attractive targets to be exploited, while trucks and trailers were the most-hit targets overall. However, throughout the analysed period, a lack of focus on the distribution stage of the oil production chain is noted. This is most likely the result of a heightened risk of civilian casualties involved in this stage, combined with relatively few volumes of oil that are present in retail hubs. Despite favourable results in limiting production numbers resulting from the shift towards a more intense approach, this study identifies

environmental damage resulting from ISIS's adaptation to the strikes. This has implications for debates surrounding post-conflict recovery in Iraq and Syria.

These results lead up to both theoretical and policy implications. On a theoretical level, this study presents a novel insight into recent US-led strategy-making in a multilateral setting while dealing with an unconventional threat. It does so through the generation of a novel dataset that presents an empirical contribution by itself. By integrating the fields of terrorism studies and conflict studies, the importance of distinguishing between terms such as violent non-state actors, insurgency groups, rebels, and terrorist organisations is revealed. Indeed, the effectiveness of treating ISIS as a terrorist organisation and thereby employing pre-set measures in light of the Financial War on Terrorism has been questioned. Hence, this case demonstrates the importance – on a policy level – of applying custom-made strategies that fit within a particular context rather than taking a one-size-fits-all approach. This study will also present an example of a step-by-step academic analysis to draw a picture of a target actor's logistical network. For example, it will confirm the vulnerability of geographical locations such as Dayr Az Zawr and Ar Raqqah in Syria, but will also reveal how Ninawa in Iraq and Hims in Syria served as important transportation hubs for ISIS's oil industry. As the US-led strategy in countering ISIS's oil network remains a relatively unexplored area, this study will invite other researchers to use the newly generated dataset to draw further insights into academic debates surrounding the resource curse, the role of oil in post-conflict trajectories, and strategy-making.

§1.3 · Chapter Overview

After this introductory chapter, the dissertation will proceed by a critical literature review. This will be presented in Chapter 2. Here academic debates in the disciplines of terrorism studies and conflict studies will be introduced, which will set out the theoretical underpinnings of this research. Subsequently, Chapter 3 is dedicated to the justification of the selected research design and methodology. Good practices for both the quantitative and qualitative parts will be laid out, which includes the acknowledgement of methodological pitfalls. This chapter will also detail how ethical considerations have been integrated into this study. Following this, Chapter 4 will present the empirical findings. This will start with an investigation of ISIS's oil network and the trade-off, which this dissertation labels the "macro-trade-off," that the US-led coalition had to consider for balancing target effectiveness with limiting collateral damage. A temporal approach is subsequently introduced that will analyse how this trade-off was handled in practice through the intensity of strikes and an investigation of target choices. The analysis will then

move from a temporal to a geographical approach to ensure that the research questions are answered in full. All findings will, finally, be summarised in Chapter 5. This chapter will also link this study's results to academic debates discussed in the literature review, draw policy implications and conclusions, as well as final recommendations for further research.

CHAPTER 2: CRITICAL LITERATURE REVIEW

§2.1 · Introduction

Scholars including Keatinge and Danner (2019: 4) have noted that terrorist organisations face a continuous struggle to fund themselves for the pursuit of their strategic and tactical objectives. As such, the starting point of this chapter is a critical review of currently existing literature in the academic field of terrorism financing. Key scholars that have laid the groundwork for the study of terrorism include Walter Laqueur (1999), David Rapoport (2001), Brian Jenkins (2006), and Martha Crenshaw (2011). This dissertation will build upon their influential works and critically evaluate areas of controversy, limitations, as well as the current state of research of the topic at hand. As will be argued, this discipline suffers from a lack of attention to novel ways of terrorism financing and will, by itself, prove unable for the construction of a theoretical framework that allows for an interpretation of ISIS's funding model. Therefore, attention will subsequently be drawn towards the field of conflict studies. It will be argued that an integration between both disciplines is desired. Each provides crucial theoretical underpinnings which, only when combined, allow for a full understanding of the role of petroleum in ISIS's financing and its implications on the onset of civil war and the desirability of third-party interventions.

§2.2 · Reviewing the Academic Field of Terrorism Financing

§2.2.1 Historical Contextualisation

When decomposing the concept of "terrorism financing," two separate concepts appear – terrorism and financing – the first of which has been the subject of widespread definitional debates. Numerous attempts have been made to define terrorism (see for instance Kaczkowski, Lokmanoglu, and Winkler, 2019; Armborst, 2010), but the absence of consensus remains. Schmid (2004) has outlined several features inherently involved in this phenomenon, most importantly by placing it in a political context. As such, terrorism would be a violent instrument of a broader ideological or political strategy, with the aim of communicating a message to a given audience (Schmid, 2004: 200, 203-206). Here, the direct victims of a terrorist attack – non-combatants – serve as an instrument for receiving the attention needed through the attack's shocking nature. However, scholars' discussions of power, subjectivity, and legitimacy continue to obstruct reconciliation towards a common definition (Blackbourn, 2011: 147). By taking a critical perspective, Ramsay (2015: 211) points out that these debates are unnecessary, as the concept can – and already has been defined a multitude of times. However, according to

him, terrorism should not be defined, as its precise nature is context-specific, thereby obfuscating rather than clarifying its meaning by engaging in these debates (Ramsay 2015: 212).

Unavoidably, when the word "financing" is added to this concept, a degree of ambiguity remains. Still, Zubair, Oseni, and Yasin (2015: 153) state that the term generally refers to 'the funds and other property made available for use by (…) terrorists as well as in relation to the proceeds of terrorist activities.' However, this definition does not provide clarity as to when regular flows of financing change into financing for purposes of terrorism. For instance, if an individual purchases counterfeits without awareness that this money will be transferred to a terrorist organisation, it remains unclear if the buyer has been involved in an act of illegal nature. In order to solve this definitional problem, Article 2(1) of the 1999 UN International Convention for the Suppression of the Financing of Terrorism provides a necessary tool for specifying who can be deemed responsible for such behaviour (United Nations, 1999):

> Any person commits an offence within the meaning of this Convention if that person by any means, directly or indirectly, unlawfully and wilfully, provides or collects funds with the intention that they should be used or in the knowledge that they are to be used, in full or in part, in order to carry out: (…) [a]n act which constitutes an offence within the scope of and as defined in one of the treaties listed in the annex; or (…) [a]ny other act intended to cause death or serious bodily injury to a civilian, or to any other person not taking an active part in the hostilities in a situation of armed conflict, when the purpose of such act, by its nature or context, is to intimidate a population, or to compel a government or an international organization to do or to abstain from doing any act.

Importantly, this definition was adopted shortly before academic scholarship on terrorism financing accelerated in both volumes and depth. After the September 11, 2001 attacks, this previously understudied field gained momentum. Overall, these new studies shed light on two gradual changes in the nature of terrorism financing over time (Ryder, 2018: 80). First, terrorist organisations have become able to fund themselves through a plethora of sources. Second, the relative cost of conducting an act of terrorism has reduced over time. Taking the first point, in the 1970s terrorist organisations relied on financing through means that Jonsson and Cornell (2007: 70) have dubbed 'unsophisticated,' specifically state sponsorship, violent crime, and diaspora support. For instance, the IRA generated money through smuggling, theft, and extortion, was supported with weapons and resources by Libya's Gaddafi regime, and also received financing from Irish-American diaspora communities (Petrova, 2019: 2164; Tierney, 2017: 162; Freeman, 2011: 470).

Now, the identified diversification of funding sources can be perceived in light of Rapoport's (2016) wave theory for understanding political terrorism. This theory builds upon

the notion that a predominant and trans-national energy shapes the nature of terrorism and drives these trends into an expansion and eventual contraction phase. The IRA would fall under the second, anti-colonial wave, which was preceded by an anarchist wave starting in the 1870s and followed by a new left wave between the 1960s and 1980s (Auger, 2020: 88). Yet, research on the September 11 attacks demonstrates that Sunni Islamist organisation al-Qaeda – which would be part of the fourth, religious wave of terrorism – had access to a financing network that was unprecedented in its robustness, resilience, and complexity (Jonsson and Cornell, 2007: 73). From this literature I deduct that, as waves pass by, so do financing strategies. For example, Ryder and Turksen (2009, 308) argue that the prominence of state-sponsored terrorism has been in decline, while reliance on private sponsors has increased over time. Furthermore, as new technologies emerge, studies into terrorism financing increasingly have to deal with complex techniques that aim to bypass detection by monitoring bodies (Gómez, 2010: 14). This has resulted in new puzzles on how to counter these sophisticated financing methods in the twenty-first century.

Overall, several sources of terrorism financing have already been noted. Freeman (2012: 4) has divided these into four categories: state sponsorship, illegal activities, legal activities, and popular support. Illegal activities would include drug trafficking, bank robbing, kidnapping, and extortion, while legal means would consist of the use of legitimate businesses. Popular support exists in the form of charities, donors, as well as through the introduced diaspora communities. The fact that academics such as Aliu et al. (2017: 101), Koseli et al. (2020: 2), and Dingji Maza, Koldaş, and Aksit (2020: 3) have taken over this distinction between legal and illegal activities gives the impression that this has become common practice. Understandably, this label refers to the nature of the funding source itself. However, coming back to the definition stated in UN Article 2(1), an individual that 'provides or collects funds' commits an offence, meaning that this classification is broad enough to account for each of these different types of financing. In other words, also the 'legal activities' are, factually speaking, illegal. Hence, this dissertation refrains from using this controversial terminology.

As introduced, the second insight identified by post-September 11 literature concerns the decreasing relative costs of conducting an attack. Clunan (2006: 570) distinguishes between two purposes of terrorism financing. One is for conducting terrorist operations, which refers to, for instance, funds for transportation, audio-video equipment, lodging, and illegal materials such as bombs. A second type refers to the financing of activities that support terrorist operations, propaganda, and training (Clunan 2006, 570). In other words, terrorism financing can be classified into a short-term set, namely direct costs for specific operations, and a long-

term set, specifically one for maintaining a broader network. Although being a form that is occasionally neglected, Danziger (2012: 213) notes that the latter is generally-speaking significantly more expensive than the former. When referring back to the above-mentioned changes over time, the IRA was able to inflict damage to the UK for costs that were approximately 130 times its own budget, while al-Qaeda managed to inflict 3,500 times as much damage costs to the US compared to its budget (Jonsson and Cornell, 2007: 74). This finding is in line with the stated rising possibility to conduct powerful acts of terrorism without losing a significant share of resources. Combined with the shown increase in diversified and complex financing methods, research in this field has become particularly valuable.

Still, this bird's-eye view of how changes in terrorism financing have been captured by scholars leaves open the question of how the nature of this phenomenon has evolved further after 2001. For example, Ryder (2018: 79) argues that the Financial War on Terrorism as introduced by US President George W. Bush shortly after the September 11 attacks is no longer fit to deal with contemporary forms of financing, such as that of ISIS. This US strategy is centred around sanctioning and attacking, for instance through freezing, confiscating, and criminalising financial assets of potential or known terrorists. These regulations have become embedded in US law, for instance in Executive Order 13224 for asset detection and blocking, as well as in international legislation (Selden, 2003: 491, 496-497). However, the two insights identified by scholars, particularly that of new and diversified methods of funding, may complicate this task.

This is the case as, firstly, diversification disperses the number of funding sources that need to be monitored. Secondly, reduced relative costs require a higher success rate of financing disruption to prevent terrorist attacks from happening in the future. Aldrich (2009: 28) adds that terrorist organisations have 'ridden the wave' of globalisation. For example, virtual currencies and possibilities offered by international banking complicate the disruption of terrorism financing even further. So, there is a need to, first, perceive how scholars have researched the financing mechanism of a terrorist group that is currently active. Second, based on these findings, it is important to investigate if Ryder's (2018) theory of the inapplicability of the FWT can be deemed correct. If so, this would point towards the need for academics to focus efforts on studying these "novel" methods of financing. Therefore, the next section will present an in-depth review of academic literature concerning financing by ISIS.

§2.2.2 Financing Structures of the Islamic State of Iraq and Syria

After ISIS proclaimed to be a worldwide caliphate in 2014, the study of this organisation took off. Academics have used the terms "ISIS," "IS," "ISIL," and "Daesh" to refer to this group, but this dissertation sticks to ISIS. IS is short for the Islamic State, which has been criticised for its blurred lines between Islam, Islamists and Muslims (Siniver and Lucas, 2016: 65-66), as well as between the organisation referred to in this dissertation and states that declare themselves to be Islamic. Both ISIL and Daesh are politically-laden, the former for building upon colonial associations and the latter for its occasional pejorative intent. ISIS is, instead, the most widely used term (Siniver and Lucas, 2016: 63-64), and should bear the least subjective interpretations. The group has stirred up the importance of studying terrorism financing, as it has been called the 'best funded terrorist organisation' of contemporary times (Shostak, 2017: 43).

Specifically, several scholars have explored how ISIS's funding mechanism has evolved over the time of its existence. Before turning into ISIS, the group served as a branch of al-Qaeda under the name of Tanzim Qaidat al-Jihad fi Bilad al-Rafidayn, shortly al-Qaeda in Iraq, between 2004 and 2006. Stergiou (2016: 191) notes that AQI employed the same fund-raising methods as its successor ISIS. Although this argument is partly true, it would be reductionist to assume that no changes in funding methods have happened over the years. Bahney et al. (2010: iii) state that AQI exercised tight control over its funding sources, which it organised in a hierarchical and bureaucratic manner. Referring back to Freeman's (2012) influential – albeit criticised – categories, AQI primarily relied on illegal, or criminal revenue streams including theft, extortion, and black-market sales. In fact, it is likely that several of the organisation's units were dedicated specifically to theft and extortion activities (Bahney et al., 2010: xiv, 39). Examples of these include real estate scams and theft of items such as cars and generators. As a result, Ruggiero (2019: 49) rightly identifies the overlap and blurred lines between terrorism and organised crime, which has been labelled the 'crime-terror nexus.' After AQI's succession, ISIS continued to rely on criminal activities, including kidnapping-for-ransom, robbery, smuggling activities, counterfeiting, extortion, and human trafficking (Blannin, 2017: 14, 16).

However, contrary to the assumption that the fund-raising methods of AQI equal that of ISIS, Tierney (2017: 165) argues that from 2014 onwards, when Abu Bakr al-Baghdadi took leadership, the organisation started to both expand and diversify its sources of funding. Keatinge and Danner (2019: 6) build upon this argument by stating that ISIS learned from

AQI's irregular and unreliable funding sources and, instead, secured its funding streams through internal and self-controlled operations. Although the organisation was self-sufficient under both names, and criminal activity has continued to play a central role in its financing, ISIS's expanding control over territory presented this opportunity. For example, the organisation began to rely on tax income from citizens under its control, such as taxing cash withdrawals, as well as the use of water, electricity, and roads (Stergiou, 192-195). Yet, studies in terrorism financing have primarily focused on non-territorial sources of funding, in particular the ones discussed above. This field of study is inherently prone to gaps in the literature, as the secrecy and development of sophisticated methods to hide money trails – exacerbated by the inability to access classified material – make this topic difficult to study (Tierney, 2017: 168). However, it overall pays little attention to the fact that terrorist organisations may also exploit territorial resources, thereby leaving room for further gaps that are not necessarily harder to analyse.

One exception to this statement is Jaafar and Woertz's (2016) work, which sheds light on the understudied topic of ISIS's financing through agriculture. They identify that the organisation regarded infrastructure such as silos as assets of strategic value, which resulted in a stable source of income (Jaafar and Woertz, 2016: 14, 16). They also claim that agriculture was 'the predominant activity' in ISIS's territories (Jaafar and Woertz, 2016: 15, 23). An estimated US$200mln was raised through barley and rye production in 2015, which roughly equals the organisation's revenue from illicit art and antiquities trading (Green, 2017: 40). Although the importance of diversified funding methods that include agriculture and artefact trading cannot be neglected, Green (2017: 42) acknowledges – contrary to Jaafar and Woertz (2016) – that his studied funding method would not account for ISIS's largest source of revenue. Instead, another source of income through territorial resources, the production and sale of oil, formed its largest source of income (Green, 2017: 42). Stergiou (2016: 193) notes that ISIS's predecessor, the Islamic State of Iraq, was already able to secure a stable source of income through oil smuggling from the Iraqi Baiji refinery between 2006 and 2009. Subsequently, as the group gained more territory, ISIS became able to expand these production activities on its own soil – thereby surpassing the importance of agriculture.

However, ISIS's oil financing has been understudied. Indeed, Keatinge and Danner (2019: 1-2) rightly identify the absence of a focus on innovative terrorism financing methods among scholars in this field, and they specifically point towards ISIS's case as a key example of this undesired lack. One exception to this claim is Do et al.'s (2018) work. They use remote sensing to estimate ISIS's oil production over the years of its existence. However, this study

suffers from a small sample size and the absence of reliable price data (Do et al., 2018: 416). Therefore still, little academic knowledge has been generated on the exact functioning of the oil network and how this income could have been – or has been – countered. Jaafar and Woertz (2016: 14) do note that, similar to agricultural assets of strategic value, oil infrastructure such as refineries have been sought to be seized intact. This relates positively to the identified aim of establishing internal and self-controlled funding operations, rather than relying on vulnerable, external sources of revenue.

So, the above-mentioned statement that ISIS is commonly regarded as the best-funded terrorist organisation up to date lacks a crucial aspect. A group that controls territory where it implements its own currency, provides public services including health care and education, and even attempts to enforce parking laws (see Clarke, 2015: 163), can and should not be merely treated as a terrorist organisation. Indeed, neither of Clunan's (2006) earlier-discussed categories of terrorism financing would account for these money flows, as they go beyond terrorism-related expenditures. Instead, Beccaro (2018: 211) characterises ISIS as a proto-state. Coming back to Ryder's (2018) hypothesis, it therefore appears possible that the sanctioning and freezing of assets renders insufficient in disrupting the group's income. ISIS developed its own sub-economy (Saltman and Winter, 2014: 55), the size of which was comparable to that of small low-income states (Hansen-Lewis and Shapiro, 2015: 143). It thereby reached a degree of financial independence that could theoretically be hard to disrupt through legal processes. With this knowledge in mind, it is useful to shift attention away from the field of terrorism financing towards that of conflict studies. Literature in this field is likely to provide an additional framework for understanding ISIS's sub-economy and the predominant role of oil therein.

§2.3 · Terrorism Studies and Conflict Studies: Finding Common Ground

§2.3.1 The Relationship between Petroleum and Armed Conflicts

A lack of attention to oil in the field of terrorism financing can be compensated for specifically when reviewing how scholars have analysed the relationship between oil and conflicts. After all, ISIS's establishment of a caliphate, on oil-rich grounds, should be perceived in light of the broader Syrian Civil War and the War in Iraq. Among the most influential theories that seek to explain political dysfunction in resource-rich areas is that of the resource curse (see for instance Ramsay, 2011; Amundsen, 2014; Sala-i-Martin and Subramanian, 2013). One of the main arguments that fall under this theory is that the presence of petroleum triggers violent conflict

in both low- and middle-income states (Ross, 2015: 240, 251). In their quantitative study, Lei and Michaels (2014: 139) indeed demonstrate that in areas where oil discoveries have been made since 1946, the incidence of internal armed conflict rose by approximately 5 to 8 percentage points. This number increases when scrutinising states that have a past of armed conflicts and coups (Lei and Michaels, 2014: 154).

Furthermore, Basedau and Lay (2009: 767) identify an inverted U-pattern when investigating the relationship between these two variables. This has been visualised in Figure 1, with each of the four lines demonstrating different levels of oil dependence, but each showing a roughly similar shape (Basedau and Lay, 2009: 767). The perceived spike can be explained by means of the greed-based hypothesis. Clootens and Kirat (2020: 584) note that rebels interested in these resources purposefully start an armed conflict for obtaining access. In this case, social justice is a motive for starting a conflict, as increasing levels of inequality due to rent-seeking behaviour by those in power – following a resource boom – has increased levels of inequality (Clootens and Kirat, 2020: 584). Therefore, whenever oil is present in relatively poor areas or places predominantly inhabited by minority populations, the risk of armed conflict should increase. Ross (2015: 251) explains the subsequent drop by stating that, once a high amount of resource wealth has been reached, this becomes a stabilising force as it allows governments to either repress or buy off these rebel groups.

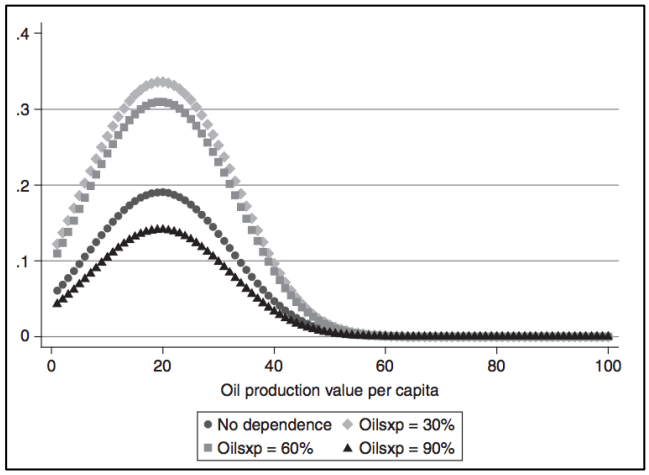

Figure 1: Effect of Oil Wealth and Dependence on the Probability of Civil War Onset

Yet, this leaves open the question of whether oil is unique, or if this trend also applies to other natural resources. De Soysa's (2015: 64) analysis points out that this relationship only exists between oil and civil war. This has resulted in the claim that the resource curse is predominantly an "oil curse." In fact, Lujala (2009: 50) argues that oil does not only increase the duration of

conflicts – based on her analysis, doubles them (Lujala, 2010: 15) – but also increases their severity. However, one prerequisite is that merely onshore, not offshore, petroleum has been shown to impact conflict risk (Ross, 2015: 251). Thus, applying this literature to the Syrian and Iraqi conflicts, oil resources in these states may pose a hurdle upon conflict termination, and potentially even transform the nature of these conflicts into a more extreme form. Therefore, one could argue that interventions are desired in these areas, as the absence of such involvement allows for the stated negative effects to take place. This need would become particularly pertinent considering the earlier-discussed possible inapplicability of the FWT, in the specific case of conflicts such as the one in Iraq and Syria where VNSAs generate large sums of money independently.

§2.3.2 The Debated Desirability of Interventions

Besides introduced measures of sanctioning, Lektzian and Regan (2016: 554) argue that civil conflicts can only be effectively shortened when these legal processes are combined with military interventions. Before this decision is made, third parties weigh the costs of an intervention against its benefits and any potential strategic interests (Bove, Gleditsch, and Sekeris, 2016: 1252). Academics have specified some of these benefits. For example, compared to the conflict termination instruments of sanctioning and revenue sharing, Le Billon and Nicholls (2007: 620) show that military interventions aimed at disrupting natural resource revenues are most successfully implemented with an 89% success rate. In contrast to interventions, sanctions may also prove ineffective due to enforcement difficulties (Lektzian and Regan, 2016: 557), and research suggests they are less successful in changing the target's behaviour (Le Billon and Nicholls, 2007: 616). Cragin (2015: 321) also notes that a focus on transit countries can aid in reducing money flows into and out of a conflict. Yet, it remains unknown if this would fully apply to the case of ISIS as well. Bove, Gleditsch, and Sekeris's (2016: 1266) research shows that the likelihood of stronger measures than these, namely military interventions, correlate positively with the military advantage of an intervening party over the conflict state. Importantly, besides military power, TPIs would also be more likely to happen if conflict states have large oil reserves (Bove, Gleditsch, and Sekeris, 2016: 1251).

However, it is debatable if scholars' arguments presented above provide a well-balanced insight, as the strategic interests of third parties may not necessarily align with those of conflict states on this matter. In line with this hypothesis, Humphreys (2005: 511) points out that conflicts on resource-rich grounds are likely to escalate even further once third parties get

involved. Academic literature on peace spoilers has long been present, with Stedman (1997: 5) arguing that these intervening parties even form '[t]he greatest source of risk' to conflict termination. Indeed, Gent (2008: 715) argues that third parties' primary reason to intervene is to influence the outcome of a conflict – not to generate a stable peace. Gaining access to natural resources, including petroleum, could be such a strategic interest at play. Therefore, the greed-based hypothesis as outlined by Clootens and Kirat (2020: 584) may not be limited to rebel groups, as this definition is too narrow, but should rather be applied to a multitude of actors in both a domestic and an international context. So, in light of continuing debates on the impact of military interventions, the argument has been made that TPIs can prolong conflicts (Lektzian and Regan, 2016: 555). In fact, in the case of conflict zones that have petroleum resources, research demonstrates that military interventions are less likely to be followed by a stable peace compared to softer measures like sanctioning (Le Billon and Nicholls, 2007: 629).

When linking these arguments back to the field of terrorism studies, military interventions for countering terrorism financing – or, rather, VNSA financing – have been strongly understudied. However, discussed opportunities for generating income through controlled territory, such as agricultural taxation or petroleum sales, can be targeted through seizing or damaging their roots, namely the outlined assets of strategic value such as refineries or fertile grounds. This would be a more direct approach for obstructing access to resources compared to softer measures like sanctioning (see Le Billon and Nicholls, 2007: 628), that aim to disrupt the movement of money after it has already been generated. However, what has been noted in this field is that military interventions under the umbrella of CT operations could, paradoxically, contribute to a terrorist organisation's strength. Acts of terrorism can provoke disproportionate responses from target states, which include the use of armed forces, that can draw populations to a terrorist cause and thereby increase their level of funding (Spaniel, 2019: 787). Satana and Demirel-Pegg (2020: 815) even argue that military CT measures would jeopardise democracy in the intervening state, as it creates the societal belief that a terrorist threat can only be alleviated through military means.

Yet, this is not to necessarily argue against the use of interventions. In fact, Koga (2011: 1161) finds no significant relationship between the presence of oil resources and the probability of military interventions. So, the debate remains unresolved. While difficulties in disrupting ISIS's oil revenues in light of the FWT have already been shown, this section demonstrates that an alternative, namely intervening, may be deemed desired but could work counter-productively at the same time. This would complicate the task of disrupting oil revenues of

organisations such as ISIS further. As such, an investigation is needed of what efforts were taken by the international community to disrupt its oil financing, if any.

Before this final point is tackled, the desirability of adopting an inter-disciplinary approach should be highlighted. The reviewed terrorism literature sheds light on one side of the coin, while conflict studies sheds light on the other. However, some academics in the former field regard terrorism as an exceptional phenomenon and refuse to analyse it by incorporating the richness of conflict studies (Toros and Tellidis, 2013: 2-3). It is commonly neglected by scholars that these two fields of study can benefit from the other's knowledge. As pointed out by Tellidis (2015: 6), the fact that TPIs in terrorist conflicts take place should have made terrorism researchers aware that an integration with conflict studies is desired. This integration would, as stated by Cox (1986: 209, cited in Toros and Tellidis, 2013: 3), construct a 'larger picture of the whole (…) and [seek] to understand the processes of change in which both parts and whole are involved.' Therefore, this dissertation will move away from treating terrorism as an isolated phenomenon. Based on Bryman's (2015: 225, cited in Esfandiary and Tabatabai, 2017: 465) argument, this merge is of particular relevance when researching ISIS. Contrary to al-Qaeda, which he frames as being primarily a 'counter-terrorism challenge,' he states that ISIS is both a counter-terrorism *and* a military one. This point will be elaborated upon in the following section.

§2.3.3 Zooming in on US Strategies for Military Interventions

The previous section has demonstrated the contested desirability of military interventions, but the question remains how states have – or have not – integrated the discussed potential negative effects of TPIs into their strategies. When scrutinising interventions undertaken by the US, Suhrke (2015) has identified different strategic approaches since the start of the Global War on Terrorism. For example, she frames Operation Enduring Freedom in Afghanistan of 2001 as an 'unambiguously enemy-centric' strategy that was focused on killing or capturing as many Taliban and al-Qaeda affiliates as possible – thereby also inflicting high numbers of civilian casualties (Suhrke, 2015: 102). In sharp contrast, COIN I campaign of 2003 (Suhrke, 2015: 105), but also the ISAF operation of 2009 (Felter and Shapiro, 2017: 45), focused on limiting civilian casualties as a means to strategic success. As such, a distinction is made between a population-centric and an enemy-centric strategy (see Paul et al., 2016: 1022-1023). The latter focuses on the physical destruction of an enemy as a principal to success, while the former places a focus on the population above the importance of destruction. So, the population-centric

school of thought opts for the use of as little force as strictly necessary to achieve one's goals (Miron, 2019: 458). This could eventually enable one to take over a VNSA's control over a population, thereby hurting the controlling actor, instead of defeating the enemy more directly. These pieces of literature are among the many that contribute to academic debates on the concept of proportionality, or the level of accepted collateral damage. Cronin (2013: 175-176) describes this latter concept as the 'unintentional or incidental injury or damage to persons or objects that are not lawful military targets.'

The relevance of this concept in the use of military action against groups that conduct acts of terrorism relates back to the earlier-mentioned argument of increasing support for a terrorist cause as a result of local populations' dissent with inflicted collateral damage. Besides, a population-centric approach can be useful as VNSAs such as insurgencies may rely heavily on popular support. However, despite differences in viewpoint whether defeat or compliance with laws of war should be the primary focus, both philosophies can refer to historical examples that prove their effectiveness (Paul et al., 2016: 1023). Furthermore, when applying this debate to military action against insurgent economies, Felbab-Brown (2017) notes that disrupting insurgents' labour-intensive illicit activities has a different effect on post-conflict reconstruction trajectories compared to economies driven by labour-non-intensive activities. More specifically, she argues that economies that provide livelihoods to a relatively large share of a population under control – which one could apply to ISIS's oil network – should not be suppressed. Disrupting these labour-intensive economies would, in fact, only hamper conflict mitigation, and there are other ways to destroy these sources of income without hurting local populations (Felbab-Brown, 2017: 107). Thus, when applying this debate and argument to ISIS's oil funding, on the one hand one can perceive the desirability – from a US perspective – of disrupting the petroleum network directly through military action. On the other hand, this review has also shown that scholars have questioned if these efforts would truly do more good than harm.

Despite this reservation, missile strikes against the organisation's oil infrastructure started being employed by the US-led coalition in 2014 (Ryder, 2018: 85, 88). Bringing all discussed elements of the critical literature review together, an understanding of the coalition's strategy in this specific case is desirable for several reasons. First, it would present an insight into recent developments of the US strategy in military actions under the umbrella of CT operations. Specifically, it would demonstrate to what extent collateral damage was attempted to be mitigated without having the possibility to rely on unilateralism – as decisions were made within a coalition comprising of twelve member states. Considering the discussed exceptional

value of an understudied manner of ISIS's financing, petroleum, an understanding of the US-led strategy to counter this would therefore also provide for unique, contemporary circumstances that would generate novel knowledge on this concept. Second, ISIS's oil revenue has not merely lacked scholars' attention, but Esfandiary and Tabatabai (2017: 465) describe how conventional military action was unlikely to have an effect on the unconventional threat presented by ISIS. This demonstrates a further need to investigate the nature of the US-led strategy, particularly as this would simultaneously reveal details of ISIS's oil network – most importantly where vulnerabilities were found that were exploited by the airstrikes. Academic knowledge of this financing source would also contribute to discussed debates on new methods of financing, specifically those related to territorial resources, the debated desirability of TPIs, and Ryder's (2018: 79) potential outdatedness of the FTW. However, despite this academic relevance of studying the US-led strategy behind airstrikes against ISIS's oil network in Iraq and Syria, an empirical gap in the literature exists here. This dissertation will therefore generate this desired knowledge in the upcoming chapters.

§2.4 · Conclusion

It has been demonstrated that the September 11 attacks have drawn academics' attention to the field of terrorism financing, but that rapid changes and increasing complexity in terrorists' financing structures – combined with classified, incomplete and inaccurate data – have left this field with unresolved gaps. This development, in addition to the argument that the case of ISIS goes beyond terrorism financing as it arguably ran a sub-economy as a proto-state, points towards a relatively unheard desire for an inter-disciplinary approach. Therefore, this literature review has discussed academic debates in both the field of terrorism studies and that of conflict studies. It has thereby not merely pointed out an empirical gap in the literature concerning how the US-led coalition attempted to disrupt ISIS's oil network, but also how this knowledge would make a desired contribution to scholarly debates in both fields. Finally, it should be acknowledged that a considerable number of the reviewed academic literature on terrorism financing refrain from clearly outlining their chosen methodology. This results from outlined hardships in collecting and analysing data in the field, but this neglect obstructs the presentation of verifiable – and hence reliable – results. Therefore, in the following chapter the methodological underpinnings of this research will be outlined transparently as a good practice for upholding the quality of one's research findings.

CHAPTER 3: RESEARCH DESIGN & METHODOLOGY

§3.1 · Introduction to the Research Design

This dissertation will generate knowledge through a mixed methods design. Specifically, a quantitative content analysis will be conducted to shed light on the independent variables of the case at hand. I have produced an original event dataset containing a total of 5,768 observations, which – according to my knowledge – introduces the first known full dataset capturing oil target hits by US-led forces in Iraq and Syria. This facilitates a unique and original analysis that will be supplemented by a qualitative secondary research method that involves the analysis of documents. This second part has the four-fold aim of generating the dependent variables for the study overall, for generating the input variables for the quantitative part, for providing a framework that allows for an interpretation of the quantitative findings, and for triangulating potentially biased data of the quantitative part. In §3.1.1, the choice of conducting a mixed methods design will be outlined, which will be followed by a justification of the case. Afterwards, both the quantitative and qualitative parts will be scrutinised and methodologically reflected upon.

§3.1.1 Presenting a Mixed Methods Study

The research questions under study consist of two components: analysing both how *and* why the US-led coalition conducted its military airstrikes against ISIS's oil network. These two components will be answered by juxtaposing a quantitative analysis of US-led airstrikes against oil targets, namely the possible cause, to a qualitative analysis of the state of ISIS's oil network and the organisation's behaviour, namely the possible outcome. At the same time, a thorough understanding of this network is a prerequisite for interpreting the American strategy against the network itself, meaning that both approaches inform and build upon the other. This has been visualised in Figure 2. So, this dissertation makes use of a mixed methods design by means of triangulation that merges the two types of research (see Venkatesh, Brown, and Bala, 2013: 24). More specifically, the study takes on what has been called by Williams (2019: 268) an "interactive" or "equal status" design, in which the quantitative and the qualitative analyses are presented sequentially to allow for an interactive integration of both parts, that are of equal priority. In full, the research design can be articulated as a fully mixed sequential equal status design (Leech and Onwuegbuzie, 2009: 269, 271), which has been coded as QUAL → QUAN in Morse's (1991: 122) notation system.

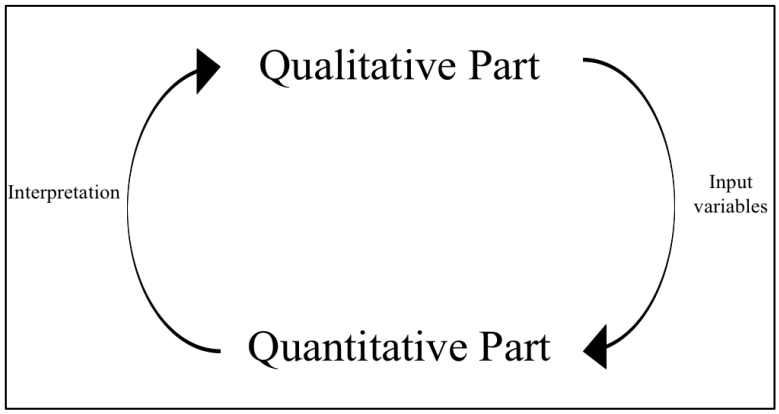

Figure 2: Qualitative and Quantitative Contributions to this Study

This research design is needed to adequately answer the research questions for two broad reasons, which will be specified in §3.2 and §3.3. First, data on both the nature and the changing state of ISIS's oil network can currently only be found in a qualitative form in documents. Other research methods are, as will be explained, unable to add upon or compensate for this. Second, the American-led strategy needs to be scrutinised through analysing the intensity of its airstrikes, including the nature of target choices and target locations. These variables can only be meaningfully assessed when generating quantitative data over the full timeframe of strikes, as small sample sizes are unlikely to present a complete picture of the strategy and would not adequately show any possible changes over time. In sum, when leaving out either of these two approaches, the study would overall render insufficient.

This design has advantages and disadvantages. As stated by Tavakoli (2012: 364), numbers can indeed be used to make words more precise, while words can be used to make numbers meaningful. Mixed methods and the use of triangulation allow for a more complete picture to be drawn by using complementary types of data. Accordingly, McKim's (2017: 203) research on mixed methods demonstrates that this integration improves the level of confidence one can have in a study's results. However, the notion of a peaceful coexistence between both approaches should nonetheless not be taken for granted. Denscombe (2008: 273) describes how this methodological movement disregards the underpinning ontological and epistemological assumptions of the two separate approaches and highlights the incompatibility of their respective philosophical premises. The duality of a positivist-inspired quantitative research position and the qualitative post-positivist position have led to the notion that mixed methods form an inconsistent system, one that does not comprehend the differences between the two paradigms (Mik-Meyer, 2016: 359).

Yet, this dissertation refuses to perceive the distinction between positivism and post-positivism as polar opposites without any common ground. Instead, it fully acknowledges and appreciates their differences, but simultaneously argues that it is more fruitful to perceive both philosophies as ends of a methodological continuum. This study employs pragmatism as the basis of its philosophical underpinnings, meaning that it is situated in the middle of this continuum to form a bridge between the two approaches. Indeed, Maarouf (2019: 1, 10) argues that the two philosophies are not necessarily incompatible, but – when combined – present a coherent approach that provides reflexivity to the researcher. This means that he or she is able to switch between alternative perceptions of social reality, and pragmatism has thereby become the third major research approach – one in its own right (Denscombe, 2008: 270).

Still, Creamer (2018: 527-528) articulates the risk of characterising a research design as mixed methods when both the quantitative and the qualitative parts are conducted separately and are only combined when drawing final conclusions. Creswell and Creswell (2017: 20) add that being involved in both approaches is time-consuming, after which one can be left with two under-analysed pieces of research rather than one rigorous whole (Mik-Meyer, 2016: 360). Firstly, however, this dissertation merges findings of both approaches sequentially, as the quantitative part will build upon the framework created in the qualitative part (QUAL → QUAN, instead of the criticised QUAL + QUAN). This integration happens during the analysis, not in the conclusion. Secondly, this study will also draw upon secondary data, rather than merely being involved in the time-consuming process of generating primary data. This refutes the argument of under-analysis out of time constraints. The rationale for this choice will be justified in §3.3.

§3.1.2 Representativeness and Theory

The choice of analysing oil targets hit in Iraq and Syria between September 2014 and October 2017 has been made based on several premises. First, the data source for the content analysis, US CENTCOM press releases, began on the 24th of September 2014 and ended after the 23rd of October 2017. So, this research will tackle the complete timescale of US-led airstrikes on oil targets, for a total period of 38 months. Second, Iraq and Syria have been selected as ISIS controlled territory in both states. Third, this dissertation quantifies oil target hits, not the number of strikes on oil targets, as the press releases do not allow for a determination of the aimed target of strikes, or which strike led to which – if any – hits. Therefore, a quantification of hits themselves circumvents the reduction of data quality out of these uncertainties. Finally,

as introduced in the literature review, ISIS presents an unprecedented case into non-conventional financing structures of VNSAs. Therefore, this study is not in the first place designed to generalise its findings, which refutes any arguments presented by scholars regarding non-generalisability or selection bias and cherry-picking for purposes of justifying pre-existing models (see Gerring, 2007: 6; Lazar, Feng, and Hochheiser, 2017: 168). Instead, the case should be perceived of as intrinsic rather than instrumental, which Bao, Pöppel, and Zaytseva (2017: 107) outline as being valuable for generating new knowledge about yet undiscovered phenomena. If more cases of a similar nature occur in the future, this dissertation can be regarded as an in-depth groundwork that can be built upon in both content-wise and methodological terms.

For example, the research design employed in this study resembles that of process-tracing, which exists in the form of a theory-testing, a theory-building, and an explaining-outcome approach (Beach and Pedersen, 2013: 3). Yet, the case and overall topic of this study is under-researched, which precludes the possibility of testing a theory or building one based on the stated research questions. The research nonetheless contributes to pre-existing theories, such as that of Humphreys (2005) concerning TPIs in conflicts that involve natural resources, but the nature of the intervention itself has lacked scholars' attention. At the same time, information on this topic remains scarce for the explaining-outcome approach that relies on entering a research cycle until a satisfactory explanation has been found. Once more similar cases occur, or once this research topic has been shed light on, future researchers are therefore encouraged to apply one of the three conventional approaches of the process-tracing method to the topic at hand.

§3.2 · Quantitative Part: Content Analysis

§3.2.1 Step-by-Step Procedure

A quantitative content analysis can be defined as a method that allows for the 'systematic, objective, and quantitative description of the manifest content of communication' (Berelson, 1952: 18, cited in Rourke and Anderson, 2004: 5). Specifically, I create an original conflict event dataset that involves the primary collection and coding of 5,768 unique data points and an analysis thereof. This analysis is undertaken in line with best practices in quantitative political science and security studies, which is a growing sub-field of study (see for instance Powell and Florea, 2021; Palmer et al., 2021). Importantly, practices as outlined by Salehyan

(2015) are carefully integrated into this dissertation, upon which this section of the methodology chapter will draw and elaborate.

As a first step, the sampling unit of this quantitative analysis is daily press releases published by the US CENTCOM. These are publicly available and accessible through its archives. For each day airstrikes on oil targets were conducted, hits are reported. This dissertation is not reliant on samples or inferential statistics but collects data by manually quantifying all hits on oil targets over the timeframe of the study. It will do so by coding single hits based on the following variables:

- Month and year of the corresponding press release, labelled *time* (e.g. October 2015);
- Target nature, labelled *tnat* (e.g. refinery, drilling rig, tanker);
- Target country, labelled *tcoun* (i.e. Iraq, Syria);
- Target province, labelled *tpro* (e.g. Salah ad Din, Anbar);
- Target place, labelled *tpla* (i.e. the most nearby city, town, or village, e.g. Mosul).

These categories have been selected as each gives an insight into what stage of the process from extraction to distribution were hit by US-led forces. The variables that fall under each category will be generated in the qualitative part that studies the network into depth, with the exception of the target countries as these exclusively consist of Iraq and Syria. The recording unit consists of one or multiple words, namely the variables, and the context unit of this study is the sentence in which these words are positioned – in case more details have been added. This is beneficial as a smaller recording unit reduces the need for subjective interpretations and thereby alleviates difficulties in coding (Halperin and Heath, 2016: 18). To ensure consistency, a codebook has been created that specifies the boundaries between the variables through the formulation of operational definitions that are both mutually exclusive and exhaustive. The codebook ensures consistency and transparency, and therefore reproducibility and validity of this study. It can be reviewed in Appendix A.

After this process of collection, the data will be analysed. Each monthly dataset will be sequentially presented, which allows for the detection of patterns and numerical generalisations. Any fluctuations in the intensity of strikes as well as target choices will be graphically visualised, as this allows one to identify when these have taken place. Subsequently, findings of the qualitative part will be juxtaposed to this analysis. This will, firstly, allow for an interpretation of the numerical data, and secondly enable the detection of any possible

relationships between the two parts. In order to aid this integration, the numerical findings will be sorted into five families that each represent a stage in the production process: extraction, transportation, refinement, and distribution (Ocakli and Scotch, 2017: 78). As a result, further knowledge is generated concerning which of these stages have been regarded – and in fact were – most vulnerable to disruptions. A more in-depth explanation of these stages will follow in Chapter 4.

As demonstrated by the chosen variables, this study will present both a granular temporal and a geographic analysis. As for the former, this approach is valuable as it allows one to perceive shifts in the US-led strategy over time. One should not assume the strategy was static: changes may have happened, which will be accounted for in a temporal analysis. In order to facilitate this, the dissertation will analyse the strategy between September 2014 and October 2017 by dividing these 38 months into five distinct phases – which ought not to be confused with the introduced *stages* of the oil production chain. Each phase marks six to ten months of airstrikes that together cover a predominant trend in target choices or airstrike intensity, a shift in the rationale behind the US-led strategy, or a combination of both. As a result, changes in the strategy can be more easily discerned, which also allows one to answer the second research question: an explanation of the chosen strategy, based on ISIS's response and effectiveness in prior phases that is captured in the qualitative part outlined below.

As for the geographic analysis, this part is valuable as – unlike other types of analysis – it demonstrates the areas that the US-led coalition regarded to be most critical to the network. When combining this data with the coded hits of target choices, one can perceive what type of oil targets were hit per geographic location, thereby accounting for a further explanation of the rationale behind the strategy. This geographic analysis is conducted in three layers (country, province, and most nearby city, town, or village) to ensure that enough detail is included and no false generalisations are made. Taken both the granular temporal and geographic analyses together, both research questions can, thus, be answered in full.

§3.2.2 Methodological Reflections

Scholars have outlined several risks inherent in a quantitative content analysis. Specifically, Oleinik (2011: 861) argues there may be a significant loss of qualitative information once this information is converted numerically. Sole reliance on this type of method could, therefore, make the social sciences a novel 'province' of the natural sciences (Oleinik, 2011: 860). Firstly, however, in this dissertation the quantitative analysis is supplemented by a qualitative one.

Secondly, the sampling unit that is subjected to quantification is a logical, not a rhetorical, type of text: one that is designed for the unambiguous conveyance of a message, instead of leaving room for interpretation. Each press release is structured in a similar way that contains little explanation and merely the necessary details of each hit. This also reduces any risk of misinterpretation out of different uses of tone, such as sarcasm, as these are uncommon in logical texts. As a result, representational reading is enabled for this research.

Still, as a limitation, it should be noted that airstrikes that have (accidently) inflicted heavy collateral damage might have been omitted from the public eye (see Salehyan, 2015: 107). After all, the US government is a conflict actor with control over the analysed press releases, and this power imbalance could result in biased data (see Bhatia, 2006). However, research such as that provided by Kocher, Pepinsky, and Kalyvas (2011) demonstrates that the use of potentially biased government data can still result in high-quality findings when handling the data in line with good practices. Therefore, although this limitation cannot be alleviated fully, the quantifications will continuously be compared to other press conferences and documents that present information on the number of strikes or hits on oil targets, to ensure that no significant distortions are present. This is one of the reasons why the dissertation also has a qualitative part (see §3.3). In addition, the US CENTCOM publishes monthly casualty assessments, which include statements on civilians killed as a result of US-led strikes. This does not guarantee that strikes have never been hidden for the public, but it does assure a degree of transparency regarding self-inflicted collateral damage. Finally, it is impossible to deduct from the press releases which targets have been hit specifically, as only approximate locations are published. This would provide plausible deniability of the coalition's involvement in attacks, without value being lost in public records – and hence this study.

Importantly, other research methods are unable to make up for these issues. Qualitative methods including interviews, surveys or focus groups would not capture the complete picture and are equally, if not more, prone to bias. Researching through direct contact is also time-consuming, while a lack of data availability is not the issue at stake. On the contrary, the required information is publicly accessible, and a quantitative content analysis offers the tools to systematically analyse these big volumes of government communications (Burnham et al., 2004: 236). In addition, the method is unobtrusive and gives key insights into government perceptions, attitudes, and strategies (Halperin and Heath, 2016: 14), as well as changes therein. This generation of knowledge is precisely what is needed to answer the stated research questions. Therefore, while taking regard of the above issues and paying particular attention to

ensuring coder stability and intercoder reliability through strict coding rules and consistency, this method remains most suitable for the study.

§3.3 · Qualitative Part: Analysing Documents

§3.3.1 Step-by-Step Procedure

In this second part, a qualitative secondary research method is employed through the analysis of documents. This process can be explained as the 'systematic approach to the use of existing data to provide ways of understanding that may be additional to or different from the data's original purpose' (Largan and Morris, 2019: 2). A key element of this part is that of synthesising. First, documents are collected based on three categories, each of which represents a sub-question that needs to be answered:

	Sub-question, incl. required variables
Category 1	How did ISIS's oil production process from extraction to distribution happen?
Category 2	What were key nodes and key locations in this process?
Category 3	To what extent did any changes in ISIS's oil production numbers, strategies, and related behaviour happen between September 2014 and October 2017?

Table 1: Three Sub-Questions of the Qualitative Part

These categories have been selected as the first one provides the contextualisation needed to interpret the findings of the quantitative content analysis, while the second category provides its input variables. Category 3 presents the dependent variables necessary to juxtapose the quantitative content analysis to. Here this dissertation builds upon Tierney's (2017: 163) argument that international pressure changes VNSAs' financing activities. Furthermore, in order to secure reproducibility, the search strategy in the collection stage will be briefly described. Academic search engines including the University of Glasgow, Dublin City University, and Charles University libraries are consulted, as well as the databases of JSTOR and Factiva. Particular consideration has been placed on ensuring that not only "ISIS," but also "IS," "ISIL," "the Islamic State," "Daesh" and "Da'ish" are used as search terms. This study will primarily collect data from the US Department of State, the US Department of Defense, the FATF, and academic journals such as *Energy Research & Social Science* and *Middle East Policy*. Reports consulted include those from The Washington Institute and the Syrian

Economic Forum, while news coverage is collected from for instance *The Guardian* and the *Financial Times*. Information in these sources is subsequently coded based on the three categories above, and each document is subjected to a critical appraisal process for securing data quality. This is done through a systematic review by means of answering the following of Bell and Waters's (2014: 163-165) assessment questions, which build upon Scott's (1990: 28) quality criteria of authenticity, credibility, representativeness, and meaning:

a) Document-focused critical assessment:
   1. What was the purpose of the document?
   2. When and in what circumstances was it produced? How did it come into existence?
   3. Is it typical or exceptional of its type?
   4. Is it complete? Has it been altered or edited?

b) Author-focused critical assessment:
   1. What is known about the author's social background, political views, aims, and past experiences?
   2. Did the author experience or observe what is being described? If so, was he or she an expert on what was being witnessed and a trained observer of the events described?
   3. Did the author habitually tell the truth or exaggerate, distort or omit?
   4. How long after the reported event did the author produce the document? Is it possible that their memory played tricks?

It should be noted that in the collection stage, inclusion is emphasised, as leaving out important documents may result in insufficient data. During the appraisal process, however, exclusion is emphasised, as this should rule out any confirmation biases. In other words, if gaps remain or if the answers point towards the fact that information may be biased or otherwise distorted, the document will be removed. This assessment is also required considering that data is bound by both time and history, meaning that interpreting data without regarding this threatens the study's internal validity (Tate and Happ, 2017: 311).

However, even when this is being accounted for, the coded data needs to meet the needs of the researcher. Therefore, during the next step, data compatibility will be tested. This will be done through examining the key variables of interest, specified in the above categories; the time period of coverage; and the location of coverage for each document. Attention will be paid to how authors have defined terms and measurements, as inconsistency among documents leads to the risk of combining incompatible pieces of information. Data that is compatible will, finally, be aggregately synthesised (Dixon-Woods, 2016: 417). What this entails is that documents coded within the same category are compared. This should demonstrate if they expand upon each other and can be synthesised, or if they provide contradicting information.

In case of the latter, and if this difference is unexplainable, the set of information will be omitted. This will finally present an overview of data that is compatible and that builds upon the knowledge generated in other documents. These results will be articulated narratively in Chapter 4.

§3.3.2 Methodological Reflections

The presented method is beneficial for several reasons. First, the above-mentioned three sub-questions are currently sufficiently answerable, as each document provides a piece of the bigger puzzle, but the pieces have not been connected yet. As a result, this method maximises the use of existing data (Tate and Happ, 2017: 310). While it is true that a method such as elite interviewing could provide new answers, the stated sub-questions can hardly all be fully answered in interviews. Instead, analysing documents allows for more information to be gathered within a shorter time span. Largan and Morris (2019: 30-31) add that this is particularly useful when studying sensitive topics. Indeed, human participants might not be willing to disclose information regarding VNSAs' activities while being under observation. Furthermore, due to the COVID-19 pandemic, person-to-person methods are complex to organise, and – based on university regulations – secondary and text-based data ought to be scoped to the fullest extent. Therefore, synthesising data provides new knowledge by means of putting the pieces of the puzzle together, which allows for the stated questions to be answered effectively.

Still, Bishop (2016: 439-440) notes that contextual features may be lost when data is reinterpreted. Building upon Hall's communication model (see Kropp, 2015: 13), a message is shaped based on its producer's perception of social reality, while the way in which this message is interpreted depends on the recipient's mental map. Indeed, contrary to the logical texts analysed in the quantitative content analysis, the documents scrutinised here are to a larger extent dependent on one's interpretation. The absence of non-verbal expressions in documents adds upon the risk that a piece of communication is decoded differently compared to how it was encoded. Therefore, awareness of one's positionality is crucial, and the adoption of reflexivity reduces this risk. For instance, one may be inclined to select information in documents that confirms preconceived ideas based on one's belief system and to ignore information that counters this (Del Vicario et al., 2017: 1).

The systematic appraisal process aids in critically assessing the documents under study, in order to step beyond biases like these. After all, interpreting data in good manners does not

only depend on how close one was to the process of its generation, but equally as much to what one makes *of* the data – one's analytical capabilities (Bishop, 2016: 440). Yet, one should always be prepared that, due to the understudied nature of the topic at hand, some gaps in knowledge persist. In fact, so-called "unknown unknowns" should even be regarded for, as there is always a risk that unimaginable pieces of information remain missing after the analysis (Pawson, Wong, and Owen, 2011: 543). However, this issue should be alleviated considering that the qualitative part aids in contextualisation and that, as per the codebook in Appendix A, variables can still be added after the quantitative content analysis has begun. What is of bigger importance is that the data is handled with reflexivity and that it is synthesised critically. Although some degree of the researcher's obtrusiveness is unavoidable, the adopted method will diminish this pitfall to the largest extent possible.

§3.4 · Ethical Considerations

Utmost care has been taken to ensure the integration of ethical considerations in this dissertation. Studies dedicated to ethics in terrorism research primarily focus on the conduct of field work, such as protecting the privacy of interviewees (Kenney, 2013: 36). Clutterbuck and Warnes (2013: 16) build upon this by outlining the importance of confidentiality, the prevention of inadvertent leaks, and the risk of misrepresentation of obtained information. However, as described, this dissertation does not rely on the generation of primary data through participants. Thorne (1998: 550-551) warns that, when analysing documents, difficulties in informed consent and confidentiality might still arise. However, the collected documents are available in the public domain and, in most cases, do not rely on primary human-to-human methods. In case they do, results have been anonymised to ensure confidentiality of the participants. This research design also renders safety-related measures for the conduct of field research (see Dolnik, 2011) irrelevant.

Yet, Jackson (2007: 249) argues that works in this field still present an 'authoritative judgement about who may legitimately be killed, tortured, rendered or incarcerated by the state in the name of counter-terrorism.' Although the subjectivity of the concept of terrorism has been discussed, this dissertation does not engage in value judgements about the military airstrikes under study. It thereby upholds Gorriti's (1991: 115) advice of ensuring a safe distance between academic research and the work conducted by state officials. By doing so, intellectual freedom and quality of scholarship are maintained (Gorriti, 1991: 105). As opposed to so-called orthodox terrorism research, which are policy-oriented and therefore tend to align

with national security interests (Mills, Massoumi, and Miller, 2020: 120, 124), this dissertation is not reliant on sponsorships. As a result, findings are not biased towards the interests of any party.

Furthermore, the requirements of Section 26(1) of the UK Counter-Terrorism and Security Act 2015 are integrated into this study. Research on terrorism may attract attention from security forces, due to which several measures have been taken. Specifically, this dissertation does not require access to websites that contain extremist material, including fora and social media, or websites that are potentially owned by terrorist organisations or affiliates, for example for the dissemination of propaganda. The only material relating to ISIS that may be downloaded is publicly accessible studies and reports. Although these do not represent terrorist organisations or their affiliates' perceptions, the documents will still not be stored on the researcher's devices. Additionally, the dissertation by no means induces individuals to engage in terrorist activity of any sorts. The recurring fact that the study relies on publicly accessible secondary material, in combination with these considerations, ensures that all ethical considerations are met in full. Thus, the dissertation does not perceive ethical issues as a distraction or barrier to research (see Mills, Massoumi, and Miller, 2020: 123), but rather as a stepping stone for the presentation of transparent, impartial, and high-quality results.

CHAPTER 4: EMPIRICAL FINDINGS

§4.1 · Introduction

In this chapter the results of the qualitative and quantitative parts are merged and presented. First, in §4.2 a preliminary framework will be drafted consisting of those findings that ease the interpretation of results in the following sections. It provides an overview of key elements of ISIS's oil network. Second, in §4.3 this framework will be used to analyse the coalition's airstrikes on ISIS's petroleum infrastructure. Five phases in the campaign have been identified, each of which corresponds to qualitative and quantitative developments that make a phased analysis valuable for understanding the military response over time – as justified in the final paragraph of §3.2.1. These five phases ought not to be confused with four *stages* of the oil production chain, which will aid the data-analysis through pointing out the process from oil extraction until its eventual distribution. In other words, temporal phases will be analysed for the profile of targets hit corresponding to different stages in this chain. Finally, §4.4 will take the empirical findings from a temporal to a geographical perspective and demonstrates which locations under ISIS control were perceived as most vulnerable to disruption. These findings will be summarised and a conclusion will be drawn in §4.5.

§4.2 · A Bird's-Eye View of the Network

Shortly before the start of the timeframe of this research, between June and September 2014, ISIS gained control over key oilfields, refineries, and centres of commerce in northern Iraq and north-eastern Syria (Clarke et al., 2017: 8). Contrary to its customary governance procedures, the organisation held its operations of these newly acquired assets under centralised control (Solomon, Chazan, and Jones, 2015). Specifically, the operations included the production, refinement, and transportation of petroleum, as well as the establishment of a distribution network, staff recruitment, price management, and maintenance (Le Billon, 2018: 10). Rather than constructing new assets, the group's primary strategy was to gain control over already ongoing oil production processes. These processes start at the well: ISIS employed an incineration method that involved the extraction of crude without releasing gas and water directly, and its subsequent burning in reservoirs for acquiring gasoline, diesel, and gas (Hammadeh and Albakri, 2015: 12). Traders and dealers were able to buy oil directly at the field. One of the cornerstones of ISIS's sales strategy was to provide payment schemes, customary-friendly discounts, and overall cheap prices, which – according to FATF (2015: 14)

estimates – ranged between US$20 and US$35 per barrel. These sums were commonly paid in cash to circumvent payments being tracked and disrupted from abroad (FATF, 2015: 14). As a result, although financial sanctions on anyone trading in ISIS-produced oil were enforced by the US Department of the Treasury (US House of Representatives, 2014), the nature of the transactions being largely outside the formal economy posed significant hurdles on the application of this measure.

Subsequently, oil traders either brought their newly acquired resources to a refinery, they sold their crude directly at a local market, or they could sell it to other middlemen (Solomon, Kwong, and Bernard, 2016). In the first case, approximately 45% of refined oil was used by ISIS itself, for instance as fuel for its tanks and vehicles (Almohamad and Dittmann, 2016: 9-10). In the second and third case, middlemen could re-sell their oil for between US$60 and US$100 per barrel (FATF, 2015: 14). This demonstrates the economic attractiveness of buying crude from the organisation. Although most oil was sold and consumed locally, and only a small percentage of ISIS-produced petroleum ended up on the international market (European Parliament, 2017: 9), some middlemen smuggled the natural resource abroad. Reports note that ISIS oil ended up in Turkey, Jordan, and Iran, while middlemen were also able to sell petroleum to the Assad regime (US House of Representatives, 2014; Ocakli and Scotch, 2017: 83).

Importantly, the driving forces behind the network were individual experts and systemised investments into the oil industry. The *Muhajireen*, referring to those in top leadership positions (Ayin Almadina, 2015: 26), governed ISIS's oil business, while engineers were headhunted and offered competitive salaries to work for the caliphate (Solomon, Chazan, and Jones, 2015). As part of ISIS's strategy of gaining control over the pre-existing oil network and running the industry alike, government officials in the Syrian Ministry of Petroleum were also approached and offered merits in exchange for collaboration (Ayin Almadina, 2015: 26). ISIS organised the industry into several departments, including the management of production, a maintenance department, a financial management department, and a civil works department (Ayin Almadina, 2015: 25-26). Through this centralised approach, a government study on the group's income caused US LTG MacFarland to state that 'all the intelligence was telling [him] was oil' (FFD, 2019), and in a US House of Representatives (2014) hearing it was stated that oil was 'by far' ISIS's primary source of revenue.

An estimated half of this revenue went to the group's general operating budget, whereas the other half was split among wages for its employees and maintenance of oil-producing facilities (Schmitt, 2015). ISIS's recruitment of members, their training, and their equipment

such as weapons were funded through oil income (US House of Representatives, 2014). As such, the petroleum network contributed to ISIS's creation of statehood in two distinct, but related manners: first for organising the industry in a similar way as the Syrian and Iraqi government had done before, and second for using its revenue to help build its self-declared caliphate. With this framework in mind, the dissertation now turns to several identified trade-offs that had to be considered by the coalition, followed by findings drawn from the dataset.

§4.3 · Targeting the Oil Industry: Nature of Target Choices

§4.3.1 Trade-Offs in the Coalition's Strategy

In analysing the nature of targets (the *tnat* variable), multiple trade-offs that the US-led coalition had to consider were found. As stated in US DoD (2015a) Press Briefing 13/11/15, the aim of the coalition's targeting was not to completely destroy ISIS's oil infrastructure to the extent that assets would become irreparable. As a cornerstone of its strategy, it is acknowledged that petroleum is an important source of revenue for both the Syrian and Iraqi governments and local populations. For example, 25,1% of Syria's total revenue in 2010 came from the oil industry (Harary, 2016: 16). Considering that there would also be 'a time *after* [emphasis added] the war' (US DoD, 2015a), oil infrastructure would be of significance under the control of other actors. As a result, the coalition's target choices have been selected within the light of this trade-off: on the one hand inflicting a strategic and long-term impact on this important source of income for ISIS (US DoD, 2015b), while on the other hand limiting the amount of destruction to allow for post-conflict reconstruction. This latter consideration also includes the limitation of collateral damage, such as civilian casualties and environmental damage resulting from military airstrikes, at least partly as this could provoke public backlash against coalition members. Yet, besides this trade-off, which will be referred to as the "macro-trade-off" in this dissertation, micro-trade-offs are also manifested in specific oil assets. Each of these assets is situated in one of four stages of the oil production chain (taken and amended from Ocakli and Scotch, 2017). This brings a structured overview of ISIS's process from extracting resources until their distribution. It allows for an identification of crucial – hence vulnerable – steps and locations in this process.

First is the extraction stage. Although it could be appealing to cease the production of oil at its core, hitting oil fields and wells entails the risk of causing a natural disaster (Harary, 2016: 13). This would, besides collateral damage and the potential of fields and wells becoming unusable, also run counter to the Geneva Conventions' Rule 43 concerning the conduct of

hostilities to the natural environment (ICRC, n.d.). US LTG MacFarland notes that oil wells are relatively hard to target (FFD, 2019), thereby providing another consideration for hitting assets in this stage.

In the second stage, which is that of transportation, potential targets consist of pipelines, tankers, and trucks. These assets – which are classified as soft targets – move petroleum from an extraction site to refineries, and subsequently from refineries to distribution hubs. First, pipelines are non-moving and are therefore relatively easy targets, but hitting them still induces the risk of oil spills and that of destroying critical petroleum infrastructure. Second, hitting trucks and tankers presents the danger of inflicting human casualties (see US DoD, 2015c), meaning civilians that are not necessarily ISIS members.

The third stage is that of refinement. Refineries are classified as hard targets: they would have to be invaded, occupied, and operated in order to profit from their use, unlike soft targets that do not require such territorial control (Ocakli and Scotch, 2017: 79). Resulting from their geographic concentration, refineries are easily defendable from ground attacks, which airstrikes could circumvent. However, refining in ISIS territory is conducted by local residents (Solomon, Kwong, and Bernard, 2016). As a result, when targeting these refineries, there is a risk of inflicting civilian casualties.

This risk also applies to the fourth and final stage – that of distribution. Retail hubs are geographically dispersed and relatively little oil is present at each compared to, for instance, pipelines (Ocakli and Scotch, 2017: 79). This could harden effective targeting, thereby making it potentially unattractive to hit assets in this stage. This demonstrates that, besides the explained macro-trade-off, each potential target that is situated within a stage also has its unique considerations that ought to be carefully weighed. In the following sections, findings from the original dataset will reveal which target choices were eventually – meaning after the process of strategic planning and weighing pros and cons of each had taken place – selected by the US-led coalition.

§4.3.2 Phase I, September 2014 – February 2015: Trial-and-Error

Phase I concerns the start of the airstrikes in September 2014 and lasted until February 2015. Out of the five phases that have been identified, Phase I is the one during which the least number of hits were executed in total, namely 76. Figure 3 demonstrates this small number relative to subsequent phases. Furthermore, out of the 29 unique target natures (*tnat*) that were identified and integrated into the dataset, 8 were hit between September 2014 and February 2015. As

visible in Figure 4, at the start of Phase I the coalition's campaign was centred around hitting stage three of ISIS's oil production chain – that of refinement. ISIS controlled an estimated 15 to 20 oil refineries at the start of the campaign (US DoD, 2014a), each of which produced an estimated 300 to 500 b/d (US DoD, 2014b). A total of 12 hits were noted in September 2014. In early October 2014, the hit refineries were declared to have become interoperable as a result of the strikes (US DoD, 2014b). Therefore, a decline in hits on refineries is visible, and a rise in hits on collection points and accompanying equipment reached a top in November of the same year. At these points crude oil was stored before being transported to refineries, and the oil revenues they thereby facilitated equalled an estimated US$1mln p/d (US DoD, 2014c). In the remainder of Phase I, wellheads, drilling rigs, derricks, and pumps were hit, despite outlined risks of targeting assets in the extraction stage. In sum, stages one and three (extraction and refinement) were at the epicentre of Phase I of the airstrike campaign.

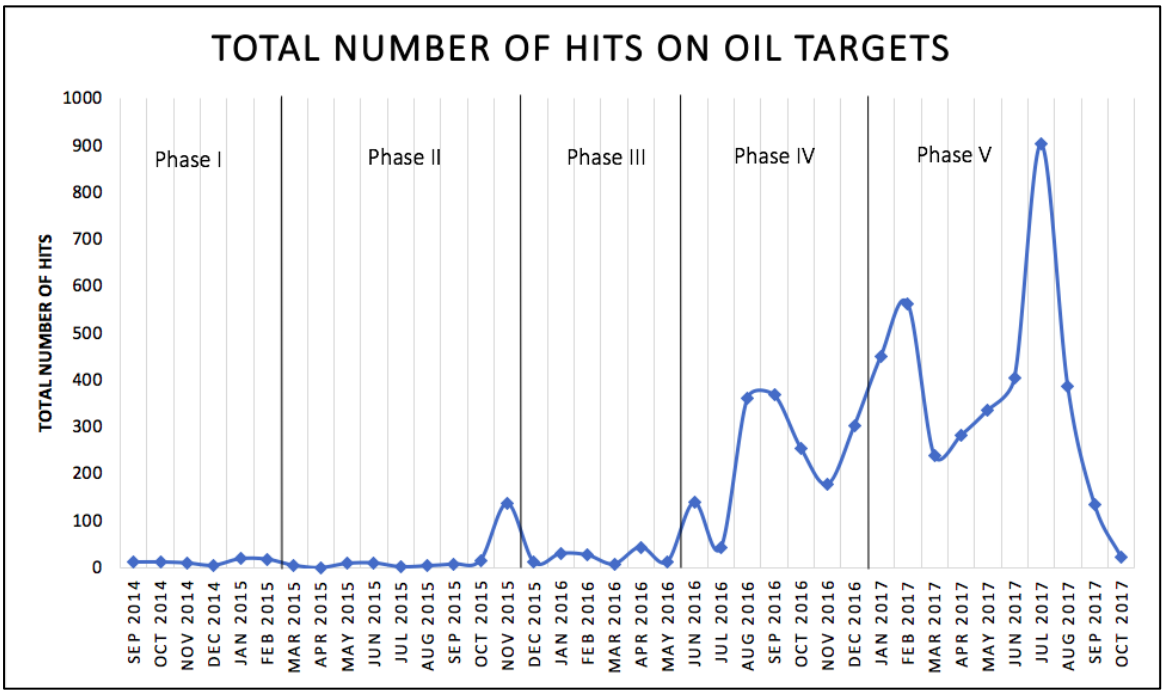

Figure 3: Total Number of US-Led Hits on ISIS-controlled Oil Targets in Iraq and Syria

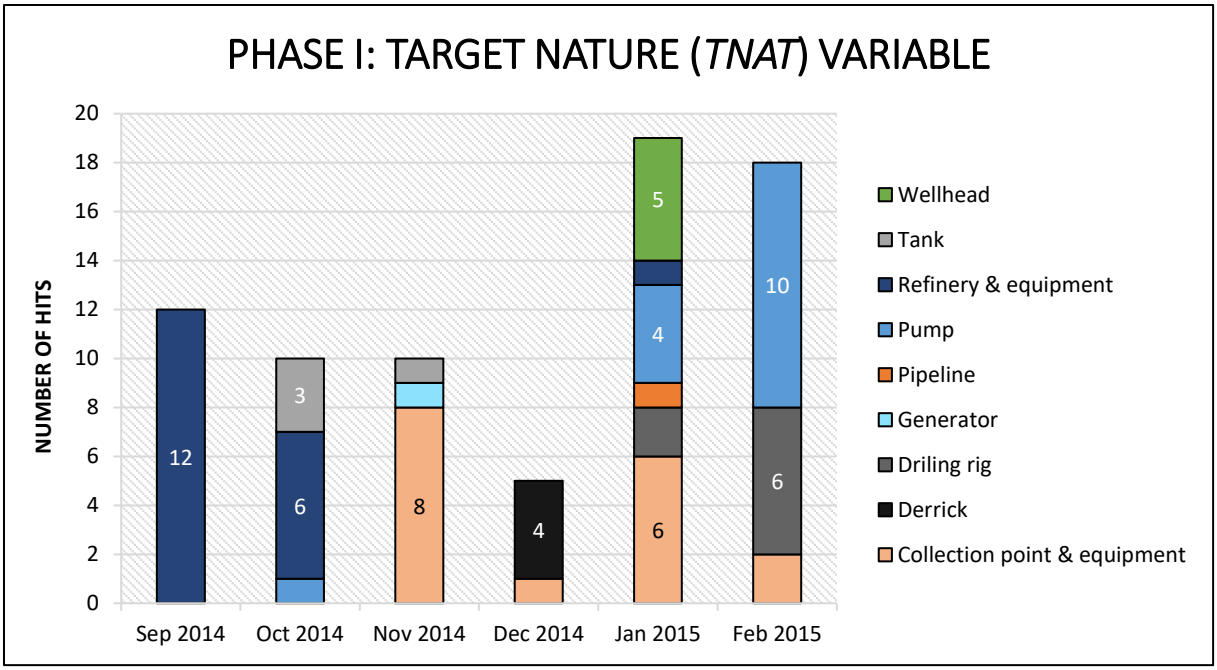

Figure 4: Hit Targets in ISIS's Oil Network in Iraq and Syria, Sep 2014 – Feb 2015

However, results demonstrate that this strategy was limited in its immediate effectiveness. Taking the Summer of 2014 as a baseline prior to Phase I, ISIS's estimated oil production equalled 40,000 b/d (Kiourktsoglou and Coutroubis, 2015: 2-3). A report from mid-Phase I indicates that airstrikes undertaken up until that point were unable to stop ISIS's revenue of millions of dollars per week (Hawramy, Mohammed, and Harding, 2014). In line with this claim, ISIS's oil production reached the mark of 45,000 b/d in late-Phase I (Kiourktsoglou and Coutroubis, 2015: 3), thereby indicating a 12,5% increase. Likewise, ISIS's oil revenue was estimated to have increased in 2015 compared to the baseline period (European Parliament, 2017: 9).

This lacking effectiveness can be perceived when scrutinising the target choices. Assets that were relatively easy to repair or replace were hit in this phase, which ISIS managed to do within an estimated 24 to 72 hours on average (US DoD, 2015a). So, although there are no signs that the hit targets differed from those that were strategically planned to be hit, the airstrikes did not result in the immediate reduction of ISIS's ability to profit from oil production. Referring back to the identified macro-trade-off that outlines the need to balance the willingness of disrupting oil production with limiting collateral damage, the analysis shows that the strategy in Phase I was not strong enough to meet the former objective.

§4.3.3 Phase II, March 2015 – November 2015: Leadup to Tidal Wave

The start of Phase II can be characterised by a reduction in hits on both refineries and collection points. In this phase signs are present that point towards a change in ISIS's strategy as a response to coalition airstrikes on stage three of the oil production chain (refinement). Specifically, more rudimentary refineries started being utilised, which are smaller than the previously-targeted refinement buildings (Bertrand, 2015). These "teapot" refineries consist of a pit made in the ground where crude is stored and distilled into fuel through portable metal furnace (Warrick, 2016). As a result of their small size, teapot refineries are harder to hit but still relatively easily repairable after being damaged. So, these are signs that the coalition did not only hit assets that could be replaced or repaired relatively quickly, but ISIS was also able to adapt its refinement strategy to the bombing campaign. Subsequently, April 2015 is the first month in which no hits on the group's oil infrastructure were reported.

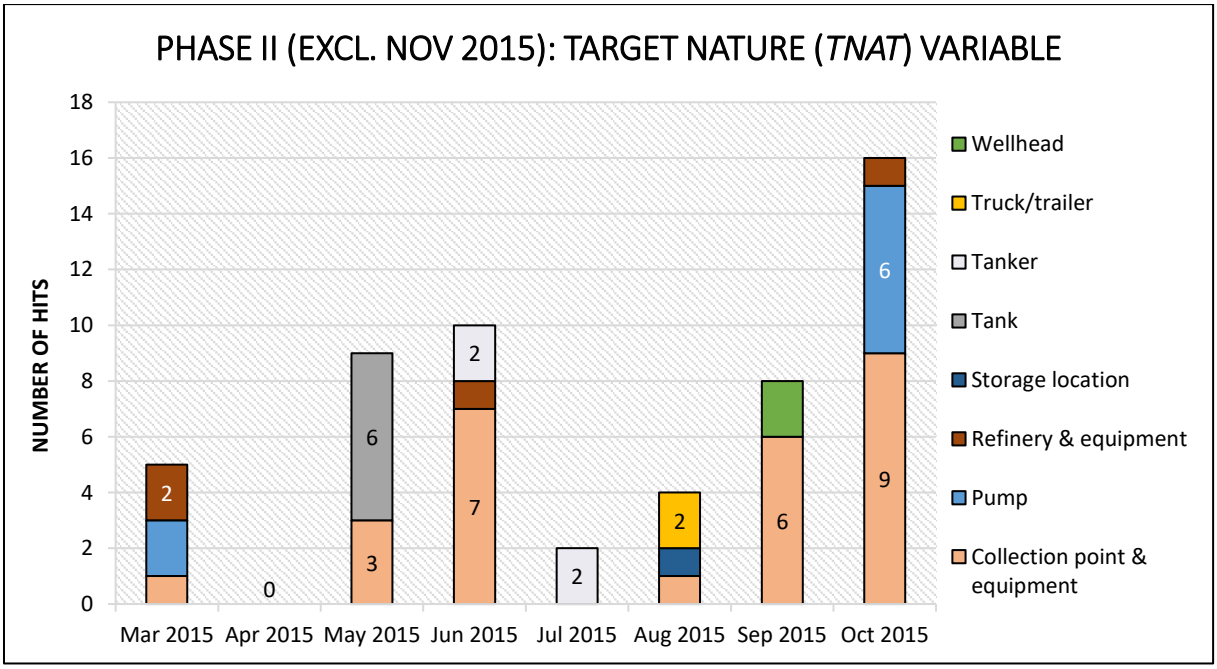

Figure 5: Hit Targets in ISIS's Oil Network in Iraq and Syria, Mar 2015 – Oct 2015

Findings show that one month later can, however, be regarded as the start of a turning point in the coalition's strategy. In May 2015 ISIS oil emir Fathi al-Tunisi, also known as Abu Sayyaf, was killed during a raid. Stored on his computer were petabytes of data on ISIS's economic map, including details on how the group ran its oil industry (FFD, 2019). This presented intelligence that the coalition was able to use to its advantage. In the months following May 2015, assets containing relatively large quantities of petroleum were hit – as visible in Figure

5. These include tankers, oil storage locations, and collection points. Thereafter, based on an analysis of Abu Sayyaf's data, an economic war campaign plan was ready to be released that laid the groundwork for Operation Tidal Wave II (FFD, 2019). This operation commenced in late October 2015. It presented the first campaign that was dedicated to the systemic targeting of ISIS's oil infrastructure, rather than the conduct of loose airstrikes on these assets as presented in Phase I.

As visible in Figure 6,[1] a spike in hits on trucks and trailers and – to a lesser extent – on GOSP/V assets is apparent after the launch of OTWII. In fact, the dataset demonstrates a remarkable number of 116 hits on the former category. Trucks were not hit in Phase I, due to the introduced risk of their drivers being killed (see FFD, 2019). However, American officials have noted that Abu Sayyaf's data shed light on the fact that truck drivers were salaried ISIS employees – and not necessarily conscripted locals – which was used to justify their targeting starting in Phase II (Schmitt, 2015). The coalition developed a strategy of dropping leaflets ahead of their strikes, stating the following message: 'Warning: airstrikes are coming. Oil trucks will be destroyed. Get away from your oil trucks immediately. Do not risk your life' (US DoD, 2015c). This can be perceived as an attempt to reduce the risk of inflicting human casualties as outlined in both the macro-trade-off and the micro-trade-off of the transportation stage.

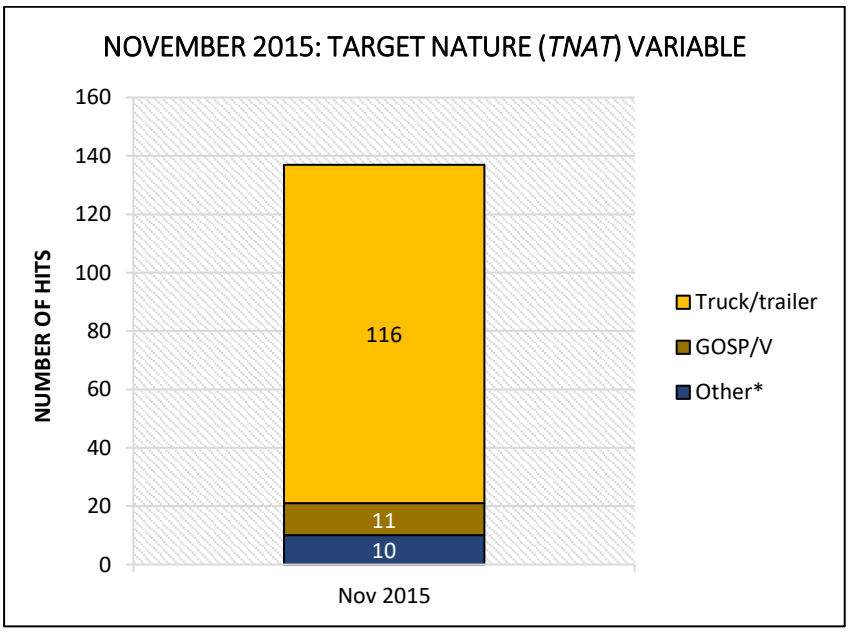

Figure 6: Hit Targets in ISIS's Oil Network in Iraq and Syria, Nov 2015

[1] Resulting from the disparity in the number of hits between the months March-October 2015 and November 2015, the latter month has been visualised separately.
* The "Other" category refers to a bundle of targets that have been combined in one category. This is done to prevent the overpopulation of graphics with targets that were hit sparsely. In this case, each target nature (*tnat*)

The decision to start hitting trucks provided several advantages. First, purchasing trucks is expensive: new heavy trucks cost approximately US$100,000 (Crane, 2015: 6). Second, their targeting does not destroy irreplaceable territorial resources or risk a natural disaster. So, hitting them presented an alternative that fits better in the macro-trade-off compared to, for example, hitting wells. Third, trucks are relatively easy to target when they are lined up near GOSP/Vs and related oil facilities (FFD, 2019). As such, the coalition's strategy was to hit these assets quickly while they were clustered, meaning waiting in line to be filled with oil, so that a majority was hit before they scattered. This explains the high number of truck hits in comparison to other targets in Figures 4, 5, and 6. Coming back to the macro-trade-off, Phase I demonstrated how the coalition's strategy was unable to reach the aim of immediately reducing ISIS's oil revenues. Phase II demonstrates how the strategy started to shift towards a stronger approach to reach this objective, specifically through targeting assets located in stage two of the oil production chain (transportation). The start of OTWII was accompanied by a greater willingness to risk human casualties and, thus, a change in how the coalition balanced the two axes of the macro-trade-off.

§4.3.4 Phase III, December 2015 – May 2016: Separation & Refinement

In this phase 12 target unique target natures (*tnat*) were identified. Figure 7 demonstrates that two of these experienced a spike between December 2015 and May 2016. For the first one, that of GOSP/Vs, the biggest number of hits in the timeframe of this research took place in Phase III, specifically in January and February 2016. This category refers to infrastructure that separates wellhead fluids into liquid oil components. A US government study into ISIS's oil industry had disclosed that GOSP/V assets were the 'best' targets to strike thanks to their critical position in the network (FFD, 2019). A testimony presented to the US Senate similarly states that destroying oil separators would be likely to affect revenue flows (Crane, 2015: 7). After the start of OTWII, targets that would take longer to repair than the prior average of 24 to 72 hours started to be hit (US DoD, 2015a). Aside from GOSP/V infrastructure, trucks continued to be targeted, albeit with an 88,1% drop in intensity compared to Phase II.

A second spike is visible in stage three (refinement). In April 2016 the largest number of hits on refineries and their equipment was reported, equalling a total of 32. This represents a 33,3% increase compared to the number of hits on refineries in both Phase I and Phase II

category that has a value of ≤ 3 is included. In November 2015 this consists of collection points & equipment, tanks, oil facilities, petroleum junction points, pumps, and refineries & equipment.

combined. These airstrikes appeared to have an immediate effect. At the end of April 2016, US MAJ GEN Gersten stated that ISIS's ability to finance the war through revenues coming from its oil refineries had been destroyed (US DoD, 2016a). However, as introduced already, hits on oil refineries incentivised the use of micro-refineries. The production facilitated by these alternative refineries was limited, but their use still allowed the group to compensate for lost revenues from unusable conventional refineries (Lead Inspector General, 2016: 43). ISIS suffered from a shortage of qualified engineering staff (Ocakli and Scotch, 2017: 77-78), from which the coalition could benefit by targeting those stages in the oil production chain that required sophisticated technical know-how, specifically stage one (extraction) and three (refinement).

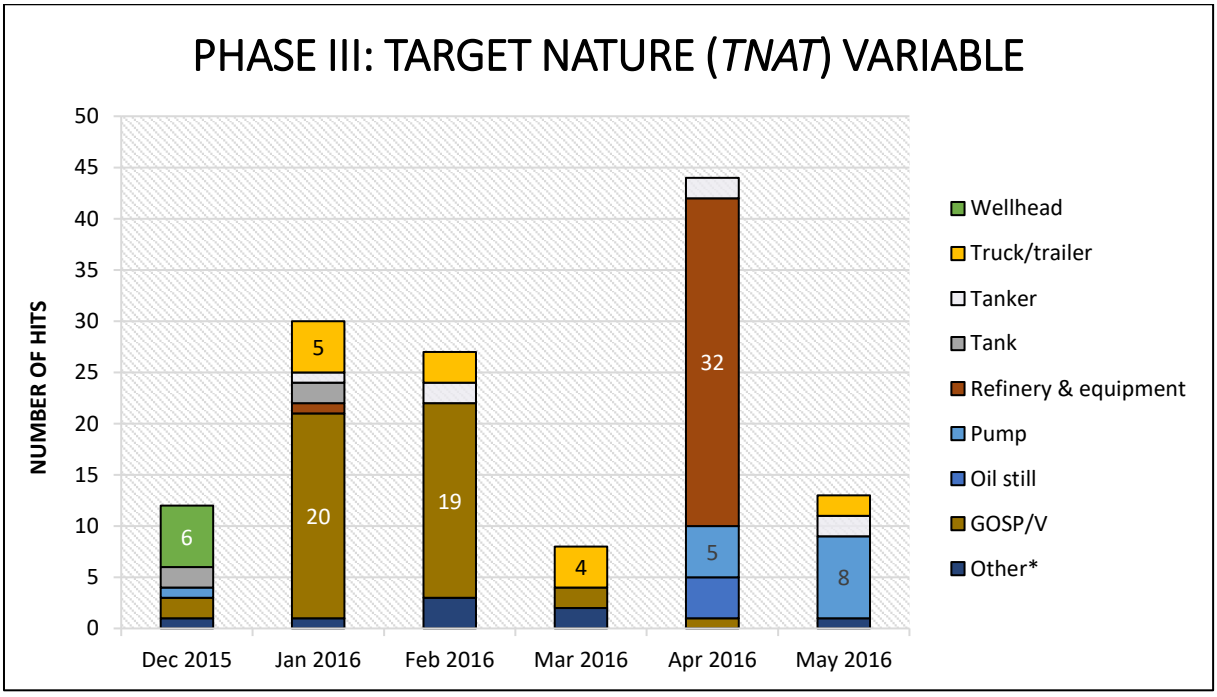

Figure 7: Hit Targets in ISIS's Oil Network in Iraq and Syria, Dec 2015 – May 2016

As a result of this strategy, the coalition was able to reduce ISIS's oil revenue, but the group also became more heavily reliant on primitive, high-polluting refining methods. Pits were dug in the ground and ignited, leading to smoke and fume emissions, and their proximity to water resources damaged crops and the quality of drinking water (Almohamad and Dittmann, 2016: 13). Respiratory diseases increasingly spread in territory under ISIS control, while fires and

* Each target nature (*tnat*) category that has a value of ≤ 3 over the entirety of Phase III is included in the "Other" category. In Phase III this consists of collection points & equipment, pipelines, POL sites (unknown), and storage locations.

explosions also posed a direct danger to citizens living nearby teapot refineries (Hammadeh and Albakri, 2015: 19). So, although the micro-trade-off of the refinement stage does not have to account for environmental concerns as pre-eminently as the extraction stage does, one can note that an indirect effect of the airstrikes can still influence this type of concern in unforeseen manners. In other words, hits on refineries indirectly resulted in pollution through ISIS's adaptation efforts, despite the role environmental damage played in the coalition's macro-trade-off.

And yet, the analysis shows that ISIS changed its behaviour after OTWII commenced. The group increased electricity prices for citizens under its control, while it also introduced new taxes in the agricultural sector, cut salaries of its fighters, and doubled oil prices in Ar Raqqah (US DoD, 2016b; Focus, 2015). In other words, changes are visible that indicate a greater need for income. In January 2016 ISIS produced an estimated 34,000 b/d (US DoD, 2016c), which reveals a 15% reduction compared to the baseline period. However, this decline should also be seen in light of ISIS's oil field losses in both Iraq and Syria. The group lost control over the Ajil oil field in Iraq during this phase (Crane, 2015: 4), and al-Jabsah was the first Syrian oil field lost in January 2016 (Solomon, Kwong, and Bernard, 2016). So, the indicators demonstrate a degree of effectiveness of the coalition's strikes in this phase, but ISIS's reduced ability to generate income through oil should also be ascribed to losses in control over territory – not merely the effective targeting of oil assets so that they became irreparable for an extended period of time.

§4.3.5 Phase IV, June 2016 – December 2016: Back to Transportation

Phase IV can be characterised by a strong increase in both the number of hits as well as in the variety of target choices. A total of 1645 hits were conducted by the coalition within these seven months, 54% of which targeted trucks and trailers in stage two (transportation). These assets became a focal point of the campaign in Phase II but were hit to a limited extent in Phase III. As visible in Figure 8, in September 2016 the highest number of hits on trucks and trailers was reported, equalling a total of 272. Furthermore, 18% of all hits in this phase were conducted on wellheads. Whereas reluctance to target petroleum infrastructure at its source – namely stage one (extraction) – has been reported in previous phases, 295 wellheads were struck between June and December 2016. This is an exceptional number compared to the total of 13 hits that were conducted on wellheads in the 21 months preceding Phase IV. Although the micro-trade-offs of wells and wellheads consider the prevention of natural disasters and the future usability

of oil resources, the coalition's willingness to target these sources has shifted in Phase IV. In mid-2016 ISIS controlled approximately 60% of oil wells in Syria and 5% of those in Iraq (Clarke et al., 2017: 8). In September 2016 the number of ISIS-controlled wells in the latter country was reduced to zero (Clarke et al., 2017: 8).

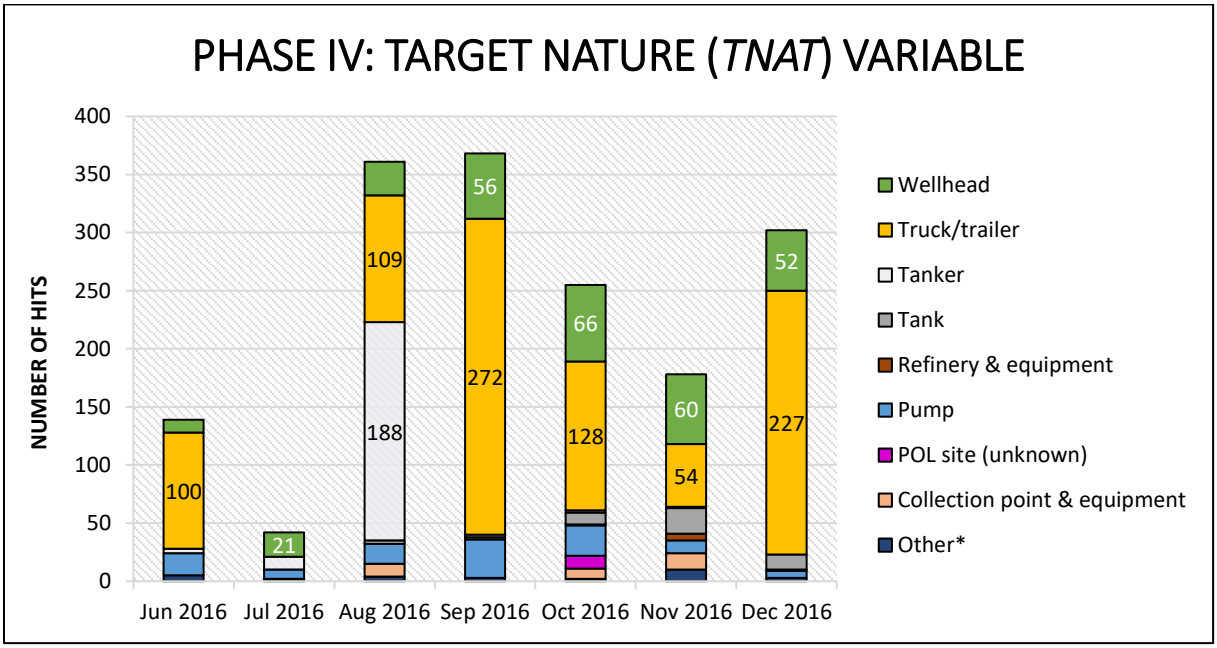

Figure 8: Hit Targets in ISIS's Oil Network in Iraq and Syria, Jun 2016 – Dec 2016

Additionally, the previously-identified focus on GOSP/Vs started to fade in this phase, while a record number of 188 hits on tankers were found in August 2016. Targeting these assets was a strategic move. Specifically, eliminating tankers was an effort by the coalition to soften ISIS's infrastructure in Mosul, as an attempt to aid the ISF in liberating the city (US DoD, 2016d). When adding hits on tankers to those conducted on trucks and trailers, it becomes visible that the majority of targeted infrastructure in this phase were located in stage two of the oil production chain (transportation). However, one should note that the number of hits does not necessarily equal impact. Notably, in light of the increased diversity of target choices, a hit on ISIS's oil ministry headquarters was identified in June 2016. This exceptional target can be seen as the first and only attempt to incur damage on the administrative and executive branch

* Each target nature (*tnat*) category that has a value of ≤ 10 over the entirety of Phase IV is included in the "Other" category. In Phase IV this consists of construction equipment, cranes, drilling rigs, GOSP/Vs, oil facilities, oil ministry headquarters, processing equipment, refineries & equipment, storage locations, transfer compressors, and workover rigs.

of the oil network, despite the potential of inflicting human casualties. The impact of this single hit has gone unreported and cannot be distilled from available data.

Meanwhile, findings demonstrate that ISIS started engaging in the destruction of oil infrastructure under its control. For example, in August 2016 the group set a petroleum storage tank in the Qayyarah powerplant on fire as an attempt to mask their movements and thereby obstruct coalition targeting (US DoD, 2016e; US DoD, 2016f). Oil wells were furthermore ignited and oil pipelines were opened to spoil the natural resource in the Tigris river (Harary, 2016: 10). So, similar to the indicators presented in Phase III, an undesired effect of the airstrikes was an increase in environmental damage resulting from ISIS's reaction. Yet, these findings simultaneously function as an indicator of airstrike effectiveness. An increase in both the volume and variety of strikes may thus have contributed to this change in ISIS's strategy, despite the identified shift in the coalition's macro-trade-off towards a greater willingness to risk collateral damage.

§4.3.6 Phase V, January 2017 – October 2017: The Final Blow

In the last phase of the airstrikes, key trends identified in prior phases continue to be observed – albeit in a more extreme form. First, the temporal increase in the intensity of strikes extends to Phase V, as has been previously shown in Figure 3. In this phase 3721 hits were found, which equals an average increase of 58,3% per month compared to Phase IV. As visible in Figure 9, July 2017 can be classified as the month with the highest number of hits over the study's timeframe from start to finish. This intensity stands in contrast to Phase I, in which a more careful approach was identified – one with limited immediate effectiveness. Second, Phase V is the phase with the largest variety in target choices. Out of the 29 unique target natures (*tnat*), a record 22 were found in this phase. Overall, the coalition conducted an intense campaign in which it primarily focused on hitting an extensive number of assets in stages one, two, and three of ISIS's oil production chain (extraction, transportation, and refinement).

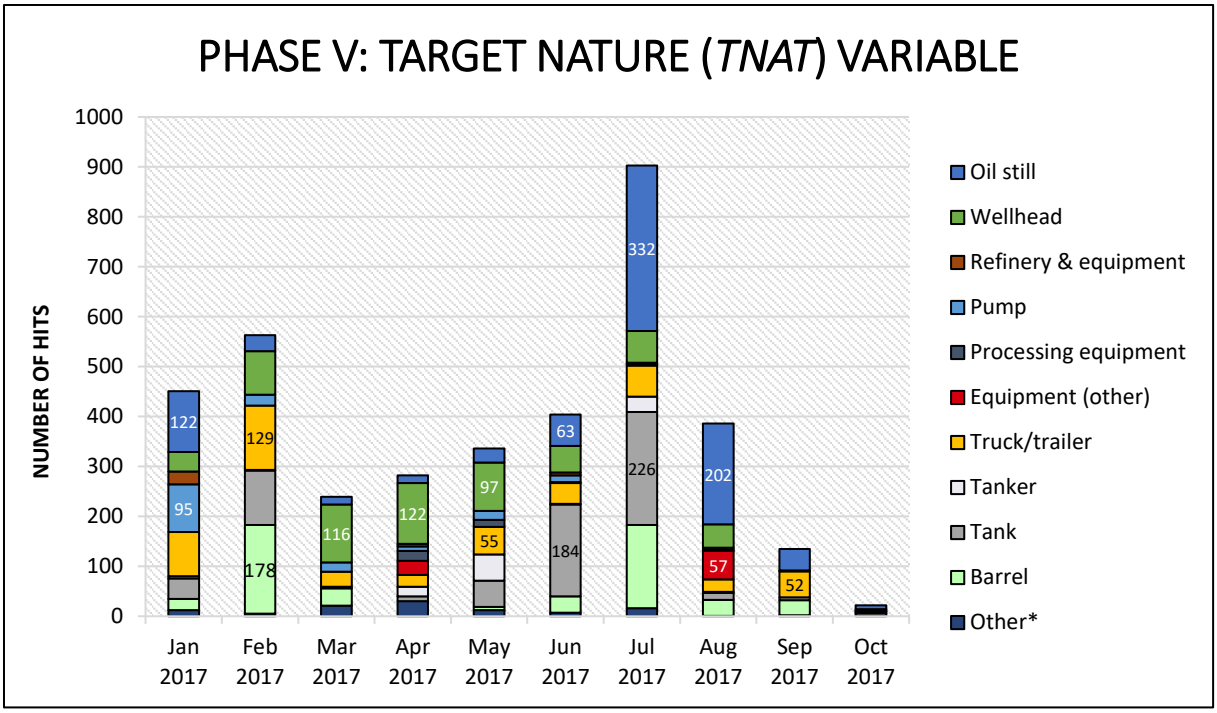

Figure 9: Hit Targets in ISIS's Oil Network in Iraq and Syria, Jan 2017 – Oct 2017

Specifically, the main target for stage one (extraction) was that of wellheads. 628 hits on wellheads were found in Phase V, and most of these were conducted in March and April 2017. Towards the end of this phase it was reported that ISIS had lost 90% of its wells (Solomon and Mhidi, 2017). The main target for stage two (transportation) was that of trucks and trailers, but assets that were employed for the storage of petroleum – primarily tanks and barrels – were also hit extensively. Remarkably, the reduced focus on stage three (refinement) in Phase IV was revived in Phase V, but this is the first time in which the distillation step of the refinement process became a focal point of the airstrikes. 860 hits on oil stills were found in Phase V, while this asset was only targeted four times between Phase I and IV. In sum, rather than focusing on one stage, the coalition directed its focus on targeting multiple stages of the oil production chain at the same time – treating each, except for stage four (distribution), with relatively equal importance.

This approach coincides with a shift in the petroleum products sold by ISIS. Oil was increasingly sold in a crude – rather than processed – form, thereby shifting more work onto its buyers (Solomon and Mhidi, 2017). This indicates a reduced ability to use oil infrastructure

* Each target nature (*tnat*) category that has a value of ≤ 25 over the entirety of Phase V is included in the "Other" category. In Phase V this consists of collection points & equipment, drilling rigs, drums, GOSP/Vs, inlet manifolds, lubricant equipment, oil facilities, petroleum junction points, pipelines, POL sites (unknown), storage locations, and wells.

post-extraction, which findings of the data-analysis confirm. In October 2017 merely 22 hits were recorded, a 97,6% decrease compared to July 2017, as ISIS had already lost a majority of assets in its oil network. By October 2017 the group lost control over its last high-producing oil fields in Dayr Az Zawr (Le Billon, 2018: 18), and according to US DoD (2017a) Press Briefing 17/10/17 a reduction of 90% in ISIS's oil revenue has been recorded in this month compared to the baseline. This loss of the organisation's oil strongholds also corresponds to a change in ISIS's behaviour. Specifically, attacks on government-controlled pipelines conducted by the group were reported in the last month of Phase V (Le Billon, 2018: 18). The identified intensity and variety of hitting targets in Phase V should, thus, be perceived as the last blow contributing to the degradation of ISIS's oil network. A combination of hitting assets and seizing control over these assets ultimately contributed to the loss of ISIS's ability to generate income from petroleum resources. The total number of hits per variable can be reviewed in Appendix A.

§4.4 · From Temporal to Geographical: Locating Target Hits

§4.4.1 Analysing Target Countries

Moving on to the location of hit oil assets, the target country (*tcoun*) variable identifies the state in which targets were hit. Table 2 demonstrates a tendency of the coalition to hit targets in Syria. 90,8% of all hits took place in this state, while the remainder were conducted on assets in Iraq. This data is in line with findings on the importance of both states to ISIS's oil business. The analysis of §4.3 has shown that the bulk of the group's controlled petroleum assets were located within Syria's borders. Additionally, by the start of Phase III ISIS still gained control over major oil fields in Syria, but its hold on Iraqi fields was described as 'minimal' before the US Senate (Crane, 2015: 4). The bulk of its refineries were furthermore located in Syria, not Iraq (Solomon, Kwong, and Bernard, 2016). As this section will show, the oil fields with the highest production numbers under ISIS control were also those in Syria. It has therefore been stated that the group regarded its controlled areas in this country as 'the most important ones' (Al Mashhour, 2016: 4) – and this study confirms that this territory was, hence, regarded as most vulnerable. So, despite the imbalance, its underlying reasoning can be justified.

Country *(tcoun)*	**Number of Targets Hit**	**% of Total**
Syria	5239	90,8%
Iraq	528	9,2%

Table 2: Number of Hit Targets in ISIS's Oil Network per Country, Sep 2014 – Oct 2017

In addition, the composition of the hit target nature (*tnat*) categories points out differences and similarities between the two states. As visible in Figures 10 and 11, trucks and trailers were the most-hit targets in both countries. The percentages in the boxes indicate the share of total hits that were recorded on target nature (*tnat*) categories in their corresponding target country (*tcoun*). Remarkably, wellheads were the second-most hit target in Syria, but zero wellhead hits were recorded in Iraq. In addition to the described imbalance between Syrian and Iraqi oil assets, it should be pointed out that an additional incentive to target assets in stage one of the chain (extraction) in Syria is the quality of produced crude. Controlled fields in Syria have relatively low concentrations of sulphur, which eases the resource's subsequent processing into usable oil products – making these fields of particular value to ISIS (Kiourktsoglou and Coutroubis, 2015: 3). Overall, Figures 10 and 11 illuminate that, on the one hand, stage one (extraction) was subjected to heavy targeting in Syria, but only minimally in Iraq. On the other hand, stages two (transportation) and three (refinement) were primary targets in both states, while stage four (distribution) lacked focus in both cases once again.

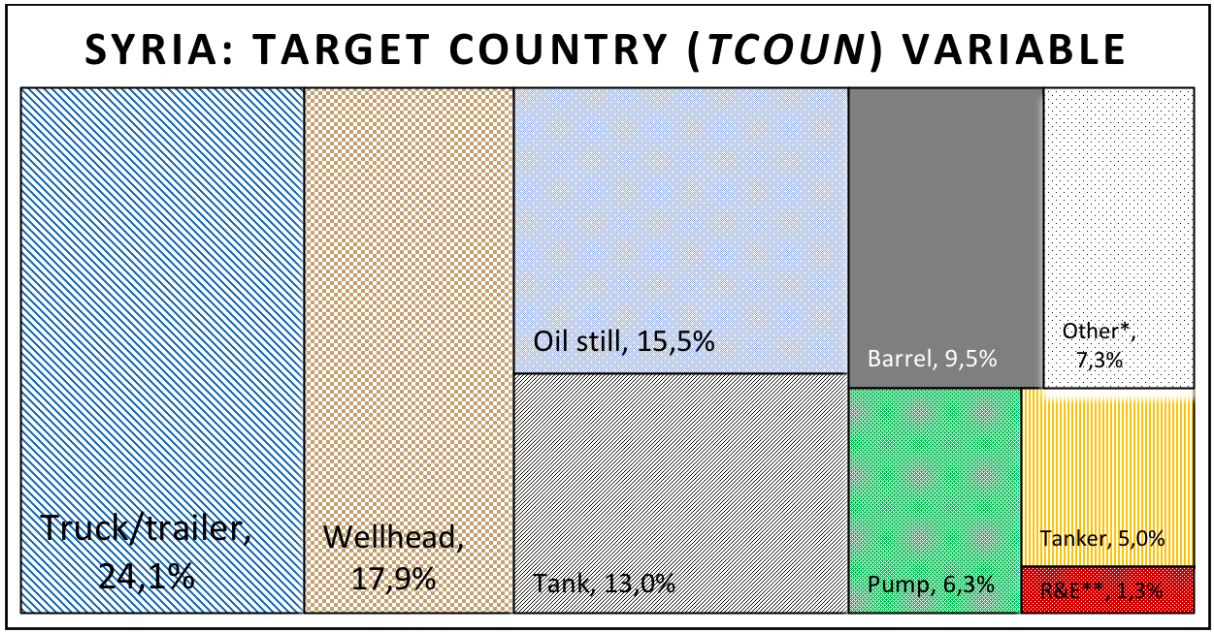

Figure 10: Hit Targets as Percentage of Total Hits on ISIS's Oil Targets in Syria, Sep 2014 – Oct 2017

* Each target nature (*tnat*) category that has a value of ≤ 65 in "*tcoun* = Syria" is included in the "Other" category. In this case this consists of processing equipment, equipment (other), oil facilities, drilling rigs, inlet manifolds, POL sites (unknown), storage locations, drums, pipelines, workover rigs, derricks, transfer compressors, lubricant equipment, petroleum junction points, construction equipment, cranes, GOSP/Vs, collection points & equipment, and wells.
** R&E = refinery & equipment.

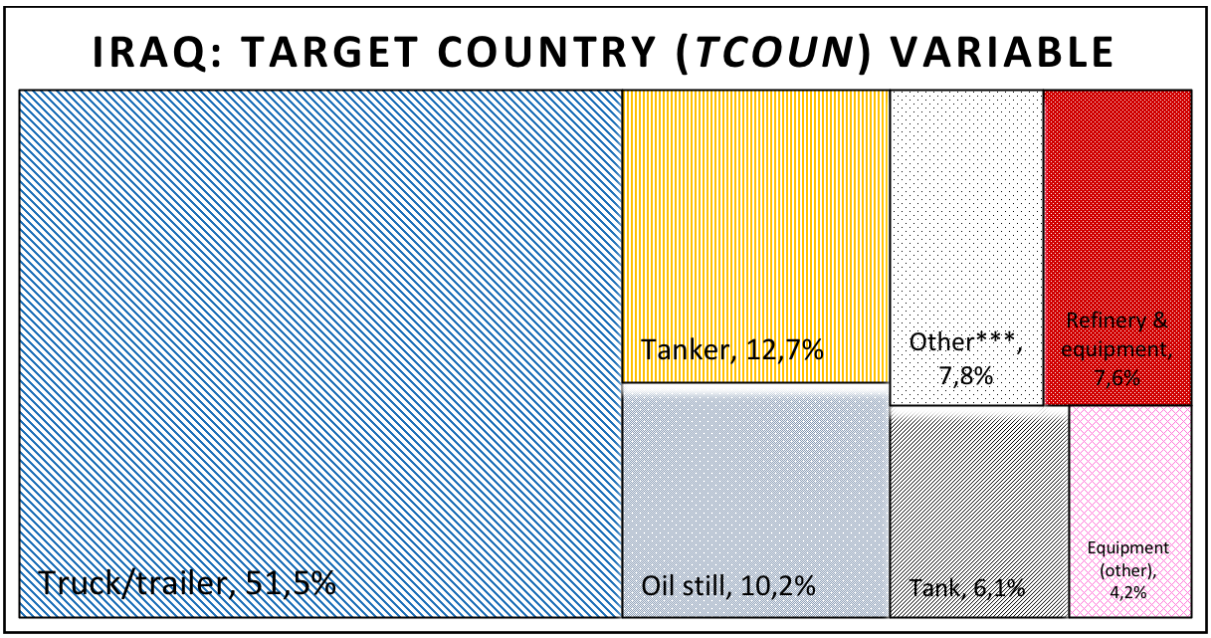

Figure 11: Hit Targets as Percentage of Total Hits on ISIS's Oil Targets in Iraq, Sep 2014 – Oct 2017

§4.4.2 Zooming in on a Regional and Local Scale

Oil targets were hit in a total of nine provinces, as captured by the target province (*tpro*) variable. Five of these are Syrian provinces, four are Iraqi. Figure 12 demonstrates that 71,6% of all recorded hits were conducted in the Syrian province of Dayr Az Zawr. Despite the relatively large imbalance between hits in this province and others, the coalition's strategy to focus efforts on targeting infrastructure in this region can be explained. According to US DoD (2015a) estimates, approximately two-thirds of ISIS's oil revenues originated from Dayr Az Zawr Province, and this region also housed the organisation's primary oil production capabilities. Among ISIS's most valuable oil fields were those of al-Omar, with an estimated production of 30,000b/d at the baseline of this research (Gordon and Schmitt, 2015), and al-Tanak, which – together with al-Omar – accounted for approximately 80% of ISIS's total oil revenues (Le Billon, 2018: 10). This data provides a further rationale for hitting targets in stage one of the production chain (extraction) in Syria, rather than Iraq. Additionally, ISIS's maintenance workshops were concentrated around the al-Omar field (Ayin Almadina, 2015: 25), and the field produces one of the highest qualities of crude in Syria (Almohamad and Dittmann, 2016: 7).

*** Each target nature (*tnat*) category that has a value of ≤ 10 in "*tcoun* = Iraq" is included in the "Other" category. In this case this consists of barrels, GOSP/Vs, oil facilities, drilling rigs, POL sites (unknown), generators, pumps, storage locations, and oil ministry headquarters.

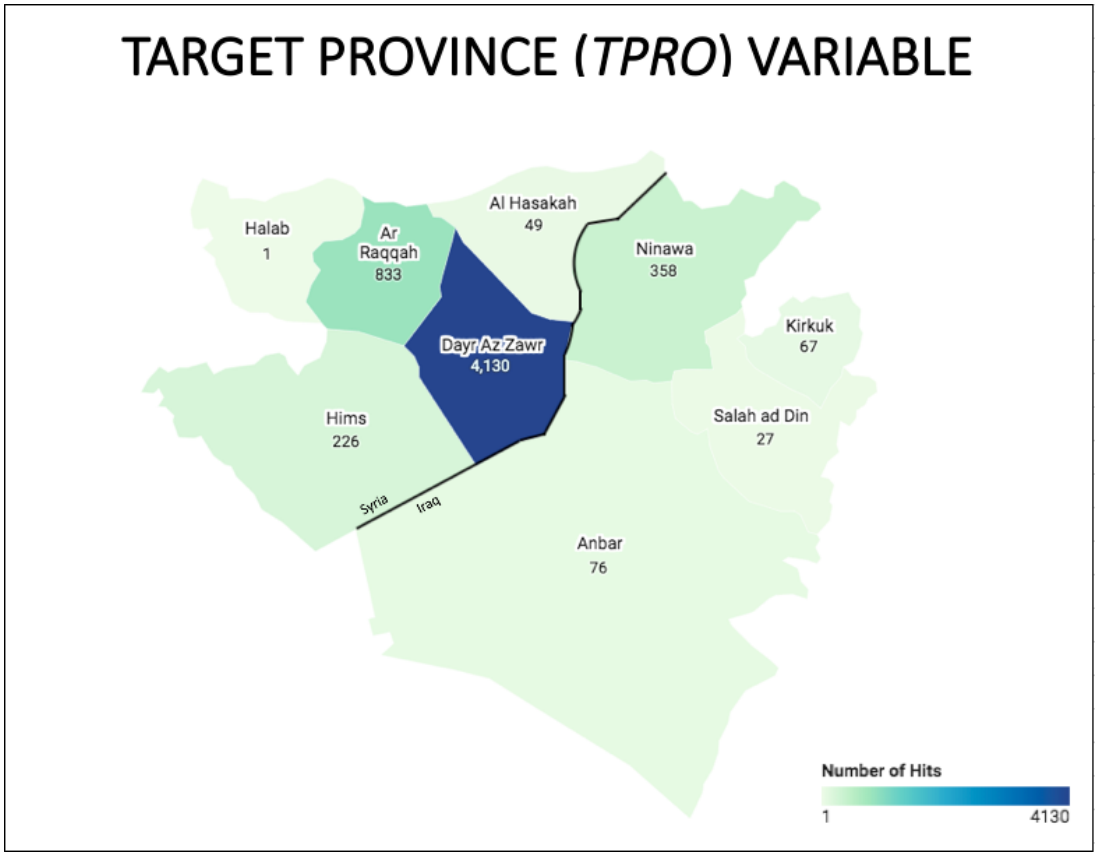

Figure 12: Number of Hit Oil Targets per Iraqi and Syrian Province, Sep 2014 – Oct 2017

So, findings confirm that Dayr Az Zawr Province can be regarded as the heart of ISIS's oil business and, as a result, was the focus of coalition airstrikes due to this vulnerability. The composition of target nature (*tnat*) categories in both this province and the second-most hit province of Ar Raqqah are similar to their national composition visible in Figure 10. However, in the provinces of Ninawa and Hims, respectively 83,0% and 94,7% of total hits were conducted on stage two of the oil production chain (transportation). These were primarily trucks and trailers. From this one can deduct that the coalition regarded the provinces of Ninawa and Hims as valuable transportation regions. This is a characterisation that has not been explicitly communicated in US CENTCOM press releases – and thereby provides valuable information to academic literature on ISIS's functioning. Furthermore, despite the presence of oil-rich grounds in Al Hasakah, ISIS's control in this area was limited. The conducted airstrikes were, due to this richness, focused on stage one of the chain (extraction). In the remainder of the provinces the number of hits was limited, and no deviating results from the compositions presented in Figures 10 and 11 were noted.

When zooming in one more level, one can identify the most nearby city, town, or village to oil target hits (the *tpla* variable). Five hotspots with a value of ≥ 200 hits from Phase I to V

were found, as depicted in Figure 13. Most of these hits were recorded near the city of Dayr Az Zawr, capital of the province that bears the same name, and Abu Kamal. These two cities are located in the vicinity of the al-Omar and al-Tanak oil fields and, based on data-analysis results, were perceived as major transportation hubs – the latter at least partly for being the gateway to Iraq. The most-hit targets near these cities were trucks and trailers, wellheads, oil stills, and tanks. Findings confirm that Dayr Az Zawr Province was of major importance to ISIS for the production, transportation, and refinement of petroleum. Albeit of less significance, hits near the city of Ar Raqqah have a similar composition of target nature (*tnat*) categories to Dayr Az Zawr and Abu Kamal. Smaller oil fields in this area were controlled by ISIS (Almohamad and Dittmann, 2016: 7), and stages one to three in the production chain (extraction, transportation, and refinement) were also targeted here.

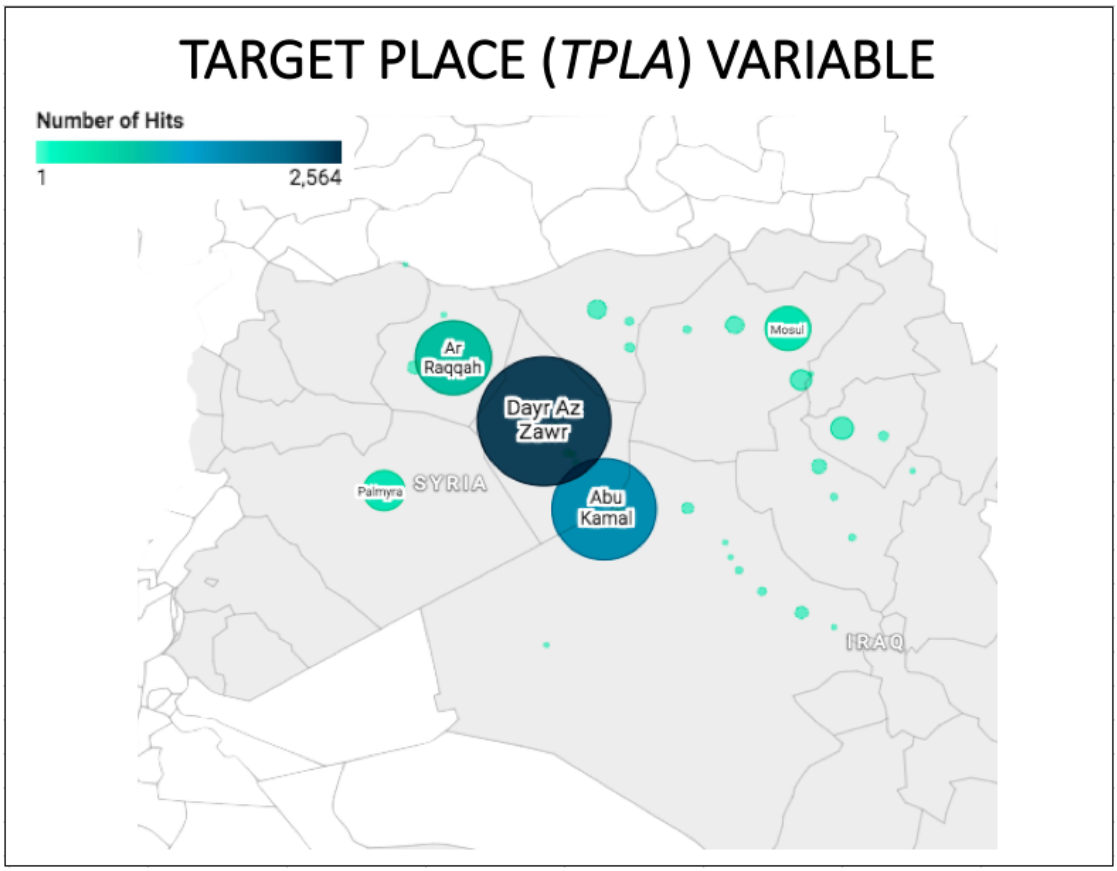

Figure 13: Iraqi and Syrian Cities, Towns, and Villages Classified per Nearby Hits on ISIS's Oil Targets, Sep 2014 – Oct 2017

Additionally, Mosul is the city with most nearby recorded hits in Iraq. 81,5% of these hits targeted trucks and trailers. This finding can be explained as the Abaatim black oil market, where a large number of trucks clustered for the transportation of oil, was located nine

kilometres west of the city (US DoD, 2016g). ISIS also controlled fields close to Mosul, such as Najma and Qayyarah, the production of which could subsequently be sold downtown. Furthermore, makeshift refineries were found in Mosul's vicinity (Warrick, 2016), and it housed the oil ministry headquarters that was hit by coalition airstrikes. So, besides being an important location for extraction, transportation, refinement, and distribution, oil operations were also managed by ISIS from this city. Finally, in the city of Palmyra 214 truck and trailer hits were recorded, thereby explaining its position in Figure 13. The importance of the province of Hims, in which Palmyra is located, as a valuable transportation region has been pointed out already. The coalition also sporadically hit targets outside the mentioned regions, specifically in Al Hasakah, Anbar, Kirkuk, Salah ad Din, and Halab. Thus, hits were spread over ISIS-controlled territory, but the underlying strategy was to exploit vulnerabilities in the heart of ISIS's oil business: in the vicinity of Dayr Az Zawr.

§4.5 · Conclusion

From the temporal and geographic analysis of the four production stages across five phases, multiple conclusions can be drawn. These give an insight into ISIS's oil business and the coalition's strategy for eliminating this business. Overall, the analysis has demonstrated that the US-led coalition started the airstrike campaign by strongly attempting to limit collateral damage in Iraq and Syria, but that it became increasingly willing to give up this commitment in order to improve airstrike effectiveness over the study's timeframe. As such, the coalition's strategy steadily moved towards an enemy-centric approach – meaning a principal focus on the destruction of the network rather than limiting collateral damage to the fullest extent possible. This has been shown through the lens of both a macro-trade-off and multiple micro-trade-offs that were identified. Over time the coalition became more willing to risk collateral damage by increasing both the volume of its airstrikes, while also increasing its variety in target choices.

It has also been shown that the technological know-how of stages one and three (extraction and refinement) of the oil production chain made these vulnerable to disruption, as long as targets were hit that could not be repaired relatively quickly. Stage four (distribution) of the oil production chain lacked attention from the coalition throughout all five phases. Trucks and trailers, which are located in stage two (transportation), were regarded among the most vulnerable hits to be targeted in the oil network, followed by wellheads. This was the case despite the risk of collateral damage, in case of the former in terms of inflicting human casualties and in case of the latter in terms of risking natural disasters and ensuring the future

usability of oil fields. The geographic analysis has shown the importance of Syria and the Dayr Az Zawr Province, the lack of hits on stage one (extraction) in Iraq, and the significance of transportation hubs in Hims and Ninawa. Finally, results demonstrate that ISIS's reaction to this strategy caused environmental damage, which has implications for academic debates – such as the one surrounding the resource curse. These contributions will be discussed in Chapter 5.

CHAPTER 5: DISCUSSION & CONCLUSION

§5.1 · Discussion

§5.1.1 Theoretical Implications

The results presented in this dissertation fill multiple empirical gaps and lay the groundwork for new debates to unfold within the fields of terrorism studies and conflict studies. To reiterate, the following research questions have been tackled: How did the US-led coalition attempt to disrupt ISIS's oil network through airstrikes conducted in Iraq and Syria between September 2014 and October 2017? And why was this strategy chosen? As a core argument, this study argues that that the US-led coalition started the airstrike campaign by strongly attempting to limit collateral damage, but that it became increasingly willing to give up this commitment in order to improve airstrike effectiveness as the campaign proceeded. As this study did not rely on the analysis of an existing dataset, but developed and coded a new one – first-hand – with 5,768 unique data points, the dataset can by itself be perceived as an empirical contribution. In this chapter it will also be laid out how future researchers can use this dataset to explore facets that go beyond the presented granular temporal and geographic analyses. Before that, further contributions will be discussed in three areas, as per the critical literature review: the broader field of terrorism financing, TPIs and accompanying US strategies, and knowledge generated on ISIS's functioning.

First, this dissertation has demonstrated the value of widening the terrorism financing debate to include relatively undiscovered sources of financing, particularly those related to territorial resources. An integration with the field of conflict studies is desired here. In line with Ryder's (2018: 80) argument, a diversification of funding methods has taken place, but these do not always follow the outlined argument that harder detection results from terrorist actors' use of new technologies. On the contrary, findings show that ISIS lacked technological know-how in its oil business, but that it was still able to avoid detection through, most notably, enforcing cash payments, producing for the local market, and – as the phases progressed – selling oil increasingly in a crude form. By doing so, international transfers were often absent and the origin of petroleum hard to determine. This provides support for the mentioned critique that it can be hard to pinpoint who has been involved in an act of illegal nature, even with the help of outlined Article 2(1) of the 1999 UN International Convention, as petroleum was bought, processed, and resold by civilians.

Furthermore, I have criticised the common legal-illegal divide used by scholars such as Freeman (2012: 4) when categorising forms of terrorism financing. The fact that ISIS-produced

oil was sold earlier in the production chain as the five phases progressed – specifically, in a cruder form – means that the resource was handled by more middlemen before it reached its final consumer. That makes one question and opens up a new debate concerning the illegality of civilians that buy, use, or sell this ISIS-produced resource, potentially without awareness of its origin. This grey area therefore calls again for a more accurate terminology to capture the essence of these different types of transactions. Finally, empirical findings have provided support for Ryder's (2018: 79) argument of the inapplicability of the FTW to ISIS's oil industry, for above-mentioned reasons, but little support has been found for Cragin's (2015: 321) argument that a focus on transit countries can effectively reduce money flows. This results from the predominant local distribution and consumption of ISIS-produced oil.

Coming closer to the core of the analysis, findings have demonstrated that the US-led campaign was – conform Le Billon and Nicholls's (2007: 620) hypothesis – successfully implemented. In §2.3.3 of the literature review two US strategies in TPIs were identified: one that carefully integrates considerations of collateral damage, most notably civilian casualties, and one that takes an enemy-centric strategy. This dissertation has identified a macro-trade-off in the US-led campaign against ISIS's oil network that takes regard of the prevention of natural disasters, human casualties, and that should ensure the future usability of petroleum resources in Iraq and Syria. In Phase I of the timeframe these considerations were accounted for and across all five phases a reluctance to hit targets in stage four of the oil production chain (distribution) was identified. This is worth noting as it is particularly likely that hits in this last phase would have resulted in civilian casualties, for example in retail hubs. Yet still, as phases progressed, more risks were taken. Empirical findings demonstrate an increase in both the volume and variety of target choices, and the two most-hit targets – trucks and trailers with 1533 hits and wellheads with 936 – were increasingly selected despite the risk of human casualties in the former category and that of natural disasters in the latter. As such, this dissertation has identified a steady move towards an enemy-centric approach over the course of the campaign: one that perceives the physical destruction of the oil network as principal. This has provided a new insight into recent US-led strategy-making in a multilateral setting while dealing with an unconventional threat.

Furthermore, findings have identified environmental pollution: not necessarily as a direct result of strikes against the extraction stage, but primarily as an indirect result of ISIS's reaction to the airstrikes such as an increasing reliance on primitive forms of refining. This outcome opens up a new debate that was outside the scope of the literature review, namely the role of pollution in conflict areas. Harary (2016: 15) claims that pollution results in an extended

time of instability and that it hardens post-conflict recovery. This finding can, when treated in isolation, be used as support for introduced theories relating to the negative effects of TPIs, the resource curse, and Felbab-Brown's (2017: 107) critique of disrupting non-state actors' labour-intensive illicit activities in controlled territory. However, when drawing a broader picture, data that is strong enough to make claims about long-term stability is yet absent. For example, Figure 14 in Appendix B shows how fluctuations in reported civilian deaths resulting from US-led coalition strikes follow a roughly similar shape to the number of strikes on oil targets revealed in Figure 3. However, this dissertation has refrained from taking this correlation as evidence for causation as, first, data on human casualties does not account for differences between strikes on oil and non-oil targets. Second, other factors, such as an overall increase in the number of strikes, may have accounted for this correlation as well. Therefore, in §5.2 a call for further research that tackles specific aspects that confirm or reject introduced theories, for instance more accurate data on human casualties and quantitative data on environmental damage, will be made. These different types of data can then, in conjunction with this dissertation, be used to draw deeper insights into their full applicability.

When it comes to the specific case of ISIS, this dissertation has demonstrated how the US-led coalition exploited ISIS's lack of technological know-how primarily by targeting assets in stages one and three of the oil production chain (extraction and refinement). Yet, despite a temporal reduction in production numbers, ISIS still managed to operate the network and generate relatively large sums of money from it. Here it is important to point out that, in line with Ocakli and Scotch's (2017: 75-76) argument, theories that describe the relationship between petroleum and political order generally classify oil as unlootable. For example, in their theory on motivations behind TPIs in lootable resource-rich areas, Findley and Marineau (2015: 465, 481) disregard oil due to its perceived unlootable nature that cannot provide income for rebels or locals and that supposedly cannot be smuggled easily, that requires large investments, as well as technologically sophisticated methods of operation. However, findings of this study have demonstrated otherwise: despite a lack of technological sophistication, ISIS was able to operate the industry by taking over the petroleum network largely intact. It thereby provided significant sums of income for itself and locals. Therefore, categorising oil as unlootable in academic studies should be done with caution.

Finally, this dissertation was manifested in a relatively unexplored academic area and has thereby also generated novel information that, instead of merely contributing to pre-existing theories and debates, can be used as a groundwork for new ones. Novel insights have been given regarding ISIS's oil network's vulnerabilities, such as geographic locations, the value of

hitting trucks and trailers – especially when clustered – and of hitting GOSP/V infrastructure, as well as trade-offs intervening parties may encounter. However, it remains unknown if these findings only apply to this case, meaning that ISIS's behaviour in Syria and Iraq allowed for unique circumstances, or if broader generalisations can be drawn that present an insight into the disruption of financing structures of VNSAs. Referring back to §3.1.2, researchers are invited to apply the theory-building route of process tracing to the findings of this dissertation. By conducting a similar analysis, meaning an application of Tierney's (2017: 163) argument that international pressure causes non-state actors to change their financing activities as well as the use of Ocakli and Scotch's (2017) stages of the oil production chain, further theoretical implications can be found.

§5.1.2 Policy Implications

Besides its theoretical relevance, policy implications can be drawn from this study. Before these are elaborated upon, it is important to note they do not exclusively apply to coalition members, but any actor that is or will be involved in disrupting related forms of VNSAs' financing structures can benefit from these considerations. A first implication has to be drawn from different types of responses that align with different types of actors. It has been shown that treating an organisation like ISIS merely as a terrorist organisation, and subsequently implementing sanctions such as asset freezing in light of the Financial War on Terrorism, has raised questions regarding effectiveness in reducing the group's oil income. As such, actors countering these types of financing ought to make a clear distinction between terms as VNSAs, rebel groups, insurgencies, and terrorist organisations. Although it is hard to set strict boundaries among these, as some terms are broader than others and overlap exists, restricting one's vision to one classification and applying a subsequent response may lead to unsatisfying results. The case of disrupting ISIS's petroleum network has demonstrated that the organisation made use of unique circumstances that were hard to counter with the implementation of a one-size-fits-all approach.

Therefore, a second implication deals with gathering and analysing information. Building upon Cragin (2015), the importance of a step-by-step analysis to draw a picture of a target actor's logistical network ought to be outlined here. The empirical findings demonstrate ineffectiveness prior to access to Abu Sayyaf's data, and a change of strategy and subsequent results after the analysis of this newly acquired data. Crucial points outlined in §4.2 should be gathered here before undertaking action, such as finding out what types of transportation are

used by a target actor, its production capabilities and business strategies, as well as where hubs are located. The latter aspect can take the same distinction among the four stages used in this dissertation, meaning a division between extraction, transportation, refinement, and distribution hubs. Taken these pieces of information together, vulnerabilities can be identified that could subsequently be exploited.

It is important to map out these vulnerabilities in order to find the right balance between disrupting a source of financing without risking unnecessary collateral damage. The more information is available, the better this balance can be found – hence this dissertation also argues for the cooperation of government agencies, such as intelligence and law enforcement bodies, to improve information-sharing practices on both a national and cross-national scale. By doing so, the reoccurrence of spending resources on the ineffective targeting of assets in a network and taking disproportionate risks of inflicting collateral damage can be avoided in the future. The cross-national aspect of information-sharing applies in particular to cases similar to the one presented in this study, in which multiple states cooperate in the planning and execution of hitting assets. Overall, the findings of this study allow state actors to reflect on the way this trade-off was handled between September 2014 and October 2017 in Iraq and Syria – and to implement recommendations like the ones presented above accordingly.

§5.2 · Conclusion

Once again, this dissertation has answered the following research questions: How did the US-led coalition attempt to disrupt ISIS's oil network through airstrikes conducted in Iraq and Syria between September 2014 and October 2017? And why was this strategy chosen? The study has introduced a new theoretical framework and combined a quantitative with a qualitative analysis to discover this yet undiscovered response to a VNSA's territorial funding source. It has been shown that the coalition's strategy at the start of the timeframe involved hitting refineries and accompanying equipment, collection points, and pumps – shortly, targets in the extraction and refinement stages of the oil production chain – but with limited effectiveness due to ISIS's ability to repair these assets quickly. However, a shift in focus on hitting trucks, trailers, and GOSP/Vs, combined with an increased intensity of airstrikes, started to have its first effects. As a result, this dissertation has pointed out the vulnerability inherent in targets located in the transportation stage of the oil production chain. Yet, the coalition also exploited ISIS's lack of technological know-how in the extraction and refinement stages – with a new focus on hitting wellheads, oil stills, and tanks – to counter ISIS's ability to fund itself through petroleum.

As time progressed, coalition members took increasing risks of inflicting collateral damage as a means to improve effectiveness and, finally, to fully disrupt ISIS's control over oil assets. This has led to the key argument of this study: a move in the US-led strategy towards an enemy-centric approach took place – one that placed the destruction of ISIS's oil network above the commitment to limit collateral damage to the fullest extent possible. Over time, the intensity of airstrikes increased, while also more diverse target natures were hit. This shift in strategy resulted from a lack of immediate effectiveness at the start of the airstrike campaign. In the end, each stage of the oil production chain was targeted heavily, except for the fourth, and final, stage: that of distribution. The identified rationale behind this decision is the fact that retail hubs contain fewer volumes of oil compared to other targets, combined with the remarkably – and unnecessarily – high risk of civilian casualties involved in stage four. Besides the nature of hit targets, the analysis has also shed light on vulnerable locations in the network. Syrian territory played a more critical role in the oil production chain than Iraqi. Important locations include the Dayr Az Zawr region, which functioned as the core of ISIS's oil business, as well as Ar Raqqah. Hims in Syria and Ninawa in Iraq were furthermore revealed to have been valuable transportation hubs. This is a characterisation that has not been explicitly communicated in US CENTCOM press releases and has thereby also generated a contribution to academic literature on ISIS's functioning generally and oil financing specifically.

Aside from the contributions these findings have made to academic debates in multiple disciplines, potential limitations of a study always ought to be considered. The first, relating to using data produced by a conflict actor, has already been discussed in §3.2.2. In short, the US CENTCOM is not a neutral actor in the case under study but does exert control over the analysed press releases, as a result of which this dissertation has taken several measures – such as triangulation – to alleviate this limitation to the fullest extent possible. A second potential limitation deals with the extent to which the analysed changes in ISIS's production strategies and behaviour are conform the *ceteris paribus* principle. Specifically, although this study has taken regard of the likelihood that other factors than US-led airstrikes may have contributed to these changes, it remains important to lay them out. Most importantly, Russia also conducted airstrikes in Syria and Iraq that might have influenced ISIS's behaviour, on-the-ground actions by other actors were beyond the scope of this study, and global oil price fluctuations could have also impacted revenue figures. These considerations result in final recommendations for further research.

Building upon the made invitation to study other related cases and to apply the theory-building route of process tracing to the findings of this dissertation, recommendations for

research on the case handled here should be made as well. After all, this study tackled a yet undiscovered phenomenon and introduced a new framework for analysis that other researchers can build upon. For example, findings on the US-led strategy result in the new question of the extent to which collateral damage in TPIs is allowed as per international law and if the coalition acted conform this. The introduced Geneva Conventions' Rule 43 concerning the conduct of hostilities to the natural environment could be scrutinised to answer this new research question (ICRC, n.d.). Related to this would also be the field of ethics. Specifically, findings of this study open up a new question of proportionality and to what extent the chosen US-led strategy and its outcomes can be ethically justified. This refers specifically to the coalition's choices in the macro-trade-off and the move towards an enemy-centric approach. Additionally, more factual information that is not openly accessible, or data that did not pass Bell and Waters's (2014: 163-165) assessment criteria or the data compatibility test, is desired. This refers to quantitative data on human casualties resulting from US-led airstrikes on oil targets, quantitative data on pre- and post-airstrike environmental damage by those in the field of environmental science, and studies on the mentioned developments of, for example, Russian strikes and other on-the-ground-efforts in Syria and Iraq that may have impacted ISIS's behaviour. In sum, this dissertation has presented a novel dataset – one that has opened up a variety of opportunities other researchers can exploit for the generation of further insights.

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APPENDIX A: CODEBOOK QUANTITATIVE CONTENT ANALYSIS

1. The fundamental unit of analysis for the dataset is the "event," i.e. an individual ISIS-controlled oil target hit by the US-led coalition that takes place at a specific known time and place and to which at least some form of damage is done. Each observation constitutes one hit, represented in a single row of the dataset, and is disaggregated by variables as described under point three. This means that, if targets have been hit multiple times, they also appear in the dataset multiple times.

2. The relevant US CENTCOM press releases are collected through their online archives, through the search terms of "ISIS," "ISIL," "the Islamic State," "Daesh," and "Da'ish" combined with "oil" and "petroleum." The concerning month and year are also entered in the search bar. This will give an overview of all relevant press releases, which are typically named either "[Date]: Military Airstrikes Continue Against ISIL in Syria and Iraq" or "[Date]: Military Airstrikes Continue Against ISIS Terrorists in Syria and Iraq."

3. The nature of each hit asset is coded alongside its location and the timing of each hit, in months. The locational data collected includes variables capturing the country in which the hit took place (*tcoun*), its corresponding province (*tpro*), as well as its most nearby city, town, or village (*tpla*). When determining the latter variable, the location that is mentioned in the corresponding US CENTCOM press release is coded. This requires no interpretation of the researcher. In addition, provinces that bear the same name as a Syrian or an Iraqi city, town, or village are coded this name *plus* the word "province," e.g. Ar Raqqah Province, in order to distinguish between target provinces (*tpro*) and target places like cities and villages (*tpla*).

4. The coded hits are conducted in light of the US-led military operation against ISIS. This means that a majority of hits were executed by US forces, but some have been conducted by coalition members. These include Australia, Bahrain, Belgium, Canada, Denmark, France, Jordan, the Netherlands, Saudi Arabia, the United Arab Emirates, and the United Kingdom.

5. Included hits are those conducted by strikes conducted by 'fighter, attack, bomber, rotary-wing, or remotely piloted aircraft, rocket propelled artillery and (…) ground based tactical artillery when fired on planned targets' (US DoD, 2017b). 'Ground-based artillery in counter-fire or in fire support to maneuver roles' are not part of the press releases (see US DoD, 2017b) and hence not coded.

6. Only hits on petroleum targets are coded. In case of doubt if a target was part of ISIS's oil infrastructure, and this is not explicitly mentioned, the hit is excluded from the dataset.

7. In coding hits, no regard has been – or, based on data availability, could have been – taken for what the target aim was. As such, both intentional and unintentional hits are included, taking into regard considerations of potential bias as outlined in Chapter 3.

8. It is allowed to add new variables as the process of coding unfolds. Those formulated pre-coding are the result of a qualitative analysis, but in order to make up for potential gaps in available data it is possible to create new variables if the concerning hit cannot be included in those created a priori.

9. Targets do not necessarily have to be destroyed in order to be coded. Damaged targets are also integrated in the dataset. Strikes inflicting no damage are, however, excluded.

10. In the extremely rare occurrence that a press release speaks of "multiple" or "several" hits, two are coded.

11. Before coding the target nature (*tnat*) of a hit, it is required to review the following definitions. In case a target hit can be classified under two variables, the terminology of the corresponding press release is taken over, and otherwise it is explicitly mentioned under which definition the hit falls.

VARIABLES	DEFINITION	NUMBER OF MONTHS HIT	TOTAL NUMBER OF HITS
TNAT	*Nature of the target that was hit*		
BARREL	Container used for storing oil, typically for purposes of transportation.	8	505
COLLECTION POINT & EQUIPMENT	Site where crude oil is stored before being transported to refineries.	18	86
CONSTRUCTION EQUIPMENT	Overarching umbrella of material and machinery used in the construction stage of the oil production chain. The nature of the object itself is, however, unspecified.	1	2
CRANE	Machine used for moving heavy objects.	1	1
DERRICK	Device articulated over an oil well for raising and lowering drilling machinery.	1	4
DRILLING RIG	Equipment used for creating oil wellbores.	10	18
DRUM	Container used for storing oil, typically for purposes of transportation. This resembles a barrel but with slight occasional differences in holding amount.	1	9
EQUIPMENT (OTHER)	Material used in the oil production chain that have not been specified – and that therefore do not fit under any other umbrella or equipment variable.	2	85
GENERATOR	Power-generating machine used for the production of oil.	1	1
GOSP/V	Short for gas-oil separation plant/vessel. This refers to a facility and related assets that separate wellhead fluids into liquid oil components.	12	81
INLET MANIFOLD	Device that transfers vaporised fuel to inlet valves. Functions include that of storage,	4	17

	disposal, and transfer to a production line.		
LUBRICANT EQUIPMENT	Petroleum-based material designed for reducing friction in machines.	1	4
OIL FACILITY	Facility encompassing the equipment between oil wells and transportation systems.	3	28
OIL MINISTRY HEADQUARTERS	Building from which oil operations are ministered.	1	1
OIL STILL	Asset used for the distillation of crude petroleum.	11	864
PETROLEUM JUNCTION POINT	Point at which an oil pipeline connects to another.	2	3
PIPELINE	Pipe used for transporting oil, typically over long distances.	3	7
POL SITE (UNKNOWN)	Undefined petroleum, oil, and lubricants site – nature of the site not specified.	4	14
PROCESSING EQUIPMENT	Overarching umbrella of material used in the oil processing stage, but of which the specific type is unknown. This can include boilers and valves.	4	37
PUMP	Station and its assets employed for pumping oil from one place to the other. This refers to both pumping oil out of wells, primarily through pump jacks, and moving the liquid to their end customers through fuel stations.	26	343
REFINERY & EQUIPMENT	Installation and accompanying equipment used to produce fuel out of crude oil. This includes modular refineries and refinement buildings. Assets for separation, as well as stills and tanks, are not included but part of their corresponding variables.	17	109
STORAGE LOCATION	Site where oil and assets used in the oil supply chain are stored. Synonyms include fuel storage area and oil cache.	15	22
TANK	Container that stores oil. Any type of tank is included – as long as they are part of the oil production chain.	21	715
TANKER	Vehicle used for the transportation of oil, typically a ship.	20	331
TRANSFER COMPRESSOR	Instrument for supplying gas at increased pressure, typically for maintaining or increasing oil production.	1	4
TRUCK/TRAILER	Vehicle suitable for transporting oil by road. This definition also includes trailers, both those attached and those not attached to trucks while being hit, for oil transportation.	22	1533
WELL	Hole in the Earth from which petroleum is obtained.	1	1
WELLHEAD	Structure installed at a natural oil well that controls pressure for drilling and production equipment. This does not include separation plant wellheads, which are part of GOSP/V.	20	936
WORKOVER RIG	Device used for intervening in an oil well, for	3	6

	example for inserting pipe tubing into a well.		
TCOUN	*Country in which the target was hit*		
IRAQ		30	528
SYRIA		36	5239
TPRO	*Province in which the target was hit*		
AL HASAKAH PROVINCE		10	49
ANBAR		21	76
AR RAQQAH PROVINCE		21	833
DAYR AZ ZAWR PROVINCE		33	4130
HALAB		1	1
HIMS		4	226
KIRKUK		5	67
NINAWA		21	358
SALAH AD DIN		9	27
TPLA	*The city, town, or village most closely located to the target that was hit*		
ABU KAMAL		24	1558
AL BAGHDADI		2	3
AL HASAKAH		6	37
AL HAWL		2	5
AL HUWAYJAH		5	59
AL MAYADIN		1	4
AL QAIM		6	38
ALBU HAYAT		1	1
AR RAQQAH		21	816
AR RUTBAH		1	1
ASH SHADDADI		2	7
AYN ISA		1	1
BASHIR		1	8
BAYJI		7	20
DAYR AZ ZAWR		31	2564
DHIBAN		1	2
HABBANIYAH		1	1
HADITHA		1	1
HIT		4	5
KHUSHAM		1	1
KOBANI		1	1
MOSUL		15	270
PALMYRA		4	226
QAYYARAH		6	49
RAMADI		5	15
RAWAH		9	11

SAMARRA	1	3
SHARRA	1	1
SINJAR	1	4
SULTAN ABDALLAH	1	1
TABQAH	3	16
TAL AFAR	7	34
TIKRIT	1	1
TUZ	1	1

APPENDIX B: AIRWARS'S REPORTED CIVILIAN DEATHS FROM US-LED STRIKES

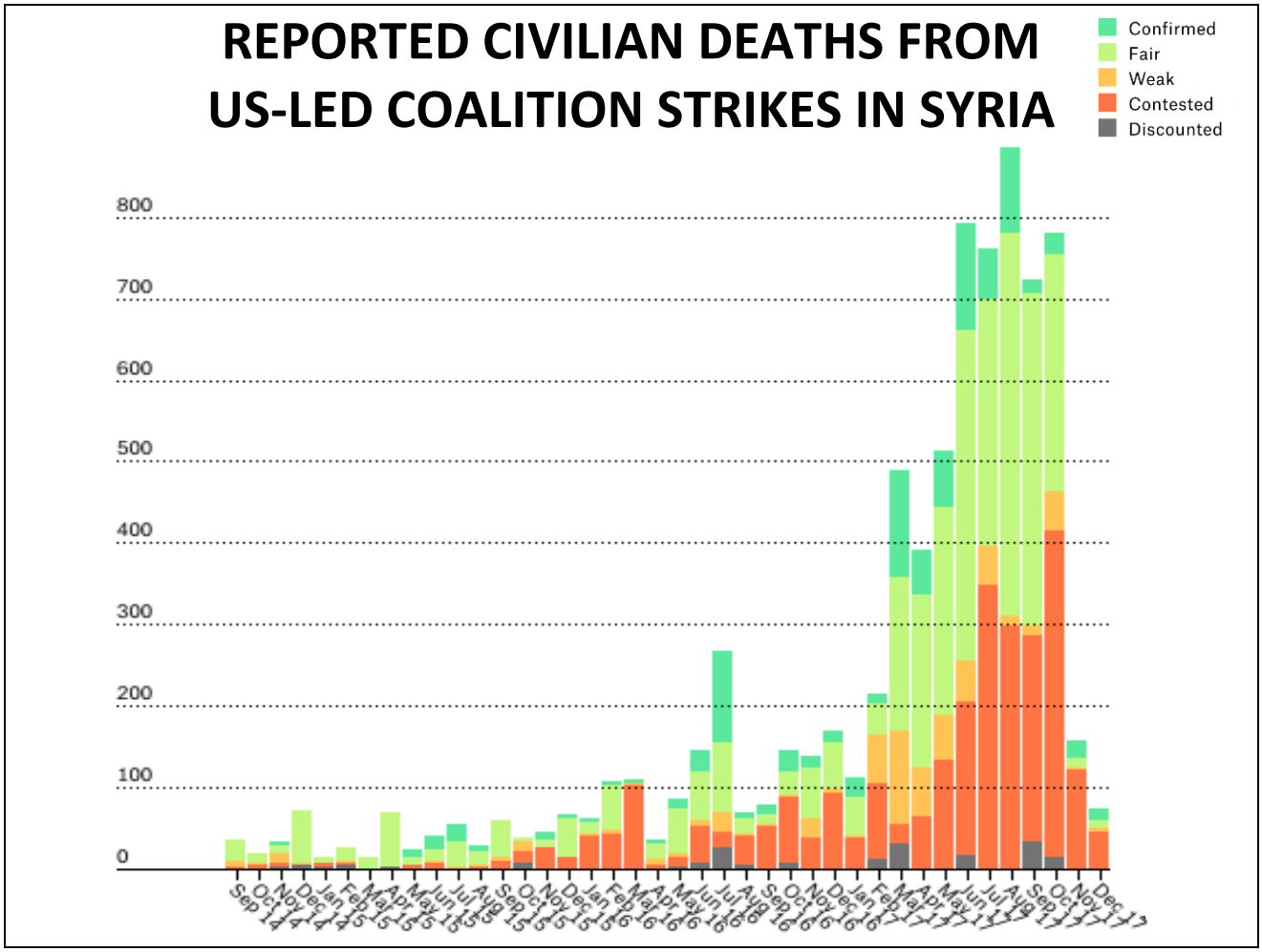

Figure 14: Civilian Deaths from US-Led Strikes in Syria, Acquired from Airwars (n.d.)