北京交通大学 经济管理学院

运输经济与物流评论

第三辑（Volume 3）

经济科学出版社
Economic Science Press

运输经济与物流评论

第三辑（Volume 3）

经济科学出版社

图书在版编目（CIP）数据

运输经济与物流评论．第3辑/北京交通大学经济管理学院主办．—北京：经济科学出版社，2012.9
ISBN 978－7－5141－2236－7

Ⅰ.①运… Ⅱ.①北… Ⅲ.①运输经济－文集②物流－文集 Ⅳ.①F50－53②F252－53

中国版本图书馆CIP数据核字（2012）第180798号

责任编辑：王长廷　袁　溦
责任校对：杨晓莹　苏小昭
责任印制：邱　天

运输经济与物流评论·第三辑（Volume 3）
北京交通大学经济管理学院　主办
经济科学出版社出版、发行　新华书店经销
社址：北京市海淀区阜成路甲28号　邮编：100142
总编部电话：88191217　发行部电话：88191537
网址：www.esp.com.cn
电子邮件：esp@esp.com.cn
北京密兴印刷厂印装
787×1092　16开　10.25印张　190000字
2012年9月第1版　2012年9月第1次印刷
ISBN 978－7－5141－2236－7　定价：38.00元
（图书出现印装问题，本社负责调换。电话：88191502）

刊　　名：运输经济与物流评论
顾　　问：徐寿波　荣朝和
主　　编：刘延平
执行主编：欧国立　叶　龙

主办单位：北京交通大学经济管理学院

运输经济与物流评论
第三辑　2012 年 9 月

目　录

CONTENTS

Vol. 3 September, 2012

Oil Transit Ports, The Foreland Concept Revisited

Risto Laulajainen*

(Gothenburg Business and Law School)

【Abstract】 Large transit port trade areas are identified and compared. An oil terminal close to oil fields or at logistical crossroads accessible to large tankers and redistributing local and imported crude oil to market oriented refineries is typical for Canadian maritime provinces and the Caribbean where US ecological lobbying has pushed new coastal refineries. Similar development is expected in the Asia Pacific. Refineries trimming inventories, a basic transit activity, exist everywhere. Trade areas vary greatly by port, sometimes apparently following corporate logic, which is impossible for an outsider to explain. The ARA ports and Singapore are the largest transit ports in the oil industry, specializing in product trade and splitting the globe between themselves along the Suez-Cape and Panama-Cape Horn lines.

【Key Words】 ecological lobbying; material balance; refinery; terminal; trade area

1. Introduction

This study is about the maritime connections of transit ports, ports that collect maritime cargoes, store, sort, repackage and possibly work them for higher value added. To qualify as a transit port or *plaque tournant* (Fr.), traders and manufacturers must then reship the merchandize overseas. Europe's colonial past offers many examples: Lisboa, Antwerp, Amsterdam, London, Kϕbenhavn... (Gaastra 2007: 130 – 148; Rönnbäck 2009: 113 – 116; Saraiva 2004: 195 – 198; Tommila 1962: 194 – 197). If there is no

* 里斯托·劳拉亚伊宁（Risto Laulajainen），瑞典哥德堡大学商业与法律学院教授。主要研究领域：运输地理，区域规划等。

maritime reshipment, the location qualifies only as a conventional import port, an *entrepôt*, as in the case of Venetzia and Sevilla, for example. The emphasis is thus on maritime rather than landside connections, i. e. hinterlands. A more subtle feature is whether the re-export comprises untreated or moderately repackaged merchandise and whether substantial manufacture is added. In the latter case, the identity of the consignee may matter. Assume a Chinese Taiwan appliance manufacturer sending components to the Shenshen SEZ for assembly. The product may be a larger component that is returned to China Taiwan for further treatment or a finished product that is shipped all over the world. We are more prone to accept a semi-finished component rather than a finished product under the heading of a transit port. Such finesse is likely to be avoided when the original cargo is a bulk commodity, as is the case in this study. But in each case we will insist that the handling will not exceed the boundaries of the original import port.

This difference today often implies free-trade zones with containerized general cargo and a shortage of data. Data availability makes itself felt at two levels, merchandise and ship operation. At the merchandise level, transit statistics may not exist at all. The breakdown of container flow by origin and destination, loaded and empty, is available only by company and is confidential. The scheduled ports are known but the actual calls, ship sizes, and arrival and departure times may be too sensitive for the public domain (Mandryk 2011). Our choice of bulk goods is partly a personal whim but partly dictated by available data. The specific catalyst was Stopford's (1993) VLCC tracking survey. Caribbean ports such as Bullen Bay, Cayman Brac, Cul de Sac, Hovic, Limetree Bay, St. Anna Bay, San Nicolas Bay, and Sint Eustatius could not be readily associated with major refining centers and some were plain terminals. But why in these locations and why only part cargoes? Was the practice constrained to the Caribbean only? Did it also exist in other bulk commodities, grain for example? What about the processing of crude into oil products?

Grain has been a realistic alternative because wheat and soya are transatlantic trades and milling is often done by small units in coastal cities. Transshipment from ocean-going vessels directly to a river barge is also routine and some of the merchandise must be stored at port. Binkley and Harrer (1981: 56) speculate about grain terminals in Europe for local distribution. Marsaxlokk on Malta has been seen in such a role but the lack of storage capacity tells otherwise (Sewell 1999: Appendix 1). Concentration of flour milling into larger companies and the ensuing rationalization of production work against this alternative. Vessel sizes and port visits are adapted to cargo sizes (Table 1).

Table 1 **Typical agri itineraries, 1990s**

Dwt	Tonnes	Linerary	Load/Disch	Cargo	Year
Handysize 26 702	20 000	San Lorenzo, Arg.	1	wheat	1997
		Durban, S. Afr.	0		
		Rosario, Arg.	1	wheat	
		Salvador, Brz.	0		
		Rosario, Arg.	1	wheat	
		Corunna, Sp. Atl.	0		
		Ventspils, Latv.	1	fertilizer	
		Durban, S. Afr.	0		
		San Lorenzo, Arg.	1	wheat	
		Hamburg, Ger.	0		
Panamax 51 091	38 400	San Lorenzo, Arg.	1	wheat	1995
		Rio Grande, Brz.	1	wheat	
		Tarragona, Sp. Med.	0		
		Ravenna, It. Adr.	0		
		Venice, It. Adr.	0		
		Kalamata, Grc.	0		
		Kalamata, Grc.	0		
Capesize 110 342	83 000	Dunkirk, Fr.	1	barley	1995
		Jeddah, Arab, Red	0		
		Pananagua, Brz.	1	soya	
		Montoir, Fr. Atl.	0		
		Rosario, Arg.	1	wheat	
		Europoort, Ned.	0		
		Charleston, US	1	oil cakes	
		Brake, Ger.	0		

Note: Cargos are informed guesses.
Source: LMIU Movement Data (1995, 1997).

LMIU Movement Data (1990s), which in dry bulk goes down to 25 000 dwt (19 000 mt grain) vessels, allows additional insight. The handysize vessel loads in shallow river ports whereas the capesize vessel gravitates toward large ports. Both load and unload all cargo in one port. By contrast, the panamax vessel loads and unloads in several ports. That does not happen on every trip but often enough to qualify as typical behavior. In this particular case, the average tonnage unloaded is 7 000 mt and all the ports are in the Mediterranean. The scope for a pure turntable without country-specific import function should consequently be there.

The other type of transit port lives on price differentials, more speculative than the break-of-bulk type. It also benefits from the accumulation of trade flows because the opportunities to meet deficits by surpluses are then maximized. Important, naturally, is the fact that the flows are created by opposing or at least different forces because then their effects are maximized. The trivial case is the price difference based on specific gravity and sulfur content (*Petroleum Handbook* 1983). One uses the terms "heavy/light" and "sour/sweet." Light and sweet crudes command higher prices because light fractions give much gasoline in refining, which is more in demand than heavy fuel oil; whereas sweet crudes contain less polluting and corroding sulfur compounds. Since crudes and the fractions available by inexpensive standard technology vary regionally, as does the structure of demand, there are sustained but variable differences between regional and seasonal prices. When the price gap exceeds the freight rate gap, a trader enters the scene and brings demand and supply together. The trade flow exists as long as the gap differences support it. The flow is supported by physical reserves, in storage tanks at port or underway in tankers (Laulajainen 2009). Anomalous cargoes apparently have this origin (Figure 1).

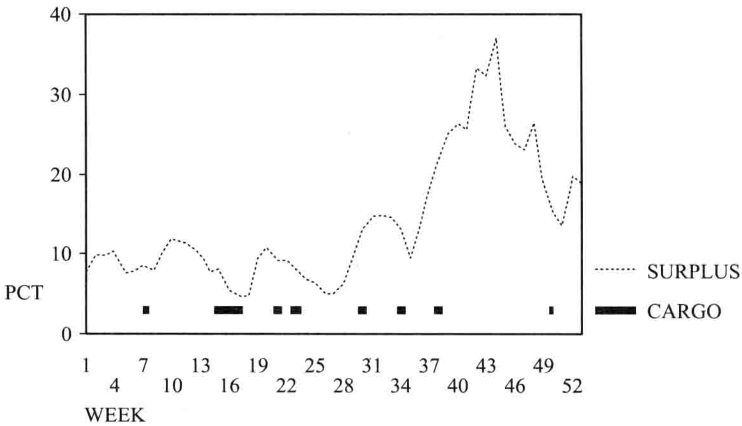

Figure 1 North Sea crude surplus cost in Singapore, 2004

Sources: LMIU Movement Data (2004); Worldscale (2004); Energy Intelligence Group, Inc. (2006).

The identification of such transit ports may be more difficult. Export terminals are obvious sources, particularly if they offer the coveted low-sulfurous light crudes. The recent civil war in Libya underlined its gatekeeper role. Interestingly, such reserves seem to accumulate along the 0 – meridian: North Sea, Libya, West Africa. Large, diversified, world-class ports are also likely to qualify because of their large supplies and information advantage (Cockett 1997: 120 – 130). Popular bunkering ports at the maritime crossroads, such as Singapore, Fujairah, Gibraltar, and Las Palmas, enjoy locational advantage and are worth considering. With more recent data and more space available, some major Asian ports would have qualified, too (Note 1). There is no shortage of port candidates. The difficulty is in finding actual traders and getting interviews. Some loose talk about confidential deals may ruin a career. This being the situation, an outsider tilts to an indirect route. In our case it means the comparison of incoming and outgoing trade flows, both crude oil and oil products. Particularly interesting are locations that have little obvious connection with either resources or markets, or both, but which nevertheless have oversized refinery or storage operations (Table 2). This third group is noteworthy in the Caribbean and the Canadian Maritime Provinces, i. e. adjacent to the huge US east coast market. Both figure strongly in the crude oil market. To get a firm grasp about the product cargoes, the world-class ports of Amsterdam, Rotterdam, and Antwerp (ARA ports) in NW Europe and Singapore in SE Asia are included. They are a blend of refinery ports and storage terminals. The two roles may matter logistically because product cargoes are sold in smaller lots and transported in smaller vessels at higher cost. This fact leads easily to the idea that product forelands are smaller than crude forelands, which need not be the case at all (Laulajainen 2009: Table 2; 2012).

Table 2　　　　Large mineral oil transit ports, 2004

Port Vessel size, dwt Intake/volume Direction	Estab.	Operation	Capacity mmt	Dirty -10 000 mmt/y Imp	 mmt/y Exp	Clean -15 000 mmt/y Exp	 pct of Imp
Maritimes							
Whiffen Head, NF	1998	terminal	9.1	8.9	11.7	n. a.	
Point Tupper, CB	1973	terminal	8.4	8.2	8.1	n. a.	
Come by Chance, NF	1973	refinery (1)	5.2	5.5	0.3	1.4	
Halifax, NS	1918	refinery (1)	4.1	2.9	0.2	0.5	
St. John, NB	1960	refinery (1)	12.4	10.5	0.0	1, 2	
Total			42.5	36	20.3	3.1	9
Caribbean							
St. Eustatius, NA	1982	terminal	n. a.	5.1	7.9	n. a.	
Bonaire, NA	1975	terminal	n. a.	5.5	5.8	n. a.	
Hovensa, BVI	1966	refinery (1)	26.1	22.0	4.6	5.8	
Aruba, NA	1928	refinery (1)	13.9	3.7	1.1	0.6	
Curaçao, NA	1918	refinery (1)	15.9	11.8	2.4	3.2	
Total			55.9	48.1	21.8	9.6	20
World-class ports							
shipping statistics		-10 000 mt					
ARA ports		refinery (10)	85.4	105.2	7.8	22.9	
Singapore		refinery (3)	65.5	86.2	18.5	23.6	
Total			150.9	191.4	26.3	46.5	24

Table to (continued)

Port Vessel size, dwt Intake/volume Direction	Estab.	Operation	Capacity mmt	Dirty -10 000 mmt/y Imp	 mmt/y Exp	Clean -15 000 mmt/y Exp	 pct of Imp
Trade statistics		-2 000 mt					
ARA ports		refinery (10)	85. 4	n. a.	n. a.	52. 3	
Singapore		refinery (3)	65. 5	n. a.	n. a.	55. 3	
Total			150. 9	n. a.	n. a.	107. 6	71

Notes: Establishment year refers to the current use. Refinery capacity refers to crude oil intake and terminal capacity to storage tank volume. Dirty cargoes are crude oil and clean cargoes are oil products. Dirty shipments are actual flows. Clean product exports by Handysizes are at calculated value (41. 5%). Clean percentages calculated from dirty imports. Parameters for converting crude intake bbl/d into mmt/y are: bbl = 0. 136 mt, yr = 365 days. Refinery loss, maximally 5%, ignored. Observe different lower boundaries for world-class shipping and trade statistics. Data delivered by Neste Oil, Finland, suggests that since LMIU Movement Data ends at 15 000 dwt (12 000 mt), the registered oil product exports in the Maritime and Caribbean segments may be only 60% of the actual volume.

Sources: Stell (2003); LMIU Movement Data (2004); China Taiwan Foreign Trade Statistics (2004); UN Comtrade (2004); Laulajainen (2011, Table 6).

The transit ports have varied histories, which are important for understanding their roles in the contemporary oil trade. Terminals and refineries in the maritimes were established for the region's own needs, be it oil products or the exploitation of the offshore Hibernia oil field, discovered in 1979 and starting production in 1997. However, the refinery at Come by Chance was closed for a short time and, when reopened in 1987, the charter explicitly excluded product sales to the Canadian market, which was considered oversupplied. Refineries in Curacao and Aruba are a legacy of the Maracaibo oil field, Venezuela. They were built on two offshore islands because ground on the mainland was too saturated by oil to offer a firm and safe construction site. The Hovensa refinery and both terminals reflected the shortage of good locations on the US mainland and growing environmental resistance to ensuing pollution. Ironically, the growing tourist industry has brought the same worries to the Caribbean islands.

2. Shipping Data

The empirical shipping data originates from 2004, the most recent year available after the tanker project was started. Thereafter it was rational to continue on the same track because the different parts support each other and the environment remains the same. The primary source is the vessel movement database of Lloyd's Marine Intelligence Unit (LMIU Movement Data 2004). Its main shortcomings in the above 60 000 dwt range are the selective coverage of domestic traffic (e. g. , from Alaska to USWC and Archangelsk to Murmansk) and the use of area identification (MEG, Far East, France, etc.) rather than port for roughly 10 percent of cargoes. In the 60 000 – 15 000 dwt range, mostly product tankers, it aggregates vessels into origin-destination pairs without differentiating between cargo and ballast legs (Note 2).

The analyst resorts to reasoning. The assumption is that ports with oil refineries originate product cargoes to non-refinery ports and are themselves destinations for returning vessels in ballast (50/50). Traffic from/to refinery ports supports such expectations to a degree. The volumes of outgoing and incoming Handysize capacities are about the same and so are their destination and origin regions. When there is a shift to a neighboring region, vessels apparently must accept ballast legs. These are more usual with ships making long rather than short trips, i. e. larger vessels. Handysize oil product shipments from/to the Maritime and Caribbean ports are a case for a modest shift. For example:

Canada-US AC	Origins (%)	Destinations (%)	Net
Maritimes	38	28	10
U. S. EC	11	15	-4
U. S. Gulf	38	46	-8
Rest	13	11	2
Total	100	100	0

The net capacity shift from south to north is obvious. Lacking suitable cargoes in the south, some vessels must ballast to the north for them. In a net sense, practically all return, some with cargo and others without. The rather theoretical split (60/40) between oil and chemical tankers is ignored. The share of multiporting out of all legs in the 60 000 + dwt segment is 17 percent. Laulajainen (2011: App. 1) gives some detailed calculation from Finland. The global share of departing product cargoes then becomes 41. 5 percent (0. 50 × 0. 83). The volumes are derived by a standard multiplier (0. 8) from known deadweight tonnages. This overall estimate, the calculated value of cargo space, is used throughout unless otherwise stated.

Exceptionally, original data are adopted at face value when solid evidence is available about the dominance of laden or ballasting vessels. Small turntable islands may be such cases, as is the shuttle traffic between Archangelsk and Murmansk. Russian exports, including former Baltic possessions, are also taken at face value because most crude production and practically all refineries are deep inland and exports normally arrive to ports by rail (Stell 2003; Byev *et al.* 2006).

The questionable quality of oil product data recommends its control at the "World –

class" ports. Unpublished statistics were available at the ARA ports (Port of XXX Authority 2004) but not in Singapore. There, United Nations Commodity Trade Statistics (UN Comtrade 2004), complemented with China Taiwan's Foreign Trade Statistics (2004), were a useful substitute. The control figures are double the LMIU data, but they also include shipments down to 2 000 mt (Table 3).

Table 3　North Atlantic oil product exports (%) by region, 2004

To/from	Maritimes			Caribbean		
	Come	Halif	S. John	Hoven	Aruba	Curaçao
Black Sea	1					
Baltic Sea	1	2				
Barents		2	1			
NW Eur	7	23	5	2	7	1
W Med	15	3		1	6	1
Can Marit	8	**46**	26	1	5	
U. S. EC	**59**	14	**51**	**58**	8	5
U. S. Gulf	5	1	5	11	**33**	8
Carib	3	6	4	21	12	**68**
S Am EC		2	1	3	3	3
California	1		8	3	19	
Mex WC					9	12
Chile						1
SE Asia				1		
Total	100	99	101	101	102	99
Mmt	1.41	0.52	1.16	5.78	0.55	3.20

Notes: EC = Eastcoast, WC = Westcoast. Shipments to Barents Sea may in reality be ballast legs. Roundings possible. See also Table 3.

Source: LMIU Movement Data (2004).

Formally, the overall outcome is naturally "faulty." That claim can be made about much economic data. Published freight quotations are not a random sample of the underlying population, still less of the rates at which the physical transportation takes place (Laulajainen 2006, 68). Estimates of the "black" economy which escapes GNP statistics vary widely and can be substantial: 30 percent for Romania, 22 percent Italy, 13 percent Germany, 10 percent Netherlands, and 7 percent U. S. A., for example (Mallet and Dinmore 2011). Still, prestigious academic research and important policy analyses rest on them. There is a need but no better way of doing it. The case is similar here. Data shortcomings are acknowledged but the need to widen geographical horizons is more important.

3. Trade Flows

3.1 North Atlantic

The North Atlantic market is dominated by the U. S. A. That reflects the size of demand and the difficulty in meeting it adequately within the American continent, North and South alike. The reserves as such may be adequate. The problem has been their disguised conservation in the North and the relative unwillingness to invest adequately for their exploitation in the South. The outcome has been large imports of crude oil and oil products, from the North Sea, MEG, and West Africa (Figure 2 ~ Figure 4). That has changed in the past 5 – 10 years, however, a change not reflected in this paper (Note 1). Since the purpose is to shed light on transit ports as a phenomenon and use the North Atlantic market only as an example, this relative non-conformity is not fatal.

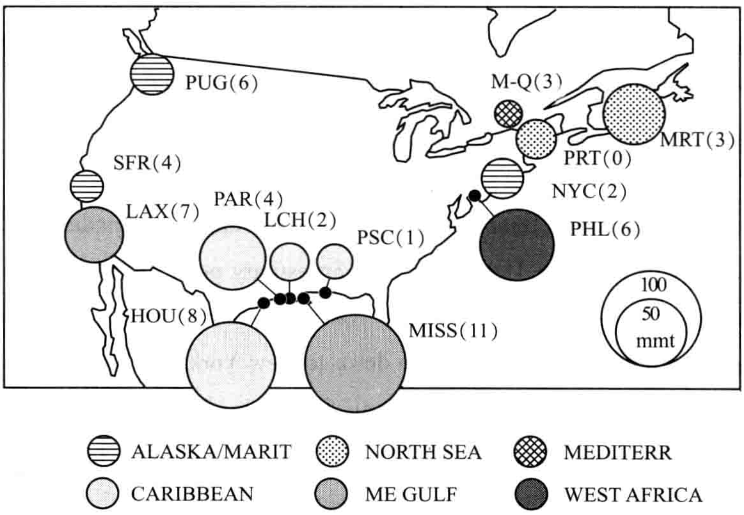

Figure 2 U. S. landings of crude oil, 2004

Legend: HOU = Houston, LAX = Los Angeles, LCH = Lake Charles, MRT = Maritime Provinces, MISS = Mississippi River to Baton Rouge, M – Q = Montreal – Québec, NYC = New York, PAR = Port Arthur, PHL = Philadelphia, PRT = Portland, PSC = Pascagoula, PUG = Puget Sound, SFR = San Francisco. Markers indicate port agglomerations with number of refineries in parentheses.

Notes: Only the dominant source is indicated. Small oil ports such as Mobile, Pascagoula, and Brownsville are not shown. It is believed that the volume shipped in vessels below the 60 000 dwt mark is insignificant. The full matrix is quite complicated and available from the author by request.

Sources: Stell (2003); LMIU Movement Data (2004).

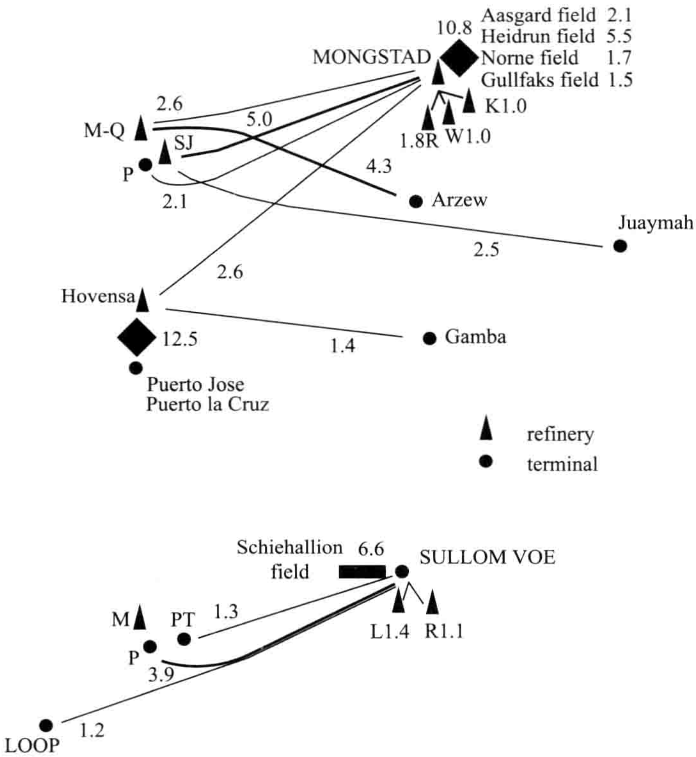

Figure 3　Trade systems centered on Mongstad / Hovensa and Sullom Voe

Legend: Minimum flow 1.0 mmt. K = Kalundborg, L = Liverpool, M = Montreal, P = Portland, PT = Point Tupper, Q = Québec, R = Rotterdam, SJ = Saint John, W = Wilhelmshaven.

Note: Shipments from Arzew and Juaymah pass entirely the Mongstad system.

Sources: Stell (2003); *World Energy Atlas* (2003); LMIU Movement Data (2004).

The major North Atlantic transit ports are either in Maritime Canada and the Caribbean on the one hand or in the large Dutch and Belgian estuary ports on the other. When emphasis is on crude oil only, the U. S. – oriented systems matter (Figure 2). North Sea, Canadian, and Alaskan ports dominate landings down to New York and San Francisco. Montreal-Québec got its foreign crude 50/50 from North Sea and Algeria. Today, crude arrives by pipeline from the Athabascan tar sand fields. Portland is displayed because Montreal was partially supplied from there by pipeline. The periodic freezing of the St. Lawrence River recommended this solution whereas Québec, closer to open ocean and with a deep channel, relied on tankers (*Fairplay Port Guide* 1998: 673, 723). Further south, supplies from West Africa, MEG, and the Caribbean dominated, in spite of the Gulf ports being more distant from MEG than New York and Maritime Provinces, for example, and shipments being mostly routed via the Cape. MEG and Indonesia, respectively, dominate Los Angeles and Hawaii.

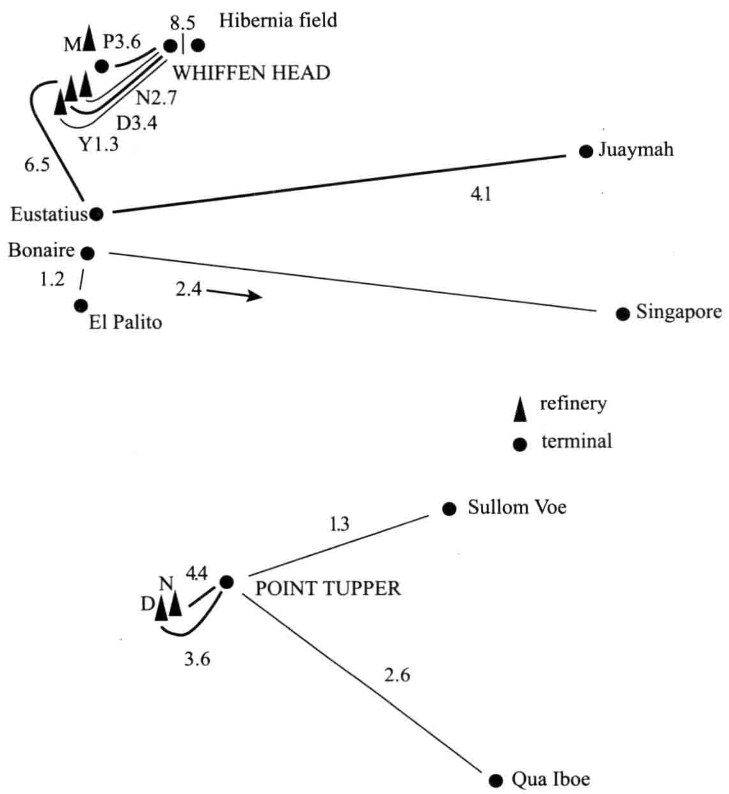

Figure 4　Trade systems centered on Whiffen Head / Bonaire and Point Tupper

Legend: Minimum flow 1.0 mmt. D = Delaware River, M = Montreal, N = New York, P = Portland, Y = Yorktown.

Note: Shipment from Bonaire to Singapore deviates from the normal pattern.

Sources: Stell (2003); World Energy Atlas (2003); LMIU Movement Data (2004).

The Canadian and Caribbean transit ports play an intermediary role between overseas imports and the U. S. Atlantic ports. This happens for two reasons. The first is the fear of having oil spills, giant spills in particular, contaminating seas and shores (Cellineri 1976). It is remarkable that the most southern refinery on the Atlantic coast is in Yorktown, fairly close to the VA/NC border, and the most eastern one on the Gulf coast is in Pascagoula, MS. There is a 1, 500 – nm-long coastal strip between them without a single refinery, in a country which has been "on wheels" for the past 90 years. It is no wonder then that ports such as Wilmington, NC, Savannah, Jacksonville, and Port Everglades import massive volumes of oil products. The other reason is that ocean tonnage, from West Africa but particularly MEG, has too large a draught for the U. S. eastcoast ports (Mokia and Dinwoodie 2002). Shallow draught and spill hazard also plague the U. S. Gulf. Extensive lightering, offshore terminals, and detailed route planning are the solution, visible in the accumulation of VLCC dischargings at LOOP (Louisiana Offshore Oil Port), in the Mississippi outer