

# The Panama Canal Expansion Program

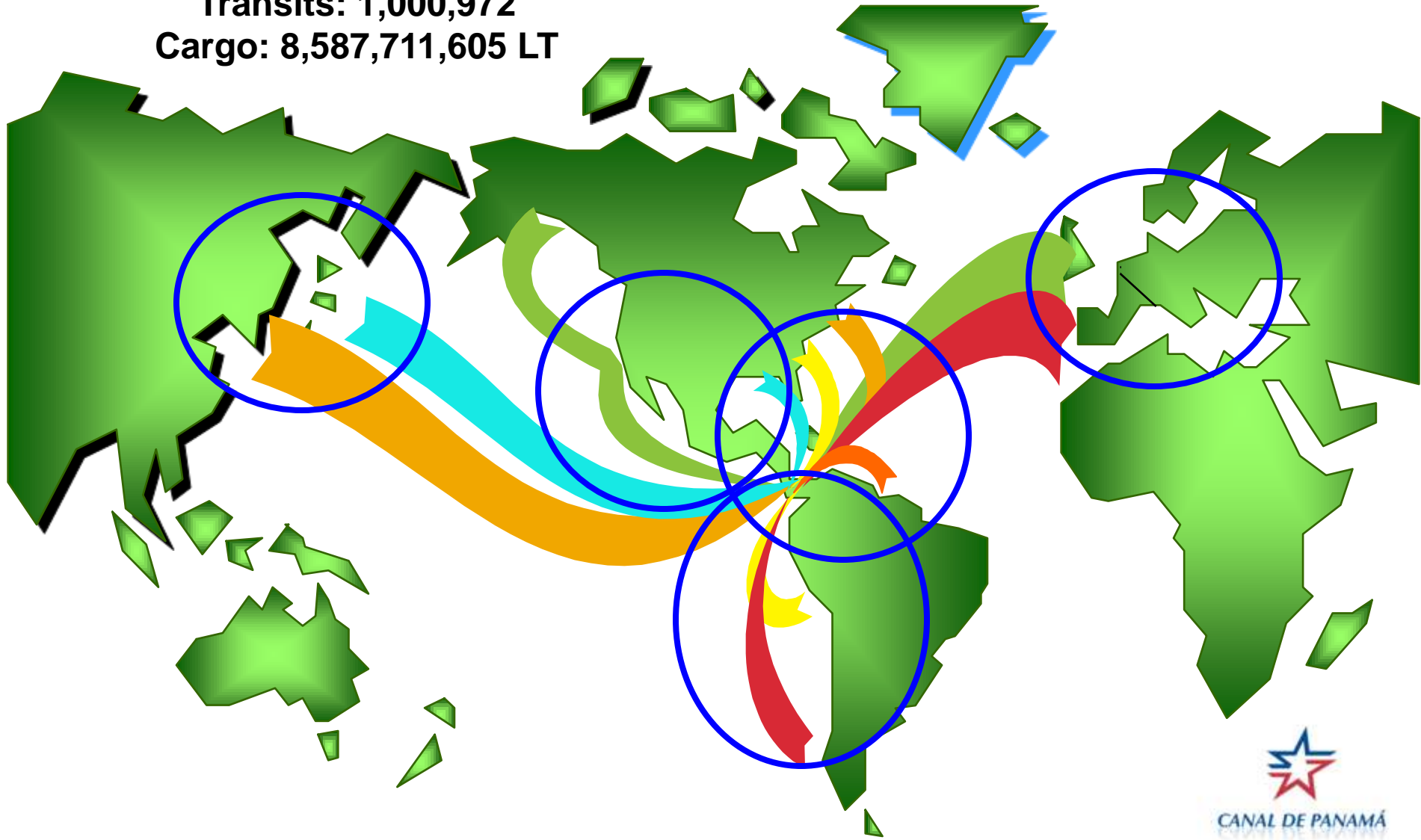
Alberto Alemán Zubieta  
Administrator  
Autoridad del Canal de Panamá  
February 1, 2011



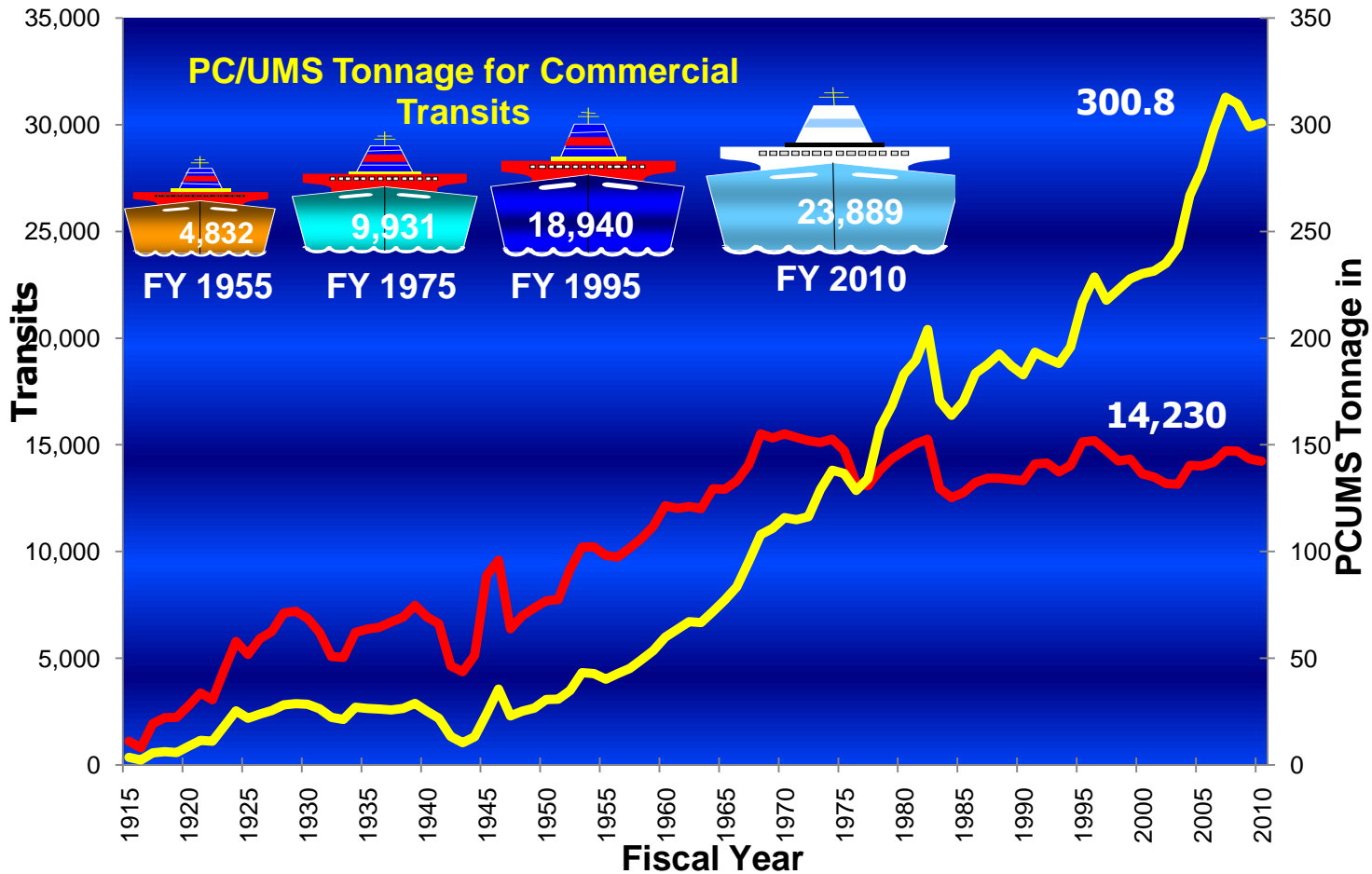
CANAL DE PANAMÁ



**1915 - 2010**  
**Transits: 1,000,972**  
**Cargo: 8,587,711,605 LT**

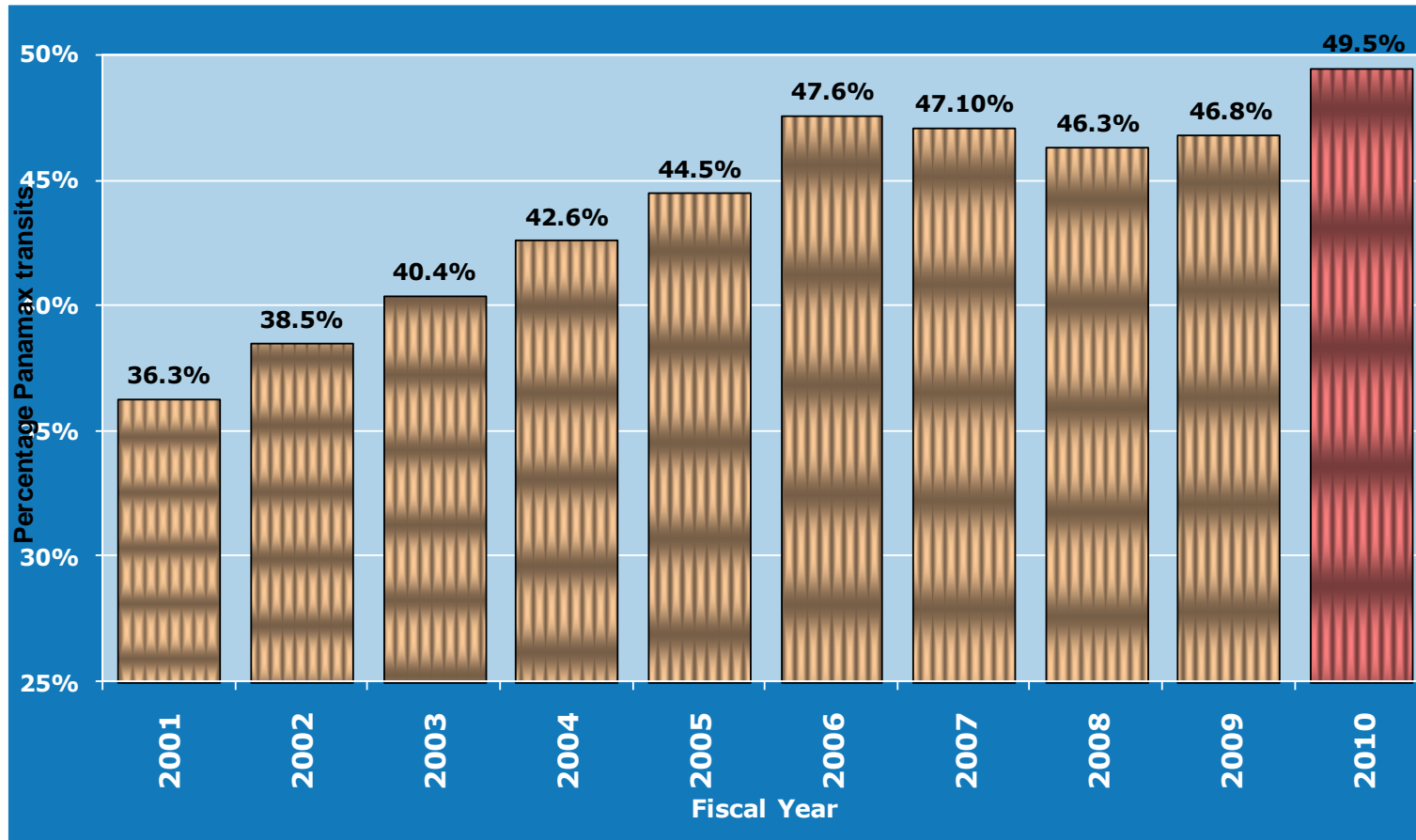


# Transits vs. PC/UMS Tonnage FY 1915 - FY 2010



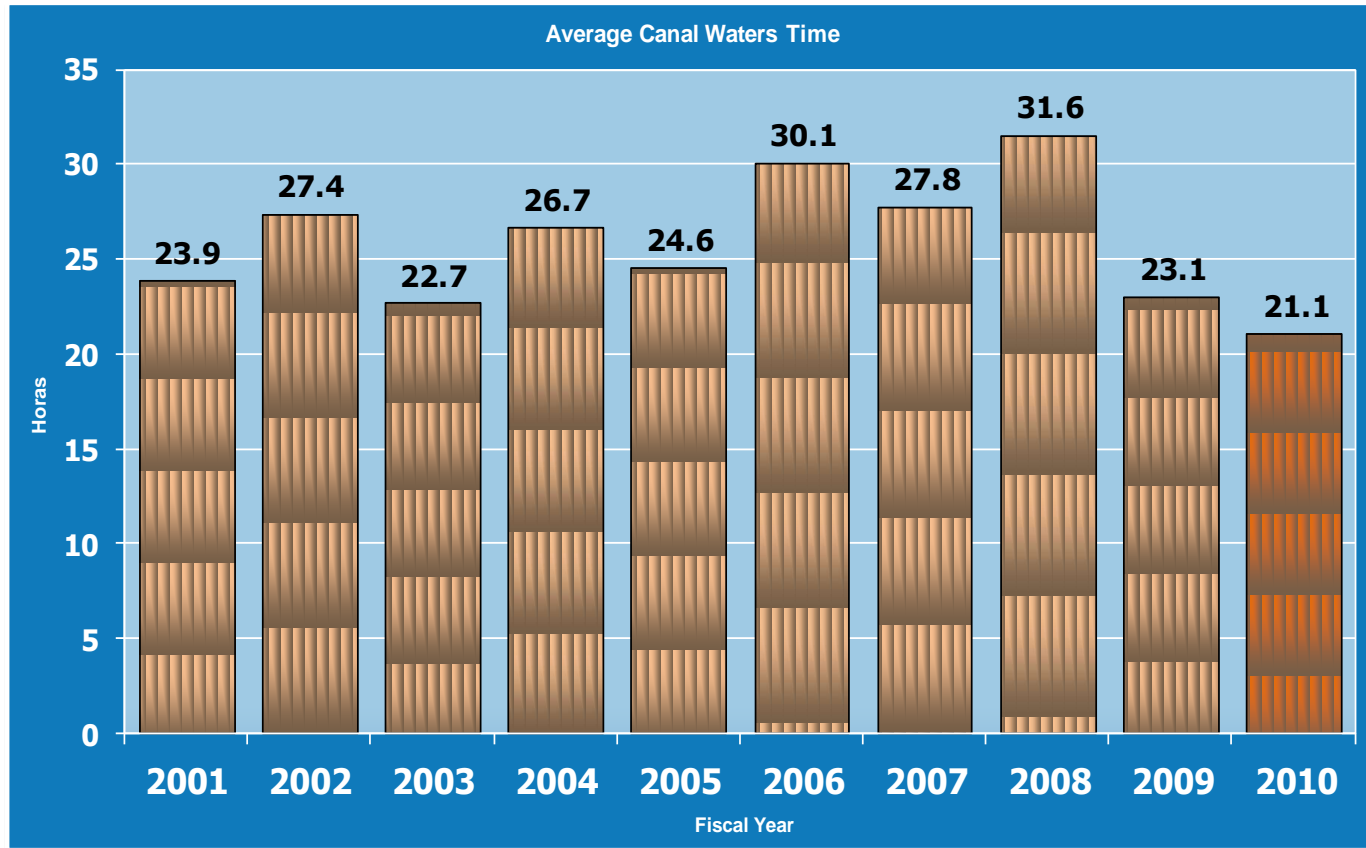


## Panamax Transits of 100' (30.5m) + of Beam FY 2001 - FY 2010



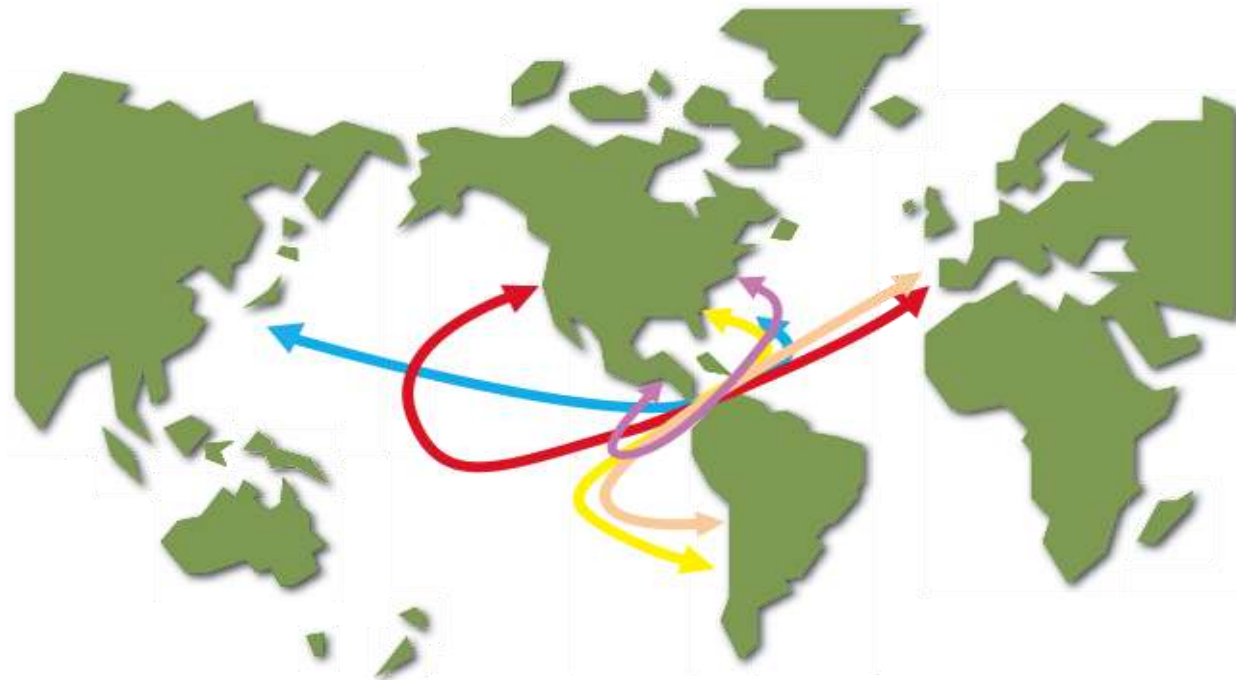
# Average Canal Waters Time

## FY 2001 - FY 2010





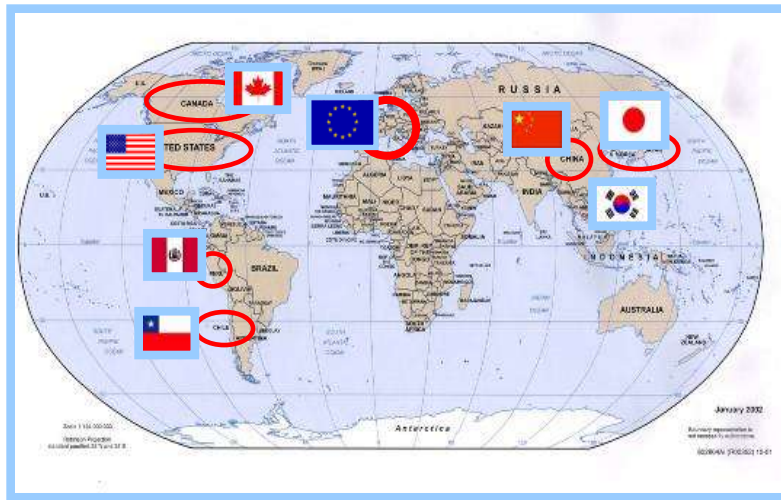
## Main Routes - FY 2010



<b>Total (long tons)</b>	<b>204.8 M</b>	
<b>East Coast US -- Asia</b>	<b>83.2M</b>	
<b>West Coast South America – East Coast US</b>	<b>23.8M</b>	
<b>West Coast South America -- Europe</b>	<b>13.3M</b>	
<b>West Coast Central America – East Coast US</b>	<b>10.3M</b>	
<b>West Coast US – Europe</b>	<b>7.7M</b>	



# The Panama Canal Trade and Main Users



## Total Cargo Movement FY 2010

USERS	FY 2009*	FY 2010*	2010 (%)
United States	132.6	135.4	66
China	46.5	43.6	21
Chile	25.5	26.7	13
European Union	26.1	26.8	12
Japan	20.5	22.7	11
South Korea	16.6	19.1	9
Ecuador	12.5	14.6	7

\* Measured in Million of Long Tons

In the relevant routes (Asia-east coast of the United States) the Panama Canal transported 41.0% of the Panama Canal trade cargo in 2010.

66% of Canal cargo traffic originates in or is destined to the United States.



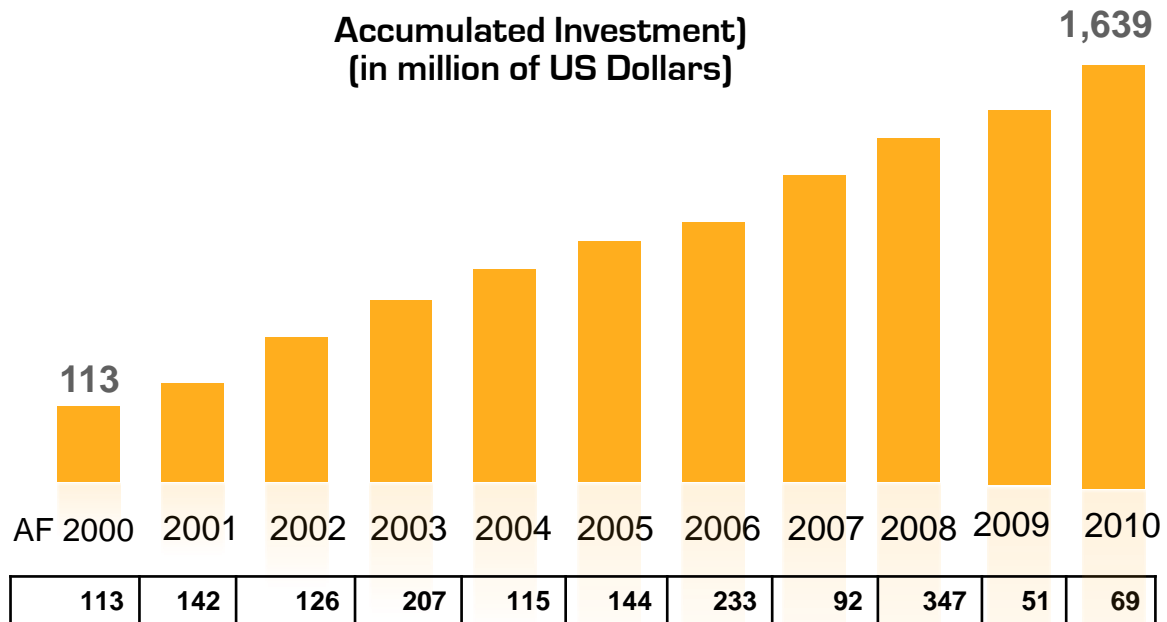
Rango		Compañía
1	➡	NIPPON YUSEN KAISHA (NYKLINE)
2	➡	MAERSK LINE
3	➡	EVERGREEN MARINE
4	🟢	MITSUI O.S.K.
5	🔴	CSAV-COMPAÑÍA SURAMERICANA DE VAPORES
6	🟢	HAPAG LLOYD
7	🔴	MEDITERRANEAN SHIPPING COMPANY
8	➡	COSCO
9	➡	HAMBURG-SUD
10	🟢	CMA CGM
11	🔴	HANJIN SHIPPING CO.
12	🔴	ZIM AMERICAN INTEGRATED SHIPPING SERVICES CO. INC.
13	🟢	SEATRADEREFER CHARTERING NV
14	🔴	SONAP
15	🟢	WALLENIUS-WILHEMSEN
16	➡	KAWASAKI KISEN (K LINE)
17	➡	STX PAN OCEAN COMPANY LTD.
18	🔴	DAMPSKIBSSELSKABET NORDEN AS
19	🟢	YANGMING MAR. TRANS.
20	🔴	CARGILL INTERNATIONAL

## Panama Canal Customer Ranking - FY 2010

(Weighted average: 40% Transits,  
60% Tolls)



# Modernization and Investment Program



Dredging



Locomotives



Technology



Tugboats



Tow track system



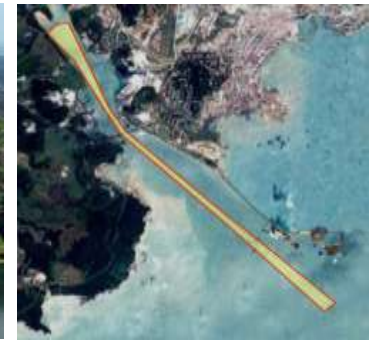
Hydraulic system

# Expansion Program Components

Project	Volume in Mm3	Current Progress
<b>1. Pacific Access Channel Excavation</b>	<b>48.8</b>	
- PAC 1	7.3	100%
- PAC 2	7.5	100%
- PAC 3	8.0	94%
- PAC 4	26.0	23%
<b>2. Dredging Projects</b>		
Widening and deepening of the navigational channel	<b>54.9</b>	
- Pacific entrance	8.7	56%
- Pacific access channel	4.0	3.8%
- Gaillard Cut and Gatun Lake	19.7	41%
- Northern reaches of Gatun Lake	4.6	22%
- Atlantic entrance	17.9	68%
<b>3. Elevation of Gatun Lake's maximum operational level</b>		<b>3%</b>
<b>4. Design and construction of the new locks</b>	<b>40.0</b>	<b>9%</b>



# Canal Expansion Components



Widening and deepening of Atlantic entrance

Elevation of Gatun Lake's maximum operational channel

Deepening and widening of Gatun Lake navigational channel

Pacific access channel excavation

Design and construction of Atlantic Locks

Deepening of Gaillard Cut navigational channels

Widening and deepening of Pacific entrance

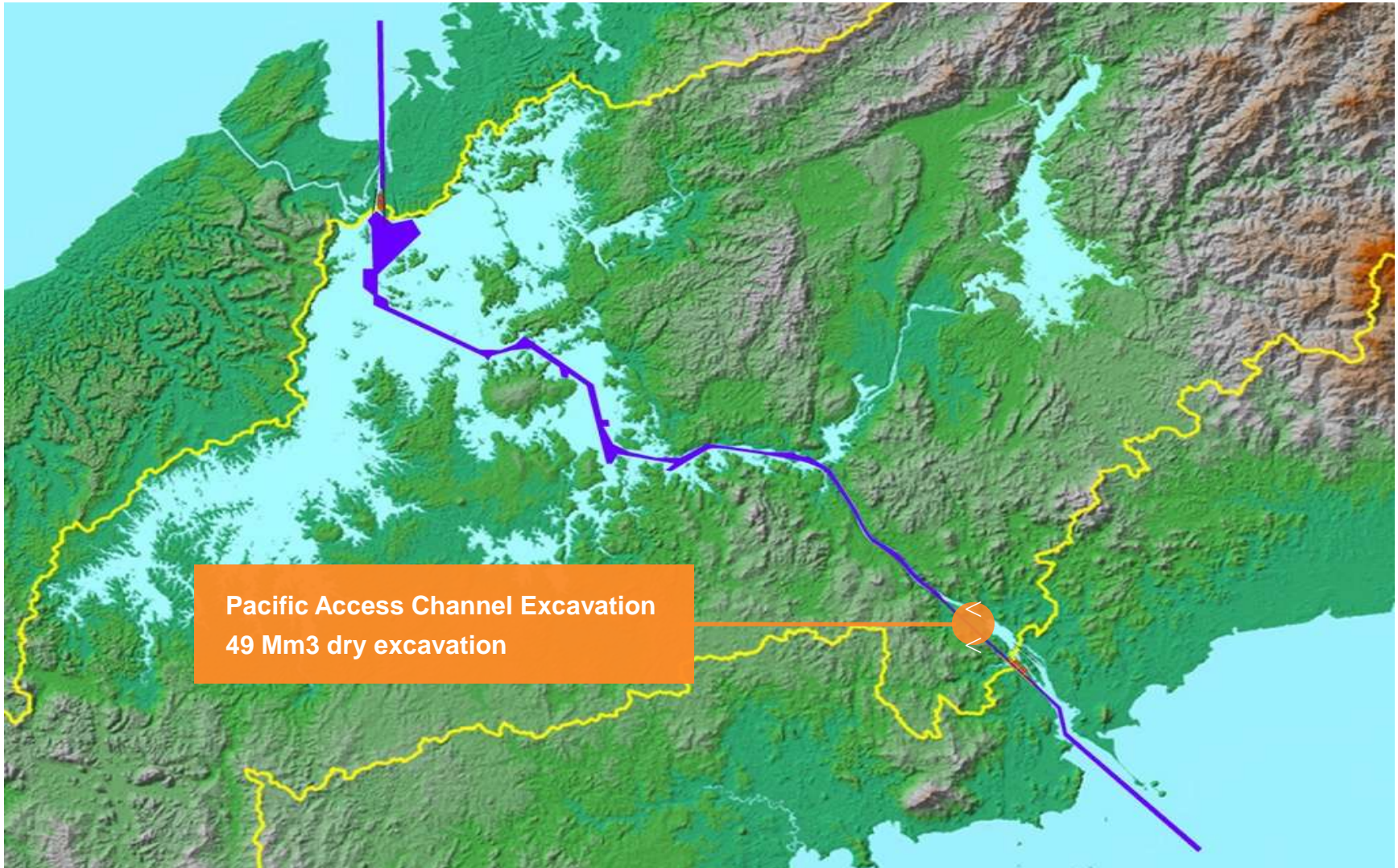
Design and construction of Pacific Locks







## Canal Expansion Components



Pacific Access Channel Excavation  
49 Mm3 dry excavation





# Pacific Access Channel

Phase 1 - 7.3 Mm<sup>3</sup> excavated



**COMPLETED**

Phase 2 - 7.5 Mm<sup>3</sup> excavated





## Pacific Access Channel – Phase 3



Total volume: 8 Mm<sup>3</sup>, cleaning 190 hectares in T6 area

Current progress: 94%

8.09 Mm<sup>3</sup> excavated





# Pacific Access Channel – Phase 3

Looking south





## Pacific Access Channel Phase 4 – Dry Excavation



**Total volume: 26 M m<sup>3</sup>** dry excavation, construction of Borinquen Dam, cleaning of 80 hectares of UXOs

**Current progress: 23%** 2.24 Mm<sup>3</sup> excavated



## Pacific Access Channel Phase 4 – Dry Excavation

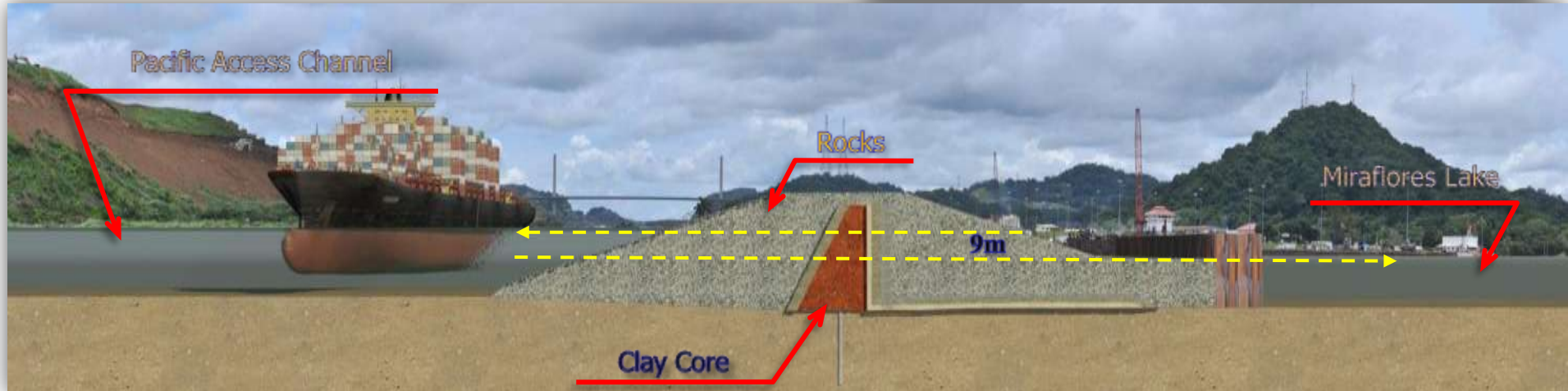


# Cofferdam Construction



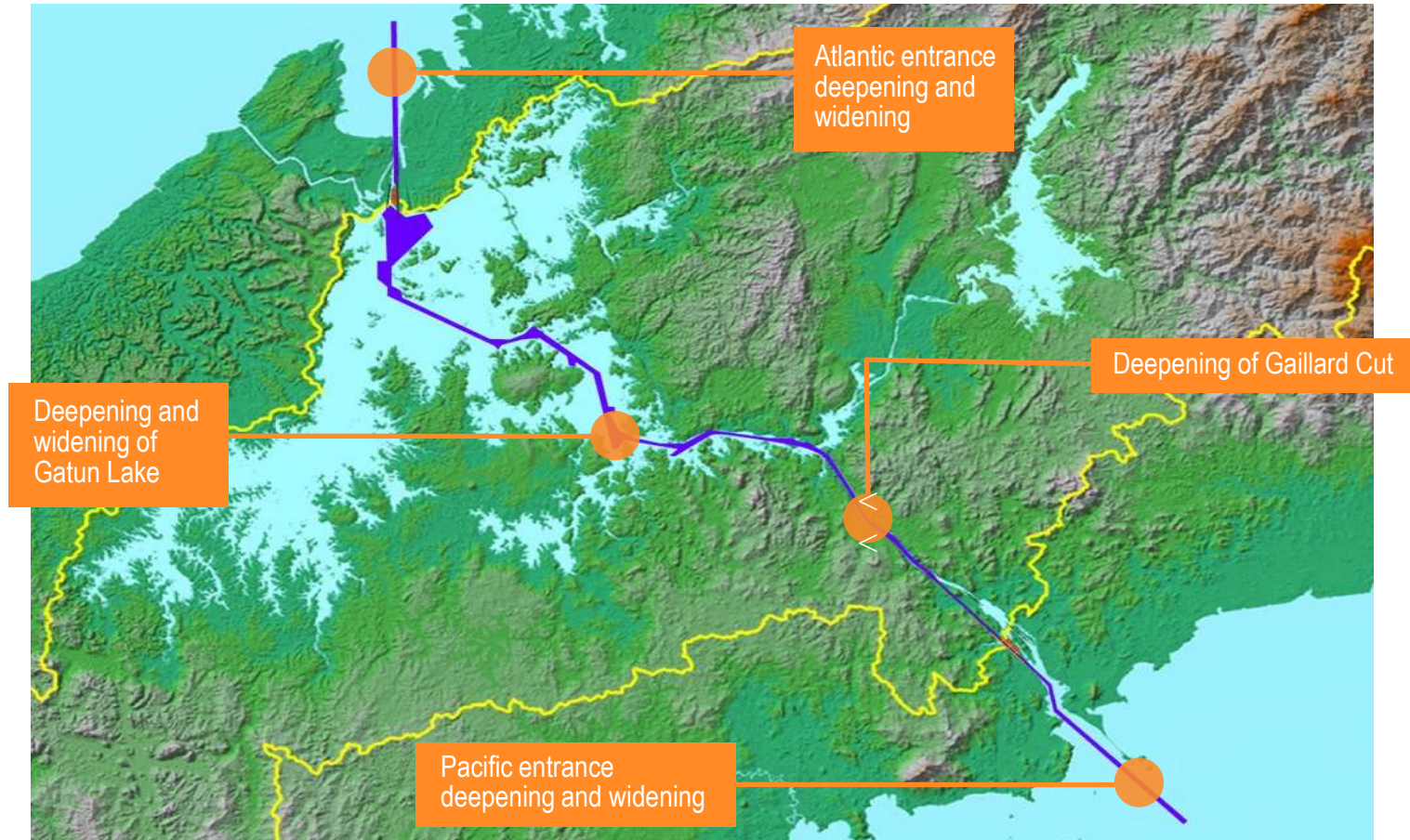


# Borinquen Dam



# Canal Expansion Components

Dredging projects: 54.9 Mm<sup>3</sup>





# Pacific entrance deepening and widening



**Total volume: 8.7 Mm<sup>3</sup>**

**Current progress: 64% 5.6 Mm<sup>3</sup> dredged**



# Dredging at the North Entrance to the Pacific Access Channel

Centennial  
Bridge

Paraiso

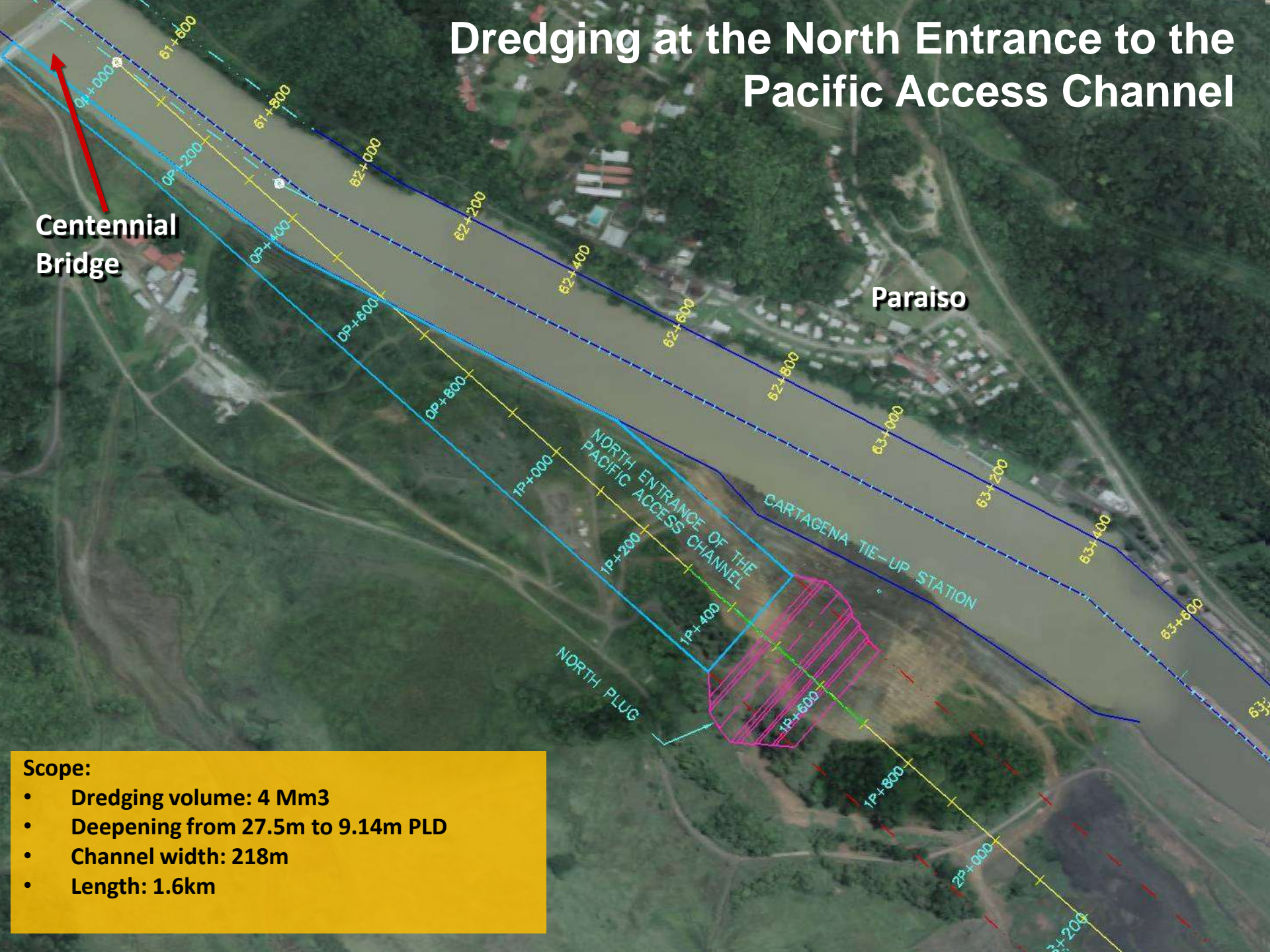
NORTH ENTRANCE OF THE  
PACIFIC ACCESS CHANNEL

CARTAGENA TIE-UP STATION

NORTH PLUG

**Scope:**

- Dredging volume: 4 Mm<sup>3</sup>
- Deepening from 27.5m to 9.14m PLD
- Channel width: 218m
- Length: 1.6km







## Dredging areas in Gatun Lake and Gaillard Cut Executed by ACP



**Total volume: 19.7 Mm<sup>3</sup>**

**Current progress: 41% 9.5 Mm<sup>3</sup> dredged**

# Dredging areas in Gatun Lake and Gaillard Cut Executed by ACP



# Atlantic entrance deepening and widening



**Width: 225m (740´)**

**Total volume: 17.9 M m<sup>3</sup>**  
**Current progress: 68% 12.2 Mm<sup>3</sup> dredged**  
**Company: Jan de Nul NV**



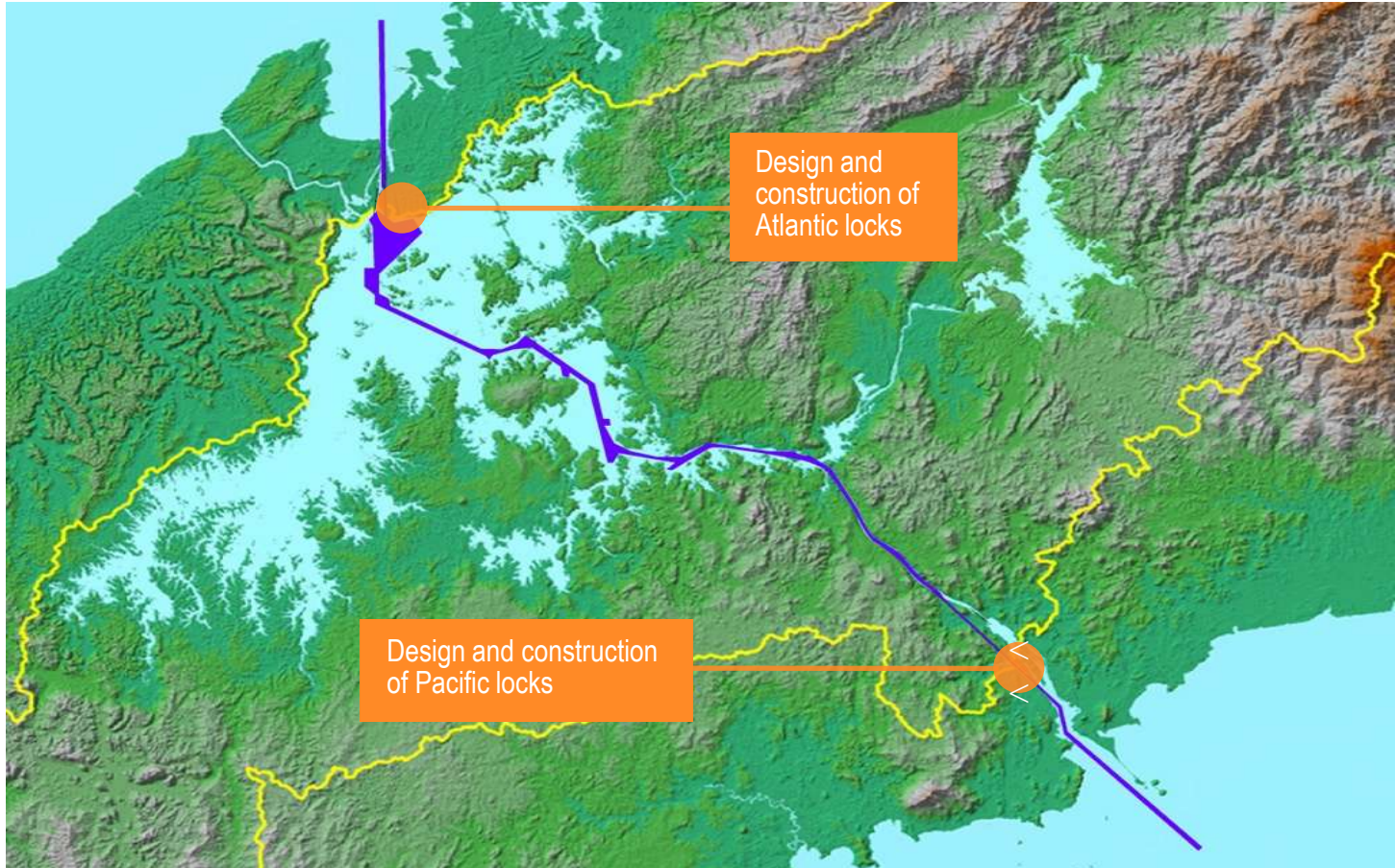
## Atlantic entrance deepening and widening





# Canal Expansion Components

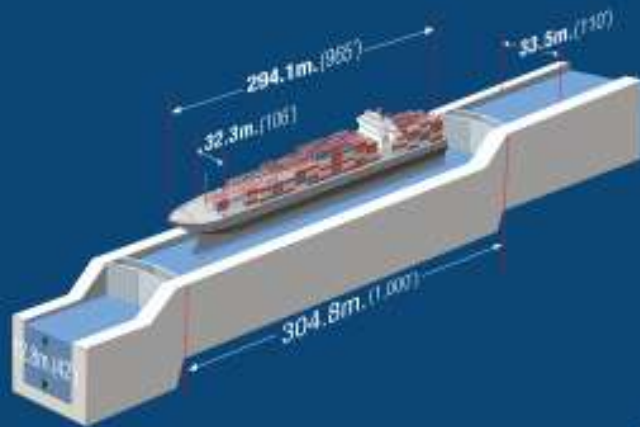
Design and construction of new locks



# Size of Locks and Vessels

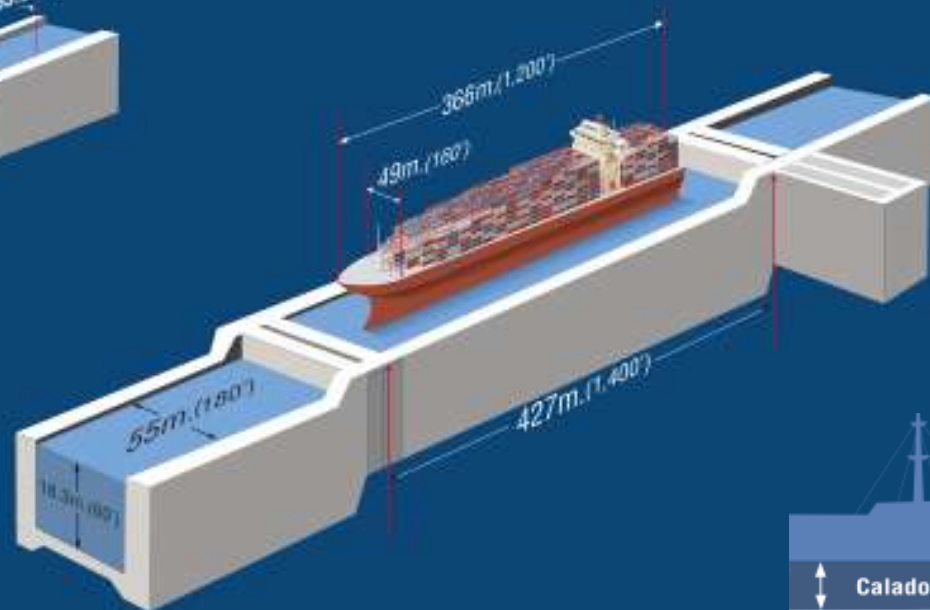
Existing locks' maximum vessel size:

**4,400 TEU**



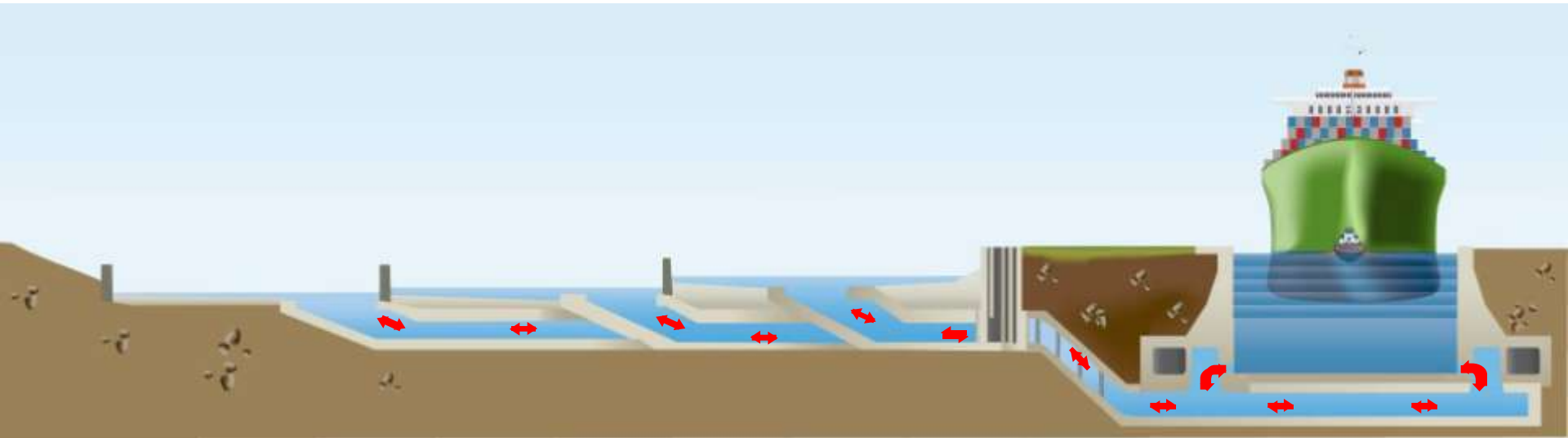
New locks' maximum vessel size:

**12,600 TEU**

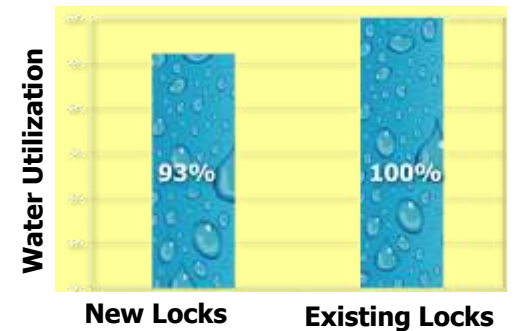




## PostPanamax Locks Operation



**7% less water than  
the existing locks**







# Design and Construction of Pacific Locks





## Industrial Park – Pacific Side







# Design and Construction of Pacific Locks







## Design and Construction of Pacific Locks





## Design and Construction of Atlantic Locks





## Industrial Park – Atlantic side





## Design and Construction of Atlantic Locks





# Volumes of Dry Excavation and Dredging used for the construction of the locks

Existing locks: 200 Mm<sup>3</sup>

1886



1909



New locks: 155 Mm<sup>3</sup>

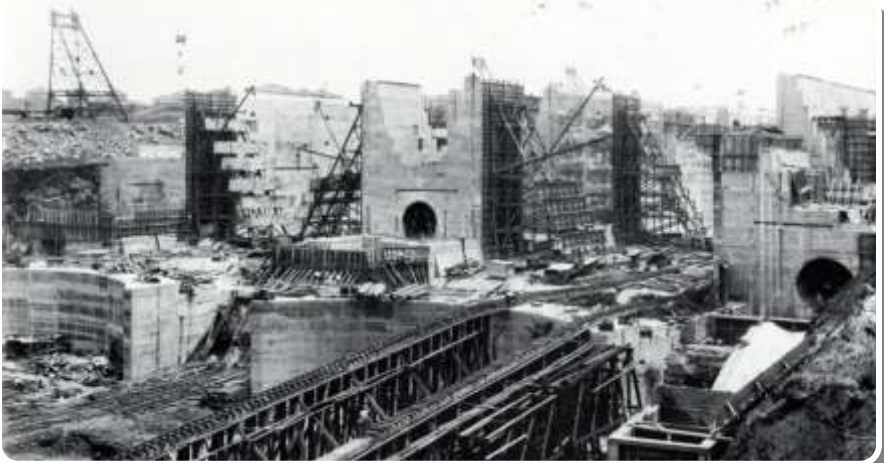
2007



2008



## Volume of Concrete Used for the Locks Construction



**Existing locks: 3.4 Mm<sup>3</sup>**



**New locks: 4.7 Mm<sup>3</sup>**



## Bid price behavior of principal Expansion Program projects

Dredging the Northern Entrance to the Pacific Access Channel	BUDGET	\$ 56,527,400	
	Jan De Nul	\$ 54,550,647	-3%
Dredging Gatun Lake's Northern Reaches	BUDGET	\$ 63,600,000	
	Dredging International	\$ 39,983,822.82	- 37%
Pacific Access Channel - 4	BUDGET	\$ 302,374,000	
	ICA-FCC-MECO	\$ 267,798,795.99	- 11%
Atlantic Entrance Dredging	BUDGET	\$ 105,821,000	
	JAN DE NUL, NV	\$ 89,617,317	- 15%
Locks	BUDGET	\$ 3,481,000,000	
	GUPC	\$ 3,221,631,384	- 7%
Pacific Access Channel- 3	BUDGET	\$ 68,067,623	
	Constructora MECO, S.A.	\$ 36,659,852.28	- 46%
Pacific Entrance Dredging	BUDGET	\$ 181,096,000	
	Dredging International	\$ 177,500,676.78	- 2%
Pacific Access Channel - 2	BUDGET	\$ 48,459,296	
	CILSA - MINERA MARIA	\$ 25,489,200.30	- 47%
Pacific Access Channel - 1	BUDGET	\$ 61,208,966	
	Constructora Urbana S.A.	\$ 41,094,000	- 33%



# Direct employment generated during Canal Expansion

Contract	# Jobs
Completed contracts (December 2010)	1,801
Contracts under execution (December 2010)	10,688
ACP (December 2010)	889
<b>Subtotal (December 2010)</b>	<b>13,378</b>
Employment estimates:	
Design and construction of locks	2,194
<b>Employment estimates subtotal</b>	<b>2,194</b>
<b>Projected total cumulative direct employment</b>	<b>15,172</b>







# Panama Canal MOUs

## UNITED STATES EAST COAST

- GEORGIA PORTS AUTHORITY
- PORT OF MIAMI
- THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
- MASSACHUSETTS PORT AUTHORITY
- SOUTH CAROLINA STATE PORTS AUTHORITY
- VIRGINIA PORT AUTHORITY
- MARYLAND PORT ADMINISTRATION
- PHILADELPHIA REGIONAL PORT AUTHORITY
- BROWARD COUNTY S PORT EVERGLADES DEPARTMENT
- PORT OF PALM BEACH
- JACKSONVILLE PORT AUTHORITY
- PORT OF NORTH CAROLINA

## UNITED STATES GULF COAST

- PORT OF HOUSTON AUTHORITY
- PORT OF NEW ORLEANS
- TAMPA PORT AUTHORITY
- MANATEE COUNTY PORT AUTHORITY
- ALABAMA STATE PORT AUTHORITY
- PORT OF GALVESTON
- TENNESSEE-TOMBIGBEE WATERWAY DEVELOPMENT AUTHORITY
- MISSISSIPPI STATE PORT AUTHORITY AT GULFPORT

## UNITED STATES WEST COAST

- PORT OF LONG BEACH

## CARIBBEAN PORTS

- CURACAO PORTS AUTHORITY

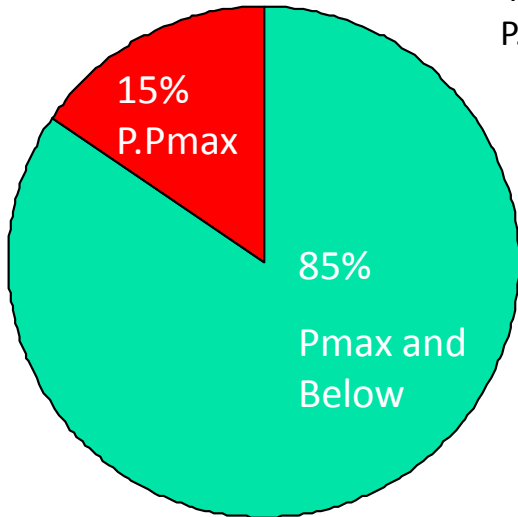
## EUROPEAN PORTS

- AUTORIDAD PORTUARIA BAHIA DE ALGECIRAS
- PORT OF ANTWERP

# Fleet Capacity and Vessel Size Composition

Containership Fleet 2000

(4.79 Million TEU)

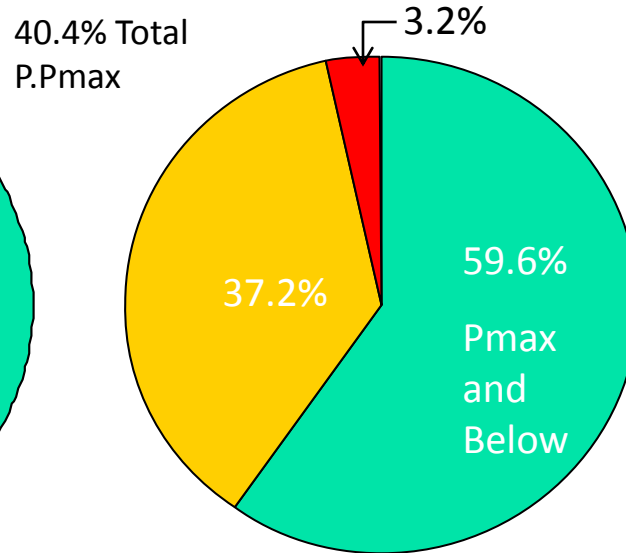


■ 0-4,000+ teu    ■ 4,000-6,000+ teu

**371 Panamax vessels**  
**134 Post Panamax vessels**

Containership Fleet 2010

(13.78 Million TEU)

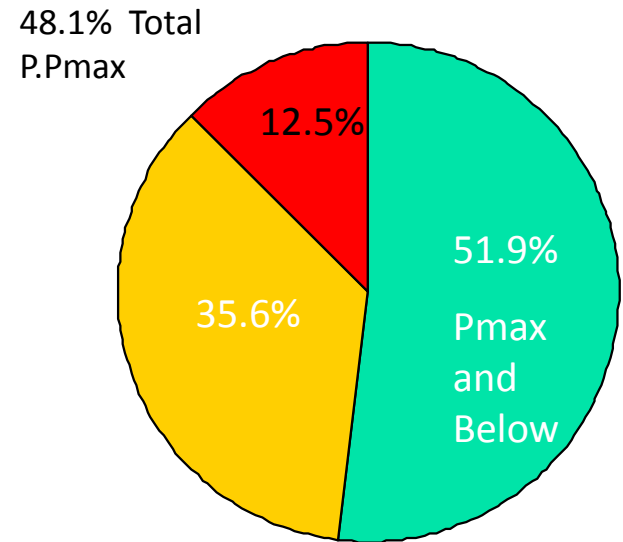


■ 0-5,000 teu    ■ 5-10,000 teu    ■ 10,000+ teu

**949 Panamax vessels**  
**775 Post Panamax vessels**

Containership Fleet 2014

(16.8 Million TEU)



■ 0-5,000 teu    ■ 5-10,000 teu    ■ 10,000+ teu

**956 Panamax vessels**  
**804 Post Panamax vessels**





## Impact of Expansion on Container Services (Lines Perspective)

For an expanded Canal, the costs per one way slot for a container service would reduce by \$26 for 8,000 TEU vessels, and by a further \$48 for 10,000 TEU vessels.



- **Cost Based on:**
  - 4000 TEU Vessel
  - Canal Tolls proposal January 2011
  - \$ 467/ MT Bunker (HFO)
  - Actual Charter Rate



- **Cost Based on:**
  - 8000 TEU Vessel
  - Canal Tolls proposal January 2011
  - \$ 467/ MT Bunker (HFO)
  - Actual Charter Rate



## The Impact of Canal Expansion on Dry Bulks

1. The USG-Asia grain trade will take advantage of expansion, but probably only to vessels of under 100,000 dwt. Likely to benefit Canal routes to remain lower cost than the WCUS gateway.
2. Potential for increased trade in coal and iron ore to China from Colombia and Venezuela

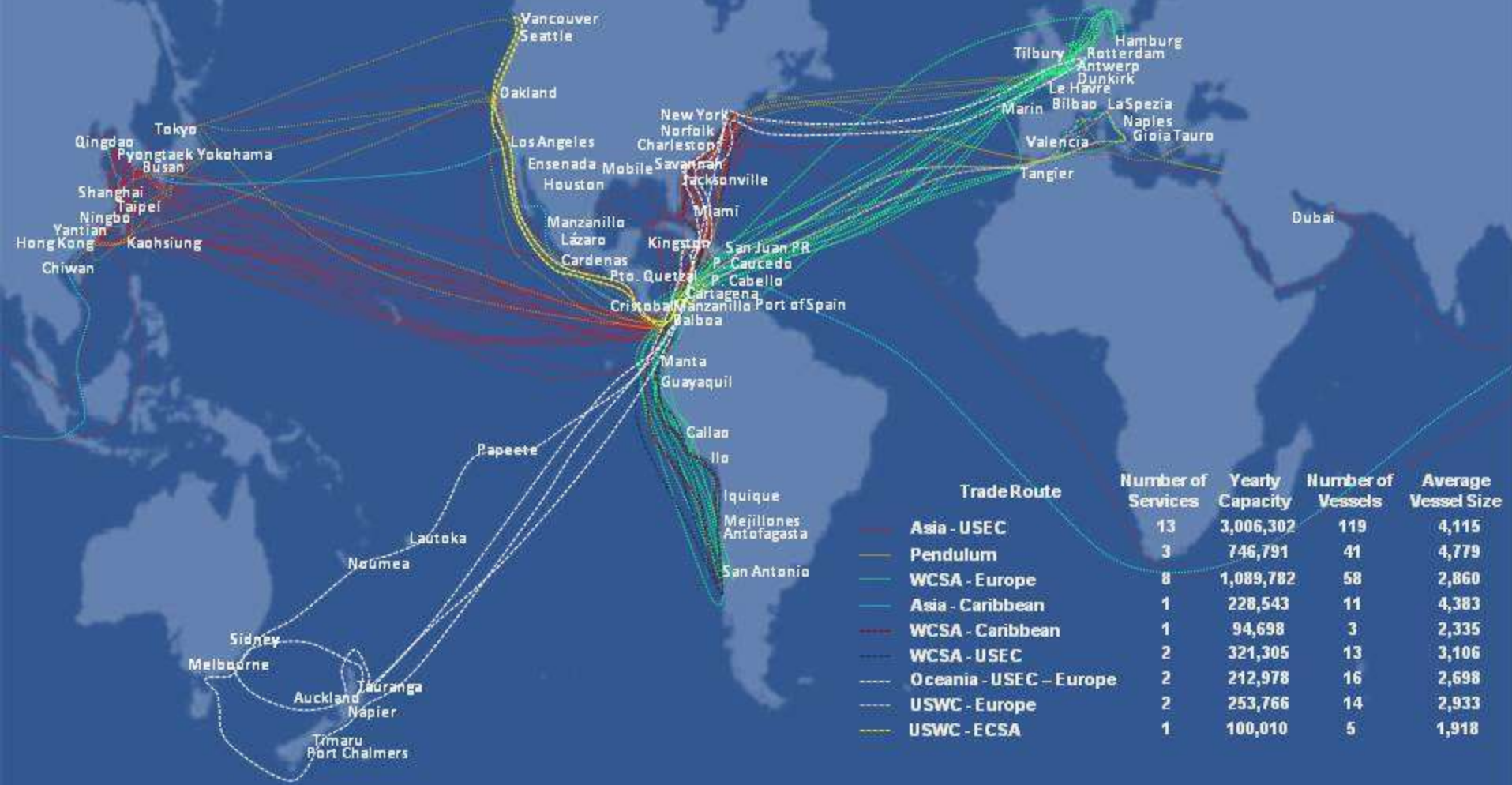




## The Impact of Canal Expansion on Liquid Bulks

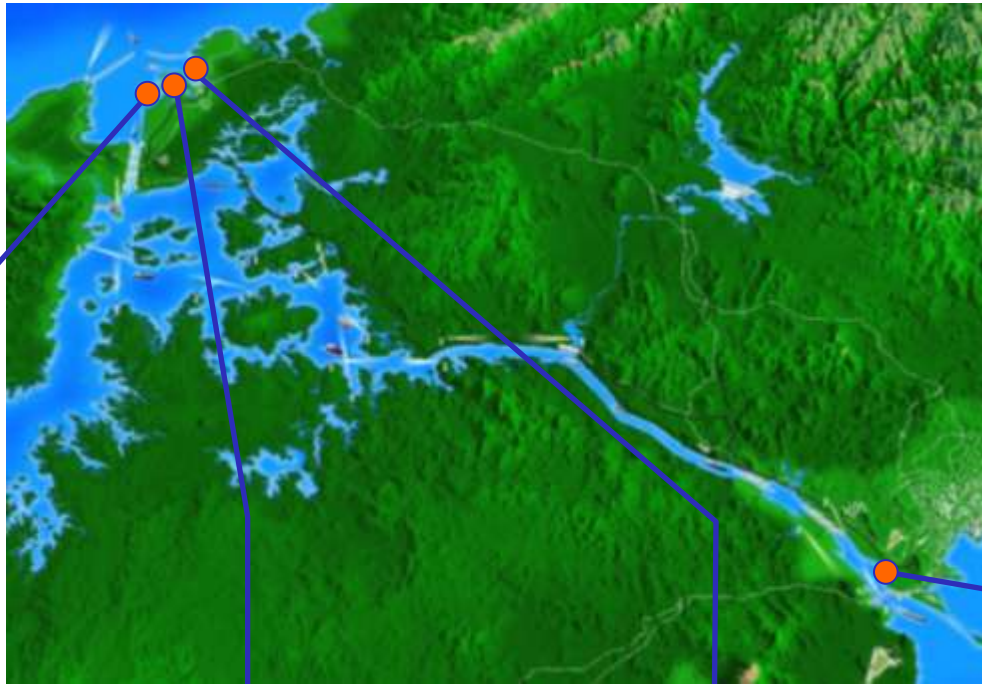
1. Canal expansion will make Ecuador – USG crude shipments more competitive vs. alternative sources (e.g., ex Nigeria).
2. New trade between Venezuela – China could develop, and trade flows between Asia and USG/ECSA should also increase.
3. The expanded Canal will be the first route choice for LNG trades between Trinidad-Chile and Peru-USG should these develop. The ability of 200,000+ cbm LNG tankers to transit will be crucial.

# Liner Services Deployed at Panama Canal Route





# Port Development in Panama



1996: 235 Thousand TEUs  
2010: 5.6 Million TEUs  
2015: 7.4 Million TEUs



Panama Ports Company – Cristobal

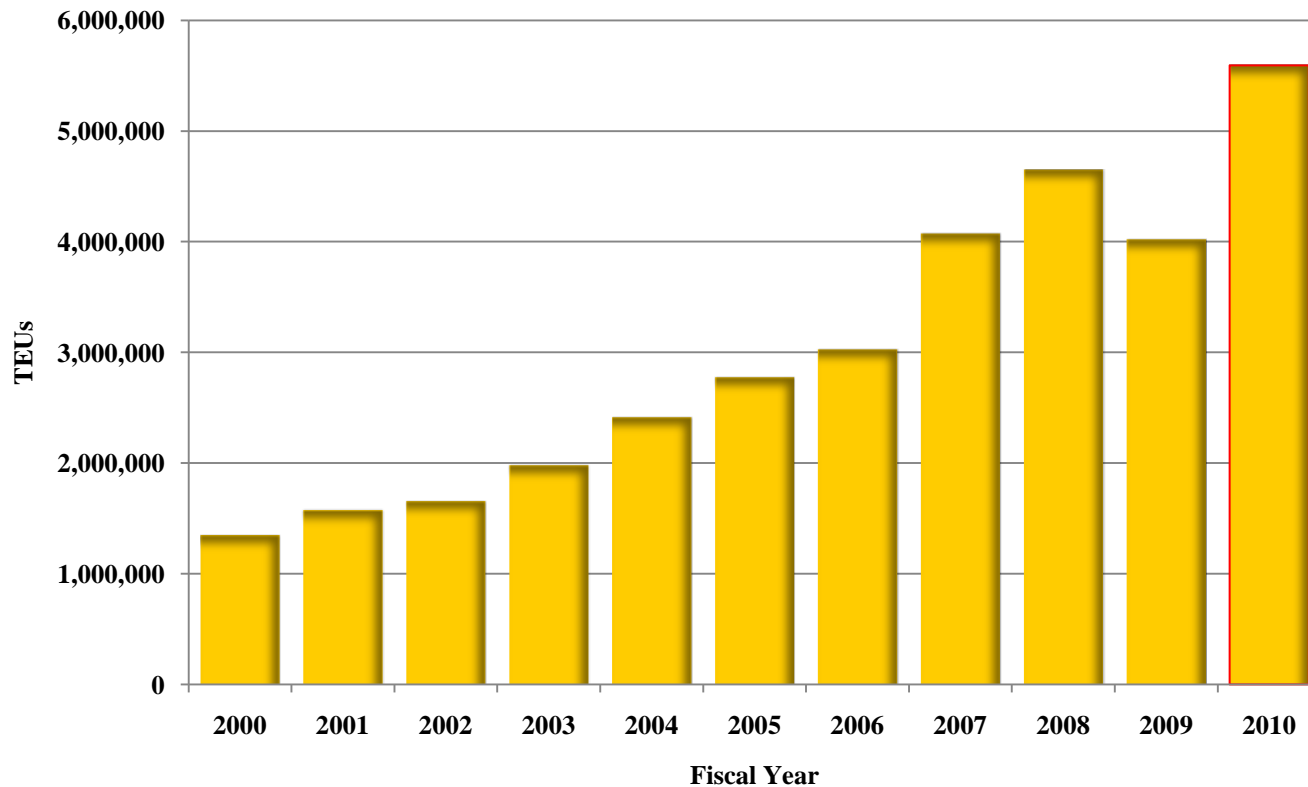
Colon Container Terminal

Manzanillo International Terminal (MIT)

Panama Ports Company - Balboa

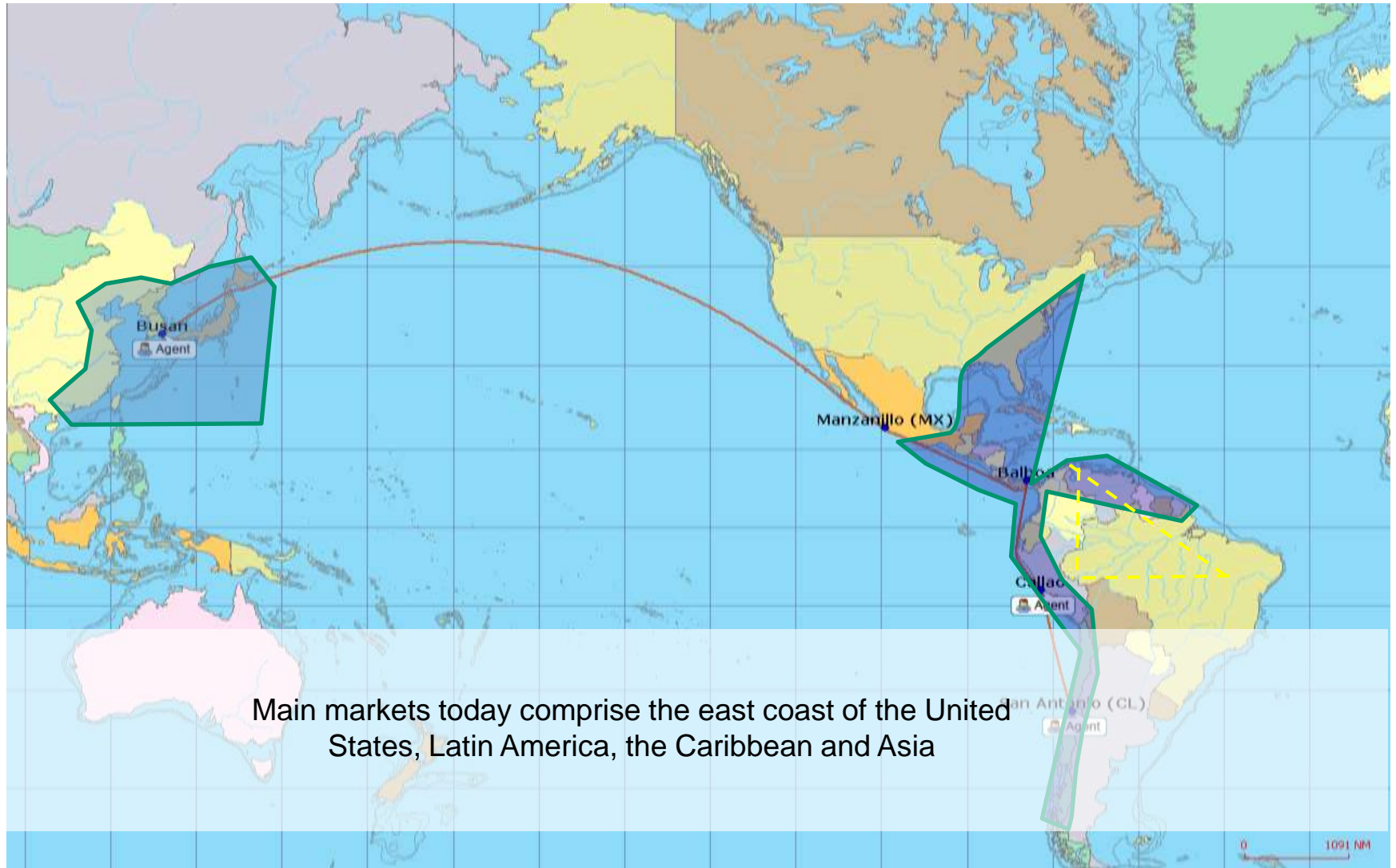


## Total TEU handled by Panamanian Ports 2000-2010



Source: Panama Maritime Authority

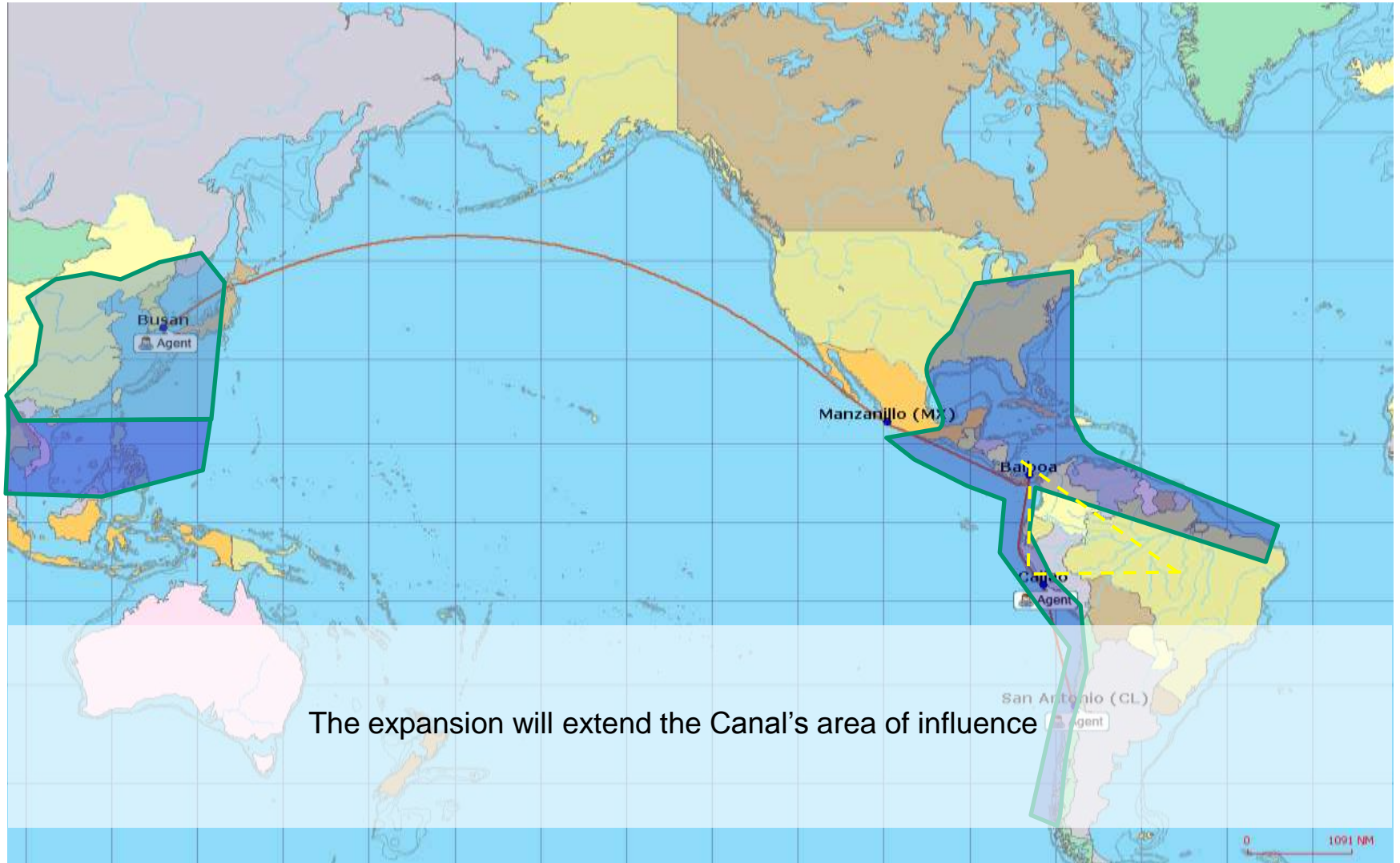
**Panama provides easy access to consumers located in Latin America, the Caribbean, North America, Asian and European markets**



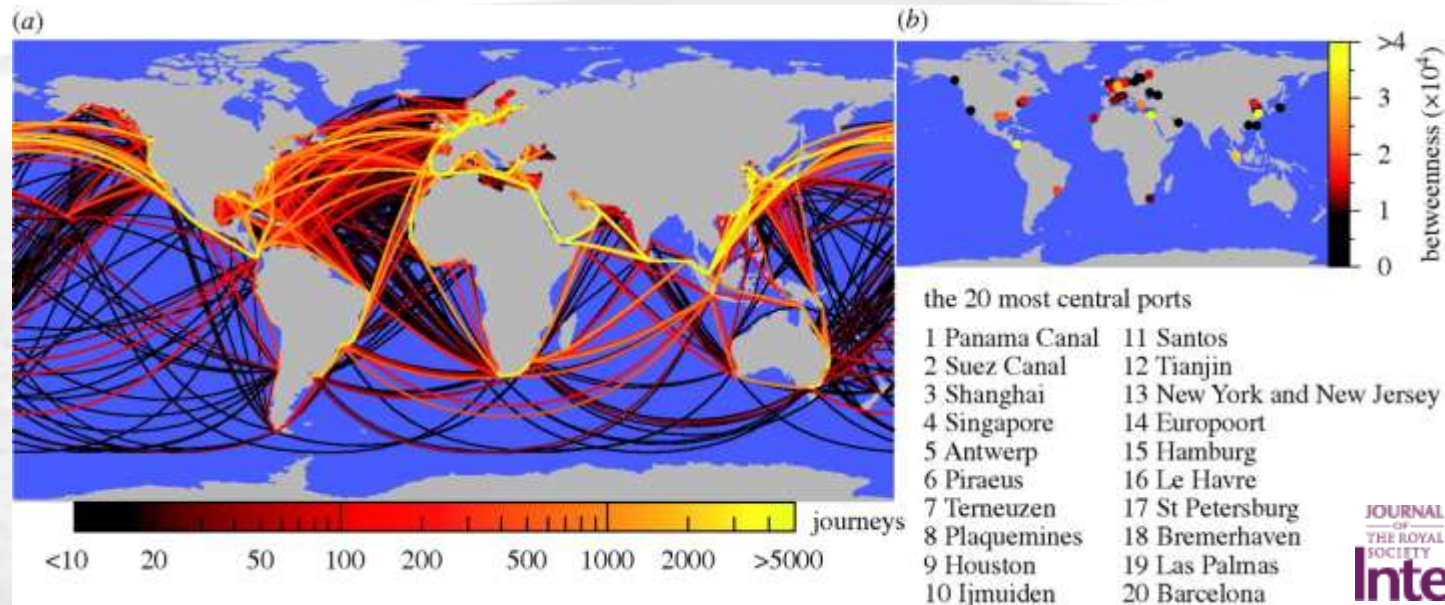
Main markets today comprise the east coast of the United States, Latin America, the Caribbean and Asia



The expansion will provide for economies of scale that will make the route more competitive, and will enhance the benefits of doing transshipment in the country

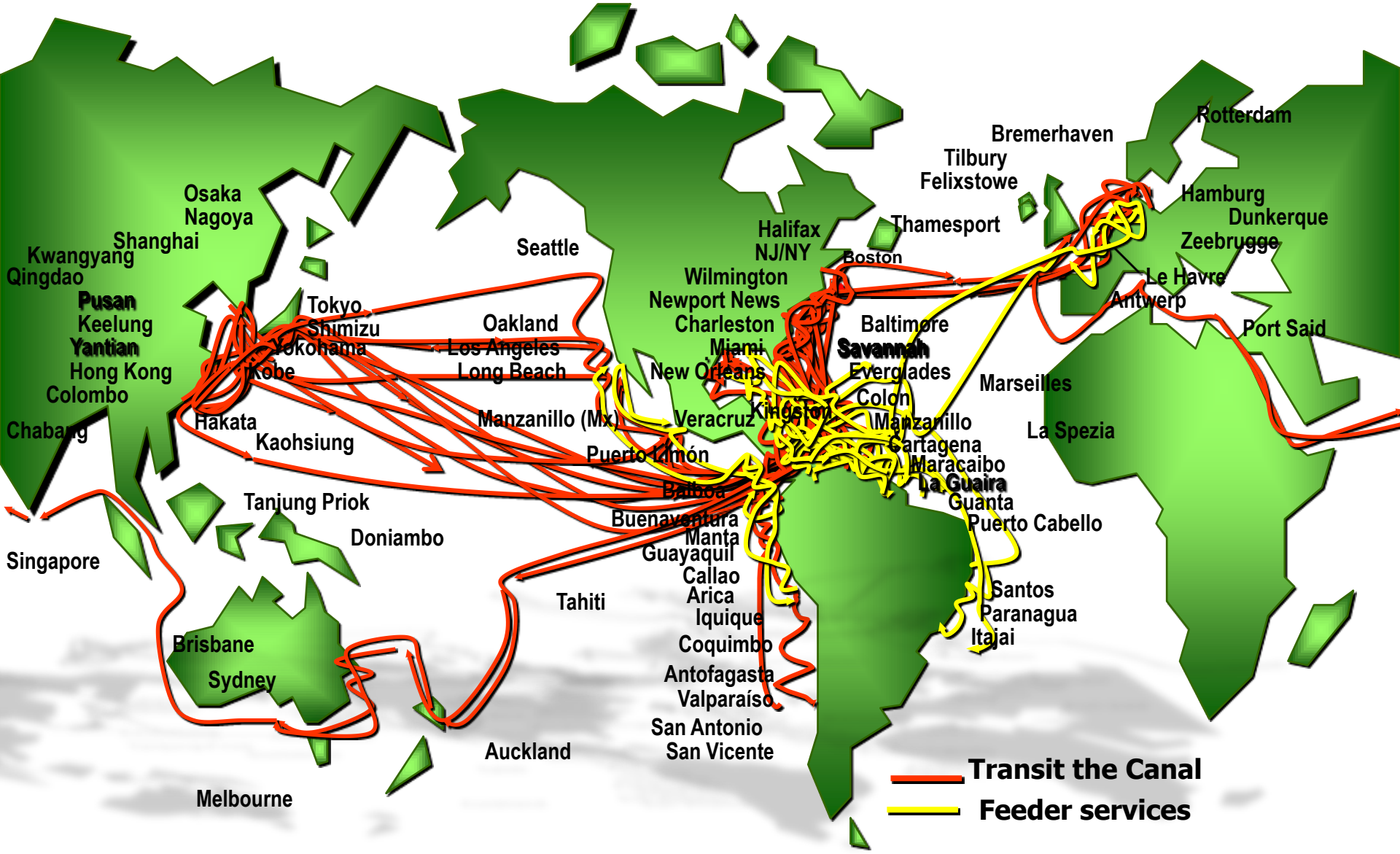


# Routes, ports and connectivities - GCSN



Routes, ports and betweenness centralities in the GCSN. (a) The trajectories of all cargo ships bigger than 10 000 GT during 2007. The colour scale indicates the number of journeys along each route. Ships are assumed to travel along the shortest (geodesic) paths on water. (b) A map of the 50 ports of highest betweenness centrality and a ranked list of the 20 most central ports.

# Panama: only port of the world with terminals in two oceans







*CANAL DE PANAMÁ*