

2015

Narco-Submarines: Specially Fabricated Vessels Used for Drug Smuggling Purposes

Byron Ramirez

Claremont Graduate University, Byron.Ramirez@cgu.edu

Robert J. Bunker

Claremont Graduate University, docbunker.warlord@gmail.com

Follow this and additional works at: http://scholarship.claremont.edu/cgu_facbooks

 Part of the [Defense and Security Studies Commons](#)

Recommended Citation

Ramirez, Byron and Robert J. Bunker (Eds.) Narco-Submarines: Specially Fabricated Vessels Used for Drug Smuggling Purposes. U.S. Army Foreign Military Studies Office, 2015. Available: <http://fmso.leavenworth.army.mil/Collaboration/Interagency/Narco-Submarines.pdf>

This Book is brought to you for free and open access by the CGU Faculty Scholarship at Scholarship @ Claremont. It has been accepted for inclusion in CGU Faculty Books by an authorized administrator of Scholarship @ Claremont. For more information, please contact scholarship@cuc.claremont.edu.

BOWLES'S *NEW AND ACCURATE MAP OF THE WORLD, OR TERRESTRIAL GLOBE,*
laid down from the *BEST OBSERVATIONS* and *NEWEST DISCOVERIES*; particularly those
either obtained *CIRCUMNAVIGATORS*: Illustrated with a variety of useful *PROJECTIONS* and
GEOGRAPHICAL DEFINITIONS, TABLES, and PROBLEMS. With an *easy and familiar Explanation*
of the most curious and interesting *PHENOMENA* of the *UNIVERSAL SYSTEM*.
Printed by the Proprietor, Catherine BOWLES,
No. 5, St. Paul's Church-Yard, LONDON.



Narco-Submarines

Specially Fabricated Vessels Used For Drug Smuggling Purposes

BYRON RAMIREZ AND ROBERT J. BUNKER, EDITORS

In cooperation with

InSight Crime &

Small Wars Journal—El Centro

Open Source, Foreign Perspective, Underconsidered/Understudied Topics

The Foreign Military Studies Office (FMSO) at Fort Leavenworth, Kansas, is an open source research organization of the U.S. Army. It was founded in 1986 as an innovative program that brought together military specialists and civilian academics to focus on military and security topics derived from unclassified, foreign media. Today FMSO maintains this research tradition of special insight and highly collaborative work by conducting unclassified research on foreign perspectives of defense and security issues that are understudied or unconsidered.

Editors' Background

Byron Ramirez is a political economy analyst who specializes in international political and economic affairs. He is a Ph.D. Candidate in Economics and Political Science at Claremont Graduate University and holds an M.A. in Economics, a M.S. in Management, and an MBA. He is presently an intern with *Small Wars Journal—El Centro*. His areas of research include geopolitics, globalization, economic and social development, and informal economies. His most recent publication is the co-edited work *Narco Armor: Improvised Armored Fighting Vehicles in Mexico*. Fort Leavenworth, KS: U.S. Army Foreign Military Studies Office.

Dr. Robert J. Bunker is Distinguished Visiting Professor and Minerva Chair at the Strategic Studies Institute, U.S. Army War College. He is also adjunct faculty, Division of Politics and Economics (SPE), Claremont Graduate University and a senior fellow with *Small Wars Journal—El Centro*. His many publications (over 200) include books, reports, articles, essays, response guidance, subject bibliographies, and encyclopedia entries in academic, policy, military, and law enforcement publications; he has also served as the editor for a number of collections of articles. Among those are (with Steve Sloan) *Red Teams and Counterterrorism Training* (Oklahoma University Press 2011) and the edited works including *Criminal Insurgencies in Mexico and the Americas: The Gangs and Cartels Wage War* (Routledge 2012); *Narcos Over the Border: Gangs, Cartels and Mercenaries* (Routledge 2011); *Criminal-States and Criminal-Soldiers* (Routledge 2008); *Networks, Terrorism and Global Insurgencies* (Routledge 2005); and *Non-State Threats and Future Wars* (Routledge 2003).

FMSO has provided some formatting to this paper to conform to organizational standards. Academic conventions, source referencing, and citation style are those of the author(s).

The views expressed are those of the author(s) and do not represent the official policy or position of the Department of the Army, Department of Defense, or the U.S. government.

Contents

PREFACE	
James G. Stavridis	4
EDITORS' NOTE	
Byron Ramirez and Robert J. Bunker	6
INTRODUCTION: NARCO SUBMARINES	
Robert J. Bunker and Byron Ramirez	9
1. RAWFEED: THE EVOLUTION OF THE DRUG SUBMARINE	
Hannah Stone	25
2. THE RISE OF THE NARCO NAVY	
Adam Elkus	27
3. THE EVOLUTION OF 'NARCO-SUBMARINES' ENGINEERING	
Byron Ramirez	29
4. NARCO-SUBMARINES: APPLYING ADVANCED TECHNOLOGIES TO DRUG SMUGGLING	
Byron Ramirez	33
5. TRAJECTORIES, CONTINUITIES AND DISPLACEMENTS IN THE BIOGRAPHY OF 'NARCO-SUBS': FROM THE CARIBBEAN TO THE PACIFIC 1993-2013	
Javier Guerrero Castro	38
POSTSCRIPT	
Mark F. Morris	46
PICTURE GALLERY	51
MAP OF INTERDICTIONS	140
APPENDIX	
A. TESTIMONY OF THE DIRECTOR JIATF-SOUTH (19 JUNE 2012)	143
B. MAP OF AREA WHERE NARCO SUBMARINES ARE BUILT IN COLOMBIA	150
C. MAP OF MOVEMENT OF COCAINE INTO THE U.S.	151
NOTES	152
REFERENCES	158
CONTRIBUTORS	163

PREFACE

Admiral James Stavridis, USN (Ret)

Admiral Stavridis served as Commander of US Southern Command 2006-2009 and was Supreme Allied Commander at NATO 2009-2013. He is currently serving as the 12th Dean of The Fletcher School of Law and Diplomacy at Tufts University.

May 2014

Narcotics are moving at sea in relatively sophisticated nautical craft beneath the waves – we need to understand their capabilities and intent. This volume is a fine start.

For several decades, law enforcement agencies and the militaries in the Western hemisphere have focused on developing strategies that will allow them to thwart the efforts of drug trafficking organizations and mitigate the flow of drugs into our great nation.

In close partnership with its allies, the United States has acquired a rich store of experience in activities aimed at disrupting the activities of criminal organizations. In spite of the success of *Operation Martillo* targeting illicit trafficking routes in coastal waters along the Central American isthmus, the flow of illicit drugs into the United States continues at a high level.

Just over 20 years ago, narco-submarines emerged as an alternative method of transporting narcotics. This study is important and relevant to the present challenges faced by law enforcement authorities and militaries as it specifically focuses on these specially fabricated vessels that have been used for drug smuggling purposes.

This effort adds value to the existing literature on the subject as it contains several essays which describe the complexity of the challenges that narco-submarines present. The document also provides the background and context behind the emergence of these vessels. Furthermore, the work illustrates the evolution of narco-submarine technology and the advances in their design, features, and technical capabilities.

Another important contribution of this paper is the extensive and comprehensive photo gallery, arranged in chronological order, which allows the reader to observe the evolution of narco-submarine technologies.

While this is a volume that will be of general interest to anyone with an interest in global security, the intended readers are military, homeland security, and law enforcement personnel who wish to learn more about these vessels and their respective capabilities. Policymakers and analysts may also find the work useful for understanding the detection and interdiction challenges that these vessels generate.

Finally, it is important that we collectively consider the *potential* of these types of vessels to transport more than just narcotics: the movement of cash, weapons, violent extremists, or, at the darkest end of the spectrum, weapons of mass destruction.

This paper, by increasing the area of knowledge about narco-submarines, should enrich and deepen our understanding of the threat they pose to our domestic security, and indeed to the global commons.

EDITORS' NOTE

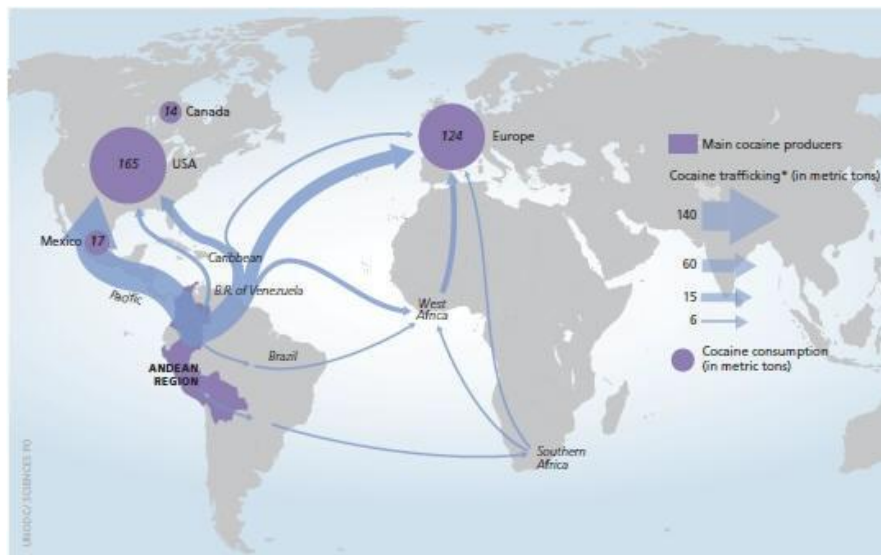
Byron Ramirez and Robert J. Bunker

May 2014

This paper is intended to be an initial primer on the subject of narco-submarines, that is, those specially fabricated vessels utilized principally by Colombian narco traffickers and developed to smuggle cocaine into the U.S. illicit drug market. The work falls within the Foreign Military Studies Office (FMSO) mandate of unclassified research conducted on defense and security issues that are understudied or under-considered. As a result, this venue was chosen to distribute the information it contains and is meant to be a follow up on to the earlier collaborative effort [*Narco Armor: Improvised Armored Fighting Vehicles in Mexico*](#) published by FMSO.

A couple of short comments will be provided in the Editors' Note to offer some context and background for the reader on this topical issue and to help them become better informed on this subject matter.

Cocaine smuggling from the Andean region of South America to the United States generates yearly revenues in the high tens of billions of dollars (e.g. 2008 UN estimate of USD \$88 billion retail) and over the last thirty-five years has produced in the low trillions of dollars in retail sales. The use of narco-subs and related vessels represents one component of a broader illicit distribution strategy that also relies upon go-fast boats, airplanes, the hiding of narcotics inside bulk containers and smaller commodities, drug mules, and other techniques to covertly get this high value product into the U.S. The main global flows of cocaine into the U.S. and other destinations can be viewed in the 2010 *UNODC World Drug Report 2010* [1]:



In fact, as of June 2012, maritime drug smuggling accounts for 80% of the total illicit flow from the Andean region into Honduras, Mexico and other mid-way transportation regions prior to entry

into the U.S. [2]. About 30% of the maritime flow is estimated by the Drug Enforcement Administration (DEA) to utilize narco submarines [3]. Overall, however, maritime interdiction rates are very low. In March 2014, the commander of the U.S. Southern Command testified to Congress that:

“Last year, we had to cancel more than 200 very effective engagement activities and numerous multilateral exercises, Marine Corps Gen. John F. Kelly told members of the Senate Armed Services Committee.

And because of asset shortfalls, Southcom is unable to pursue 74 percent of suspected maritime drug trafficking, the general said.

“I simply sit and watch it go by,” he continued. “And because of service cuts, I don’t expect to get any immediate relief, in terms of assets, to work with in this region of the world.” [4].

As a result, it can be seen that narco-submarines and related maritime drug trafficking methods are being carried out with relative impunity, with only about 1 in 4 craft presently being interdicted.

Given this context concerning the immense values associated with the cocaine trade to the U.S. and the large amount of these illicit drugs not being interdicted during the initial leg in their journey to the United States, we now turn our attention to the paper which focuses on these specially fabricated vessels themselves. The work contains, in addition to this note, a preface, introduction, and a number of short essays discussing and analyzing narco-submarines. The majority of the work is then comprised of a picture gallery containing over 30 distinct narco-subs that have been identified. It also contains a map and a table that highlights where these distinct narco subs were interdicted, an appendix, endnotes, a reference listing, and, finally, biographies of the contributors to the work.

It should be noted that, in addition to this paper, it is recommended that a number of highly informative videos on this subject matter be viewed as supporting audio-visual material. They are as follows:

- [*Go Inside a Drug Submarine With the Narco Sub Godfather*](#). Run time: 27:42 minutes. Original air date: July 4, 2010. Motherboard.
- [*Cocaine Sub Hunt*](#). Run time: 50:00 minutes. Original air date: June 28, 2011. National Geographic Channel.
- [*Inside Cocaine Wars: Narco Sub Mystery*](#). 1 Season 2013. Run time: 45:57 minutes. Original air date: April 7, 2013. National Geographic Channel.

Of course, additional narco-submarine audio-visual resources in both English and Spanish exist on the web in short news clips and related postings. For readers who wish to do even more research on this topic, a listing of very useful narco-submarine essays and videos can be found in the references section of this paper.

The editors would like to thank Steven Dudley and Dave Dilegge for their support in this important project, and the contributors to this work—Adam Elkus, Javier Guerrero Castro, Mark F. Morris, James G. Stavridis, and Hannah Stone—for their past and present work on this topic. This paper would not have been possible without the cooperation of the online sites *InSight Crime* (insightcrime.org) and *Small Wars Journal—El Centro* (smallwarsjournal.com) which have provided reprint permission for their writings. In addition, many of the images found in the picture gallery were drawn from numerous OSINT sources, including *Covert Shores* (covertshores.blogspot.com) and other online news and governmental websites, numerous images were also provided by Captain Mark F. Morris, and all were then fused together and expanded to create a meta image gallery for this publication. Finally, we would like to thank the Foreign Military Studies Office (FMSO), Fort Leavenworth, for its support in publishing this document and seeing its value vis-à-vis our need to better understand all elements of the ongoing criminal insurgencies in Mexico and other regions of Latin America.

INTRODUCTION: NARCO-SUBMARINES

Robert J. Bunker and Byron Ramirez

May 2014

Drug cartels today are much more organized, adaptive, and strategic. Over time, they have acquired vast financial resources that allow them to invest in technologies geared towards providing them with a strategic edge. Drug cartels have learned to adapt to a changing environment where law enforcement authorities and militaries are also seeking to find their own effective ways of disrupting the flow of illicit drugs. Technology has become a source of competitive advantage and both drug cartels and militaries have been investing in engineering and technological tools that will allow them to counteract one another.

On one side, drug cartels attempt to optimize their operational efficiency while mitigating the risk of detection, seizure, and capture. On the other side, we have law enforcement and militaries' efforts to improve their surveillance and detection capabilities. This race to out-flank and counteract one another has led to the development of narco-submarines.

During the past twenty years, Colombia's various drug cartels have engaged in investing in and developing narco-submarine technology that will yield a competitive edge. Over time, their increasing need to evade capture and confiscation of narcotics led drug cartels to move away from using go-fast boats and planes, and instead turn towards developing in-house, homemade, custom built narco-submarines.

A narco-submarine (also called narco-sub) is a custom-made, self-propelled vessel built by drug traffickers to smuggle their goods. Over the years, their engineering, design and technology have improved, thus making them more difficult to detect and capture. Moreover, from a cost-benefit perspective, the yielded benefits are far superior to the associated costs of building these vessels.

Although militaries and law enforcement agencies have become progressively collaborative in their efforts to reduce the flows of narcotics, the use of narco-submarines enables narcotics to continue to reach their destinations while reducing the probability of detection. Albeit, there have been some confiscations of narco-submarine vessels over the last several years. These appropriations in turn have led to our understanding of how narco-submarines are designed, engineered, and used to deploy narcotics.

Narco-subs can be generally divided into three categories: *Low Profile Vessels (LPV)* / *Self-Propelled Semi-Submersibles (SPSS)*, *Submersibles / Fully Submersible Vessels (FSV)*, and *Narco Torpedoes (the towed variety)*. The third and fourth essays in this paper will fully discuss these categories of vessels – thus, for this introduction our interest is to focus on the actual numbers and estimates concerning these cocaine smuggling craft and related issues.

However, before providing this information, a fourth type of smuggling vessel *Static Narco Containers / Torpedoes (aka Parasitic Devices)*, should be quickly mentioned. These containers which are conceptually and functionally related to narco-subs—though passive in nature—are

bolted or magnetically placed on the bottom of freighters and other large cargo ships by cartel and organized crime frogmen. They hitch a ride from South American ports (Colombian and possibly others) into ports in Mexico and the United States, and now it also appears that they are being transported into Europe, where cartel divers in the receiving port recover the illicit narcotics that they contain. While these containers are outside of the topical focus of this paper, a couple of pictures of them will be provided below for informational purposes and to provide context for the reader concerning a drug smuggling technology related to that of narco-sub.



Example of a bolt on static container used to smuggle cocaine on the underside of a cargo ship.
Provided by U.S. ICE/DHS; Undated Photo (pre-March 2011) [1]

<http://www.washingtonpost.com/wp-dyn/content/article/2011/02/28/AR2011022801199.html>.

In May 2014, drugs were found beneath a ship which had sailed from Colombia to Scotland. Police discovered 108 kg of narcotics in the rudder area of Cape Maria, moored 2.8 miles from Largs, North Ayrshire. National Crime Agency authorities also seized diving equipment, a rigid inflatable boat and an underwater scooter. The ship had been waiting to berth at Hunterston terminal when officers from Police Scotland and the Border Force moved in. Dutch authorities were also involved in the operation. [2]



April 2013 interdiction of narco torpedo (left bottom corner) attached to a cargo ship in Rotterdam port. The device contained 101kg of cocaine with an estimated street value of up to 7 million euros [3].

<http://www.telegraph.co.uk/news/worldnews/europe/netherlands/10021140/Narco-torpedoes-and-frogmen-drug-smuggling-ring-busted-in-Rotterdam.html>.

Governmental Numbers (and Estimates)

When viewing governmental narco-submarine numbers and estimates, the OSINT information is fragmentary at best due to its sensitive nature. Thirty-six estuary and open sea Colombian interdictions of semi-submersibles are said to have taken place between 1993 and 2009 per Captain Mario Rodriguez, Commander of the Pacific Coast Guard [4]. This is very much in contrast to these 2011 Colombian figures:

Colombian officials have seized 63 submersible and semi-submersible submarines since 1993.

“We have developed systems that allow us to detect the [submarines],” Adm. Álvaro Echandía, the former National Army Commander, said last month. “In 2009, we captured 20; in 2010, six and so far this year [we have] eight” [5].

These are slightly less than these somewhat later 2011 figures — “Since 1993 authorities have seized 66 semi-submersibles used to smuggle drugs, including seven in 2011, according to the Colombian navy” [6].

To these above figures more detailed Colombian interdiction information provided concerning seizures to 2012 in a National Geographic documentary yields the following statistics:

- 2 vessels found near the Gulf of Uraba
- 5 vessels found near Buenaventura
- 10 vessels found near Sanquianga National Park
- 10 crews in vessels captured at sea [7].

It is unclear, however, if a few submersible estuary (prior to launch) seizures have not in fact been counted in both the 2009 and 2012 information provided. Still, the Colombian figures suggest their interdiction numbers range from about thirty narco-subs to well into the sixties.

From the U.S. side, per the testimony of Rear Admiral Charles Michel, JIATF-South Director, in June 2012, the following statistics pertaining maritime contact numbers and interdictions are provided:

JIATF-South detected an SPSS [Self-Propelled Semi-Submersibles] at sea for the first time in 2006. By 2009, the interagency detected as many as 60 SPSS events were moving as much as 330 metric tons per year. Prior to 2011, SPSS had only been employed by traffickers in the Eastern Pacific. However, since July 2011, JIATF-South has supported the disruption of five SPSS vessels in the Western Caribbean, each carrying more than 6.5 metric tons of cocaine.

There have been a total of 214 documented SPSS events, but only 45 were disrupted due largely to the difficulty of detecting such low-profile vessels [8].

It is unknown how the thirty to sixty something Colombian interdictions relate to the forty-five JIATF-South interdictions concerning overlapping incidents and how semi-submersibles vis-à-vis true submersible interdictions are presented in these figures.

The numbers of these vessels which now exists is also highly debatable with potentially dozens of them being produced every year by criminal organizations in Colombia such as the FARC (Fuerzas Armadas Revolucionarias de Colombia), Rastrojos, and Urabeños [9] [10]. One point greatly influencing the numbers of these vessels which exist at any specific time is if they are utilized once and then scuttled after their delivery (the traditional U.S. military viewpoint) or if they are utilized multiple times (the traditional Colombian military viewpoint). Depending on the perspective held, greater or lesser numbers of narco subs would be required to be produced each year to replenish the vessels lost due to capture, accidental sinking, intentional-scuttling to avoid capture, and, potentially most importantly, at the end of a delivery run.

What is known is that the capability of these vessels has grown over the last two decades with their evolution and, if the Colombian cartels' dream of making the journey (using fully submersible narco-subs) to West Africa and Europe is realized, such subs would very well represent a valuable cross Atlantic trafficking resource that would not likely be scuttled at the end of such a profitable illicit trade route [11] [12].

Vigo Submarine

In August 2006, Spanish authorities seized a narco submarine off Spain's Atlantic coast, near Vigo. According to reports, the traffickers were followed by Spanish authorities for months. Once authorities had gathered enough evidence and received information that a shipment of cocaine from South America was about to arrive, they proceeded to make the arrests and confiscate the vessel.

The narco-submarine was intended to serve as a ferry vessel that would have met a larger vessel in mid sea. The failed plan intended for the traffickers to transfer a load of 6,000 kilos of cocaine into the narco-submarine and then bring it to shore. The narco-submarine was carrying 4,400 liters of fuel when seized which suggests that it had the extended range to deliver the illicit product to other European shorelines. Authorities indicate that the arrested were Spanish traffickers who were working alongside a South American drug cartel [13] [14].



<http://www.farodevigo.es/sucesos/2008/03/13/red-narcosubmarino-vigo-preparaba-alijo-6000-kilos-coca/207700.html>



<http://www.farodevigo.es/sucesos/2011/01/11/red-narcosubmarino-abandonado-ria-vigo-enfrenta-121-anos-carcel/507645.html>

Analysis Based on the Picture Gallery (Interdiction Data Set)

Based on visual evidence derived from the picture gallery, we have in essence amassed an interdiction data set. The picture gallery presented later in this paper specifies the individual vessel's date and location of interdiction. Based on our research, a total of 33 specific vessels have been identified with several other vessels whose date and location of interdiction cannot be determined.

Exhibits 1 through 4 below show interdictions recorded during the past several years. Although some reports suggest that more vessels have been captured over the years, without specifying a number, the physical visual evidence (picture gallery) assembled using several sources has yielded the data represented in the figures that follow.

Exhibit 1

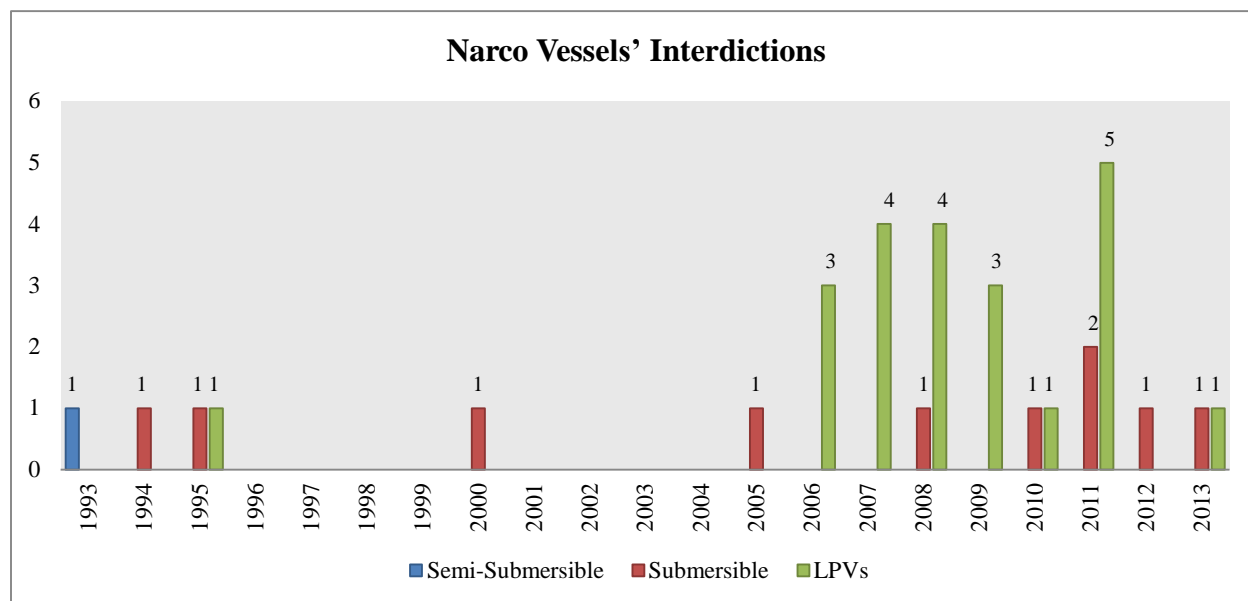


Exhibit 1 shows the number of narco vessel interdictions per year (between the period 1993 thru 2013) by vessel type (LPV; Semi-Submersible; and Submersible). Source: Editors' calculation

In recent years, there have been more interdictions while drug cartels continue to increase their use of narco vessels. Our data set shows 33 distinct narco vessels (see picture gallery) that have been seized. The majority of the seized vessels are LPVs (Low Profile Vessels) which represent 22 of the 33 vessels in our sample. The second highest number of interdictions (10) falls under the Submersibles category.

Exhibit 2

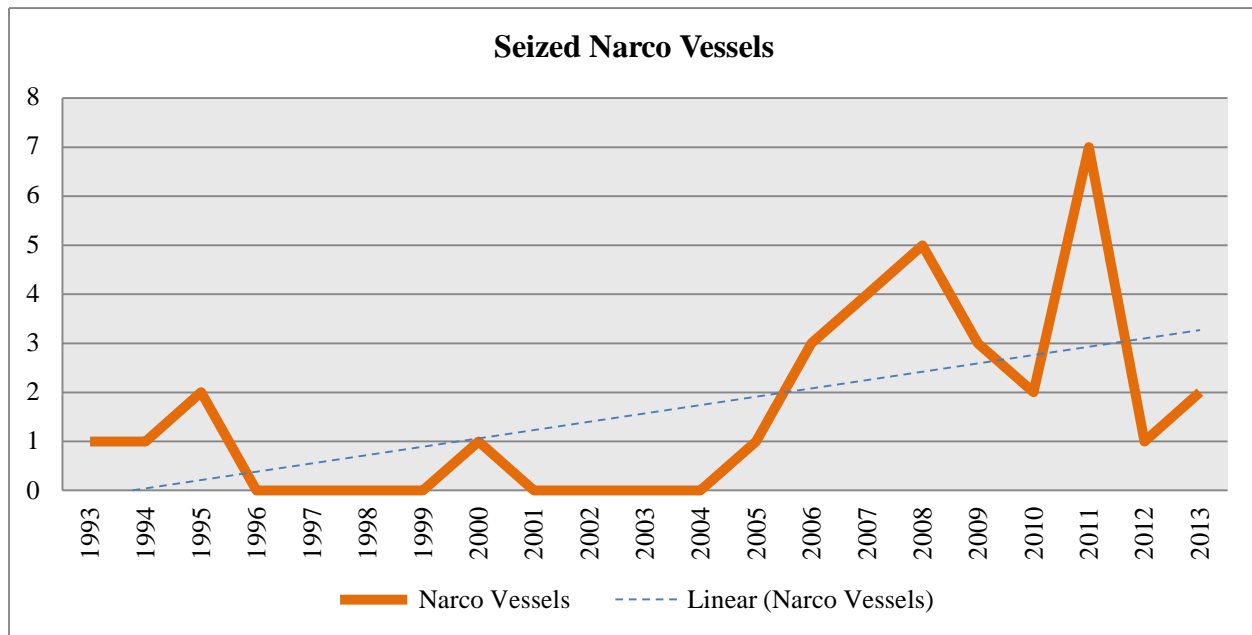


Exhibit 2 illustrates the increase (upward trend) in the number of total seized narco vessels during the past 20 years (1993 thru 2013). Source: Editors' calculation

Exhibit 3

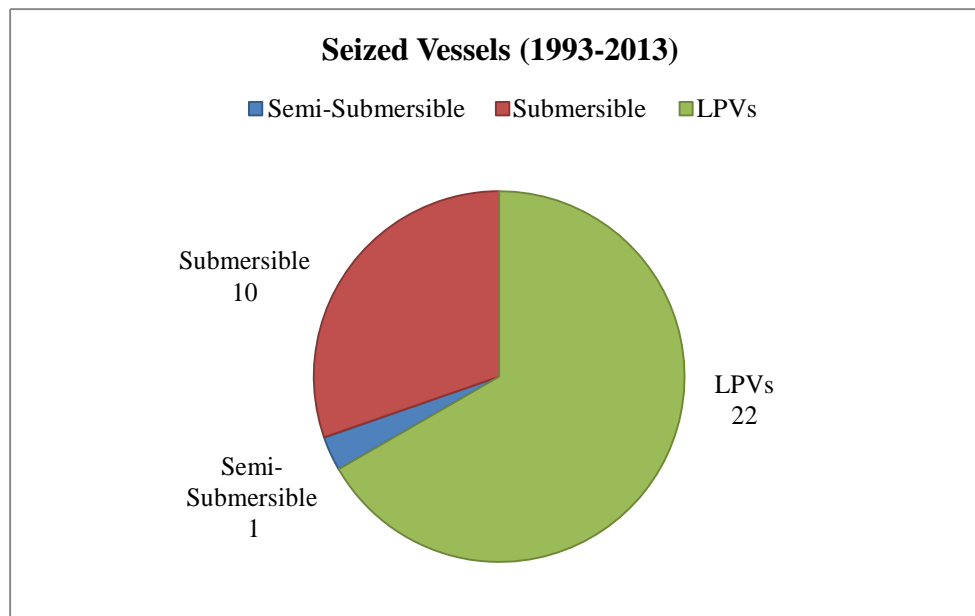


Exhibit 3 shows a visual proportional break-down of seized narco vessels (by vessel type) during the last 20 years. Source: Editors' calculation

Exhibit 4**INTERDICTIONS TABLE**

Type Year	Semi- Submersible	Submersible	LPVs	Total
1993	1			1
1994		1		1
1995		1	1	2
1996				0
1997				0
1998				0
1999				0
2000		1		1
2001				0
2002				0
2003				0
2004				0
2005		1		1
2006			3	3
2007			4	4
2008		1	4	5
2009			3	3
2010		1	1	2
2011		2	5	7
2012		1		1
2013		1	1	2
Total	1	10	22	33

Exhibit 4 is an interdiction table which shows the total number of narco submarine vessels (by vessel type) interdicted each year between the years 1993 and 2013. Source: Editors' calculation

The interdiction table above suggests that, since 2006, there has been a clear increase in the number of interdictions. This hints that the cartels just before and around 2006 may have started using narco vessels with greater frequency. Perhaps more vessels were interdicted in recent years due to the greater number of vessels that authorities came across. Moreover, the data seems to propose that cartels have been using different types of narco-submarines concurrently; hence, they seem to be employing a mixed strategy.

The following cost-benefit analysis table (Exhibit 5) has been prepared by the editors using sources that reveal approximate financial figures.

Exhibit 5: Cost-Benefit Analysis

Vessel Category	Description	Cost of Manufacturing	Advantages	Disadvantages
Semi-submersibles	These vessels are capable of ballasting down to lower their surface profile and controlling their running depth, but cannot fully submerge.	It is estimated that the cost of building these was approximately \$1 Million USD.	Can control running depth and direction. Capable of carrying 2 tons of narcotics (worth around \$40 Million USD).	Can be detected rather easily relative to LPVs and submarines as they cannot submerge fully.
Submersible: <i>Submarine</i>	Submarine with self-propulsion capability and ability to submerge fully under water. Equipped with advanced radar, GPS, navigational technology. Invisible on radar and infrared when below the surface.	Approx. \$2 to 4 Million USD	Can travel at a speed of 11 mph for a distance of 2,000 miles (3,200 km) while carrying 10 tons of narcotics (worth around \$200 Million USD). Almost undetectable as they are capable of diving 30 feet under the surface.	Most expensive to design, develop and build. Take some time to build, require many parts to manufacture, as well as someone with knowledge and skills.
Submersible: <i>Torpedo</i>	A covert transportation torpedo canister which is towed by another vessel.	Approx. \$250 K to \$500K USD	Can travel at a depth of about 30 meters at almost the speed that 'towing' vessel is travelling. Capable of carrying 2 to 5 tons.	Not able to control direction as they are unmanned. They rely on towing vessel. Reduced carrying capacity.
Low Profile Vessels (LPVs)	Resemble the shape of sealed 'go-fast' boats. Their design has improved, making them lower to the water surface and almost completely submergible. Equipped with navigation systems, anti-radar features, and water-cooled mufflers.	Approx. \$750 K to \$1 Million USD	Can carry up to 10 tons of narcotics (worth around \$200 Million USD). Have 300 hp motor. Built mostly from fiberglass. Stealthy design and upper lead shielding helps to minimize their heat signature. Carry a crew of five.	They are not able to submerge fully under water. They can be detected from the air.

NARCO-VESSELS: CATEGORIES

Narco-sub's can be generally divided into three categories; *Low Profile Vessels (LPV)* / *Self-Propelled Semi-Submersibles (SPSS)*, *Submersibles / Fully Submersible Vessels (FSV)*, and *Narco Torpedoes (the towed variety)*.

Below we present additional information on each of these three categories along with their own respective set of accompanying diagrams.

Note: All diagrams presented in the immediate section below via:

<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html?spref=tw&m=1> [Blogger LZ]. No updates to the site for some years now.

Semi-Submersibles

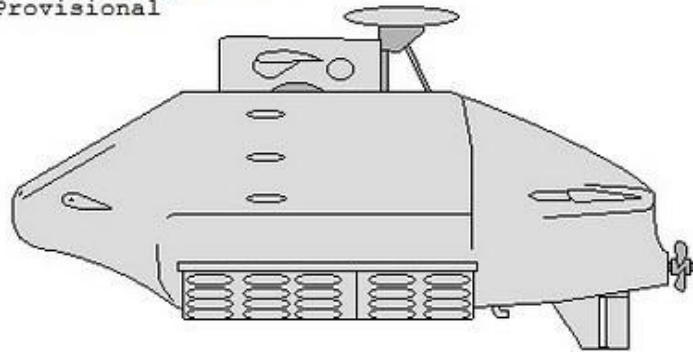
These vessels are capable of ballasting down to lower their surface profile, and controlling their running depth, but not fully submerging. These are rare with only a few ever been captured.



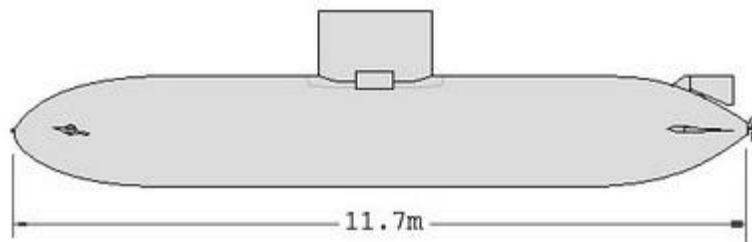
Submersibles (FSVs)

Type A: Submarine with self-propulsion (self-propelled) capability. This is the most advanced category and hence the most expensive to develop and build. Fully submersibles are very rare. Only a few have ever been captured. Due to sporadic evidence, it is difficult to project how many of this type of vessels are currently employed. Based on the detected vessels to date, there does not seem to be any clear evidence of successful operation of fully submersible submarines.

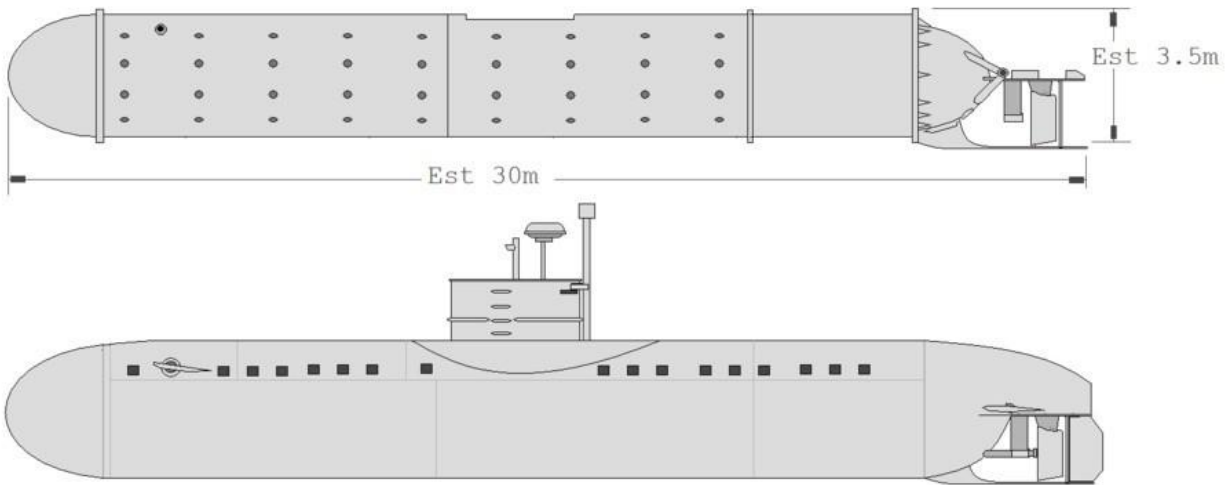
1994 Tayrona
Provisional



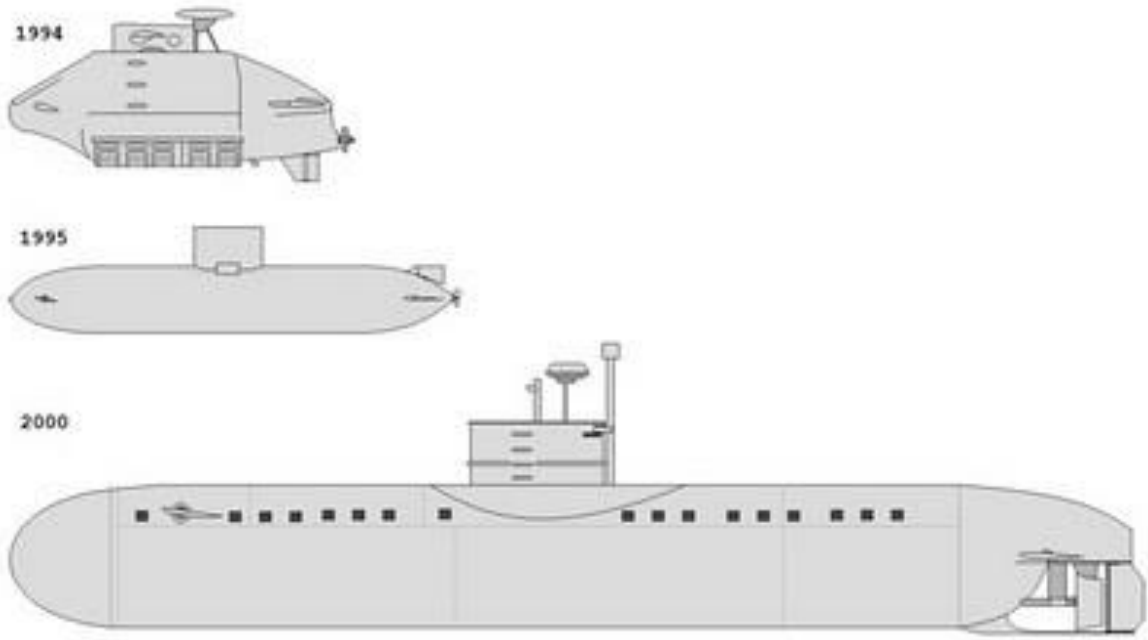
1995 Cartagena Submarine
Provisional



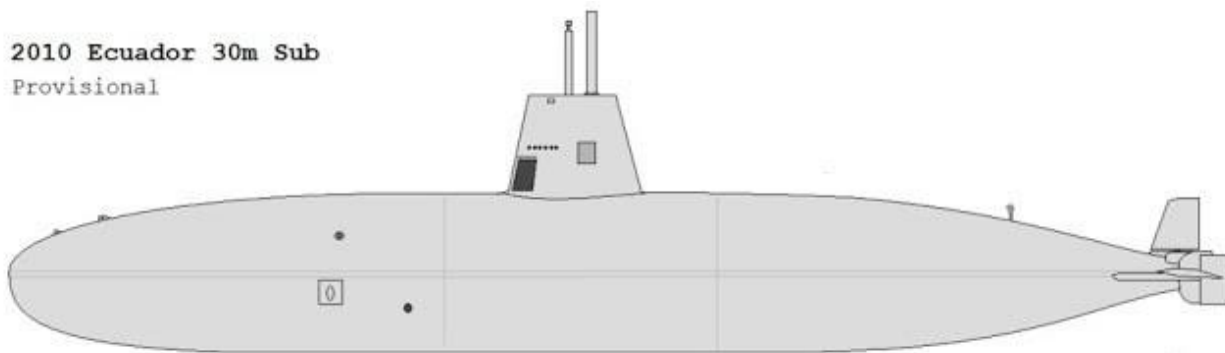
Facatativa Submarine
Provisional



Size Progression (comparison):



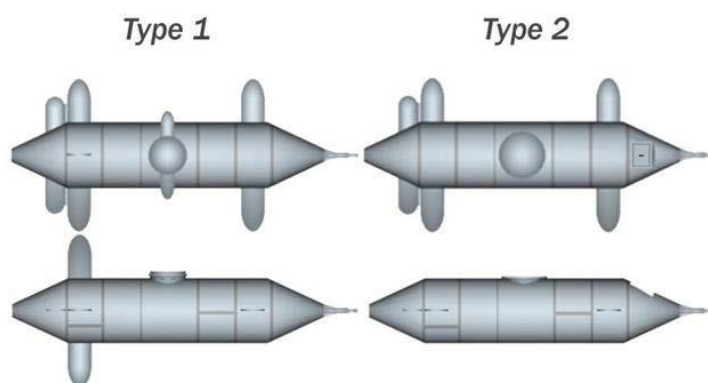
2010 Ecuador 30m Sub
Provisional



Narco-Torpedoes

Type B: Towed 'Torpedo' - covert transportation canister towed by disguised vessel.

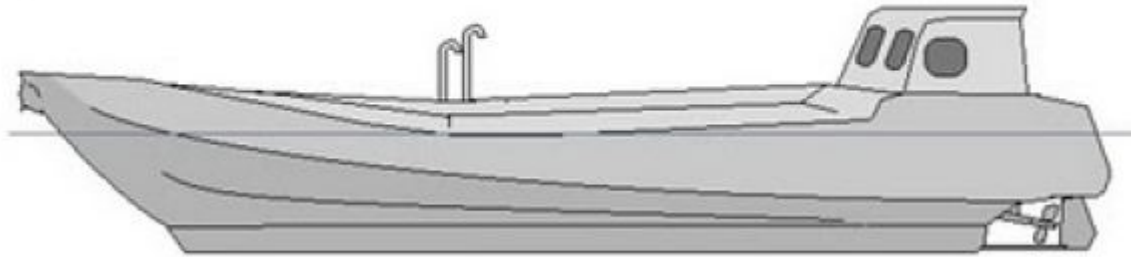
'Narco Torpedo' smuggling system



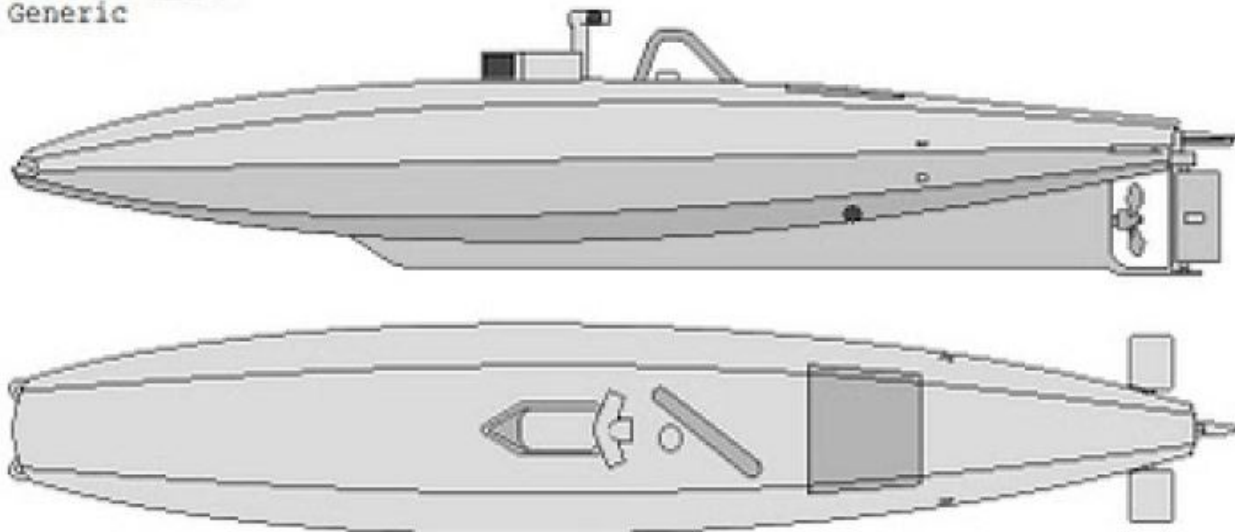
Low Profile Vessels (LPVs)

The first low profile vessels (LPVs) boats resembled sealed 'go-fast' boats which simply rode lower in the water. The usual arrangement of these vessels had a cabin at the rear and cargo hold amidships. However, over time the LPV's configuration has been modified resulting in a specialized hull form with generally pointed bow and stern, with small cabin amidships, an engine compartment located in the rear of the vessel, and narcotics cargo placed in every available space. These LPVs were designed to run awash to minimize radar cross-section. *They are often incorrectly described as "semi-submersible"*. They represent the vast majority of seized drug smuggling vessels to date.

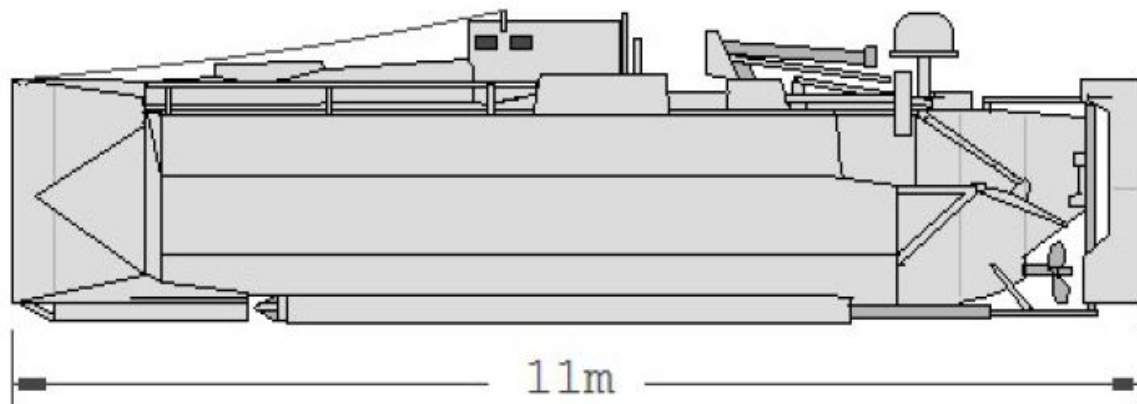
1992 low profile boat
Generic



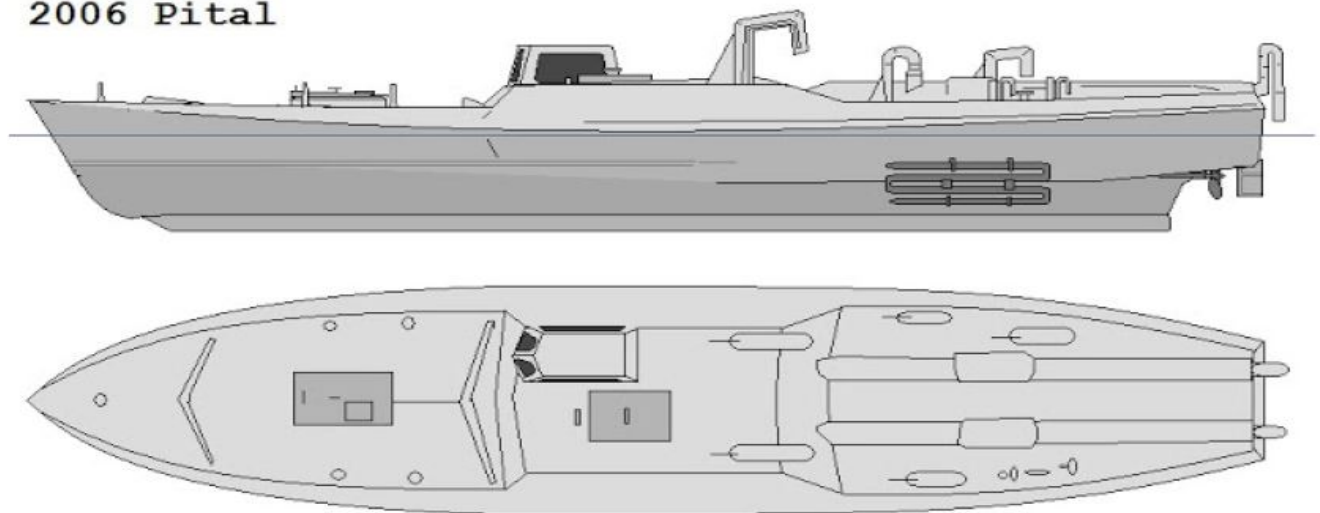
Steel LPV
Generic



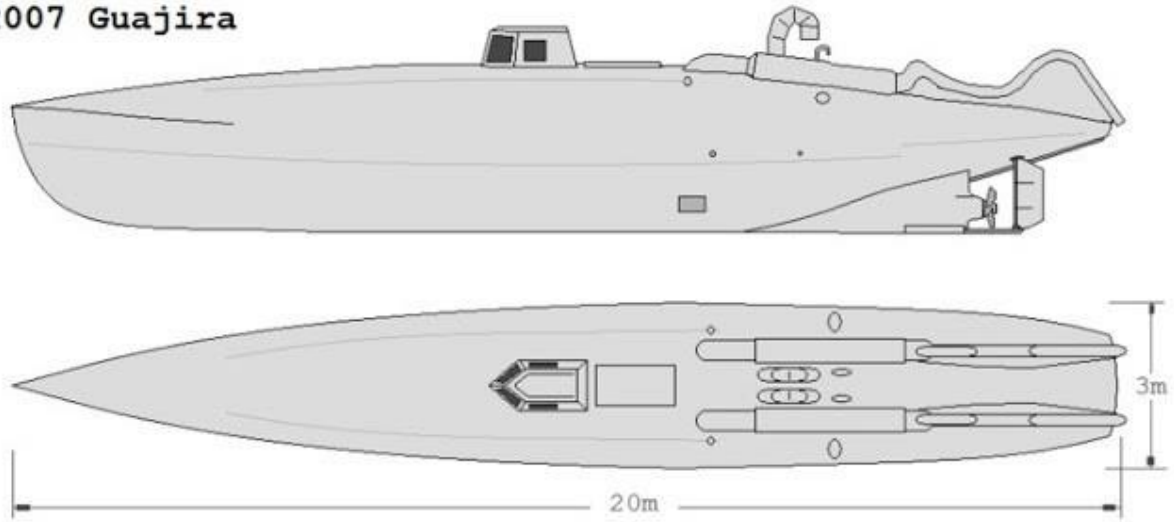
2006 Vigo



2006 Pital



2007 Guajira



SECTION 1:

RAWFEED: THE EVOLUTION OF THE DRUG SUBMARINE

Hannah Stone

InSight Crime

Originally published 8 March 2011

Following the discovery in February of Colombia's first fully submersible "narco-submarine," built by drug cartels to ship cocaine through the Pacific to the United States via Central America and Mexico, the Colombian newspaper *El Pais* has produced a special report on the evolution of submersible and semi-submersible drug-trafficking vessels, whose increased use demonstrates not only the creativity of drug gangs in finding a way to get their products to market, but the extent of their resources in being able to privately construct such sophisticated devices.

The emergence of the semi-submersible followed work by U.S. and Colombian authorities to increase maritime interdiction in the Pacific in the 1990s and 2000s, with sea patrols and radar tracking managing to intercept many of the speedboats or so-called "go-fast" the traffickers used.

The traffickers had to come up with a new method: traveling below the surface of the water. Initially, as Colombian Rear Admiral Hernando Wills explains in an interview in the video attached below, the boats were semi-submersibles that were crudely designed like go-fast boats with another hull placed on top to allow them to travel just beneath the water's surface.

Wills describes the first discovery of one of these crafts, which took place in 1993 on the Colombian island of Providencia. The craft was "very rudimentary," the navy officer says, with the capacity to carry just one ton of cocaine.

Later versions sunk slightly deeper and were often constructed from fiberglass in order to make them hard to detect by radar. And the vessels would have a system of drainage valves to make them easy to scuttle if intercepted, sending the evidence to the bottom of the sea.

The latest seizures, however, illustrate a rapid evolution in capabilities. In contrast to these early attempts, the submarine found in the southwest province of Cauca in February is 30 meters long and three meters wide, and can carry four crew members in its air-conditioned interior, which even features a small kitchen. Perhaps most importantly, it can carry eight tons of cocaine, dive eight meters underwater, and reach all the way to the coast of Mexico, with only a periscope remaining above the surface (see *El Pais*' diagram).

This was the second such privately-constructed fully-functional submarine discovered, after the July 2010 finding of such a craft in Ecuador close to the Colombian border. That submarine could go 20 meters deep, and carry 10 tons of cocaine.

Such capacity is a game changer. A 2008 U.S. military Southern Command report predicted that semi-submersible vessels would soon be able carry 330 tons north each year or close to half of all cocaine moving north.

There is some evidence this may already be the case. A 2010 United Nations report on *The Globalization of Crime* said that in 2008, 46 percent of all cocaine seized by Colombia in the Pacific was found on semi-submersibles. With the U.S. estimating that 69 percent of cocaine entering the country in 2007 left Colombia via the Pacific, semi-submersibles have in the last few years been responsible for a very sizeable proportion of the global cocaine trade.

However, the subs represent something that goes beyond their capability to carry drugs. They are home-made, privately built by drug traffickers in makeshift jungle workshops. The amount of funds needed to set about such a project is huge, with navy personnel estimating that the Cauca submarine likely cost more than two million dollars to build. This ability to invest and take on long-term, high-value projects is a warning of the traffickers' high level of resources and organization.

The increased use of submersibles and semi-submersibles is highlighted in the UN's International Narcotics Control Board's latest annual report, which says that the use of semi-submersibles for drug trafficking has "strongly increased" in recent years, quoting Colombian government figures that while 19 such vessels were seized worldwide between 1993 and 2007, 34 were seized in 2008 and 2009 alone.

Colombia's territory bordering the Pacific provides the ideal environment to construct and hide a submarine, as much of it is wild and remote country criss-crossed with rivers and jungles. Much of the region is under the influence of drug trafficking organizations such as the Rastrojos, with a heavy presence of the Revolutionary Armed Forces of Colombia (Fuerzas Armadas Revolucionarias de Colombia - FARC), particularly the rebels' 29th Front in Nariño and 30th Front in Choco.

<http://www.insightcrime.org/news-analysis/the-evolution-of-the-drug-submarine>

SECTION 2: THE RISE OF THE NARCO NAVY

Adam Elkus

USNI News

Originally published 15 June 2012

Updated 5 February 2013

Somali pirates and Iranian irregular warfare craft are well known to naval audiences, but the narco navy deserves equal infamy for its drug-smuggling operations in the Americas. Both crude self-propelled semi submersibles and full makeshift submarines are complicating drug interdiction in the Americas. The United States and international partners have responded with network-centric surveillance, tracking, and interdiction efforts, but seaborne interdiction operations are ultimately adjuncts to the more expansive interdiction missions conducted on the U.S.-Mexican border itself and the counternarcotics operations run throughout Central and Latin America by the U.S. military and the Drug Enforcement Administration.

Since the beginning of the War on Drugs in the 1970s, the United States and its partners have sunk vast sums into detecting, interdicting, and deterring drug smuggling. But, as rapper Rick Ross observed, drug smugglers consider “being dead broke [as] the root of all evil.” The mind-boggling sums of money available to those who can supply product to the hemisphere’s biggest drug market is more than enough to convince drug lords and their agents to risk imprisonment, injury, and death. How much money? By 2009 estimates (the latest available), Mexican and Colombian cartels rake in \$39 billion in wholesale drug profits annually. Depending on where you live in the U.S., a kilo of cocaine sells for between \$34,000 to \$120,000. The risks are great, but so are the potential rewards.

The primary battlespaces in the drug war are the “plazas,” a set of heavily contested drug-trafficking routes in northern Mexico. Cartels spill blood and cut off heads for control of the plazas, but the Caribbean trafficking routes are no less important. By utilizing small craft and “narco-sub,” drug smugglers make it more difficult and expensive for the US to interdict them. The narco navy also heavily exploits capability gaps among American partners that lack American manpower and advanced intelligence, surveillance and reconnaissance systems.

The most basic surface combatant utilized by the narco navy is the old-fashioned and dependable go-fast boat. Familiar to viewers of *Scarface* and *Miami Vice*, the go-fast boat is typically between 25 and 45 feet in length and mostly travels at night. An typical go-fast boat contains one to two tons of Colombian cocaine and typically complete a coke run in one day. Go-fast boats are occasionally augmented by slower craft such as Mexican “panga” boats—small fishing boats used to transport marijuana from Mexico’s Pacific coast to California.

But the narco navy is hardly limited to surface operations. Drug smugglers have their own silent service in the narco-sub. So what are narco-sub? These craft range from cheap, self-propelled semi-submersibles that move product over short distances to submarines with periscopes capable of traveling from South America to the United States. Narco-submarines have been discovered in

Mexico, Ecuador, Colombia, and other regions of the Americas. They augment the fast-boast force through their ability to clandestinely transport drugs and evade detection.

Narco-sub, while primitive compared with advanced Western navies, are nothing to be scoffed at. They have long since evolved from the disposable water coffins utilized in the 1990s to supersubs that operate out of clandestine pens along the Colombian coastline. One narco-sub contained up to 10,000 pounds of cocaine and was equipped with global positioning systems. Another sub was 74 feet long, with twin propellers and a 5-foot conning tower. Of course, not all narco-sub are sophisticated, as smaller subs capable of transporting lesser loads shorter distances continue to be employed.

How do the United States and its partners cope with narco-sub and go-fast boats? Some of the same principles of data fusion, collaboration, and synchronization that Norman Friedman dubbed “picture-centric warfare” in warfighting come into play when interdicting the narco navy. The United States Southern Command (SOUTHCOM) has invested in the use of intelligence, surveillance, and reconnaissance tools as well as nontraditional organizations like the Joint Interagency Task Force South that share information throughout the U.S. government.

The United States has also significantly internationalized the drug war. The U.S., Canadian, Central American, and European joint anti-illicit trafficking campaign Operation Martillo is one of SOUTHCOM’s key tools for combating drug smuggling. With 14 countries participating, Martillo netted 119 metric tons of cocaine with a wholesale value of \$2.35 billion. Because of the problem’s sheer scale, decisive operations against drug traffickers are only possible with international cooperation.

Martillo, however, is only one segment in a larger American set of regional security initiatives in the Americas. In Mexico, cooperation against drug cartels occurs under the framework of the Merida Initiative. Extensive American civilian and military assistance has also resumed in a Central America increasingly buffeted by fierce drug-related crime and violence. Just as naval operations ultimately are aimed at influencing events on land, the U.S. contest with the narco navy augments and supports land-based operations.

As long as drugs are profitable, traffickers will invest in more elaborate ways to evade the military and law enforcement. The presence of submarines themselves are operational responses to the tightening of the net around the Caribbean. This does not mean, however, that the United States and allies cannot raise the cost of operating with sophisticated ISR systems, intelligence-sharing, and collaborative and flexible organizations that ensure the right people have the information necessary for detection and interdiction. What it does mean is that drugs will continue to be smuggled—overland and at sea—by truck and by submarine.

<http://news.usni.org/2012/06/15/rise-narco-navy>

SECTION 3: THE EVOLUTION OF 'NARCO-SUBMARINES' ENGINEERING

Byron Ramirez

Small Wars Journal

Originally published 27 February 2014

Updated for this paper 18 May 2014

Who: Colombian drug cartels.

What: The deployment of 'narco-sub' vessels which include submarines, semi-submersible (SPSSs) vessels, narco-torpedoes, and low profile vessels (LPVs) in Colombia as a tactical countermeasure to the increased effectiveness of law enforcement agencies and military services in detecting and seizing planes and go-fast boats. These vessels provide a new means for transporting and delivering narcotics to their intended destinations while lowering the risk of detection and interdiction.

When: Indications traced back to at least 1993 near the San Andres Islands, Colombia. In that interdiction, the captured semi-submersible vessel was about 7 meters long and had the capacity to carry up to 2 tons of narcotics. By the mid-2000s, there had been a significant increase in the number of semi-submersible (SPSSs) vessels and low profile vessels (LPVs) found and seized by Colombian and U.S. authorities. The design of the confiscated vessels reflects an evolutionary engineering process.

Where: Most recently, the vessels are being manufactured near Colombia's Pacific coastline. Smugglers carry building materials, including heavy equipment like propulsion gear and generators into jungles and then assemble the vessels under jungle canopies. Once completed, the vessels are moved through mangroves via muddy rivers that empty into the Pacific Ocean. Once there, the vessels travel northward towards Central America and Mexico where they will transport and deliver narcotics.

Why: Due to the increased collaborative efforts of law enforcement agencies and militaries as well as their increased tracking and policing technologies which enabled them to detect drug planes and go-fast boats with greater effectiveness, smugglers developed 'narco-subs' as an innovative, alternate counter-measure for delivering their narcotics. These vessels have been custom-built by drug traffickers to smuggle their narcotics in an effort to reduce the risk of detection and seizure.

Evolution: When examining the various vessels seized to date, we can observe an evolution in the engineering used in these 'narco-sub' vessels. The first vessel confiscated (1993) was truly a rough initial experimental model, built out of fiberglass and wood. The San Andres semi-submersible as it came to be known was able to control its running depth and direction. However, this vessel was not able to fully submerge. Hence, it was visible from the air. Moreover, its speed was relatively low, estimated to be less than 10 mph. These attributes converged to make its detection highly possible.

During the years that followed, perhaps until near the end of 2004, the ‘narco-sub’ vessels went through an *experimentation phase* during which cartels attempted to improve design and performance capabilities through trial and error. It is during this phase that we can find the 1994 Tayrona model and the 1995 Cartagena model. Both of these vessels were submersibles capable of self-propulsion and full submersion. Even though their engineering was relatively rudimentary, these vessels were still capable of travelling longer distances while carrying larger loads of narcotics. Hence, their improved design allowed them to travel slightly faster and submerge underwater, while having an increased carrying capacity. It is also during this experimentation phase that some drug smugglers contracted Russian engineers to help develop a better narco-submarine (see Facatativa submarine).

Interestingly, between 2005 and 2006, authorities seized an increased number of similarly designed vessels which seems to indicate rapid consistent construction which in turn appears to signal a rapid *prototyping phase* taking place. Since most of the seized vessels during this time period seem to exhibit similar design characteristics, it is possible to conceive that drug traffickers may have streamlined their scope of designs and focused on building certain models. After all, most of the seized vessels during this period seem to resemble go fast-boats (similar hull form) that were reconfigured so that their profile is lower and hence they are less visible. However, during the narco-submarine *prototyping phase*, drug traffickers continued to experiment with numerous variations. This includes all sorts of methods to mask the heat signature (using underwater heat exchangers) and even cathodic protection. It is believed that this may have been necessary because they used discarded fiberglass molds to make the hulls of both Go-Fast boats and SPSSs. In terms of how they accessed discarded molds, when legitimate boat manufacturers claim to have destroyed their molds after they were used, one can only guess. It is also during this phase that we see the emergence of low profile vessels (LPVs). The vessels captured during 2005 and 2006 seem to fall under the category of LPVs. These vessels had greater stealth, better operational performance, and increased speed and size.



It is difficult to determine whether at some point drug cartels decided to focus mainly on building LPVs instead of submarines and that is perhaps the reason for the increased number of LPVs that were detected. Nonetheless, it is most likely that drug smugglers have employed a mixed strategy of using both LPVs and submarines concurrently and the LPVs may have been less effective in avoiding detection, thus explaining why they may have been captured in greater numbers.



Beginning in 2007, authorities witnessed more advanced capabilities in narco-vessels, along with more effective designs that seem to have become increasingly standardized. In essence, this is a phase of *standardization and design maturity*. Narco vessels seized after 2007 were faster, more stealthy, and capable of carrying bigger loads of drugs than earlier models. During this period, a narco-sub was capable of reaching speeds of 11 miles per hour while carrying up to 10 tons of narcotics worth around \$200 million USD wholesale. Moreover, some of these newer models are powered by a 300 / 350 horse-powered diesel engine. They also carry large fuel tanks which allow them to travel a range of 2,000 miles (3,200 km). Because the majority of their structure is made out of fiberglass material and they travel nearly below the sea surface, these vessels are almost impossible to detect via sonar or radar. Colombian narco-traffickers are effective at diversifying their risk by never solely relying on a single method of transport. During the *standardization phase* they continued to employ ‘go-fast’ boats and fishing boats and also began using ‘go-

slows’. Rather than deploying one ‘go-fast’ carrying 2000 kg, they instead used 10 smaller ‘go-slows’, single engine boats each carrying 200 kg which remained in Colombian, Panamanian, and other territorial waters.

In recent years, ‘narco-sub’ vessels (mostly LPVs) have been built with upper lead shielding which helps to minimize their heat signature and hence they can evade infrared sensors. Some of the newer models have piping along the bottom to allow the water to cool the exhaust as the ship moves, making it even less susceptible to infrared detection. This suggests that enforcement agencies face great challenges in finding them, and thus, must detect them from the air, while realizing that they yield almost no wake and that their color scheme is usually adapted to where the boat is designed to operate from; hence, a boat from the southern Pacific coast of Colombia would be a different shade than one operating near the border with Panama or in the Caribbean. Lastly, ‘narco-sub’ vessels also possess ballast tanks to alter the vessel’s buoyancy and are equipped with a satellite global positioning system that aids navigation.

Evolutionary chart:

1970s through early 1990s	Go-fast boats 	Fiberglass material. Deep “V” offshore racing hull - usually 30 to 50 feet (10 to 15 m) long, narrow in beam, and equipped with two or more powerful engines, often with more than 1000 combined horsepower. The boats can typically travel at speeds over 80 knots (150 km/h) in calm waters, over 50 knots (90 km/h) in choppy waters, and maintain 25 knots (47 km/h) in the average five to seven foot (1.5 to 2 m).
Early 1990s through 2004	‘Narco-sub’ Experimentation Phase 	Fiberglass and wood; low horse power engines; Many different designs used; Limited in range and capacity.
2005 - 2006	‘Narco-sub’ Prototyping Phase	Similar vessels seized; Increased horse-powered engines; increased capabilities such as greater stealth, better operational

		<p>performance, and increased speed and size; Introduction of low-profile vessels (LPVs).</p>
2007 - present	<p>‘Narco-sub’ Standardization and Maturity Phase</p> 	<p>Faster (up to 11 mph); Some made from steel; Capable of carrying bigger loads of drugs than earlier models; Two-diesel engines; Engines up to 350 hp; Upper lead shielding; Advanced navigation systems; GPS; Anti-radar features; water-cooled mufflers.</p>

SECTION 4: NARCO-SUBMARINES: APPLYING ADVANCED TECHNOLOGIES TO DRUG SMUGGLING

Byron Ramirez

Small Wars Journal

Originally published 8 March 2014

Updated for this paper 18 May 2014

Over the last few decades, drug smuggling from Latin America to the US has become a highly lucrative business. Despite the efforts of several national and international law enforcement agencies to seize drugs, arrest smugglers, disrupt the operational capabilities of cartels, and diminish the flow of illicit drugs, drug smuggling continues. International law enforcement agencies and militaries have increasingly collaborated and their efforts have yielded numerous littoral and ocean seizures and arrests. Nonetheless, drug smuggling activities in the Western hemisphere persist.

In the early 1990s, as radar and communication technology held by militaries and law enforcement agencies improved, small planes and go-fast boats belonging to the Colombian cartels became more easily detectable. As a result of the increased pressure from governments and policing authorities, drug smugglers had to design countermeasures and develop innovative ways to transport and deliver their drugs.

This essay focuses on a set of highly advanced technological inventions used for transporting and delivering narcotics: narco submarines, semi-submersible (SPSSs) vessels, low profile vessels (LPVs), and narco-torpedoes. Narco-submarines (name generally assigned to these types of vessels) are indeed innovative logistical tools that allow smugglers to reduce the risk of detection and capture. From a cost-benefit analysis perspective, smugglers truly reap high 'net benefits' as the benefits certainly surpass the costs. From an economic standpoint, the amount returned is a high multiplier of the amount invested. And from a strategic viewpoint, drug smugglers through their narco submarines are able to effectively counteract militaries' and agencies' surveillance moves. Hence, drug smugglers have both economic and strategic incentives to invest in narco submarine technologies.

In the early 1990s, Colombia's Medellin Cartel began to consider 'narco-subs' as covert and innovative method for distributing its products. Because the Colombian drug cartels at that time were vertically integrated— they controlled the various steps in the product value chain (coca cultivation, manufacturing, distribution, etc.)—they well understood the economic value of being able to efficiently control the delivery of narcotics to their destination while lowering the risk of detection, interception, and apprehension.

As a result, Colombian drug cartels began to allocate economic resources and invest in producing narco-submarines as an alternate distribution method. Actual Russian naval engineers were contracted by the cartels to assist in narco-submarines' design and construction. The apparent goal of drug smugglers was to develop a vessel that would be self-propelled, radar-dodging, stealthy, and capable of travelling long distances.

After the Medellin Cartel's collapse in the early 1990s and subsequently the arrests of the Cali Cartel leaders, remaining lieutenants and their respective emerging drug smuggling organizations continued to make investments in narco-submarine technologies.

Narco-Subs

The first so-called 'narco submarine' was detected in 1993 near the San Andres Islands in Colombia. However, it was not a fully-submersible vessel. Rather, *the San Andres Narco-Sub* was a semi-submersible not capable of diving fully under water. Most of the surface vessel glided under water while the cockpit and exhaust tubes remained above water. It was about 7 meters long and had a carrying capacity of up to 2 tons and a crew of 2. This vessel was constructed out of fiberglass and wood. Later, early narco-submarine vessels that were produced include the following:

- *The Tayrona Narco-Sub*: In 1994, another vessel, named the Tayrona submarine was seized near Santa Marta, Colombia. This vessel was less than 10 meters long. It was made of wood and fiberglass and was fit for shallow submergence only with depth controlled by lead weights externally mounted on the lower hull. It also possessed advanced communication and navigation equipment. This first manned submersible was perhaps towed behind another vessel (or so it is believed by COLNAV Intel). COLNAV naval engineers and architects estimate that this submarine only had a range of about 200 nm. COLNAV Intelligence suggests that the tactic employed with this sub was to tow it and release it when sighted by a Navy/Coast Guard vessel, or once it was near its destination.
- *The Cartagena Narco-Sub*: A year later, Colombian authorities captured an unfinished vessel in Cartagena, Colombia. This vessel, the Cartagena submarine, had a cylindrical steel hull which hints the intention of operating it at greater depths relative to the fiberglass vessels previously confiscated. When this vessel was found there were no ballast tanks nor the water inlets/outlets associated with them, which suggests that lead weights were to be employed similarly as with the 1994 Tayrona model. The 1995 Cartagena submarine was about 11 meters long, 2 meters wide, and had a carrying capacity of about 1.5 tons.

As the years transpired, the narco-sub technology seems to have improved. As with any technology, iteration was probably necessary and results were not immediately evident.

- *The Facatativa Narco-Sub*: In September 2000, law enforcement agencies in Colombia found a Russian-designed narco-sub in the town of Facatativa, near Bogotá. This vessel was longer and wider than previous models and had a more elaborate cylindrical, stealthy design. When the vessel was found it was still under construction. Its estimated construction cost is 10 million USD. The Facatativa submarine was 30 meters long and 3.5 meters wide. This vessel was indeed intended to be a submarine, capable of full submersion. It was to be 'double hulled' with a single shrouded screw. It is estimated that it could have carried a crew of up to 12 persons. Had this submarine been completed, the double-hulled vessel may have been able to travel long distances 2,000 nautical miles (3,700 km), dived 330 feet (100 meters) and carried 150-200 tons of cocaine or heroin.

The Facatativa vessel is significant as it had a large carrying capacity (storage space), and would have been able to travel long distances and dive to depths that would have made its

detection highly challenging. The Facatativa model would likely have had depth sonar, satellite communication, GPS, and navigation radar.

- *The Vigo Narco-Sub*: Spanish Police in 2006 captured a vessel on the Atlantic coast which they called the Vigo vessel. It is believed that this submarine was constructed in Spain and was not closely related to the Colombian subs in design terms. The vessel was 11 meters long, 3 meters wide, and made from steel with ballast tanks on the flanks. A design feature worth noting is the use of separate props for the diesel (main) and electric drive. This vessel was likely intended to travel short distances between a cargo ship and shore to bring illicit drugs into Spain for distribution.

- *A Kevlar Coated Narco-Sub*: In July 2010, Colombian and Ecuadorian authorities with the assistance of the United States found and seized a submarine a few miles south of the border between Colombia and Ecuador. This was a noteworthy find as this was a 30 meter long, 3 meter wide, large fiberglass submarine with diesel-electric drive and twin screws. The Kevlar coated submarine was designed for underwater operation while it could also operate in shallow submergence. The pilot windows located at the base of the sail seem very similar to the cockpits of other low-profile vessels.

- *The Timbiqui Narco-Sub*: In February 2011, Colombian authorities assisted by the DEA (Drug Enforcement Administration) seized a 100 foot long (30 meters) submarine in Timbiqui, Cauca, Colombia. The submarine lied half-submerged in a mangrove swamp. The vessel was a fully submersible made out of fiberglass. It could carry a crew of 4 and dive down to 30 feet (9 meters) below the surface. The submarine had the capacity to transport 8 tons of narcotics worth close to \$150 million to \$200 million USD. The estimated cost of building this submarine is around \$2 million USD. The vessel's design, two diesel engines, and sophisticated navigational equipment would have allowed it to travel long distances (up to 2,000 miles) at a speed of up to 11 miles per hour.

Low Profile Vessels (LPVs)

Since early 2006 there were an increased number of seized narco vessels, namely low profile vessels (LPVs). Improved detection and surveillance technology allowed authorities in Colombia and the United States to more easily detect, intercept, and seize drug carrying vessels. Authorities then realized that drug smugglers countered accordingly and produced increasingly sophisticated vessels, which include features such as modern electronics, navigation systems, anti-radar features, and water-cooled mufflers, all of which make detection more difficult.

The first low profile vessels (LPVs) boats resembled sealed 'go-faster' boats which simply rode lower in the water. The usual arrangement of these vessels had a cabin at the rear and cargo hold amidships. However, over time the LPVs' configuration has been modified resulting in a specialized hull form with generally pointed bow and stern, with small cabin amidships, an engine compartment located in the rear of the vessel, and narcotics cargo placed in every available space. Moreover, sloping sides to the cabin suggest radar stealth. Overall, the vessels' stealthiness derives from being built largely out of fiberglass and being low in the water.

In more recent model adaptations, LPVs included the capability to trim running depth via hydroplanes at rear, a much lower profile than most low-profile boats with the nose completely

submerged even in calm seas, and metal construction instead of fiberglass. Some examples of LPVs include the 2006 Pital model and the 2007 Guajira model.

- The 2006 *Pital LPV* was seized on the River Timbo near Buenaventura, Colombia. It was 18 meters long and almost 4 meters wide. It could carry 4 tons. The 2006 Pital model is unique for its twin engine and twin prop arrangement.
- The 2007 *Guajira LPV* seized 10 miles off Colombia's Atlantic coast (near the Guajira Department) was 20 meters long and 3 meters wide. It had the capacity to carry 10 tons. The rounded cross-section of this LPV provides much larger internal volume and load capability than most other low-profile boats previously constructed. The mechanical design of this vessel is also of a twin engine with twin props, twin screw and had large fuel tanks. COLNAV estimated that this vessel had a range of 3500 nm. This was the first instance of a LPV captured on the Caribbean coast. The range of this particular vessel yields some inquiries. Why would Colombian drug traffickers need that type of range? Are Colombian DTOs perhaps displeased with the cut that the Mexican DTO receive and are consequently developing narco submarines that will allow them to bypass Mexico altogether? Or perhaps are they concerned about US efforts at the southern border so they may be producing submarines with longer range capacity in case the U.S. makes some breakthrough in security.

Narco-Torpedoes

In August 2005, U.S. authorities seized an unmanned semi-submersible in the Pacific Ocean. This caught the attention of militaries and law enforcement authorities as they realized that some vessels were being built in the form of torpedoes, filled with narcotics, and towed underwater by another boat. These were towed behind a vessel, usually a fishing boat. These probably pre-date the first submarine attempts. The 'narco torpedo' essentially travels at a depth of about 20 to 30 meters. The torpedo is released if the authorities approach, and discharges beacons after a set period of time to allow recovery by a back-up boat after the authorities have left the area. The 'narco-torpedo' vessel represents a tactical variation in transporting narcotics. Narco-torpedoes are designed to be difficult to detect and are cheaper to build than semi-submersibles.

Conclusion

During the past 20 years, drug smugglers have experimented with the design and construction of submarines, semi-submersible (SPSSs) vessels, low profile vessels (LPVs), and narco-torpedoes. The vessels that have been seized to date reflect technological innovation as well as a commitment towards continuously improving the vessels' design and operational capabilities. Drug smugglers have effectively employed technology as means to their specific ends. It is evident that during the last two decades drug smugglers have invested on advancing their 'narco-sub' technologies. There is a clear economic payoff in doing so; the cost of building one of these vessels is low relative to the immense levels of profit they produce, while their design and engineering help to reduce the overall risk of detection. It is not known how many of these narco-sub vessels are currently under construction and in operation. However, we can be certain that in spite of increased efforts on the part of militaries and law enforcement authorities to detect, intercept, and disrupt narcotics

distribution, drug smugglers will certainly continue to search for effective ways of transporting and delivering their product.

SECTION 5: TRAJECTORIES, CONTINUITIES AND DISPLACEMENTS IN THE BIOGRAPHY OF ‘NARCO-SUBS’: FROM THE CARIBBEAN TO THE PACIFIC 1993-2013.

Javier Guerrero Castro

Written 23 April 2014

Drug Smuggling Organizations (DSOs) have used different approaches to submarine smuggling; each of those methods creates new challenges for Law Enforcement Agencies (LEAs). Some of those strategies employed include: divers carrying drugs to the sea boxes of ships or, cylindrical tubes (fiberglass or steel) firmly tied to the keel of small vessels and the popular method known as ‘narcosubs’. Narco-subs is a definition that encompasses different semi-submersible and submersible artifacts used by (DSOs) to transport illicit drugs to different destinations along the Caribbean Sea or Pacific Coast of Central America.

Narco-subs can be classified into two main categories: Semi-submersible artifacts and submersible artifacts. The first category, accounts for most of the narco-subs, while events of the second categories are scarce. The main difference between the two categories is their immersion capacity. A semi-submersible can submerge up to three quarters of its structure while a submersible achieves full immersion of its hull. Within the latter category, we have both manned and unmanned devices. The most common of the unmanned artifacts are also known as ‘Torpedoes’ or ‘narco-torpedoes’ that are cylindrical steel tubes with stabilizing fins (Fig 1.) and which are usually towed by fishing boats.



Fig.1

Despite the important role of innovation developed by the DSOs in order to carry their activities, these processes have been scarcely studied. Two broad interpretations of the phenomenon can be found. The first often found in the media focuses on the ‘technological achievements’ of DSOs accompanied with a sense of wonder for such. The second is centered on the idea of ‘catching up’. This second interpretation only takes into account the flexibility and technological innovation capacities of DSOs and can be summarized in the idea that Drug Smugglers are always ‘one step ahead’ of LEAs.

In the case of Drug Smuggling Technologies, we are in need of studies that go beyond the two mentioned approaches. We must also understand the technological choices of those involved in the War on Drugs (WoD) along with related full implications and complexity. As Dolnik (2007,

p. 16) affirms “it is impossible to understand fully the tactical and technological choices of a group without understanding the historical, emotional and expressive meaning of a particular weapon or tactic to a given group.” When we understand that the adaptation of a particular technology necessarily involves transformations within the group that adopts it, we then will be able to explain other changes, including organizational ones. Also, it is necessary in order to achieve a comprehensive understanding of the evolution of a technology to analyze the coupling of technology design as well as its implementation and use (Pollock & Williams, 2008).

New technologies are seldom developed from scratch, but are the result of a process of gradual change and/or a combination of existing technologies (MacKenzie & Wajcman, 1999, p. 9). And what is more important to any study of drug smuggling innovation is that the process of technological choice is also based on economic decisions (MacKenzie & Wajcman, 1999, p. 12). In order to understand the process of technological innovation within the WoD we need to take into account the structural aspects of the environment of technologies (Rip & Kemp, 1998), emphasize the importance of local expertise and experience, in the form of tacit, experience based and local knowledge for the building of successful technological artifacts (Williams, 1997), as well as use a more symmetrical analysis that involves not only DSOs but LEAs innovation in a process of co-evolution of technology.

If we wish to analyze the process of technological innovation leading to the design, building and use of ‘narco-subs’, we could start off by identifying some key aspects of the historical development of the ‘narco-subs’ while highlighting the different approaches that the concept and development of the artifact in both the Caribbean and the Pacific has had. At the same time, it is worth highlighting the main changes regarding maritime interdiction developed by Colombian LEAs, specially the Colombian Navy.

A common thread in the accounts of the development of narco-subs is the idea of a logical progression, both from other forms of smuggling narcotics and in the move from semi-subs to fully submersible artifacts (e.g. Kraul, 2007; Lagan, 2010; Mackey, 2010), and as a history of continuous technological improvement (e.g. Observatorio de Drogas de Colombia, 2010; Watkins, 2011). A closer analysis of the data reveals a far more complex story, in which different artifacts have been designed, built and used not following a logical progression but exploring different overlapping alternatives. What is found is a diversity of submersible and semi-submersible artifacts, which can be initially analyzed as the result of ‘micro-innovations’ in some cases, and of radical solutions in others.

As with other illicit related topics, to reconstruct the full history of the narco-subs is a difficult task. Nevertheless, there are some data available that allows us to approach the phenomenon. Even though this approach can be criticized for taking into account only “unsuccessful criminals”, the opposite view is to assume that LEAs are essentially efficient. The most recent data through 2013 indicates that 82 ‘narco-subs’ (Fig. 2) and 98.2 tons of cocaine have been seized, as well as 22 craft shipyards¹. This number encompasses semi-submersible, submersible, manned and unmanned artifacts. But we currently lack, and probably will always, the numbers of those narco-

¹ Source: Armada República de Colombia. Estadísticas 2013. Bogotá D.C. Colombia. Dirección de Operaciones Navales.

subs that sank. Most of the ‘narco-subs’ have been found in the pacific, approximately 78% (64 artifacts), while 20% of them in the Caribbean².

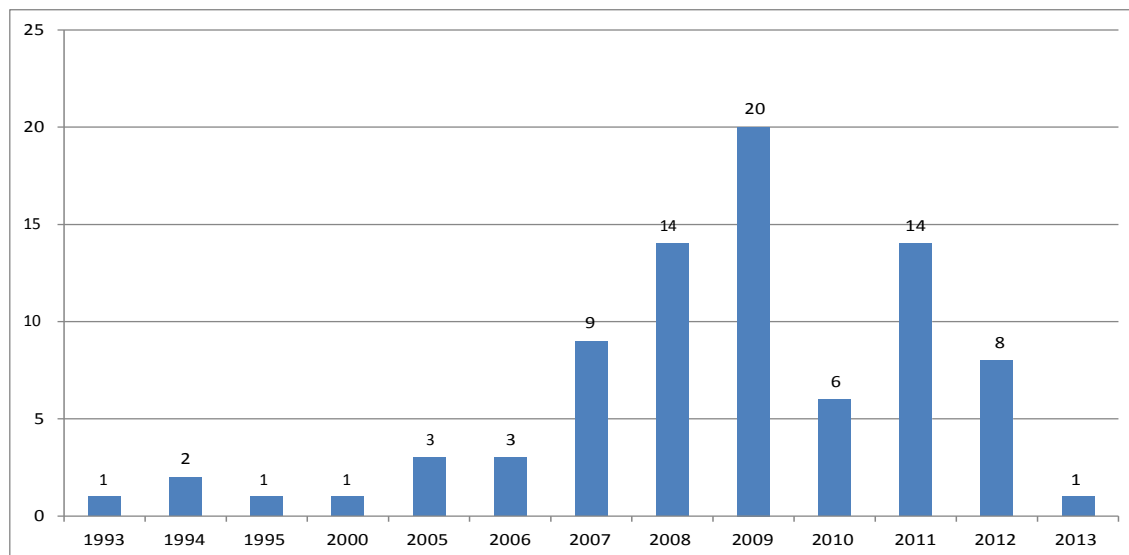


Fig. 2 - Number of narco-subs seized.

The analysis of the data allows us to see the history of ‘narco-subs’ as being divided into three periods: 1.) First attempts, 1993-2000, 2.) Development and consolidation of semisubmersible artifacts, 2001-2009 and; 3.) Current moment, 2010-Present. Each of these periods shows different trajectories in design and building of narco-subs, and maybe one of the aspects that could provide explanations for this are the structural aspects of the environment³.

While the first period in the history of ‘narco-subs’ dates back to 1993 in the Caribbean, specifically near the Island of San Andres, it could have started a couple of years earlier. Two different trajectories are found within this period, the first with ‘Laura’ the narco-sub found in San Andres, and the one found in Barranquilla in 1994. With the first approach, there are changes in the hull of the boats, consisting mainly in covering it with fiberglass, turning them into semi-submersible artifacts. The second approach in the early history of narco-subs, is that builders started with, as a navy captain said, trying to make something really complex, that is to say, to build submarines, or at least fully submersible artifacts. There are two prototypes representative of this trajectory, first the ‘Tayrona’ (Fig. 3) and second, the ‘Cartagena’ (Fig. 4).

² The ‘Facatativa’ a narco sub discovered in a town near Bogotá accounts for the missing percentage.

³ Not just as geography but as the interaction between LEAs and DSOs in the complex environment of the War on Drugs. Nevertheless it is important to mention the importance of taking into account the difference in geography, and tidal regimes are important in the way that drug smugglers act and interdiction takes place as well.



Fig. 3 - The Tayrona



Fig. 4 - The Cartagena

According to naval sources of the time, while different in their design, both the ‘Tayrona’ and the ‘Cartagena’ submarines had formal naval engineering behind them, and both possessed hydrodynamic designs based on blueprints. The Tayrona was said to be able to submerge up to 10 meters below the surface, it also had a sail and ballast tanks and was powered by a truck diesel engine that was adapted to the vessel. The ‘Cartagena’ was said to be able to submerge up to 20m⁴. The building of these artifacts was apparently done in workshops in urban areas, and once finished; they were transported to the shores by truck. The materials mainly used were steel and fiberglass.

It is important to mention two important developments of LEAs during the middle of the nineties. The first corresponds to the development of the Colombian Navy Coast Guard, and the second the signing of a long term agreement between Colombia and the United States regarding maritime interdiction.

⁴ <http://www.eltiempo.com/archivo/documento/MAM-387160>

While the Colombian Navy Coast Guard was officially created in 1979, it was not until 1994 when the first boats were purchased. The ‘Dolphins’ as they are known, are small and slow boats, nevertheless they provided the Colombian Coast Guard with the opportunity to acquire knowledge regarding interdiction and procurement of technology. In 1998, the Colombian Coast Guard acquired the capacity to control to some extent, one among the principal interdiction tools used during the nineties, the go-fast boats. LEAs were then able to procure faster boats as well as benefit from the deployment of Coast Guard stations and Radar Systems⁵. The signing and implementation of the agreement between the governments of the United States of America and of Colombia to suppress illicit traffic by sea, entered into force on February 20, 1997, allowing complementing capabilities and efforts regarding interdiction.

The second period can be broadly dated between the years 2000 and 2009. During this period, the threat of narco-sub turned from the Caribbean to the Pacific Ocean. During this period, it is possible to discern a process of micro innovations from boats to semi-submersible artifacts, but also a more radical approach, the building of hulls from scratch. Within the first trajectory of micro-innovation we can account for the enhancement of cargo capacities and hidden compartments, followed by the covering of the hull with fiberglass (Fig. 5). Nevertheless, this left builders with the unsolved problem of the trail and heat signature of the vessels. These problems faced by traffickers were actually used by LEAs to seize vessels using visual inspections and infrared technologies. Builders tried to solve the heating problem by covering the engines and putting them inside. Finally, builders opted to cover the entire hull with fiberglass, placing a hatch and trying different approaches for the exhausts, Fig. 6 is an example.



Fig. 5

⁵ There are interesting turns, learning and setbacks in the process of technological and organizational innovation within the Coast Guard.



Fig. 6

The second trajectory consisted of building semi-submersible artifacts from scratch. The usual path begins with the building of the structure, which is made from wood, then a mixture of resins, catalyst and solvents is spread onto the wood structure until a waterproof, insulating, lightweight and durable layer is formed. After this stage, electrical wiring and engines are assembled. Unlike the design mentioned in the previous paragraph, this semi-submersible used a diesel engine. Different models of this trajectory introduced micro-innovations; hydrodynamic designs were also introduced which helped to improve autonomy, resistance and fuel consumption. Also, the trail problem was resolved by using different hydrodynamic solutions until the trail was reduced to a minimum. Also, different approaches to the exhaust were used (Fig. 7 and Fig. 8). Finally, fiberglass and wood are adopted as main building materials.



Fig. 7



Fig. 8

Similarities between artifacts allows us to confirm that semi-submersible artifacts found in the Caribbean (Uraba and La Guajira) during these years were the result of the same groups of 'narco-subs' builders that built subs that operated in the Pacific⁶. However, there is a clear difference from the early years of narco-subs construction. The artifacts built from 2005 on were built in artisanal workshops in the middle of the jungle, but near the sea, using hard to access places, with thick vegetation around (usually in mangrove areas), near estuaries and kept in maximum secrecy during the building of the artifacts.

It is also important to note that during this period, the Colombian navy developed skills in detecting, monitoring, interdicting and capturing these artifacts using both previous strategies used in capturing go-fast boats as well as developing new ones (Rodriguez Viera, 2013).

During the third period, we can appreciate two trajectories, one of displacement and one of uncertainty. The two trajectories are: (1) the search for a fully submersible manned artefact, and (2) the use of different approaches to unmanned submersible artifacts. The displacement of knowledge (possibly embodied in builders that are capable of avoiding capture) to the Caribbean, as five 'narco-subs' were interdicted between 2011 and 2012.

The first trajectory is exemplified in two artifacts, one seized in July 2010 in Ecuador, and the second one seized in February 2011. The main characteristics of these vessels are their immersion capacity, and the introduction of new materials such as Kevlar in the building of this new 'generation' of 'narco-subs'. One important aspect is that the knowledge required for building these artifacts is claimed to be expert knowledge. This knowledge is difficult to pass on and therefore such a trajectory is hard to follow. The second trajectory of submersible artifacts is represented in the artifacts known as narco-torpedoes and the return to tubes fixed to hulls of cargo ships.

Finally, uncertainty is hard to avoid. Are narco-subs sailing in the Pacific or in the Caribbean? The U.S Drug Enforcement Administration has considered that only about 20% of these artifacts are intercepted. There are others, who are not as pessimistic and prefer a medium estimate. Let us remember that no method has disappeared.

⁶ The author was able to collect data regarding the building of the semisubmersible found in La Guajira in 1997, which was still in construction. The people of the area assert that builder came from the Pacific; they were easily recognizable because they were 'morenos' (African American) in a zone inhabited by aborigines.

Final Thoughts

It is clear that the process of learning within the WoD for both DSOs and LEAs is both a process of “learning by trying”, making improvements and modifications to different components as to make them work, and ‘learning by using’, making improvements in the artefact or systems of artifacts implemented (Fleck, 1994, p. 638).

After analyzing the 20 years of narco-subbs we can see some interesting patterns, (1) the move from the Caribbean to the Pacific, (2) the move from complex submarine artifacts with formal knowledge involved (Caribbean) to more local knowledge developments, involving work with fiberglass easily found among fishing communities in the Pacific coast who also travel to the Caribbean, and (3) the search for building complex submarine artifacts.

POSTSCRIPT

Captain Mark F. Morris, USN

May 2014

When I arrived in Colombia in early 2006, the main method of transport for the narco-traffickers in the Caribbean was still the “Go-Fast,” a high-speed, open cockpit (and usually hand-made) boat with four or five outboard motors carrying 1,000 to 2,000 kilograms of cocaine. In the Pacific, it was a registered, flagged fishing vessel carrying from 4,000 to 10,000 kilograms (first using the Colombian and later the Ecuadorian flags). On both coast these vessels would leave Colombia for somewhere in Central America to discharge their cargo for land transport to and across our southern frontier. But something was very worrying to Colombian Navy Admirals; they repeatedly told me that their Naval Intelligence kept hearing rumors of submersibles or submarines. They had seen the rudimentary submersibles in the early 1990s and two they had captured were on display at the Cartagena Naval Base. These were most probably vessels that were towed behind a mother-ship and only released when the mother-ship had been detected by some type of maritime patrol or near their final destination. They had also seen in the Pacific and captured towed-behind torpedoes (the Colombian Navy used the term “artifact” rather than torpedo) designed to carry cocaine. When the mother-ship was detected, the towline was released and the torpedo would remain below the surface for several hours and then rise to be reacquired by the towing vessel to continue on their journey. Most amazing was the true submarine found under construction in an industrial area of Bogota in 2000; not only amazing due to its double hull and complex ballasting system but also because Bogota is over 350 miles from the nearest coast and is high in the Andes at over 8,000 feet above sea level. But other than these few examples, the narco-trafficking submersibles only existed in these maddening rumors.

This all changed abruptly in late 2006 when the U.S. Coast Guard captured a Self-Propelled Semi-Submersible (SPSS) off the coast of Costa Rica with about 3,000 kg of Colombian cocaine. After that, SPSSs seemed to be everywhere. In the most technical sense, an SPSS is not a submarine, but rather a Low Profile or Low Observable Vessel, but by most accounts the narco-traffickers themselves referred to them as “submarines” (while the crews referred to them as “coffins”). As more and more were captured, the Colombian Navy and we in the U.S. Embassy saw increasing sophistication of capabilities and measures to prevent detection. These included various paint schemes to camouflage the vessel in the water. Below the waterline heat exchangers as well as venting the diesel engine exhaust below the waterline to reduce the heat signature emitted by the vessel. Hammering a thin layer of lead between the wooden deck and fiberglass to reduce the radar reflectivity of the vessel (or so we thought was the idea). One vessel was even fitted with cathodic protection in the form of zinc blocks which means to someone familiar with sea-going vessels that this vessel was designed for long-term usage not the one-way trip of almost all narco-trafficking vessels. The idea that the SPSS was only a Pacific coast method of transport was ended with the discovery of a large, nearly complete vessel on the Guajira Peninsula in 2008. Even to this day, some Colombian Naval Officers refer to this vessel as “The Beast” due to its large size. It was almost 70 feet long, had a very wide beam with twin engines and twin propellers; analysis by Colombian

Navy naval engineers and naval architects indicated that it had an unrefueled range of over 2,500 nautical miles and an 8 ton cargo capacity. Yet the rumors of true submarines remained.

If 2007 and 2008 were the years of the semi-submersible, and while the SPSS did not disappear as a method of transport (just as the Go-Fast had not during this time), 2009 became the year of the small boat. Instead of a “Go-Fast” with 2,000 kilos of cocaine, the drug trafficking organizations sent hundreds of small, single-engine boats called “pangas,” each with 100 to 200 kg of cocaine built into the hull and framework of boat. These boats hugged the coastline remaining in territorial waters of the littoral states thereby avoiding U.S. and Allied naval forces stopping them. While the local Coast Guards or Maritime Police Forces may be able to stop one or two, the vast majority of them sailed past unmolested. I used the American Football term “Flooding the Zone” as way to describe this within the Embassy and later to the Colombian Admiralty. And yet, in spite of all the success of this method, the rumors of true submarines persisted.

A few days before my transfer from Colombia in 2010, the Colombian Naval Intelligence’s rumor of a true submarine was confirmed as fact by the capture of the first of two. The first was found in Ecuador only a few miles south of their border with Colombia and a few months later, the second was in Colombia many miles north of the Ecuadorian border. These submarines, built in jungle shipyards, showed that they had sophistication necessary for completely submerged operations. And though designed to run on the surface on diesel propulsion, they had the ability to submerge and run on battery power for several hours and while underwater would be very difficult to detect.

So, how do we detect, monitor, track, and stop submersibles, semi-submersibles, and, moreover, any vessel trafficking illicit products? What are the best countermeasures against a narco-trafficking vessel in general and specifically what are the best countermeasures against the true submersibles? First and foremost, detecting any vessel on the high seas is difficult at best. With some wind and waves, it is nearly impossible to see a small boat or the snorkel of a submarine. Now, add in the fact that designers and operators are working to conceal themselves and their purpose makes the task only harder. American operations analysis shows that given good intelligence of a drug event and a patrol box of a certain length and width, a surface vessel operating alone has only a 5% probability of detecting (PD) that event. A surface vessel with an embarked helicopter increases the PD to 30%, and by adding a Maritime Patrol Aircraft to the mix, the PD goes up to 70%. Analysis by the Colombian Navy shows that adding one of their submarines to the mix raises the PD to 90%.

My colleagues in the DEA would say that the whole process always begins with intelligence. This gives them an indication of what they call a drug trafficking event. From this intelligence they would ask the proper authorities to move maritime assets into place to monitor the area and detect a suspect vessel. Once detected, next track the vessel, and then move in the forces necessary to stop, question, board, and capture suspect vessels (known as the “end game”). Monitoring, detecting, and tracking is the first part of the problem and the “end game” is the second part of the problem. The final part of the problem is where the DEA and other law enforcement investigate to determine the origin of both the cocaine and the vessel transporting it. With respect to the vessel, the goal was to find and destroy the building facility (usually a jungle boatyard) and more importantly, arrest the illicit vessels’ designers and builders as a way of reducing the drug trafficking organizations ability to produce improved vessels in the future.

Monitoring, detecting, and tracking can be done by surface vessels patrolling but are best done with properly equipped maritime patrol aircraft (MPA). These are fixed wing aircraft with medium to long endurance as well as very good radar and electro-optical/infrared-optical (EO/IO)¹ system. These aircraft should also have systems designed to detect and evaluate radio transmissions and receivers for the shipboard Automatic Identification System (AIS)². MPA are also usually fitted with some aerial observer windows that allows for both human observation and photography of suspect vessels. With queuing provided by either naval or law enforcement intelligence, the aircraft would launch for a patrol over an area where the suspect vessel is thought to be transiting. By flying planned search patterns, the crew maximizes its chance to detect the suspect vessel by radar, radio transmission detection, and the EO/IO system. More often than not, the crew's main job is to determine a suspect vessel amongst a myriad of other vessels. For a narco-trafficking submarine or SPSS this would be rather easy but for a panga or drug-carrying commercial fishing vessel this can be very difficult. This is where a very high resolution EO/IO system is used to monitor the suspect vessel from outside what is known as the counter-detection range. Surface vessels can also patrol an area being part of the monitoring, detecting, and tracking phase of the problem. As shown above, they are limited in their ability to monitor and detect when operating alone (a 5% PD) but when they have an flight deck and use an embarked helicopter they are six times more effective (a 30% PD). Again, adding a MPA to the problem makes detection more likely than not (a 70% PD).

Once a suspect vessel is detected and is being tracked, then this vessel needs to be interrogated and if necessary boarded, searched, the crew arrested, and evidence seized. This can only be done by a surface vessel with the capability to send a boarding party to another vessel. The interrogation is to determine if the vessel is a registered (e.g., under the flag of a state) or a stateless vessel. If it is a registered vessel, then permission of the flagging state is needed before the vessel can be boarded.³ If the vessel is not registered, or flying a false flag, it can be boarded without further permission. Once detected, often the crew of a drug carrying vessel will start dumping the illicit cargo overboard or purposely scuttle or fire their vessel. In this case the job of the boarding party is to first save the lives of the crew of the trafficking vessel and then if time allows, recover evidence for prosecution. Since operating an unregistered submersible or semi-submersible is against both U.S.⁴ and Colombian⁵ law it is not necessary for the boarding party to risk their lives entering a sinking vessel in order to seize evidence of illegal drugs.

There are two types of surface vessels best suited for counter-narcotics operations. First is a high-speed pursuit or interceptor boat designed to outrun a "Go-Fast." One example is the Midnight Express brand boat provided to the Colombian Coast Guard with Plan Colombia funding and more purchased later with Colombian Navy funds. This 39 foot long boat, at one time also used by the US Customs Service, has a top speed of 70 knots. While quite successful in counter-narcotics and

¹ Some of which are known by the trade name "FLIR"

² AIS is a system mandated by the International Maritime Organization on all vessels over 300 gross tons. Some national authorities, such as Colombia, require it on all vessels engaged in commercial fishing in their EEZ without regard to size. The system provides the receiving station information about AIS-equipped vessel, therefore it is thought that it is less like that an AIS equipped vessel would be engaged in illicit activity.

³ Ships engaged in piracy or slaving but not drug trafficking can be the exception under International Law

⁴ See 18 U.S. Code § 2285, known as the Drug Trafficking Vessel Interdiction Act.

⁵ The Colombian law is very similar to U.S. with one notable exception; if the person convicted is a former member or employee of the Colombian Navy, then the sentence is doubled.

other Coast Guard-type operations such as search and rescue, they had very little endurance for patrolling.

The other type of vessel is one suited for patrolling. This could be any sized vessel from the former U.S. Coast Guard 82 foot Point Class cutters transferred to the Colombians early in Plan Colombia to Colombia's frigates with flight decks and an embarked naval helicopter. The former could patrol for three or four days, the latter for several weeks. The important factor here is the ability to stay at sea for more than a day and patrol beyond the visual horizon.

Once a vessel of any type is seized and the crew arrested, then law enforcement investigates both the origin of the cocaine as well as the origin of the vessel. While a hand-made panga or Go-Fast leaves few clues that can lead to arrests of the designers and builders, the more sophisticated SPSS and especially the true submersibles, usually leave many more clues. For example, diesel engines have serial numbers so that previous owners can usually be found. In the case of a submersible and the pressures of water at even a few feet of depth, one cannot buy piping and valves at your average builder's warehouse store but rather must order high quality specialty pieces designed to resist greater pressures. These items have marking that identify things like the manufacturer, date and place of manufacture, lot number, etc.; things that give law enforcement better ability to track the item to the buyer.

One specific countermeasure in the case of submersibles is the tracking of potential crew members and designers. Many of the panga, Go-Fast, and even SPSS crews are recruited from the coast of Colombia in areas where fishing is common, so there is a large pool of potential recruits with years of boating experience. But a submarine is different; one cannot recruit a crew from a fishing village and expect them to successfully operate a submarine without extensive training. One can only recruit an experienced submarine crew from the very small pool of former navy submariners. Seven South American navies have submarines and while all the subs in these navies are not the same, all have German-built Type-209 submarines which could provide a small pool of men who have all trained and qualified on the same platform. Likewise, the pool of those who could design or supervise the building of a submarine is very small and are very likely to have prior navy or naval shipyard experience working on submarines.

A final note about countermeasures; it is important for the maritime forces to remain flexible because the Drug Trafficking Organizations are always changing their techniques, tactics, and procedures. In my time in Colombia, while the narco-traffickers would develop new methods – such as the SPSS – they would continue to use the older, proven methods such as Go-Fasts. We had to be careful in our assistance to the Colombians to avoid providing single-purpose solutions. My thought was that if we provided them equipment that could only be used for a single purpose, for example, maybe a type of sonar to detect and track a semi-submersible, it would have a little use when they shifted back to fishing boats or sent more loads by Go-Fast. With the limited resources I had under Plan Colombia, I wanted high quality items that could be used in a variety of situations.

A narco-sub, be it a semi-submersible or true submarine, represents a vast improvement over the other methods of transporting narcotics and other illicit cargo. They are more difficult to detect and track than the more traditional methods of transport and generally have greater range and cargo capacity. But unlike the older methods, both the semi-submersible and submarine represent a threat to our national security; if they can leave the coast of Colombia with 5 to 10 tons of cocaine and

transit with little chance of detection, they could also approach our coast undetected with 5 to 10 tons of something more dangerous than drugs.

The views expressed in this essay are those of the author and do not necessarily reflect the official policy or position of the Department of the Navy, the Department of Defense, or the U.S. Government.

PICTURE GALLERY: NARCO VESSELS

Vessel No. 1

Name: San Andres semi-submersible

Location: San Andres Islands, Caribbean

Date: 1993



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>

Vessel No. 2
Name: Tayrona Submarine
Location: Santa Marta, Colombia
Date: 1994



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Javier Guerrero Castro

Vessel No. 3
Name: Cartagena model
Location: Colombia
Date: Seized 1995



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



http://www.tamariskrtw.com/?attachment_id=1296



Courtesy Captain Mark F. Morris

Vessel No. 4
Name: Batboat
Location: Northern Colombia
Date: Seized between 1993 - 1995

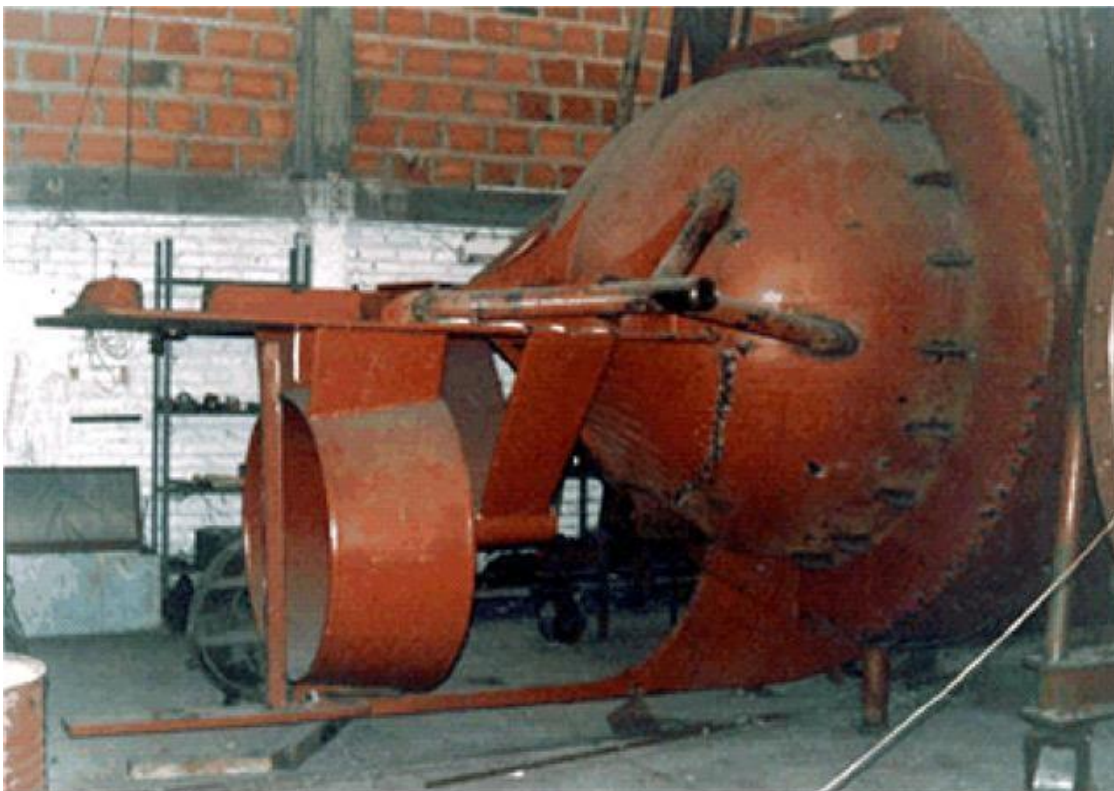


http://www.tamariskrtw.com/?attachment_id=1296



Courtesy Javier Guerrero Castro

Vessel No. 5
Name: Facatativa Submarine (Russian-designed)
Location: Facatativa, Colombia
Date: September 7, 2000



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



<http://mafiatoday.com/wp-content/uploads/2010/07/Cocaine-Submarine.jpg>

Vessel No. 6
Name: Unmanned torpedo
Location: Pacific Ocean
Date: August 18, 2005



<http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>



<http://abcnews.go.com/Blotter/slideshow/improved-cocaine-submarines-11238696>

Vessel No. 7

Name: Pital (Low Profile Vessel)

Location: Near Buenaventura, Colombia

Date: March 2006



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>

Vessel No. 8

Name: 50-foot wood and fiberglass craft

Location: Pacific Ocean (near Costa Rica)

Date: November 2006



<http://www.nbcnews.com/id/15811689/#.UsZt0vRDtxw>

Vessel No. 9
Name: Bigfoot 1(LPV)
Location: Pacific Ocean near Colombia
Date: November 2006



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris

Vessel No. 10

Name: Low profile vessel – 18 meters long and 3 meters wide

Location: Colombia's Pacific Coast

Date: July 2007



<http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



<http://www.ryot.org/drug-traffickers-using-submarines-to-move-product/32166>

Vessel No. 11
Name: Low profile vessel (boat)
Location: Colombia
Date: 2007



Length: 18 m - Width: 3.1 m - Height: 2.23 m - Range: 1300 NM - "Cruise" speed: 10 kts.
Maximum speed: 12 kts - Hull construction: Fiberglass/wood - Fuel capacity: 1600 gal.
Engine: Caterpillar 3408V Turbo 550 HP.

<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



<http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>

Vessel No. 12
Name: Guajira low-profile vessel (boat)
Location: Guajira, Colombia
Date: 2007



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



<http://www.documentingreality.com/forum/f242/drugs-submarines-9096/>



<http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>

Vessel No. 13
Name: Narco Torpedo
Location: Near Buenaventura, Colombia
Date: 2007



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



http://news.nationalgeographic.com/news/2010/07/photogalleries/100713-cocaine-submarines-sub-smuggling-drugs-world-crime-pictures/#/cocaine-sub-seized-torpedo_23288_600x450.jpg

Vessel No. 14

Name: LPV

Location: 75 miles off Colombia's Pacific coast

Date: December 31, 2007



<http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>



Vessel's crew sank the vessel upon encountering authorities.

<http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>

Vessel No. 15
Name: Steel LPV
Location: Colombia
Date: February 2008



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>

Vessel No. 16
Name: Colombian home-made LPV
Location: Pacific Ocean (near Mexico)
Date: July 2008



<http://www.mcclatchydc.com/2012/12/03/176143/colombias-narco-sub-museum-gives.html>



<http://news.bbc.co.uk/2/hi/americas/7515056.stm>

Vessel No. 17

Name: Bigfoot 2 (LPV)

Location: Pacific Ocean (350 – 400 miles west of Guatemala)

Date: September 2008



<http://themaritimeblog.com/us-coast-guard-and-us-navy-interdict-two-semi-submersible-vessels/>



http://www.strategypage.com/military_photos/military_photos_20080916233911.aspx



http://www.nbcnews.com/id/26795833/ns/world_news-americas/t/us-military-nets-second-cocaine-sub-week/#.UzXPafldVxy



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>

Vessel No. 18

Name: Handmade LPV with 1.6 tons of cocaine

Location: Tumaco, Colombia

Date: 2008



http://news.nationalgeographic.com/news/2010/07/photogalleries/100713-cocaine-submarines-subsmuggling-drugs-world-crime-pictures/#/cocaine-sub-seized-handmade_23285_600x450.jpg

Vessel No. 19

Name: Narco LPV

Location: 150 miles northwest of the Colombia-Ecuador border

Date: January 2009



Photo: US Navy

<http://www.wired.com/threatlevel/2009/01/new-law-harpoon/>

Vessel No. 20
Name: Low Profile Vessel (Self Propelled)
Location: Caribbean Sea
Date: January 2009



<http://www.sun-sentinel.com/news/florida/sfl-drug-submersible-vessels-busted-off-pacifi-002,0,4899141.photo>



http://articles.sun-sentinel.com/2011-08-01/news/fl-coast-guard-drug-sub-20110801_1_vessels-first-narco-caribbean-waters

Vessel No. 21

Name: Low Profile Vessel

Location: Eastern Pacific off the coast of Central America

Date: October 21, 2009



<http://coastguard.dodlive.mil/2010/07/drug-subs-2-0/>

Vessel No. 22

Name: Low Profile Vessel

Location: 500 miles off Colombian Pacific coast

Date: June 2010





<http://www.chron.com/news/gallery/Narco-subs-caught-on-camera-18124.php>



<http://www.chron.com/news/nation-world/article/Narco-subs-of-cartels-sink-to-new-lows-in-1707377.php>

Vessel No. 23

Name: Kevlar-Coated Super-submarine

Location: 5 miles south of Colombia-Ecuador border

Date: July 2, 2010



http://www.wired.com/magazine/2011/03/ff_drugsub/all/



<http://www.chron.com/news/gallery/Narco-subs-caught-on-camera-18124/photo-1251598.php>



<http://www.chron.com/news/gallery/Narco-subs-caught-on-camera-18124/photo-1251598.php>



http://thelede.blogs.nytimes.com/2010/07/06/advances-in-narco-submarine-technology/?_r=0



<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html>



<http://www.chron.com/news/gallery/Narco-subs-caught-on-camera-18124/photo-1251598.php>



<http://coastguard.dodlive.mil/2010/07/drug-subs-2-0/>



<http://news.nationalgeographic.com/news/2010/07/photogalleries/100713-cocaine-submarines-subs-smuggling-drugs-world-crime-pictures/>



http://www.wired.com/magazine/2011/03/ff_drugsub/all/



http://www.slate.com/articles/news_and_politics/foreigners/2013/10/mauner_mahecha_s_drug_submarines_inside_a_high_tech_south_american_narco.html

Vessel No. 23

Name: Kevlar-Coated Super-submarine (*Interior of vessel*)

Location: 5 miles south of Colombia-Ecuador border

Date: July 2, 2010



http://www.wired.com/magazine/2011/03/ff_drugsub/all/



http://www.wired.com/magazine/2011/03/ff_drugsub/all/



http://www.wired.com/magazine/2011/03/ff_drugsub/alV



http://www.wired.com/magazine/2011/03/ff_drugsub/all/





http://www.wired.com/magazine/2011/03/ff_drugsub/all/



http://www.wired.com/magazine/2011/03/ff_drugsub/all/



<http://coastguard.dodlive.mil/2010/07/drug-subs-2-0/drug-sub-interior-dea/>

Vessel No. 24

Name: LPV

Location: 335 miles off Costa Rica (Pacific Ocean)

Date: January 20, 2011



The U.S. Coast Guard Cutter Midgett and its crew of 160, based in Seattle, intercepted the vessel 335 miles off Costa Rica (in the Pacific Ocean). The vessel was carrying 6.6 tons of cocaine.

http://seattletimes.com/html/localnews/2015001894_narcosub09m.html

Vessel No. 25

Name: 100 Foot Long Submarine

Location: Timbiqui, Cauca, Colombia

Date: February 2011



<http://www.thedailybeast.com/articles/2012/05/13/the-drug-war-at-sea-rise-of-the-narco-subs.html>



<http://boingboing.net/2011/02/14/100-ft-long-drug-smu.html>



<http://boingboing.net/2011/02/14/100-ft-long-drug-smu.html>



<http://humanmindblower.wordpress.com/2011/02/19/colombian-narcotics/>



<http://boingboing.net/2011/02/14/100-ft-long-drug-smu.html>



<http://www.militaryphotos.net/forums/showthread.php?192796-Colombian-Armed-Forces-pics-videos-and-more/page143>



<http://www.militaryphotos.net/forums/showthread.php?192796-Colombian-Armed-Forces-pics-videos-and-more/page143>



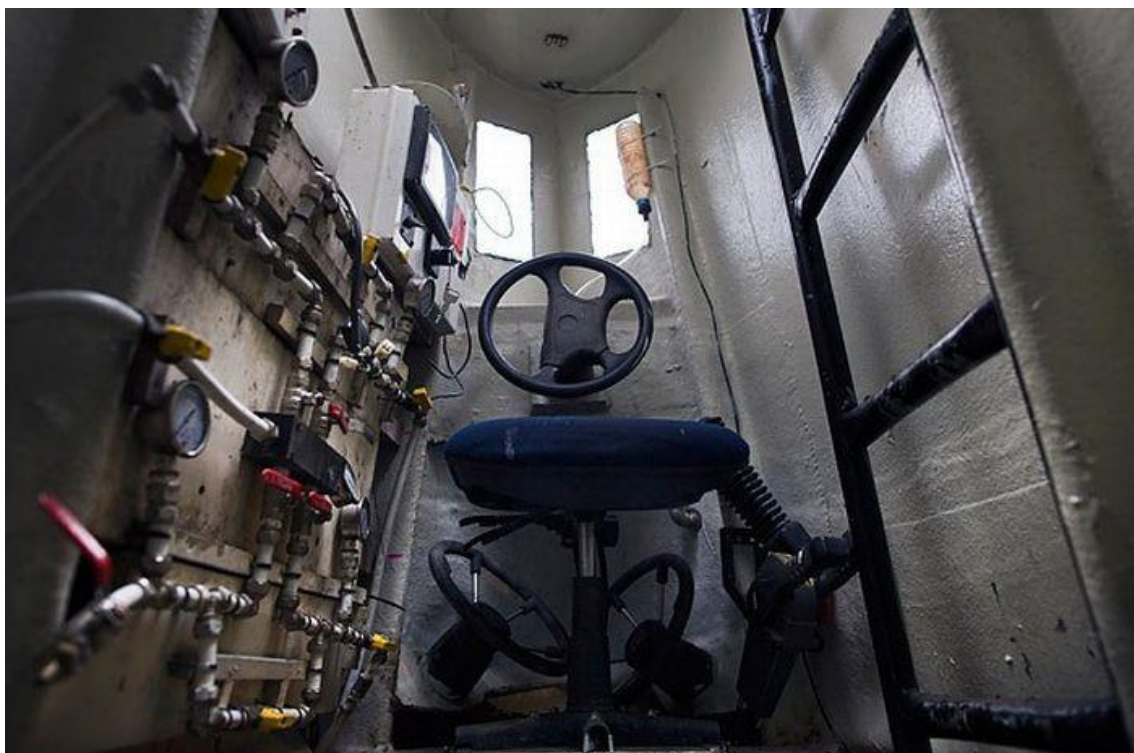
<http://www.sandiegored.com/noticias/5972/VIDEO-Advanced-narco-sub-seized-in-Colombia/>



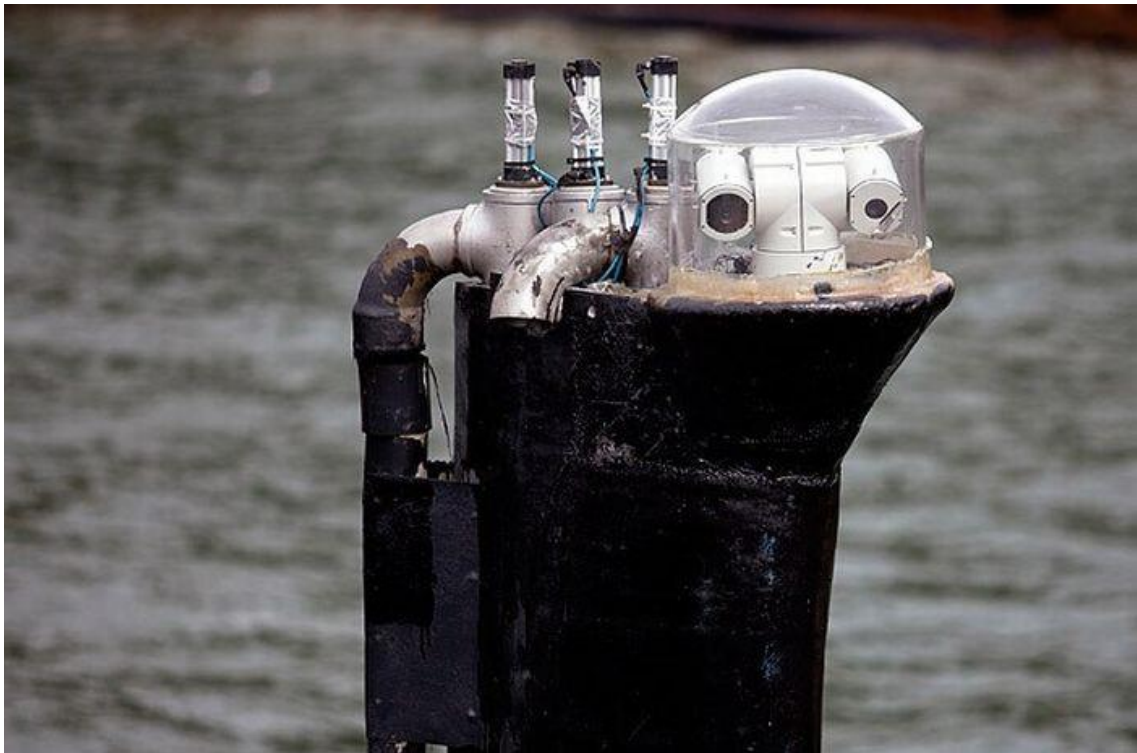
<http://content.time.com/time/world/article/0,8599,2061934,00.html>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>

Vessel No. 26
Name: Low Profile Vessel
Location: Eastern Pacific Ocean
Date: April 2011



<http://defensetech.org/2011/04/20/another-drug-sub-is-caught-at-sea/>

Vessel No. 27
Name: Low Profile Vessel
Location: Near Buenaventura, Colombia
Date: September 2011



<http://news.blogs.cnn.com/2011/09/27/two-new-narco-subs-found-in-colombia/>



<http://rastreadordenoticias.com/wp-content/uploads/2011/09/submarino-farc.jpg>



<http://www.dailymail.co.uk/news/article-2041685/That-sinking-feeling-Colombian-drug-cartels-latest-weapon-captured--submarine-maiden-voyage.html>



<http://www.bbc.co.uk/news/world-latin-america-15051108>

Vessel No. 28

Name: Low Profile Vessel (Interdicted by the U.S. Coast Guard)

Location: Western Caribbean

Date: September 17, 2011



A crew member aboard a LPV surrenders after the craft was stopped by the U.S. Coast Guard cutter Mohawk. The sub, already sinking after crew members scuttled it, had a cargo of cocaine aboard.

<http://miami.cbslocal.com/2011/09/28/coast-guard-stops-another-drug-sub-in-caribbean/>

Vessel No. 29

Name: Low Profile Vessel (Interdicted by the U.S. Coast Guard)

Location: Western Caribbean Sea

Date: September 30, 2011



The crew of the Coast Guard Cutter Mohawk interdicted the LPV in the Western Caribbean Sea on Sept. 30, 2011, before its crew sank the vessel. Above is the photo of the sunken LPV.

<http://miami.cbslocal.com/2011/10/28/coast-guard-recovers-7-tons-of-cocaine-from-drug-sub/>



U.S. authorities proceeded to recover 7 tons of cocaine from the sunken vessel.

<http://miami.cbslocal.com/2011/10/28/coast-guard-recovers-7-tons-of-cocaine-from-drug-sub/>

Vessel No. 30
Name: Fully functional narco-submarine ("Snorkel" sub)
Location: Western Colombia
Date: 2011



<http://www.ryot.org/drug-traffickers-using-submarines-to-move-product/32166>



<http://channel.nationalgeographic.com/channel/galleries/narco-sub-mystery/at/blue-submarine-726492/>

Vessel No. 31

Name: Unmanned Torpedo (7.5 meters long and 1.5 meters wide)

Location: 65 Km south of Buenaventura, Colombia

Date: May 2012



<http://www.infobae.com/2012/05/29/1051363-colombia-hallaron-otro-submarino-narco>

Vessel No. 32

Name: Low Profile vessel (15 meters long and 3 meters wide)

Location: 60 miles from Rio Naya, Colombia

Date: January 2013



<http://www.hispanicallyspeakingnews.com/latino-daily-news/details/narco-blog-narco-sub-with-crew-of-4-captured-by-colombian-navy/20969/>

Vessel No. 33

Name: Submarine

Location: Near Ecuador – Colombia border

Date: October 2013



http://infosurhoy.com/en_GB/articles/saii/features/main/2013/10/23/feature-02



http://dialogo-americas.com/en_GB/articles/rmisa/features/regional_news/2013/10/31/cooperacion-ecuador-colombia



<http://www.cuencahighlife.com/post/2014/03/02/Cocaine-blues-Although-it-produces-almost-none-of-its-own-Ecuador-has-become-stopover-point-in-drug-trade.aspx>

Miscellaneous photographs



<http://channel.nationalgeographic.com/channel/galleries/narco-sub-mystery/at/underwater-drug-vessel-726491/>



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



http://news.nationalgeographic.com/news/2010/07/photogalleries/100713-cocaine-submarines-subsmuggling-drugs-world-crime-pictures/#/cocaine-sub-seized-captains-wheel_23282_600x450.jpg



<http://www.cnn.com/2010/WORLD/americas/06/29/vbs.colombian.narcosubs/>



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



http://www.ryot.org/wp-content/uploads/2012/12/WORLD_NEWS_DRUGS-SUBS_1_ML.jpg



<http://natgeotv.com/ca/inside-cocaine-submarines/galleries/drug-subs>



<http://sundodgers.com/2013/01/17/columbia-uses-submarines-to-smuggle-drugs/>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



<http://natgeotv.com/ca/inside-cocaine-submarines/galleries/drug-subs#8642>



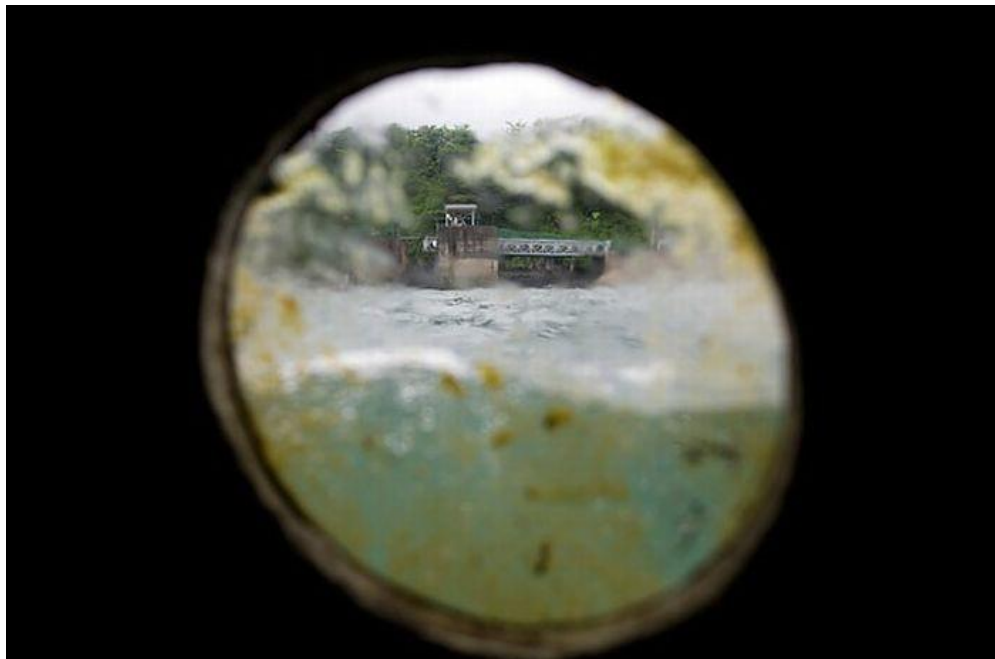
<http://natgeotv.com/ca/inside-cocaine-submarines/galleries/drug-subs#8643>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>



http://www.nytimes.com/2012/09/10/world/americas/drug-smugglers-pose-underwater-challenge-in-caribbean.html?_r=0



Photo of the hold area of a submersible - near the bow of the vessel where the cocaine is stored.
<http://www.npr.org/templates/story/story.php?storyId=18707501>



<http://www.npr.org/templates/story/story.php?storyId=18707501>



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



Courtesy Captain Mark F. Morris



<http://abcnews.go.com/Blotter/slideshow/improved-cocaine-submarines-11238696>



<http://abcnews.go.com/Blotter/slideshow/improved-cocaine-submarines-11238696>



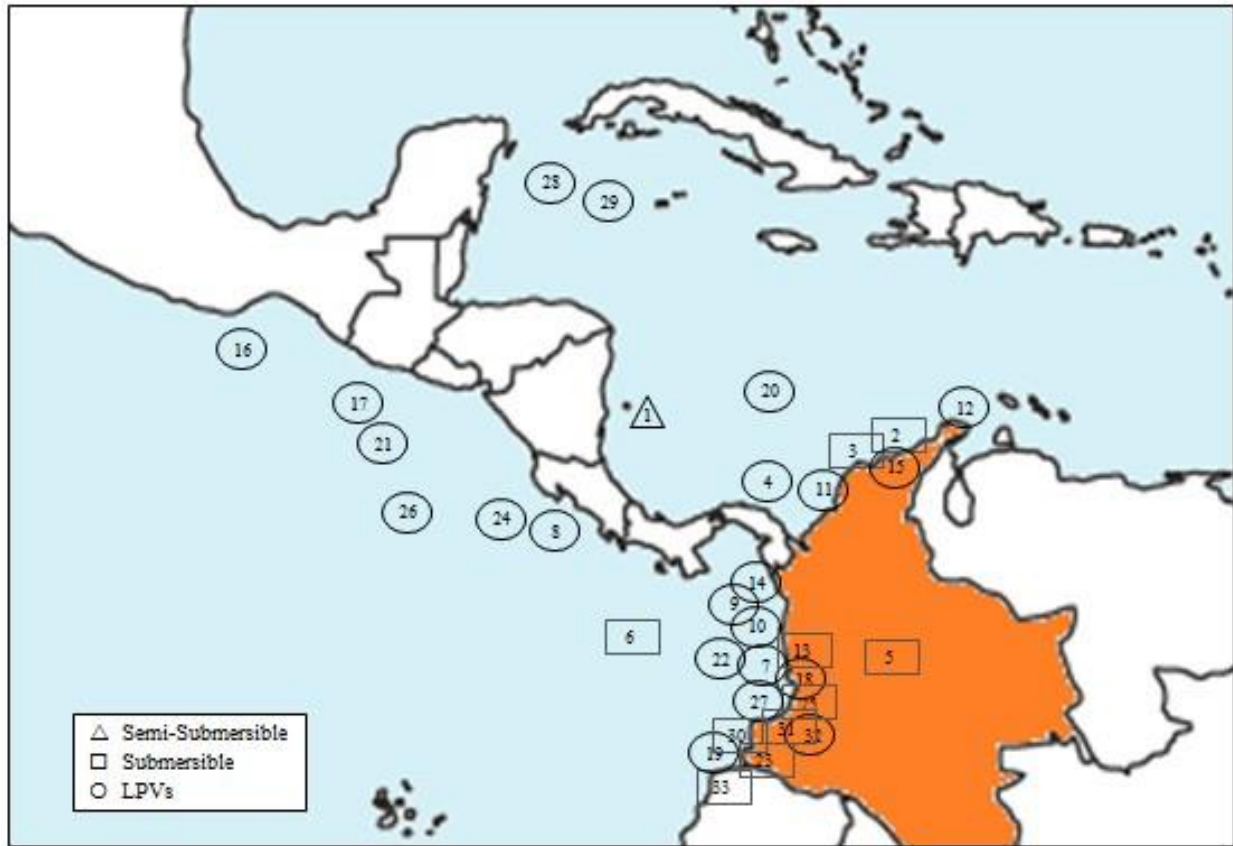
Narco-sub clandestine construction facility in Puerto Escondido, Cordoba, Colombia
<http://m.semana.com/nacion/galeria/narcosubmarinos-historia-contada-fotos/328992>

Name: PLUTO (U.S. Department Homeland Security) - *Training submarine*
Location: United States (East and West coasts)
Date: 2008 thru present



<http://www.sciencedaily.com/releases/2012/09/120910112529.htm>

MAP OF INTERDICTIONS



This map shows the location where our 33 identified vessels, listed in our picture gallery, were interdicted between 1993 and 2013.

NARCO-VESSELS' INTERDICTIONS OVER TIME

Byron Ramirez and Robert J. Bunker

Type Year	Semi-Submersible	Submersible	LPVs
1993	(1) San Andres, COL		
1994		(2) Santa Marta, COL	
1995		(3) Cartagena, COL	(4) Northern Colombia
1996			
1997			
1998			
1999			
2000		(5) Facatativa, COL	
2001			
2002			
2003			
2004			
2005		(6) Pacific Ocean	
2006			(7) Buenaventura, COL (8) Pacific Ocean (near Costa Rica) (9) Pacific Ocean near Colombia
2007		(13) Buenaventura, COL	(10) Colombia's Pacific Coast (11) Colombia (12) Guajira, COL
2008			(14) Colombia's Pacific Coast (15) Colombia (16) Pacific Ocean (near Mexico) (17) Pacific Ocean (near Guatemala) (18) Tumaco, COL

Type Year	Semi-Submersible	Submersible	LPVs
2009			(19) Pacific Ocean (near Colombia-Ecuador border) (20) Caribbean Sea (21) Eastern Pacific off the coast of Central America
2010		(23) Colombia-Ecuador border	(22) Pacific coast (near Colombia)
2011		(25) Cauca, COL (30) Western Colombia	(24) Near Costa Rica (Pacific Ocean) (26) Eastern Pacific Ocean (27) Buenaventura, COL (28) Western Caribbean (29) Western Caribbean Sea
2012		(31) Buenaventura, COL	
2013		(33) Near Colombia-Ecuador border	(32) Southwestern Colombia
Total	1	10	22

APPENDIX A

WRITTEN STATEMENT OF REAR

ADMIRAL CHARLES MICHEL

DIRECTOR

JOINT INTERAGENCY TASK FORCE SOUTH (JIATF-SOUTH)

BEFORE THE

**SUBCOMMITTEE ON BORDER AND MARITIME SECURITY
HOUSE COMMITTEE ON HOMELAND SECURITY**

**HEARING ON BORDER SECURITY THREATS TO THE HOMELAND:
DHS'S RESPONSE TO INNOVATIVE TACTICS AND TECHNIQUES**

19 JUNE 2012



Introduction

Chairwoman Miller, Ranking Member Cuellar, and other distinguished Members of the Subcommittee, thank you for the opportunity to appear before the Subcommittee. Illicit trafficking poses a serious threat to our national security, presenting a formidable challenge not only for the United States but for our international partners as well. Our borders are being assailed by a dangerous adversary that is well-resourced, adaptive, and experienced at exploiting all avenues of approach to the United States. These transnational criminal networks employ all modes and means of conveyance across all transportation domains to reach U.S. and global markets. The challenge is daunting.

Illicit trafficking threatens our country at every land, air, and sea border and challenges the sovereignty of our many international partners. In particular, the tactics, techniques, and procedures employed by drug traffickers are methodologies that can be used by anyone wanting to move illicit people and/or cargo – including terrorists. The established routes, proven methods of conveyances, built-in logistics, communications, and command and control networks could be leveraged by a variety of groups seeking to do harm to the United States. While this potential exists, to date, Joint Interagency Task Force South (JIATF-South) and U.S. Southern Command have not seen any indication of terrorist organizations or their affiliates using illicit trafficking networks to reach the United States to commit acts of terrorism. We continue to monitor this possibility closely.

JIATF-South has broad legal authorities to conduct detection and monitoring operations against illicit trafficking in order to hand off targets to the appropriate law enforcement authorities. The highest priorities are nationally nominated targets of interest, from weapons of mass destruction to special interest aliens and high value targets. The next tier down comprises a broad spectrum of transnational threats, to include the cocaine trade that by itself is worth an estimated \$85 billion globally¹. Staggering amounts of revenue and profit allow transnational criminal organizations (TCOs) to challenge nations by exacerbating corruption and undermining governance, rule of law, judicial systems, free press, democratic institution-building, and transparency, as indicated in the 2011 *Strategy to Combat Transnational Organized Crime* (CTOC)². Cocaine is still one of the most lucrative forms of profit for TCOs and is produced in marketable volumes and quality in three countries in South America: Colombia, Peru and Bolivia³. Peru and Bolivia have the potential to produce 41 percent and 25 percent of the total cocaine volume respectively, and Colombia potentially produces 34 percent⁴. According to Drug Enforcement Administration (DEA), of the United States drug seizures subjected to forensic analysis, 97 percent comes from Colombia⁵, and it is this specific flow that threatens Central America, Mexico, and the United States.

With a homicide rate of 82 per 100,000⁶, Honduras is the most dangerous country in the world, including the current zones of conflict in the Middle East. San Pedro Sula, Honduras has a

¹ UNODC World Drug Report 2011.

² The White House. President Obama's Strategy to Combat Transnational Organized Crime.

³ 2010 Interagency Assessment of Cocaine Movement.

⁴ 2010 Interagency Assessment of Cocaine Movement. Potential production is assessed by arable hectares available for coca growth.

⁵ DEA. Analysis of Cocaine Price and Quality.

⁶ UNODC 2011 Homicide Rates by Country.

homicide rate of 159 deaths per 100,000 citizens, surpassing Ciudad Juarez, Mexico as the world's most violent city⁷. Violent TCOs and gang activity, supported by the flow of cocaine and other contraband towards the United States and the rest of the global market, are negatively impacting citizen security. As illicit drugs move outward to the consuming markets, the money from illicit drug transactions returns to the source and transit regions, creating instability within our partner countries by promoting corruption and undermining legitimate financial institutions. My statutory focus as Director of JIATF-South is combating the illicit drug trade by detecting the flow of drugs early in the supply chain and facilitating interdiction as far from our borders as possible, before illicit drugs are broken down into small, harder-to-detect load sizes. Operation MARTILLO is the focusing lens of a whole-of-government, international solution to this significant regional threat to national security. Coordinated by JIATF-South to support the President's CTOC strategy, Operation MARTILLO seeks to deny the use of the Central American littorals by TCOs while maximizing the drug interdiction efforts of our interagency partners in the principal geographic corridor through which the bulk of illicit drugs moves toward the United States.

Drug Movement in the Transit Zone: Go-Fasts, Semi-Submersibles and Fully Submersibles

JIATF-South challenges drug traffickers in the air and on the sea 24 hours a day, 7 days a week, in defense of America's borders. We are relentless and committed while operating in a resource-constrained environment. Our goal is to put drug traffickers at risk of interdiction and arrest at each and every step of their journey. We work very hard in constant support of law enforcement to ensure this all occurs seamlessly with the most effective use of our resources. Through better intelligence, technological innovations, and unprecedented interagency and international partnerships, JIATF-South has supported record cocaine disruptions, totaling 1,997 metric tons over the last ten years⁸.

From all indications, eighty percent of cocaine, bound for the United States, transits initially via maritime methods of conveyance, while the remaining 20percent makes its first moves by air⁹. Today, Honduras is the primary initial arrival point for cocaine as it leaves the source zone; in 2011, approximate 35 percent of the world's cocaine supply made its first landfall there¹⁰. Once on land, larger loads are eventually broken down into smaller packages before entering the United States. The Mexico/Central American corridor, which includes the waters of the Eastern Pacific and Western Caribbean, is the primary threat vector toward the United States, accounting for more than 90 percent of total documented cocaine movement¹¹.

Cocaine from the source zone moves by a number of conveyances, the primary being go-fasts, usually open hulled boats anywhere from 20 to 50 feet in length with one to four powerful outboard engines. Carrying anywhere from 300 kilograms to 3.5 metric tons of cocaine, these vessels typically leave Colombia and follow the Western Caribbean coastline of Central America to make landfall, principally in Honduras. In the Eastern Pacific, the same types of vessels will leave

⁷ Consejo Ciudadano para la Seguridad, Justicia y Paz Penal A.C. (Citizen Council for Public Security and Criminal Justice), Mexico, 2011.

⁸ JIATF-South analysis of Interagency Consolidated Counter Drug Database (CCDB).

⁹ JIATF-South case analysis.

¹⁰ JIATF-South analysis of Interagency Consolidated Counter Drug Database (CCDB).

¹¹ JIATF-South analysis of Interagency Consolidated Counter-Drug Database (CCDB).

Colombia or Ecuador, and transit off-shore to Guatemala and Mexico or follow the coastline to Panama or Costa Rica.

In 2011, the interagency's Consolidated Counter Drug Database (CCDB) indicated that there were 568 go-fast events moving 490 metric tons of cocaine from South America toward the United States. Ninety-four percent of those movements were along the Central American isthmus into Honduras, Guatemala and Mexico¹². This massive volume moving off-shore and often through the countries of Central America is contributing to the instability and corruption seen in northern Central America, Mexico, and along our Southwest Border.

Though not present in the same numbers as go-fasts, the Self-Propelled Semi-Submersibles (SPSS) and Fully Submersible Vessels (FSV) are potentially an even more insidious threat to the security of the United States for two reasons: (1) their large, up to 10-ton payload capacity and (2) the extraordinary difficulty of detecting these vessels at sea. This makes them a dangerous drug conveyance that could potentially be adapted for transporting other more serious security threats to the United States¹³.

The SPSS is typically constructed in undergoverned spaces, often in the sparsely populated mangrove estuaries of Western Colombia and Ecuador. Costing less than a million dollars apiece to construct, they can move enough cocaine in a single trip to generate more than \$100 million in illicit proceeds for the traffickers¹⁴. JIATF-South detected an SPSS at sea for the first time in 2006. By 2009, the interagency detected as many as 60 SPSS events were moving as much as 330 metric tons per year. Prior to 2011, SPSS had only been employed by traffickers in the Eastern Pacific. However, since July 2011, JIATF-South has supported the disruption of five SPSS vessels in the Western Caribbean, each carrying more than 6.5 metric tons of cocaine.

There have been a total of 214 documented SPSS events, but only 45 were disrupted due largely to the difficulty of detecting such low-profile vessels¹⁵. The Congress, deserves a note of thanks for its foresight and wisdom in enacting 18 USC § 2285, the Drug Trafficking Vessel Interdiction Act of 2008, which made the mere operation of these stateless vessels in international waters a crime. This has greatly helped interdiction efforts because it eliminated the necessity for law enforcement authorities to recover contraband in order to affect successful arrests and prosecutions.

The SPSS was an evolutionary step in the creation of a covert capability to transport multi-ton loads of contraband without any logistical support or refueling. This capability is now present in the FSV. These vessels can get underway from the source region, fully loaded with up to 10 metric tons of cocaine and a crew of four, and travel up to 6,800 nautical miles unsupported¹⁶. Though there is currently no intelligence of shipments directly to the United States, this is a range capacity that can take an FSV from the west coast of Colombia to the coast near Los Angeles, or from the north coast of Colombia to Galveston. Unlike the SPSS, the FSV power plants are typically complex diesel-electric systems that allow them to operate submerged by day on battery power

¹² Interagency Consolidated Counter-Drug Database (CCDB).

¹³ Office of Naval Intelligence, Assessments of seized SPSS and FSVs.

¹⁴ JIATF-South and Office of Naval Intelligence assessment of seized SPSS.

¹⁵ Interagency CCDB

¹⁶ Office of Naval Intelligence, Assessments of seized FSVs.

and to run on the surface at night while recharging their batteries. As complex and sophisticated as they may appear, FSVs are constructed in the same undergoverned locations as SPSSs. These areas are very difficult for law enforcement or even military forces to reach. However, three FSVs have been seized in remote jungle areas, the first in Ecuador in 2010, and the last two in Colombia. Each of these three vessels was unique in its construction and had cargo capacities of over seven metric tons. In 2011, the Interagency documented three FSV movements, none of which were successfully interdicted¹⁷.

Operation MARTILLO: Supporting Regional Stability/National Security

Record interdiction years in the mid-2000s caused TCOs to react and mitigate their risk in several ways. SPSSs and FSVs were developed and their operations refined. Go-fast load sizes were reduced while the number of events increased significantly. Most alarmingly, TCO operations at sea were moved from deep water, where technological advantages favored U.S. interdiction forces, to the Central American littorals¹⁸.

This operational migration toward the Central American isthmus created an increasingly difficult and destabilizing situation whereby primary drug movements from the source zone made landfall earlier, often in countries incapable of stopping them. Operating in and around the territorial waters of Central America made international cooperation and bi-lateral agreements all the more critical to our success.

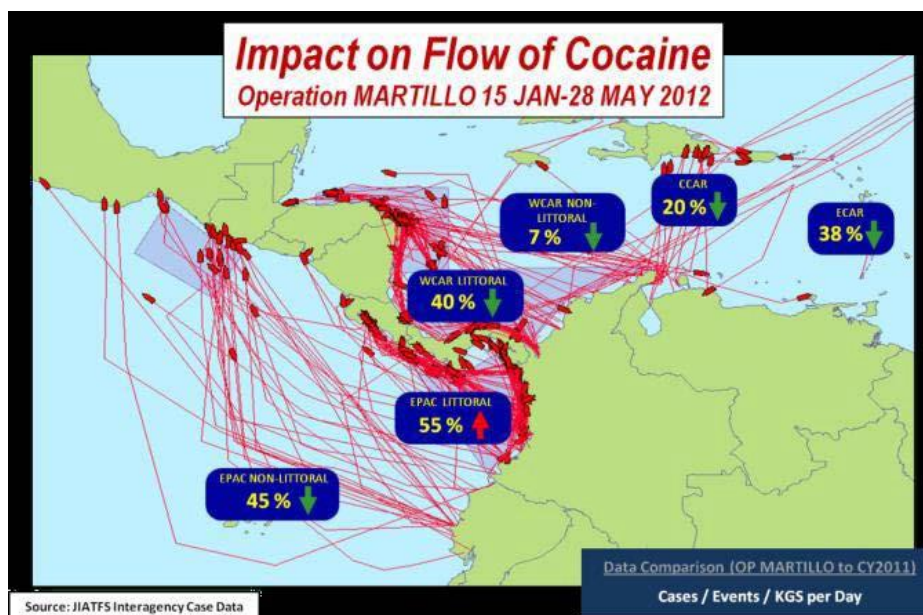
To counter this shift in flow and to alleviate pressure on Central American countries, Operation MARTILLO began in earnest on 15 January 2012. It is one component of a U.S. whole-of-government approach to counter the spread of Transnational Organized Crime (TOC) in Central America. By demonstrating a consistent presence in the littorals of Central America, the United States, and our international partners seek to force TOC networks to move their transshipment routes to deeper waters in the Pacific and Caribbean. Operation MARTILLO demonstrates a clear commitment on the part of Western Hemisphere nations and other allies to work together to combat the spread of TCOs, and to protect their citizens from the violence, harm and exploitation wrought by TCO networks. Operation MARTILLO created a framework whereby complementary operations by partner nations and other U. S. government agencies could increase the effectiveness and synergy against TCOs in a difficult budget and operating environment.

Since 15 January, JIATF-South has documented significant decreases in the flow of illicit drugs in the Central American corridor (see graphic above). Compared to the same period in 2011, the JIATF South documented flow of illicit drugs in the Central American corridor dropped by 46 metric tons. While cocaine flow is down in most of the region, we did note a significant increase in activity in the Eastern Pacific littorals which we attribute to increased awareness of tracks brought by enhanced focus of our interagency and international partners in the region¹⁹. Our law enforcement partners are expending great effort to provide actionable information to support the operation. This translates to a significantly increased awareness of the movement of cocaine over previous years.

¹⁷ Interagency CCDB.

¹⁸ 2010 Interagency Assessment of Cocaine Movement.

¹⁹ JIATF-South analysis of CCDB and JIATF-South case analysis.



The overall significant decrease in movement indicates an impact on the traffickers caused by the presence of U.S. ships and aircraft, the efforts of our law enforcement partners and those of our allies and partner nations in the region. Further illustrating the commitment of our hemispheric partners, I note that partner nations have participated in 83 percent of disrupted events, acting as a force multiplier and playing an enormous role in the success of the operation. Though we have not yet seen the traffickers shift to another region in the Joint Operating Area, we assess that a continued persistent presence over time will force them to change their tactics and we are prepared to respond to that shift when the time comes.

Closing

Our target set spans the full spectrum of national and international security, presenting a formidable transnational challenge for U.S. and allied nations. We fight a highly mobile, disciplined, and well-funded adversary that threatens democratic governments, terrorizes populations, impedes economic development, and creates regional instability. The mission to counter transnational organized crime and illicit trafficking cannot be viewed in isolation from our efforts to combat terrorism, because the patterns, tactics, and techniques employed by traffickers are the same as the methodologies used by anyone wanting to move illicit people or cargo - including terrorists.

Our operational successes indicate an increasing level of trafficker sophistication and innovation as they rapidly employ readily available cutting edge technologies, change their tactics, and shift seamlessly between modes of communication and methods of conveyance. Our success is dependent upon our collective capability to be more innovative, more adaptive, and more agile than our adversaries. Currently, we are unable to target 74 percent of high confidence events. Of the 26 percent that we are able to target the principle impediment to successful detection and monitoring is the lack of the necessary sensors to generate persistent wide area surveillance and

precision geolocation. In spite of our challenges, we continue to be successful for two primary reasons. First, JIATF-South is a dynamic and evolutionary organization, one continuously adapting itself to evolving target sets. Second, the national and international unity of effort found within our command spans geographical and functional boundaries, bringing with it operational efficiencies and critical capabilities.

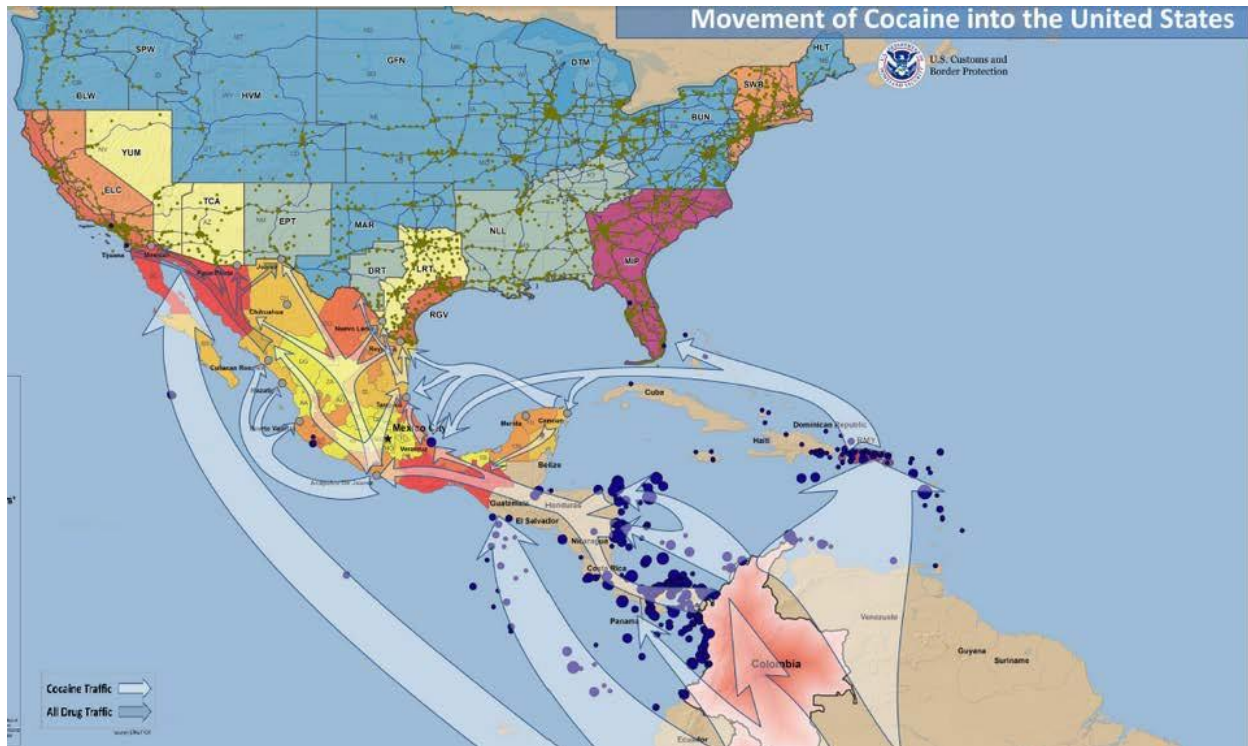
I close by once again thanking the Congress for its steadfast support of our men and women in uniform, who work every day to keep our nation safe and I look forward to our continued collaboration to counter transnational organized crime and the illicit traffic that supports it.

APPENDIX B: MAP OF AREA WHERE NARCO SUBMARINES ARE BUILT IN COLOMBIA



<http://www.insightcrime.org/news-analysis/war-for-cocaine-corridors-consumes-colombias-busiest-port>

APPENDIX C: MAP OF MOVEMENT OF COCAINE INTO THE U.S.



<http://docs.house.gov/meetings/HM/HM11/20130226/100300/HHRG-113-HM11-Wstate-LeeW-20130226.pdf>

NOTES

Editors' Note

1. *UNODC World Drug Report 2010*. New York: United Nations.
2. WRITTEN STATEMENT OF REAR ADMIRAL CHARLES MICHEL DIRECTOR JOINT INTERAGENCY TASK FORCE SOUTH (JIATF-SOUTH) BEFORE THE SUBCOMMITTEE ON BORDER AND MARITIME SECURITY HOUSE COMMITTEE ON HOMELAND SECURITY HEARING ON BORDER SECURITY THREATS TO THE HOMELAND: DHS'S RESPONSE TO INNOVATIVE TACTICS AND TECHNIQUES 19 JUNE 2012,
<http://homeland.house.gov/sites/homeland.house.gov/files/Testimony-Michel.pdf>.
3. *Inside Cocaine Wars: Narco Sub Mystery*. <http://www.youtube.com/watch?v=aO3hikt5H3k>. 1 Season 2013. Run time: 45:57 minutes. Original air date: April 7, 2013. National Geographic Channel. DEA estimate mentioned about 39:50 minutes into the video.
4. Claudette Roulo, Budget shortfalls reversing SOUTHCOM gains, commander says. United States Southern Command. March 12, 2014,
<http://www.southcom.mil/newsroom/Pages/Budget-shortfalls-reversing-SOUTHCOM-gains,-commander-says.aspx>.

Introduction

1. Curt Anderson, ICE dive unit in Miami targets drug smuggler ships. *The Washington Post*. February 28, 2011,
<http://www.washingtonpost.com/wp-yn/content/article/2011/02/28/AR2011022801199.html>.
2. Huge cocaine haul found beneath ship moored off Scottish coast. *BBC News*. May 15, 2014,
<http://www.bbc.com/news/uk-scotland-glasgow-west-27420947>.
3. Henry Samuel, 'Narco-torpedoes' and frogmen: drug smuggling ring busted in Rotterdam. *The Telegraph*. April 26, 2013,
<http://www.telegraph.co.uk/news/worldnews/europe/netherlands/10021140/Narco-torpedoes-and-frogmen-drug-smuggling-ring-busted-in-Rotterdam.html>.
4. *Narco submarines - narco submarinos*. http://www.vice.com/es_mx/motherboard/colombian-narcosubs. Run time: 27:41 minutes. Original air date: November 5, 2011. Motherboard. (En español; English subtitles). Information provided at 2:48 minutes into the video.
5. Carlos Andrés Barahona, Colombia: Government dismantles narco-submarine networks. *infosur hoy*. September 15, 2011,
http://infosurhoy.com/en_GB/articles/saii/features/main/2011/09/15/feature-01.

6. Colombia seizes FARC narco-submarine. *infosur hoy*. September 26, 2011, http://infosurhoy.com/en_GB/articles/saii/newsbriefs/2011/09/26/newsbrief-04?source=related.
7. *Inside Cocaine Wars: Narco Sub Mystery*. <http://www.youtube.com/watch?v=aO3hikt5H3k>. 1 Season 2013. Run time: 45:57 minutes. Original air date: April 7, 2013. National Geographic Channel. Information provided at 3:45 minutes into the video.
8. WRITTEN STATEMENT OF REAR ADMIRAL CHARLES MICHEL DIRECTOR JOINT INTERAGENCY TASK FORCE SOUTH (JIATF-SOUTH) BEFORE THE SUBCOMMITTEE ON BORDER AND MARITIME SECURITY HOUSE COMMITTEE ON HOMELAND SECURITY HEARING ON BORDER SECURITY THREATS TO THE HOMELAND: DHS'S RESPONSE TO INNOVATIVE TACTICS AND TECHNIQUES 19 JUNE 2012, <http://homeland.house.gov/sites/homeland.house.gov/files/Testimony-Michel.pdf>.
9. James Bargent, War for Cocaine Corridors Consumes Colombia's Busiest Port. *insightcrime.org*. February 14, 2014, <http://www.insightcrime.org/news-analysis/war-for-cocaine-corridors-consumes-colombias-busiest-port>.
10. Prensa Digital Notic Voz El Cajigalence, Incautan a las FARC un narco submarino. *Globedia*. September 25, 2011, <http://ve.globedia.com/incautan-farc-narco-submarino>.
11. See Nils Elzenga, Latin American Drug Traffickers May Use Submarines To Move Drugs Across The Atlantic. Associated Press. *The Huntington Post*. June 20, 2011, http://www.huffingtonpost.com/2011/06/20/latin-american-cocaine-traffickers-submarines-atlantic-_n_880861.html.
12. Narco subs someday making the journey to Europe is a major theme in *Narco submarines - narco submarinos*. http://www.vice.com/es_mx/motherboard/colombian-narcosubs. Run time: 27:41 minutes. Original air date: November 5, 2011. Motherboard. (En español; English subtitles).
13. La red del "narcosubmarino" de Vigo preparaba otro alijo de 6.000 kilos de coca. *Faro de Vigo*. March 13, 2008, <http://www.farodevigo.es/sucesos/2008/03/13/red-narcosubmarino-vigo-preparaba-alijo-6000-kilos-coca/207700.html>.
14. La red del narcosubmarino abandonado en la ría de Vigo se enfrenta a 121 años de cárcel. *Faro de Vigo*. January 11, 2011, <http://www.farodevigo.es/sucesos/2011/01/11/red-narcosubmarino-abandonado-ria-vigo-enfrenta-121-anos-carcel/507645.html>.

Section 3

1. Jim Popkin, "Authorities in Awe of Drug Runners" Jungle-Built, Kevlar-Coated Super-Subs." *Wired Magazine*. March 29, 2011, http://www.wired.com/magazine/2011/03/ff_drugsub/all/.
2. Top Documentary Films staff, "Cocaine Submarines." *Top Documentary Films.com*. 2010, <http://topdocumentaryfilms.com/cocaine-submarines/>.
3. Documentary.net staff, "Colombia's Coke-Smuggling Submarines." *The Documentary Network*. July 11, 2013, <http://documentary.net/colombias-coke-smuggling-submarines/>.
4. Vice staff, "Colombian Narcosubs." *Vice.com*. February 15, 2011, <http://www.vice.com/motherboard/colombian-narcosubs>.
5. Christopher Lagan, "Drug Subs 2.0." *Coast Guard Compass*. July 13, 2010, <http://coastguard.dodlive.mil/2010/07/drug-subs-2-0/>.
6. RT staff, "Feds Helpless in Fight with Drug Cartel Submarines." *RT.com*. September 11, 2012, <http://rt.com/usa/drug-us-submarines-guard-900/>.
7. National Geographic Channel staff, "Inside: Cocaine Submarines." *Natgeotv.com*. 2012, <http://natgeotv.com/ca/inside-cocaine-submarines>.
8. Jake Hanrahan, "Narco-Submarines of the Colombian Jungle." *Sabotagetimes.com*. May 23, 2012, <http://sabotagetimes.com/life/narco-submarines-of-the-colombian-jungle/>.
9. National Geographic Channel staff, "Cocaine Sub Hunt." *Natgeotv.com*. June 28, 2011, <http://www.youtube.com/watch?v=QLauqH1EeII>.
10. Sibylla Brodzinsky, "Secret of the Swamps: Colombia's Cocaine Submarines." *The Guardian*. June 21, 2009, <http://www.theguardian.com/world/2009/jun/21/colombia-swamps-submarines-drugs-cocaine>.
11. Email correspondence provided by Captain Mark F. Morris, USN, on March 7, 2014.

Section 4

1. Jim Popkin, "Authorities in Awe of Drug Runners" Jungle-Built, Kevlar-Coated Super-Subs." *Wired Magazine*. March 29, 2011, http://www.wired.com/magazine/2011/03/ff_drugsub/all/.
2. Top Documentary Films staff, "Cocaine Submarines." *Top Documentary Films.com*. 2010, <http://topdocumentaryfilms.com/cocaine-submarines/>.

3. Documentary.net staff, "Colombia's Coke-Smuggling Submarines." *The Documentary Network*. July 11, 2013, <http://documentary.net/colombias-coke-smuggling-submarines/>.
4. Tobias Käufer, "Colombia's Drug Submarines Becoming Vehicle of Choice for Cartels." *Huffington Post*. July 20, 2011, http://www.huffingtonpost.com/2011/07/20/colombia-drug-submarines-_n_904780.html.
5. Vice staff, "Colombian Narcosubs." *Vice.com*. February 15, 2011, <http://www.vice.com/motherboard/colombian-narcosubs>.
6. John Otis, "Drug Traffickers Move Underwater." *Global Post*. April 15, 2009, <http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>.
7. Christopher Lagan, "Drug Subs 2.0." *Coast Guard Compass*. July 13, 2010, <http://coastguard.dodlive.mil/2010/07/drug-subs-2-0/>.
8. Chris Kraul, "Ecuador Police Seize 100-Foot Narco-Submarine Being Built Secretly." *Los Angeles Times*. July 6, 2010, <http://articles.latimes.com/2010/jul/06/world/la-fg-ecuador-narco-sub-20100706>.
9. RT staff, "Feds Helpless in Fight with Drug Cartel Submarines." *RT.com*. September 11, 2012, <http://rt.com/usa/drug-us-submarines-guard-900/>.
10. National Geographic Channel staff, "Inside: Cocaine Submarines." *Natgeotv.com*. 2012, <http://natgeotv.com/ca/inside-cocaine-submarines>.
11. Dane Schiller, "'Narco Subs' Of Cartels Sink To New Lows in Trafficking." *Houston Chronicle*. June 26, 2010, <http://www.chron.com/news/nation-world/article/Narco-subs-of-cartels-sink-to-new-lows-in-1707377.php>.
12. National Geographic Channel staff, "Cocaine Sub Hunt." *Natgeotv.com*. June 28, 2011, <http://www.youtube.com/watch?v=QLauqH1EeII>.
13. Sibylla Brodzinsky, "Secret of the Swamps: Colombia's Cocaine Submarines." *The Guardian*. June 21, 2009, <http://www.theguardian.com/world/2009/jun/21/colombia-swamps-submarines-drugs-cocaine>.
14. Jim Popkin, "The High Seas." *Slate Magazine*. October 8, 2013, http://www.slate.com/articles/news_and_politics/foreigners/2013/10/mauner_mahecha_s_drug_submarines_inside_a_high_tech_south_american_narco.html.

15. Michael S. Schmidt and Thom Shanker, "To Smuggle More Drugs, Traffickers Go Under the Sea." *The New York Times*. September 9, 2012
http://www.nytimes.com/2012/09/10/world/americas/drug-smugglers-pose-underwater-challenge-in-caribbean.html?_r=1&.
16. Email correspondence provided by Captain Mark F. Morris, USN, on March 7, 2014.

Section 5

1. Dolnik, A. (2007). *Understanding Terrorist Innovation: Technology, tactics and global trends*. New York: Routledge.
2. Fleck, J. (1994). Learning by trying: the implementation of configurational technology. *Research Policy*, 23(6), 637-652.
3. Kraul, C. (2007). Colombian drug cartels take underwater route Retrieved November 15, 2011, from <http://articles.latimes.com/2007/nov/06/world/fg-narcosub6>.
4. Lagan, C. (2010). Drug Subs 2.0 Retrieved December 1, 2011, from <http://coastguard.dodlive.mil/2010/07/drug-subs-2-0/>.
5. MacKenzie, D., & Wajcman, J. (1999). Introductory Essay: The Social Shaping of Technology. In D. MacKenzie & J. Wajcman (Eds.), *The Social Shaping of Technology* (pp. 3-27). Buckingham: Open University Press.
6. Mackey, R. (2010). Advances in 'Narco-Submarine' Technology Retrieved November 15, 2011, from <http://thelede.blogs.nytimes.com/2010/07/06/advances-in-narco-submarine-technology/>.
7. Observatorio de Drogas de Colombia. (2010). Observatorio de Drogas de Colombia, acciones y resultados, 2009. Bogotá D.C.: Observatorio de Drogas de Colombia.
8. Pollock, N., & Williams, R. (2008). *Software and Organisations The biography of the enterprise-wide system or how SAP conquered the world* London and New York: Routledge.
9. Rip, A., & Kemp, R. (1998). Technological Change. In S. Rayner & E. L. Malone (Eds.), *Human Choice and Climate Change* (Vol. Vol. II, Resources and Technology, pp. 327-399). Columbus, Ohio: Battelle Press.
10. Rodriguez Viera, M. G. (2013). *Estrategia contra el tráfico ilícito en artefactos sumergibles y semisumergibles*. (Maestria), Funiber, Bogotá, D.C.
11. Watkins, L. J. (2011). *Self-Propelled Semi-Submersibles: The Next Great Threat to Regional Security and Stability*. (Master of Arts in Security Studies), Naval Postgraduate School, Monterrey, CA.

12. Williams, R. (1997). Universal solutions or local contingencies? Tensions and contradictions in the mutual shaping of technology and work organization. In I. McLoughlin & M. Harris (Eds.), *Innovation, Organizational Change and Technology* (pp. 170-185). London, UK; Boston, USA: International Thomson Business Press.

REFERENCES

Essays

1. 100-ft-long drug-smuggling, Narco-crafted submarine discovered in Colombia.
<http://boingboing.net/2011/02/14/100-ft-long-drug-smu.html>.
2. Authorities in Awe of Drug Runners' Jungle-Built, Kevlar-Coated Super-Subs By Jim Popkin at *Wired Magazine*.
http://www.wired.com/magazine/2011/03/ff_drugsub/all/.
3. Ayer Médico, Hoy Narco: El Mexicano Que Quiso Ser Pablo Escobar. By Miguel Angel Montoya. Editorial Oveja Negra, 2007.
4. Bring Back the Coast Guard ASW Mission.
<http://chuckhillscgblog.net/tag/narco-sub/>.
5. Carlos Andrés Barahona, Colombia: Government dismantles narco-submarine networks. *infosur hoy*. September 15, 2011,
http://infosurhoy.com/en_GB/articles/saii/features/main/2011/09/15/feature-01.
6. Claudette Roulo, Budget shortfalls reversing SOUTHCOM gains, commander says. *United States Southern Command*. March 12, 2014,
<http://www.southcom.mil/newsroom/Pages/Budget-shortfalls-reversing-SOUTHCOM-gains,-commander-says.aspx>.
7. Cocaine Smuggling Runs Silent, Deep by Eliza Ronalds-Hannon.
<https://reportingproject.net/occrp/index.php/en/ccwatch/cc-watch-indepth/1726-submarines-take-cocaine-smuggling-deeper-undercover>.
8. Cocaine Submarine Pictures: New Seizure Shows Advances.
http://news.nationalgeographic.com/news/2010/07/photogalleries/100713-cocaine-submarines-subs-smuggling-drugs-world-crime-pictures/#/cocaine-sub-seized-captains-wheel_23282_600x450.jpg.
9. Colombia seizes FARC narco-submarine. *infosur hoy*. September 26, 2011,
http://infosurhoy.com/en_GB/articles/saii/newsbriefs/2011/09/26/newsbrief-04?source=related.
10. Colombia's Drug Submarines Becoming Vehicle of Choice for Cartels by Tobias Käufer for *Huffington Post*.
http://www.huffingtonpost.com/2011/07/20/colombia-drug-submarines-_n_904780.html.
11. Colombian Narco-Subs by *Vice Staff*.
<http://www.vice.com/motherboard/colombian-narcosubs>.
12. Curt Anderson, ICE dive unit in Miami targets drug smuggler ships. *The Washington Post*. February 28, 2011,
<http://www.washingtonpost.com/wp-yn/content/article/2011/02/28/AR2011022801199.html>.
13. Dolnik, A. (2007). *Understanding Terrorist Innovation: Technology, tactics and global trends*. New York: Routledge.
14. Drug Smuggler Semi-Submersible Seized.
http://www.strategypage.com/military_photos/military_photos_20080916233911.aspx.
15. Drug submarine seized in Colombia.
<http://www.rte.ie/news/special-reports/2012/0530/322993-drug-submarine-seized-in-colombia/>.

16. Drug Subs 2.0 by Christopher Lagan at *Coast Guard Compass*.
<http://coastguard.dodlive.mil/2010/07/drug-subs-2-0/>.
17. Drug Traffickers Move Underwater by John Otis for *Globalpost*.
<http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater>.
18. Ecuador Police Seize 100-Foot Narco-Submarine Being Built Secretly by Chris Kraul at *Los Angeles Times*.
<http://articles.latimes.com/2010/jul/06/world/la-fg-ecuador-narco-sub-20100706>.
19. Ecuador: Security forces seize narco-submarine by Ezra Fieser for *Infosurhoy.com*.
http://infosurhoy.com/en_GB/articles/saii/features/main/2013/10/23/feature-02.
20. Feds Helpless In Fight with Drug Cartel Submarines.
<http://rt.com/usa/drug-us-submarines-guard-900/>.
21. Fleck, J. (1994). Learning by trying: the implementation of configurational technology. *Research Policy*, 23(6), 637-652.
22. Henry Samuel, 'Narco-torpedoes' and frogmen: drug smuggling ring busted in Rotterdam. *The Telegraph*. April 26, 2013,
<http://www.telegraph.co.uk/news/worldnews/europe/netherlands/10021140/Narco-torpedoes-and-frogmen-drug-smuggling-ring-busted-in-Rotterdam.html>.
23. Huge cocaine haul found beneath ship moored off Scottish coast. *BBC News*. May 15, 2014,
<http://www.bbc.com/news/uk-scotland-glasgow-west-27420947>.
24. Inside Cocaine-Smuggling Submarines.
<http://acidcow.com/pics/18622-inside-cocaine-smuggling-submarines-12-pics.html>.
25. Inside Seized Drug-Smuggling Submarines by *CNN*.
http://content.time.com/time/photogallery/0,29307,2061931_2260134,00.html.
26. Inside: Cocaine Submarines.
<http://natgeotv.com/ca/inside-cocaine-submarines>.
27. James Bargent, War for Cocaine Corridors Consumes Colombia's Busiest Port. *insightcrime.org*. February 14, 2014,
<http://www.insightcrime.org/news-analysis/war-for-cocaine-corridors-consumes-colombias-busiest-port>.
28. Kraul, C. (2007). Colombian drug cartels take underwater route Retrieved November 15, 2011, from
<http://articles.latimes.com/2007/nov/06/world/fg-narcosub6>.
29. La red del "narcosubmarino" de Vigo preparaba otro alijo de 6.000 kilos de coca. *Faro de Vigo*. March 13, 2008,
<http://www.farodevigo.es/sucesos/2008/03/13/red-narcosubmarino-vigo-preparaba-alijo-6000-kilos-coca/207700.html>.
30. La red del narcosubmarino abandonado en la ría de Vigo se enfrenta a 121 años de cárcel. *Faro de Vigo*. January 11, 2011,
<http://www.farodevigo.es/sucesos/2011/01/11/red-narcosubmarino-abandonado-ria-vigo-enfrenta-121-anos-carcel/507645.html>.
31. Lagan, C. (2010). Drug Subs 2.0 Retrieved December 1, 2011, from
32. Los 'narcosubmarinos', un dolor de cabeza en la lucha contra las drogas de EEUU.
http://www.elmundo.es/america/2012/04/19/estados_unidos/1334866342.html.
33. MacKenzie, D., & Wajcman, J. (1999). Introductory Essay: The Social Shaping of Technology. In D. MacKenzie & J. Wajcman (Eds.), *The Social Shaping of Technology* (pp. 3-27). Buckingham: Open University Press.

34. Mackey, R. (2010). Advances in 'Narco-Submarine' Technology Retrieved November 15, 2011, from <http://thelede.blogs.nytimes.com/2010/07/06/advances-in-narco-submarine-technology/>
35. Narco submarines, torpedoes and semi-submersibles.
<http://covertshores.blogspot.com/2010/06/narco-submarines-torpedoes-and-semi.html?spref=tw&m=1>.
36. 'Narco subs' of cartels sink to new lows in trafficking by Dane Schiller.
<http://www.chron.com/news/nation-world/article/Narco-subs-of-cartels-sink-to-new-lows-in-1707377.php>.
37. Narco-Submarines of the Colombian Jungle by Jake Hanrahan for *Sabotage Times*.
<http://sabotagetimes.com/life/narco-submarines-of-the-colombian-jungle/>.
38. NPS OR Team Optimizes Defense Against Narco Semi-Subs. By *Naval Postgraduate School Public Affairs Office*; Honegger, Barbara.
https://calhoun.nps.edu/public/bitstream/handle/10945/33018/Naval_Postgraduate_School_-_NPS_OR_Team_Optimizes_Defense_Against_Narco_Semi-Subs.pdf?sequence=1.
39. Observatorio de Drogas de Colombia. (2010). Observatorio de Drogas de Colombia, acciones y resultados, 2009. Bogotá D.C.: Observatorio de Drogas de Colombia.
40. Pollock, N., & Williams, R. (2008). *Software and Organisations The biography of the enterprise-wide system or how SAP conquered the world* London and New York: Routledge.
41. Prensa Digital Notic Voz El Cajigalence, Incautan a las FARC un narco submarino.
Globedia. September 25, 2011,
<http://ve.globedia.com/incautan-farc-narco-submarino>.
42. Repunta el uso de narcosubmarinos sofisticados: *NYT*.
<http://www.excelsior.com.mx/2012/09/10/nacional/858218>.
43. Rip, A., & Kemp, R. (1998). Technological Change. In S. Rayner & E. L. Malone (Eds.), *Human Choice and Climate Change* (Vol. Vol. II, Resources and Technology, pp. 327-399). Columbus, Ohio: Battelle Press.
44. Rodriguez Viera, M. G. (2013). *Estrategia contra el tráfico ilícito en artefactos sumergibles y semisumergibles*. (Maestria), Funiber, Bogotá, D.C.
45. Secret of the Swamps: Colombia's Cocaine Submarines by Sibylla Brodzinsky at *The Guardian*.
<http://www.theguardian.com/world/2009/jun/21/colombia-swamps-submarines-drugs-cocaine>.
46. See Nils Elzenga, Latin American Drug Traffickers May Use Submarines To Move Drugs Across The Atlantic. Associated Press. *The Huntington Post*. June 20, 2011,
http://www.huffingtonpost.com/2011/06/20/latin-american-cocaine-traffickers-submarines-atlantic-_n_880861.html.
47. Self-Propelled Semi-Submersibles: The Next Great Threat to Regional Security And Stability. By Lance J. Watkins.
http://edocs.nps.edu/npspubs/scholarly/theses/2011/June/11Jun_Watkins.pdf.
48. Submersibles and Transnational Criminal Organizations. By Brian Wilson.
https://www.maineaw.maine.edu/academics/oelj/pdf/vol17_1/vol17_oelj_35.pdf.
49. Subs That Move Drugs by Jim Wyss at the *Miami Herald*.
<http://www.ryot.org/drug-traffickers-using-submarines-to-move-product/32166>.
50. The Cocaine Wars: Invasion of the Drug Submarines by John Otis / Bahia Malaga.
<http://content.time.com/time/world/article/0,8599,2061934,00.html>.

51. The High Seas by Jim Popkin for *Slate Magazine*.
http://www.slate.com/articles/news_and_politics/foreigners/2013/10/mauner_mahecha_s_drug_submarines_inside_a_high_tech_south_american_narco.html.
52. The Submarine in the Andes: Rise of a Non-State Navy? By Tyler K. Moore,
<http://calhoun.nps.edu/public/bitstream/handle/10945/25625/NPS-SO-01-01.pdf?sequence=1>.
53. To Smuggle More Drugs, Traffickers Go Under the Sea by Michael S. Schmidt and Thom Shanker for *The New York Times*.
http://www.nytimes.com/2012/09/10/world/americas/drug-smugglers-pose-underwater-challenge-in-caribbean.html?_r=1&.
54. Two new narco subs found in Colombia by *CNN*.
<http://news.blogs.cnn.com/2011/09/27/two-new-narco-subs-found-in-colombia/>.
55. *UNODC World Drug Report 2010*. New York: United Nations.
56. Watkins, L. J. (2011). *Self-Propelled Semi-Submersibles: The Next Great Threat to Regional Security and Stability*. (Master of Arts in Security Studies), Naval Postgraduate School, Monterey, CA.
57. Williams, R. (1997). Universal solutions or local contingencies? Tensions and contradictions in the mutual shaping of technology and work organization. In I. McLoughlin & M. Harris (Eds.), *Innovation, Organizational Change and Technology* (pp. 170-185). London, UK; Boston, USA: International Thomson Business Press.
58. WRITTEN STATEMENT OF REAR ADMIRAL CHARLES MICHEL DIRECTOR JOINT INTERAGENCY TASK FORCE SOUTH (JIATF-SOUTH) BEFORE THE SUBCOMMITTEE ON BORDER AND MARITIME SECURITY HOUSE COMMITTEE ON HOMELAND SECURITY HEARING ON BORDER SECURITY THREATS TO THE HOMELAND: DHS'S RESPONSE TO INNOVATIVE TACTICS AND TECHNIQUES 19 JUNE 2012,
<http://homeland.house.gov/sites/homeland.house.gov/files/Testimony-Michel.pdf>.

Videos

59. *Cocaine Sub Hunt*. <http://www.youtube.com/watch?v=QLauqH1EeII>. Run time: 50:00 minutes. Original air date: June 28, 2011. *National Geographic Channel*.
60. *Cocaine Submarines*. <http://topdocumentaryfilms.com/cocaine-submarines/>.
61. *Colombia's Coke-Smuggling Submarines*.
<http://documentary.net/colombias-coke-smuggling-submarines/>.
62. *Go Inside a Drug Submarine With the Narco Sub Godfather*. Run time: 27:42 minutes. Original air date: July 4, 2010. *Motherboard*. <http://motherboard.vice.com/read/high-tech-narco-sub-seized-in-ecuador-go-inside-one-video>.
63. *Inside Cocaine Wars: Narco Sub Mystery*. <http://www.youtube.com/watch?v=aO3hikt5H3k>. 1 Season 2013. Run time: 45 minutes. Original air date: April 7, 2013. *National Geographic Channel*.
64. *Narco submarines - narco submarinos*. http://www.vice.com/es_mx/motherboard/colombian-narcosubs. Run time: 27:41 minutes. Original air date: November 5, 2011. *Motherboard*. Same video as above. (En español; English subtitles)

65. *Narco Submarinos, Parte 1*. <http://www.youtube.com/watch?v=E3qLp5QVOSU>. Run time: 14:26. Original air date: October 4, 2011. *Discovery Channel en Español*. (En español).
66. *Narco Submarinos, Parte 2*. http://www.youtube.com/watch?v=hliGV_wHjXE. Run time: 19:41. Original air date: October 4, 2011. *Discovery Channel en Español*. (En español).

CONTRIBUTORS

Dr. Robert J. Bunker is Distinguished Visiting Professor and Minerva Chair at the Strategic Studies Institute, U.S. Army War College. He is also adjunct faculty, Division of Politics and Economics (DPE), Claremont Graduate University and a senior fellow with *SWJ—El Centro*. His many publications (over 200) include books, reports, articles, essays, response guidance, subject bibliographies, and encyclopedia entries in academic, policy, military, and law enforcement publications; he has also served as the editor for a number of collections of articles. Among those are (with Steve Sloan) *Red Teams and Counterterrorism Training* (Oklahoma University Press 2011) and the edited works including *Criminal Insurgencies in Mexico and the Americas: The Gangs and Cartels Wage War* (Routledge 2012); *Narcos Over the Border: Gangs, Cartels and Mercenaries* (Routledge 2011); *Criminal-States and Criminal-Soldiers* (Routledge 2008); *Networks, Terrorism and Global Insurgencies* (Routledge 2005); and *Non-State Threats and Future Wars* (Routledge 2003).

Adam Elkus is an analyst specializing in foreign policy and security. He is a Ph.D. student at American University and holds an M.A. from Georgetown's Security Studies Program. He is Associate Editor at *Red Team Journal* and is a contributor to *Mexico's Criminal Insurgency: A Small Wars Journal-El Centro Anthology* (iUniverse 2011). He is also a frequent contributor to *Small Wars Journal* and has published in numerous venues, including *The Atlantic*, *Defense Concepts*, *CTC Sentinel*, *Infinity Journal*, and others. He is an associate at *SWJ El Centro* and blogs at *Abu Muquwama*, *CTOVision* and *Information Dissemination* on strategy, technology and international politics.

Javier Guerrero Castro is a sociologist who graduated from the National University of Colombia (Universidad Nacional) in 2009, and earned his MSc in Research in Science and Technology studies (with distinction) at the University of Edinburgh in 2012. Currently, he is a Doctoral Research Student at the Science, Technology and Innovation Studies Center, University of Edinburgh. His research focuses on the co-evolution of smuggling technologies, techniques, and countermeasures in Colombia, and the process of assessing, learning and designing strategies, as well as law enforcement agencies use of technologies to thwart smugglers.

Mark F. Morris, Captain, USN, is Associate Professor, Department of Security Studies, National War College, where he teaches strategy to future strategic leaders. He is also Course Director for the college's Latin American Studies and a guest lecturer at the Inter-American Defense College. From 2006 to 2010 he was assigned to the U.S. Embassy Bogota as the Chief of the U.S. Naval Mission to Colombia where he worked with and advised the Colombian Navy, Marine Corps, and Coast Guard in their Counter-Narcotics and Counter-Insurgency efforts.

Byron Ramirez is a political economy analyst who specializes in international political and economic affairs. He is a Ph.D. Candidate in Economics and Political Science at Claremont Graduate University and holds an M.A. in Economics, a M.S. in Management, and an MBA. He is presently an intern with *SWJ—El Centro*. His areas of research include geopolitics, globalization, economic and social development, and informal economies. His most recent publication is the co-edited work *Narco Armor: Improvised Armored Fighting Vehicles in Mexico*. Fort Leavenworth, KS: U.S. Army Foreign Military Studies Office.

Dr. James G. Stavridis is currently serving as the 12th Dean of The Fletcher School of Law and Diplomacy at Tufts University, and is Chair of the Board, U.S. Naval Institute (2013-present). A retired Admiral in the U.S. Navy, he led the NATO Alliance in global operations from 2009 to 2013 as Supreme Allied Commander. He also served as Commander of U.S. Southern Command, with responsibility for all military operations in Latin America from 2006-2009. A Fletcher Ph.D., he won the Gullion prize as outstanding student and has published five books and over a hundred articles. His focus is on innovation, strategic communication and planning, and creating security through international, interagency, and public/private partnerships in this turbulent 21st century.

Hannah Stone is a writer for *Insight – Organized Crime in the Americas*, which provides research, analysis, and investigation of the criminal world throughout the region. She has also guest blogged at *The Christian Science Monitor*. Ms. Stone is a graduate of the University of Oxford (2006) and the London School of Economics (2008), and has worked for *InSight Crime* since 2011.