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Research paper

Maritime transportation of illegal drugs from South America

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ABSTRACT

Background: The US invests considerable effort in searching and interdicting drug-trafficking vessels in the Caribbean and Eastern Pacific regions. While some vessels are indeed interdicted, resulting in confiscation of substantial quantities of drugs, many such vessels manage to avoid detection and arrive safely at their destinations in Central America and Mexico with their drug load intact. The agency in charge of interdicting this traffic, Joint Interagency Task Force South—JIATF-S, sends out both aerial and surface assets for search and interdiction missions.
Methods: An important parameter for planning search and interdiction missions is an estimate of the expected steady-state number of the various types of drug trafficking vessels present in the search regions at any given time. In this paper we use various publicly available sources to estimate these numbers.
Results: We estimate that the number of drug shipments initiated per month ranges between four and six dozen, and at any given time there are between two and four vessels, of all types, on the high seas. These estimates remain quite robust over a relatively large range of assumptions and estimates regarding the size and distribution of the drug flow, mix of vessel types, and physical characteristics of those vessels.
Conclusion: Our analysis provides insight for how to allocate assets to search, detect, and interdict drug trafficking vessels. The results can also be useful to vet informants to check if their information is consistent with our flow estimates. To the best of our knowledge this is the first time such flow estimates appear in the open literature.

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Introduction

One of primary missions of the US Southern Command (USSOUTHCOM) is to disrupt the flow of drugs from Central and South America to the United States via the southern approaches. This mission is executed by the Joint Interagency Task Force South—JIATF-S. JIATF-S is a US-government interagency that collaborates with law-enforcement agencies from other countries in Central America. Drug Trafficking Organizations (DTOs) employ both maritime and air conveyances and use a variety of vessel types to transport the drugs. Examples of maritime means of transportation include go-fast boats, pangas, fishing vessels, and self-propelled semi-submersibles (SPSS). JIATF-S's area of operations (AO) covers over 42 million square miles (ONDCP, 2014; Stavridis, 2010), yet it has quite a limited fleet of search and interdiction assets to effectively support its mission.

Notwithstanding lead-times in the drug supply chain, a reasonable and simple estimate for the non-intercepted flow of cocaine from South America to the US in a given time period is the estimated total consumption of cocaine during that time in the US. If the total consumption is X, and there are no other significant sources of cocaine shipped to the US, then the total flow of cocaine to the US in that period is X too. Estimates of drug consumption are given in Caulkins, Kilmer, Reuter, and Midgette 2015, Kilmer et al. (2014), ONDCP (2010, 2012, 2013, 2014), Rhodes et al. (2012) and UNODC (2011). However, we must be cautious using this estimate. First, the purity of cocaine decreases as it moves through the supply chain down to the consumers. Thus, X tonnes of cocaine in the streets of US cities may be generated from only Y tonnes of shipped cocaine of higher purity, where $Y < X$. Second, nearly all the cocaine exported from South America to the rest of the world flows through the Caribbean and Eastern Pacific regions, and thus we cannot merely focus on US consumption estimates. The main question we address in this work relates to the interdiction efforts of JIATF-S: how many cocaine-carrying vessels of a certain type are afloat in the area of interest at any given time? This number is affected by the number and capacity of the various vessels, production capacities and processing schedules of cocaine at the sources in South America, logistic constraints regarding ground transportation, weather, and possibly seasonality in demand for

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cocaine. The number of vessels and their spatial distribution in the area are also affected by the actions of the interdicting force—JIATF-S. The latter consideration lends itself to a game-theoretic situation. This paper aims at estimating the DTO traffic intensity at sea by focusing on the maritime transportation section of the DTO supply chain. Here we take an aggregate approach by considering both production and consumption data to constitute the base for estimating total DTO traffic in the maritime Caribbean and Eastern Pacific. In particular, we ignore possible responses of DTOs to interdiction efforts by JIATF-S. To simplify exposition we henceforth call JIATF-S the *interdictor*.

DTO traffic estimates

As mentioned in the Introduction, we plan to answer the following question: how many drug-carrying DTO vessels of a certain type are afloat in the AO at any given time? The challenge is to estimate an unobservable parameter (undetected vessels) based on limited available data regarding production, consumption, and interdiction. From the point of view of the interdictor, each DTO vessel is in one of three possible states: interdicted, known but not interdicted, and unknown. A vessel in the state known but not interdicted is a vessel whose existence, and perhaps its whereabouts, are known to some agency such as FBI, CIA, DEA, local law enforcement, or partner nations, but interdiction does not occur for various reasons (e.g. the information is not passed to the interdictor in sufficient time). The primary challenge, however, is estimating the unknown category. The Consolidated Counterdrug Database (CCDB) tracks some of these shipments and labels them as either confirmed (seizures), substantiated, or suspect (Kilmer et al., 2014). The suspect category may be a rough proxy for some of the unknown traffic flow, however some of the events in the suspect category may include drug shipments that do not actually exist. See Section 7.1.3.3 in Kilmer et al. (2014) for a more in-depth discussion of the uncertainty associated with using the data in the CCDB. Rather than work directly with the data in the CCDB and attempt to correct for possible under and over counting, we start our analysis at a more aggregate level by considering production and consumption data. First we construct an estimate of the cocaine departing Colombia via maritime conveyances. Then we use information on routes and vessels used by DTOs to estimate the number of vessels transiting the AO at any given time. We limit ourselves to data from unclassified sources. Much more detailed, but classified, data exists in the CCDB and other government sources. The methodology presented in this paper may be applied to those classified sources to obtain more refined estimates. We focus our attention on four types of vessels: go-fast boats, SPSS, fishing vessels, and pangas. Go-fast boats are small, agile and powerful boats that can go as fast as 80 knots in calm waters. Self-propelled semi-submersibles (SPSS) (aka narco-subs) are custom-made vessels that cannot dive but can submerge such that only the cockpit and the exhaust gas pipe stay above water. Pangas are modest-sized outboard-powered boats mostly used for coastal fishing. We consider three smuggling corridors from the northern part of South America: the Eastern Pacific (EastPac), the Western Caribbean (WCarib), and the Eastern Caribbean (ECarib). EastPac and WCarib consist of routes heading to the western and eastern coasts of Central America, respectively, while ECarib contains routes heading toward Caribbean islands such as Jamaica, Hispaniola, and Puerto Rico. The reference to these three aggregate corridors stem from the available data; if more detailed route information becomes available (e.g. information about specific departure and arrival zones along each corridor), we could enhance our analysis to account for this level of detail. Our main result is that, based on the available data covering the years 2009–2012, one would expect about 57 maritime shipments launched per month across all corridors and vessel-types. More specifically, at any particular time an average of 2.5 drug-smuggling vessels, of all types, are present on the water in the AO. We present point estimates – rather than confidence intervals – because the available data is limited to only rough estimates of mean values. There is insufficient data to estimate statistical distributions or even variances of relevant random variables. We do perform extensive sensitivity analysis in the next section. Whenever we need to make operational assumptions we assume a worst-case scenario from the point of view of the interdictor. To compute these estimates we consider the following inputs.

1. Amount of export quality cocaine leaving South American each year.
2. Fraction of exported cocaine that transits via maritime conveyances in the AO.
3. Fraction of cocaine that traverses along each of the three corridors.
4. Average distance traveled by smugglers along maritime routes for each of the three corridors.
5. Fraction of cocaine carried on each of the four types of vessels.
6. Velocity of each of the four vessel-types.
7. Drug-capacity of each of the four vessel-types.
8. Average time to traverse each corridor by vessel-type.

The baseline for the aforementioned estimations is discussed in the Appendix A.

We present up front our baseline estimates for each one of the aforementioned eight parameters in the following tables. The details behind these estimates and their associated uncertainties appear in the Appendix A. The next section presents sensitivity analysis.

850 metric tonnes of export quality cocaine flow out of South America each year. Approximately 10% of the cocaine transits via air, and we assume that the remaining 90% transits via the sea. Even the drugs that eventually transit to Europe via air, usually travel to an intermediate point first in Central America or the Caribbean (UNODC, 2011). Thus, 765 metric tonnes traverse the water each year, and breaking down this number according to the distribution in Table 4 provides the estimated amount of cocaine that flows on each corridor/vessel-type combination. To determine how many shipments are made each year, we divide the amount of drugs by the average capacity per vessel from Table 3. For example 112 metric tonnes (765×0.15) flow along the EastPac each year in SPSS. Since each SPSS carries 5 metric tonnes, that equates to approximately 22 SPSS transits in the EastPac per year, or slightly less than 2 per month. Performing similar calculations yields Table 5.

We also compute the average number of vessels in the AO at any given time. The longer it takes to traverse a route, the more vessels we expect to be on the water. We use the velocities in Table 3 and the distances in Table 2 in our calculation. For example, a go-fast travelling 25kts will traverse the average 750 nm EastPac route in 30 h. From Table 5 a go-fast is launched every 0.033 h $(((24.4)/(30 \times 24)))$ along the EastPac, and thus we would expect on average 1.0 go-fasts (0.033×30) along the EastPac corridor at any given time. Similar calculations produce Table 6.

As mentioned earlier, we present the results in Tables 5 and 6 as point estimates, when in reality there is a great deal of uncertainty about the underlying inputs (e.g. velocities, capacities, etc), and hence in the outputs contained in Tables 5 and 6. In the next section we thoroughly examine the uncertainty in the inputs and analyse how this impacts the final results. In the future when more accurate information and data are collected, one can update the input estimates in Tables 1–4 and use our methodology to produce more refined results.