

# Measuring the Effect of a Lack of Maintenance Dredging of Ship Channels

DIAGNOSING THE MARINE TRANSPORTATION SYSTEM: MEASURING  
PERFORMANCE AND TARGETING IMPROVEMENT

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Jim Kruse  
Director, Center for Ports & Waterways

# Tale of Two Ports

## ∞ Houston

- 52-mile channel
- 115 private and public Coast Guard- regulated facilities, including more than 160 deep-draft berths
- Energy capital of the world
- First in foreign tonnage
- 8<sup>th</sup> largest container port in continental US (2008)

## ∞ Corpus Christi

- 6<sup>th</sup> largest US port in tonnage
- 30-mile channel
- 34 dock sites requiring analysis

# Direct Immediate Economic Effects

- ∞ Effects due to vessel operational and loading limitations associated with channel maintenance at actual depth for actual vessel traffic during the base years (“Actual”)
- ∞ Effects with assumed loss of 1 ft of draft from actual maintained channel depths (“Actual Minus 1 ft”)
  - 2 ft in case of Corpus Christi

# Data Sources

- ∞ Interviews with businesses & government agencies actively involved in use of ship channel
- ∞ Literature review and survey of AAPA membership
- ∞ Port authority vessel call records
- ∞ Pilot log/records
- ∞ Greater Houston Port Bureau
- ∞ PIERS
- ∞ Sea-web (Lloyd's Register)
- ∞ Veson Nautical Distance 2004 Database
- ∞ Various commodity pricing sources
- ∞ Various user websites and terminal operators
- ∞ Institute for Water Resources vessel operating cost data
- ∞ Port tariff
- ∞ Ports and Terminals Guide

# First Steps

- ☞ Link data files from pilots, port authority and Greater Houston Port Bureau (for Houston), and resolve discrepancies.
- ☞ Acquire tons per centimeter factor for vessels experiencing reduction in cargo-carrying capacity.
- ☞ Determine last/next port of call (distance & channel drafts)
- ☞ Acquire commodity pricing data for users identified as losing business
- ☞ Acquire vessel operating costs and service speeds
- ☞ Verify authorized channel depths and design drafts for both public and private piers

# Houston Effects

- ∞ Light Loading (Non-Container Vessels)
  - Maximum sailing draft during study period was less than limiting depth for dock (lesser of authorized federal channel or dock design depth)
  - 2 subsets
    - Increase in shipping cost
    - Cargo was left behind and cannot be recovered--direct loss of business

*This category was by far the most significant in both ports!*

# Houston Effects

- Valuation:
  - Multiply transit time by hourly operating cost
  - Multiply in-port time by hourly in-port cost
  - Calculate per ton cost under current and assumed conditions
  - Multiply difference in per ton cost by tonnage actually carried
  - For “lost business” (trader) shipments, determine cargo capacity lost due to light loading and multiply by commodity unit value

# Houston Category 1 Values

## Number of Affected Vessels

	Actual			Minus 1 Ft		
	Unit cost increases only	Unit cost increase & lost business	Net	Unit cost increases only	Unit cost increase & lost business	Net
2008 Out	0	10	10	92	168	260
2008 In	19	11	30	81	169	250
2009 Out	4	12	16	39	131	170
2009 In	3	20	23	18	94	112
<b>Totals</b>			<b>79</b>			<b>792</b>

## Economic Effect

TOTALS	Actual			Minus 1 Ft		
	Effect of increased unit costs	Lost Business	Total Cost	Effect of increased unit costs	Extrapolated Lost Business	Total Cost
2008 Out	\$168,823	\$0	\$168,823	\$10,797,357	\$117,133,276	\$127,930,633
2008 In	\$720,246	\$35,683,809	\$36,404,056	\$16,202,915	\$131,860,367	\$148,063,282
2009 Out	\$730,622	\$4,544,606	\$5,275,228	\$7,714,839	\$34,809,258	\$42,524,097
2009 In	\$632,386	\$8,774,462	\$9,406,848	\$6,481,828	\$29,518,638	\$36,000,466
<b>Total</b>			<b>\$51,254,954</b>			<b>\$354,518,478</b>



# Houston Effects

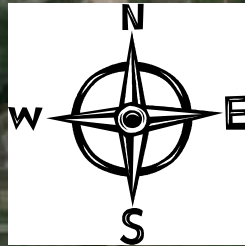
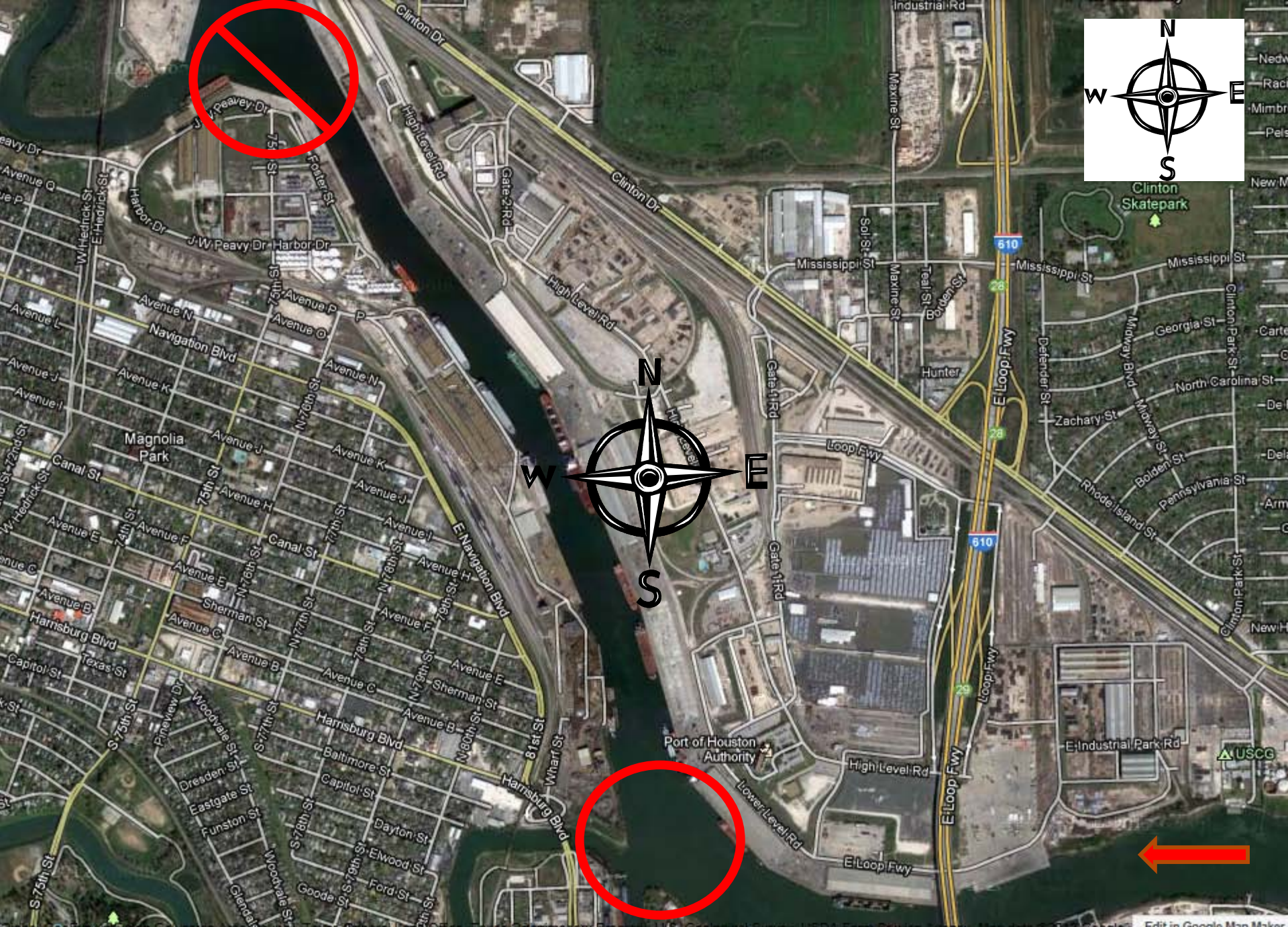
## ∞ Partial Discharge at Woodhouse Terminal

- Partial discharges necessary to reduce draft of vessel to available draft at city docks
- Extra costs:
  - Shift of the vessel from Woodhouse to city dock (pilot fees & tugboat fees)
  - Drayage from Woodhouse to city dock
  - Extra labor at Woodhouse Terminal (operated by different party than the target terminal)

## ∞ Maneuvering Stern First

- Vessels drafting > 28 ft could not use primary Turning Basin
- Turned in secondary Turning Basin across from City Dock 26
- Extra costs for users above CD 26:
  - Additional pilot







# Houston Effects

## ☞ Daylight Restrictions

- Vessels drafting > 39 ft and above (upstream) from Shell Oil docks move only during daylight hours due to increased risks of allusions or groundings
- Extra costs:
  - Vessel operating cost during delay
  - Dockage (outbound vessels)

## ☞ Light Loading Container Shipments

- No loss under actual conditions
- Light loading for outbound shipments with loss of draft
- Assumed 13 mt/TEU
- Line estimated \$1000/TEU lost

# Corpus Christi Effects

- ∞ No current effects
- ∞ Analyzed effect of loss of 1 and 2 ft of draft
- ∞ Two effects:
  - Light Loading—same issues as Houston
    - 9 docks (or users) severely affected with loss of 1 ft of draft, and 11 docks (or users) severely affected by loss of 2 ft of draft
  - Deep draft rig movements
    - 3 options with channel restrictions
      1. Pay to dredge channel
      2. Remove weight, move rig offshore, and reinstall weight components
      3. Install flotation devices to lift rig out of water and facilitate movement along channel
    - 3<sup>rd</sup> option most likely—the one analyzed

# Corpus Category 1 Values

## Number of Affected Vessel Calls

TOTALS	Number of Vessel Calls		
	Total	Unit cost increases only	Unit cost increase & lost business
Outbound - 1 ft loss	3	1	2
Inbound – 1 ft loss	54	33	21
<b>Total</b>	<b>57</b>	<b>34</b>	<b>23</b>
Outbound - 2 ft loss	7	3	4
Inbound – 2 ft loss	78	56	22
<b>Total</b>	<b>85</b>	<b>59</b>	<b>26</b>

# Corpus Category 1 Values

## Economic Effects

TOTALS	Minus 1 Ft		
	Increased Unit Costs	Lost Business	Total Cost
Total Category 1 Effect			
Outbound	\$53,933	\$1,950,809	\$2,004,742
Inbound	\$2,492,838	\$57,176,613	\$59,669,451
Total	\$2,546,771	\$59,127,422	\$61,674,193

TOTALS	Minus 2 Ft		
	Increased Unit Costs	Lost Business	Total Cost
Total Category 1 Effect			
Outbound	\$573,464	\$3,427,497	\$4,000,961
Inbound	\$6,299,937	\$100,621,351	\$106,921,288
Total	\$6,873,401	\$104,048,848	\$110,922,249

# Corpus Category 2 Effects

## Cost of Adding Flotation to Rigs

Cost Component	Cost
Fabrication	\$6,000,000
Installation	\$1,000,000
Removal	\$2,000,000
Disposal	\$500,000
<b>TOTAL</b>	<b>\$9,500,000</b>

# Contact Information

Jim Kruse

Center for Ports and Waterways

Texas Transportation Institute

[j-kruse@ttimail.tamu.edu](mailto:j-kruse@ttimail.tamu.edu)

713-686-2971

