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of Engineers.**

***Great Lakes System-wide  
Reliability Analysis –  
Estimating Port and Harbor  
Benefits and Costs***

**2006 NETS  
Symposium  
Salt Lake City, UT**

**Jon Brown  
Buffalo District  
Jan 2006**



# *Great Lakes Navigation Overview*



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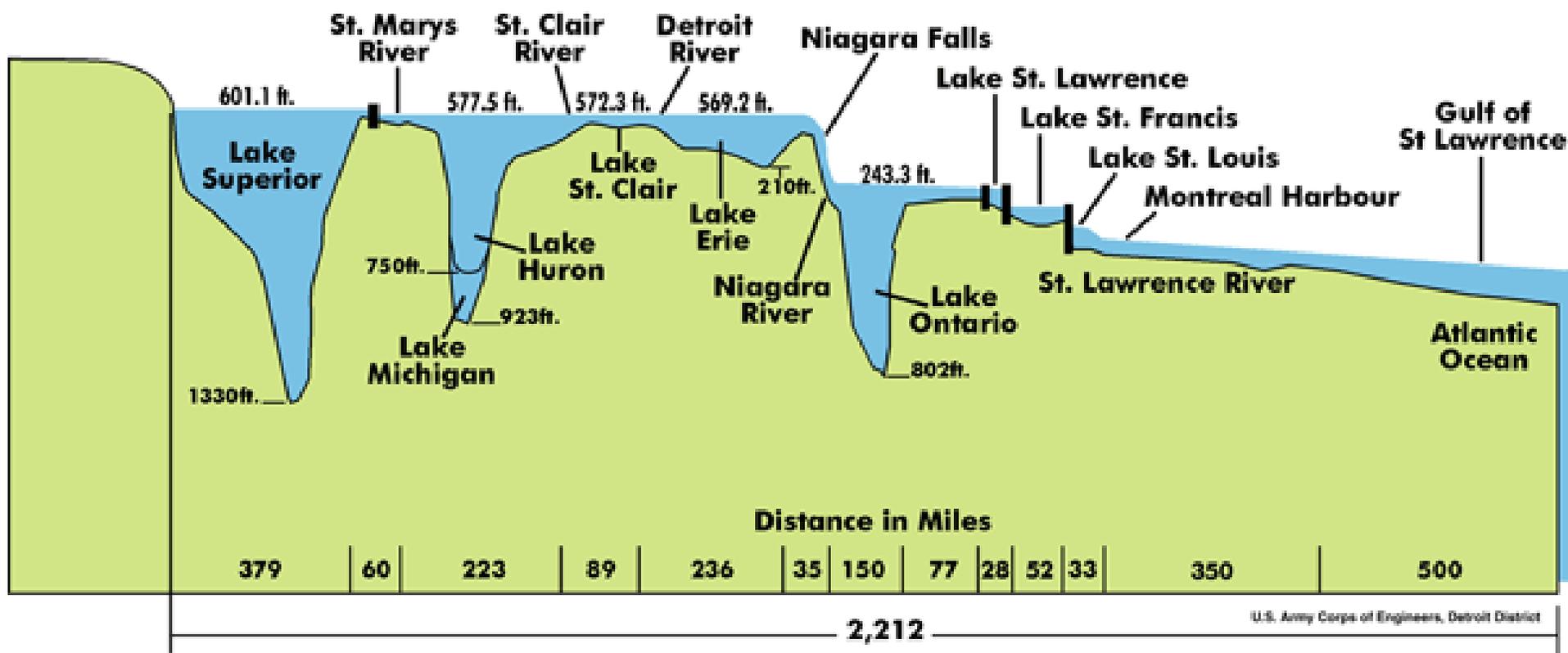
- Physical GL System
- Existing GL Navigation System
- Historical Perspective
- Today's Challenges



# Great Lakes System Profile



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# Great Lakes – St. Lawrence Seaway



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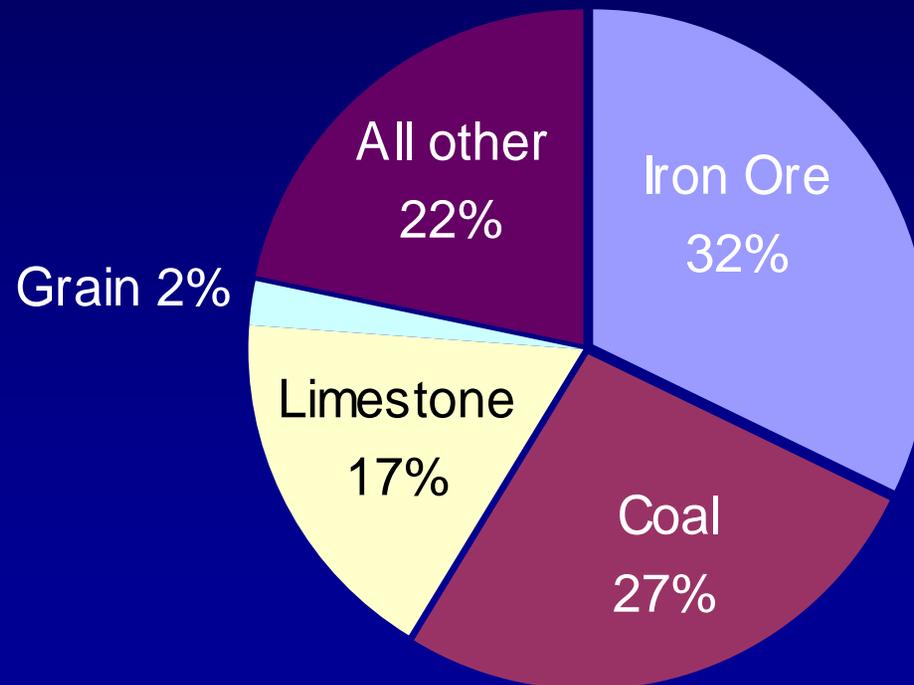


# 2003 Major Commodities

Total: 156.5m short tons



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# Iron Ore Pellets



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# *Eastern Coal*



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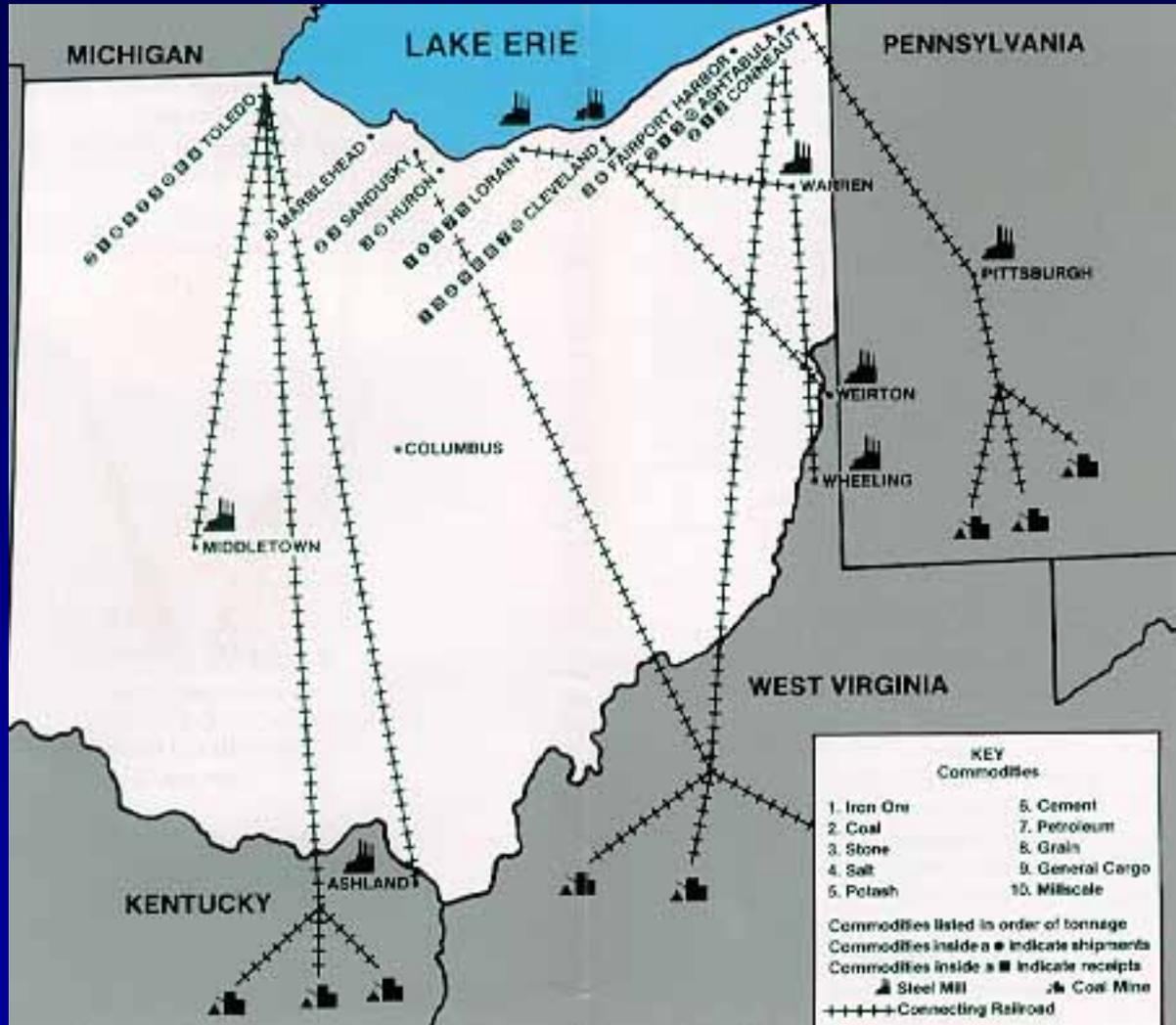




# Source of Eastern Coal



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# *Western Coal*



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# *Limestone*



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# *Great Lakes Fleet Self-Unloaders & Bulk Freighters*



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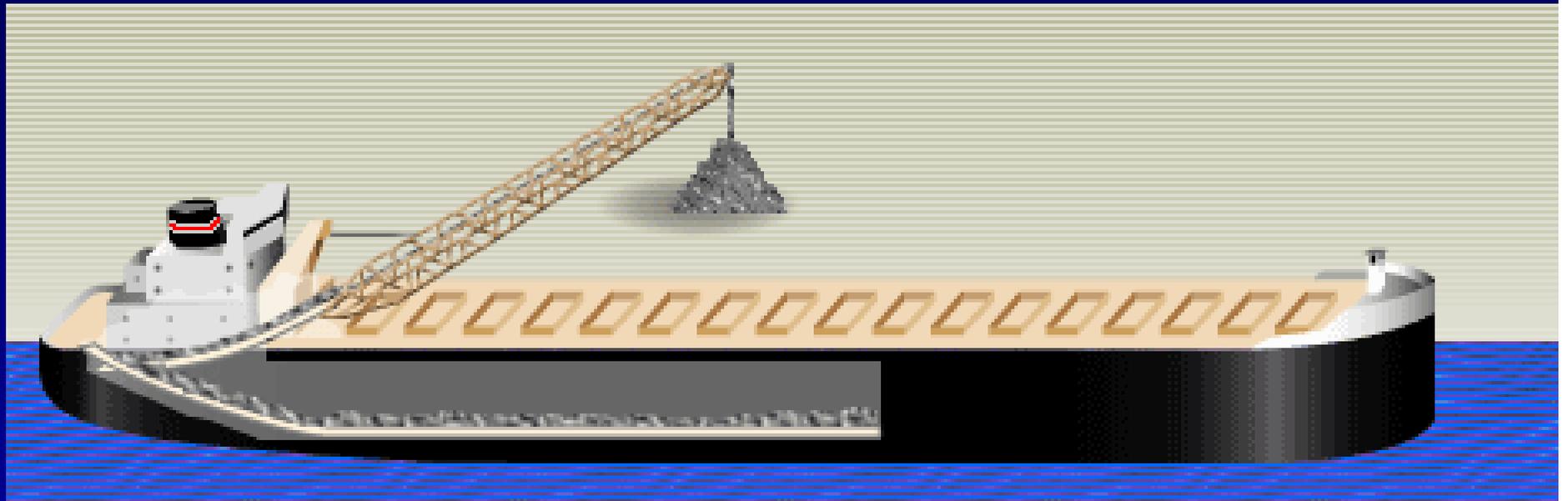
Vessel Class	U.S.	Canadian	Total
1 (<400 ft)		6	6
2 (400-499 ft)	1		1
5 (600-649 ft)	15	6	21
6 (650-699 ft)	7	4	11
7 (700-730 ft)	7	51	58
8 (731-849 ft)	12	3	15
9 (850-949 ft)	1		1
10 (950-1,099 ft)	13		13
	----	----	----
	53	70	126



# *Self Unloader*



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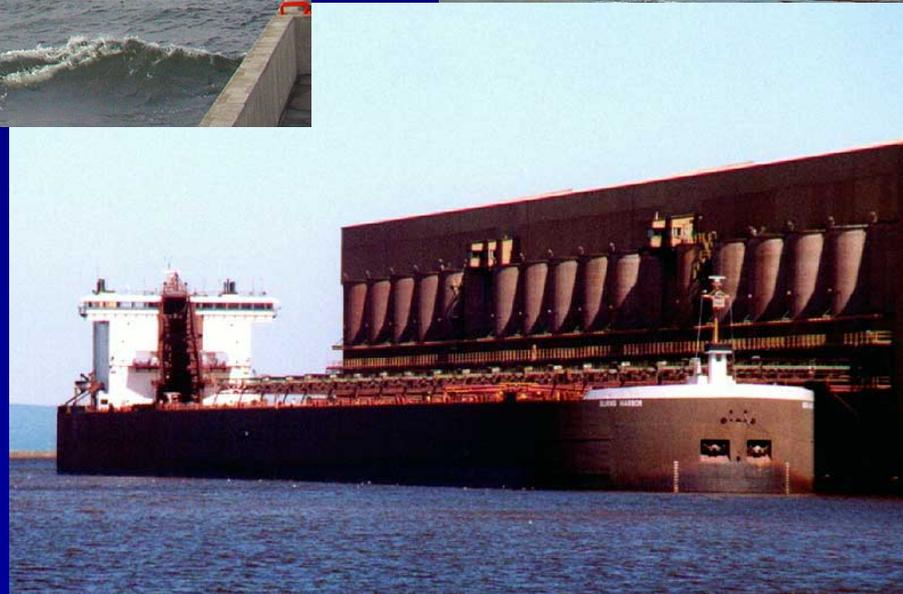




# Class X



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*One Corps Serving the Army and the Nation*



# Class VII



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Gary Clark

*One Corps Serving the Army and the Nation*

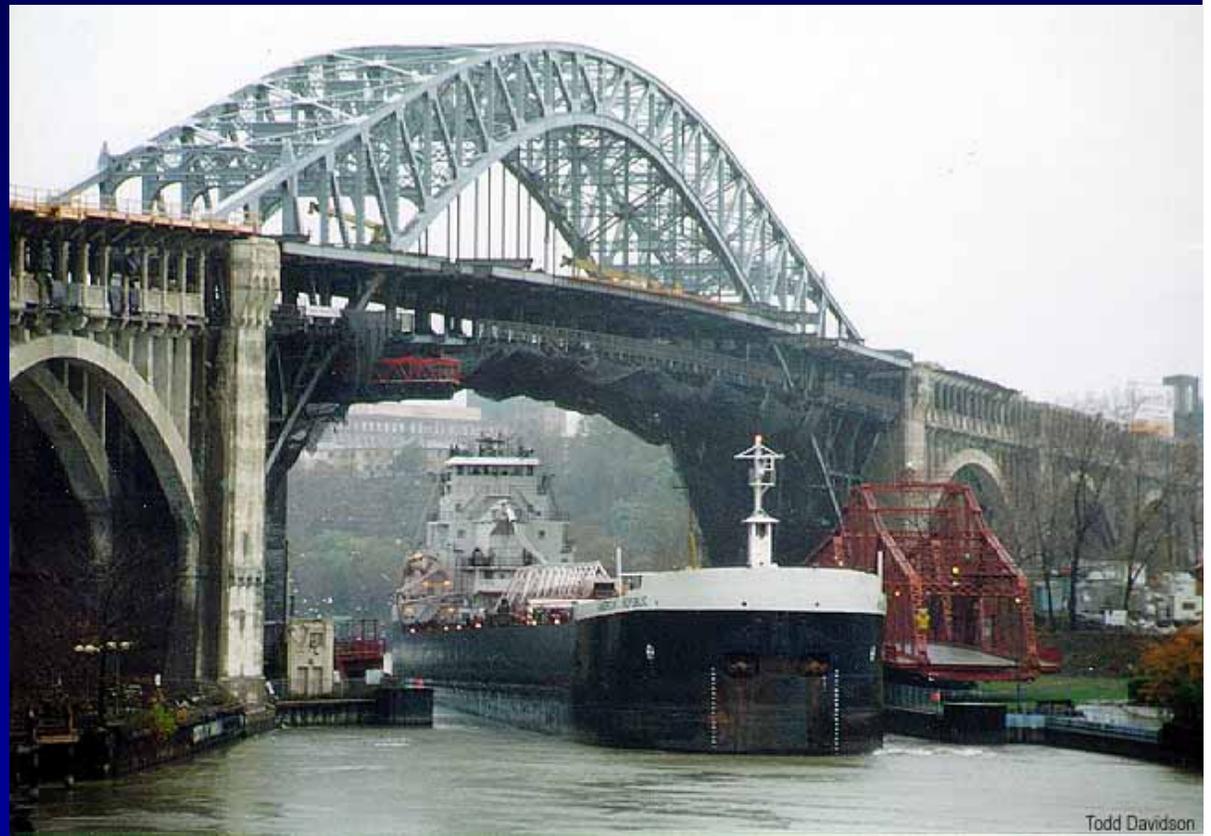


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# *Class V*



John Belliveau



Todd Davidson

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# *New Challenge Today -Maintain Existing infrastructure*



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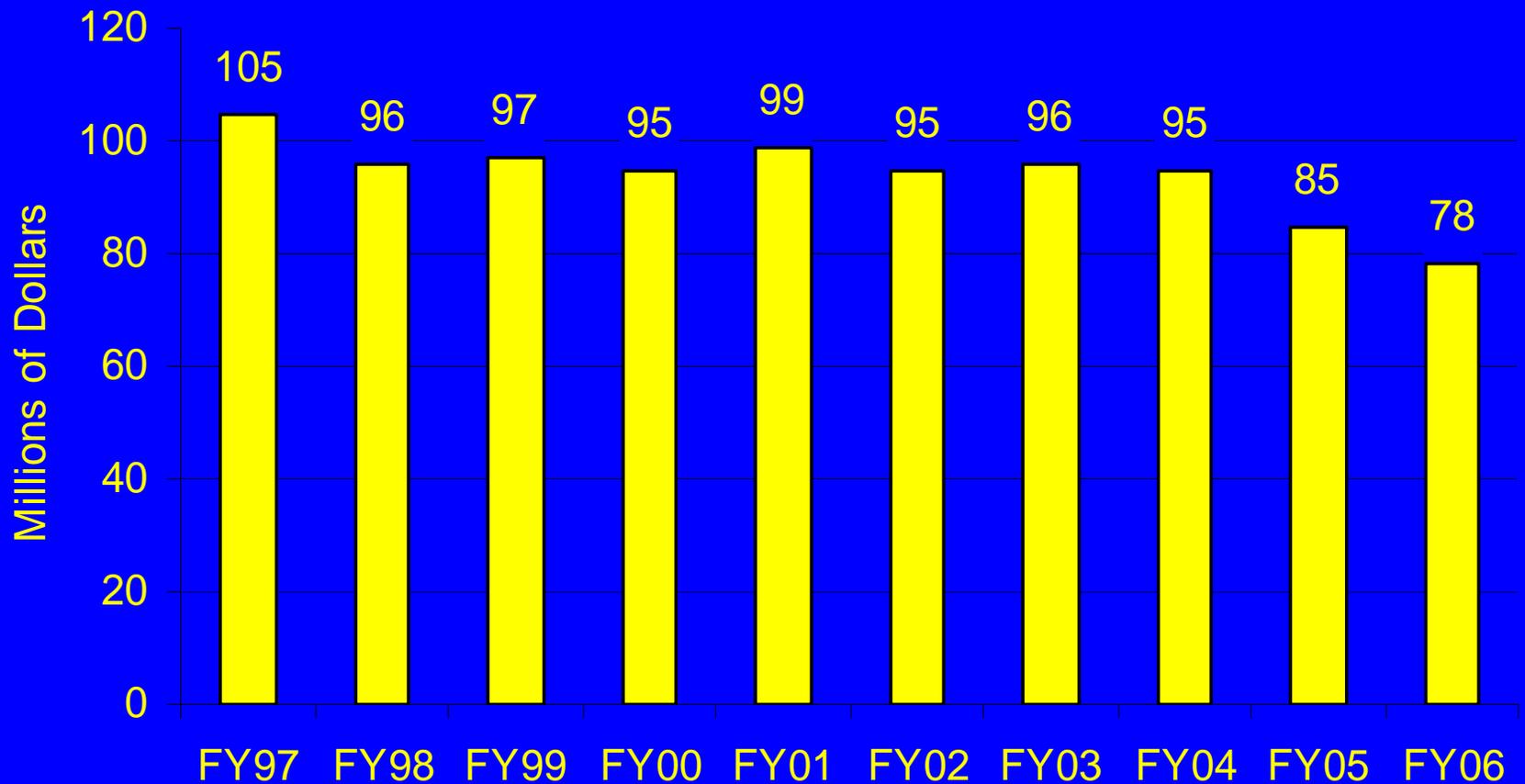




# *Flat and Declining Great Lakes O&M Budgets*



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## *Challenge: Aging Infrastructure & Restricted Navigation Channels*



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- Many navigation structures are greater than 100 years old.
- Large drainage basins, which typically discharge at Federal harbors, are responsible for rapid and heavy shoaling.





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## *Summary of Ave Annual Maintenance – Buffalo District*

- About million CY at 10 harbors dredged annually
- Up to 2,000 linear feet of navigation structures repaired by floating plant
- Approx. 1 major construction contract let for repairing navigation structures (1-3 million \$\$)





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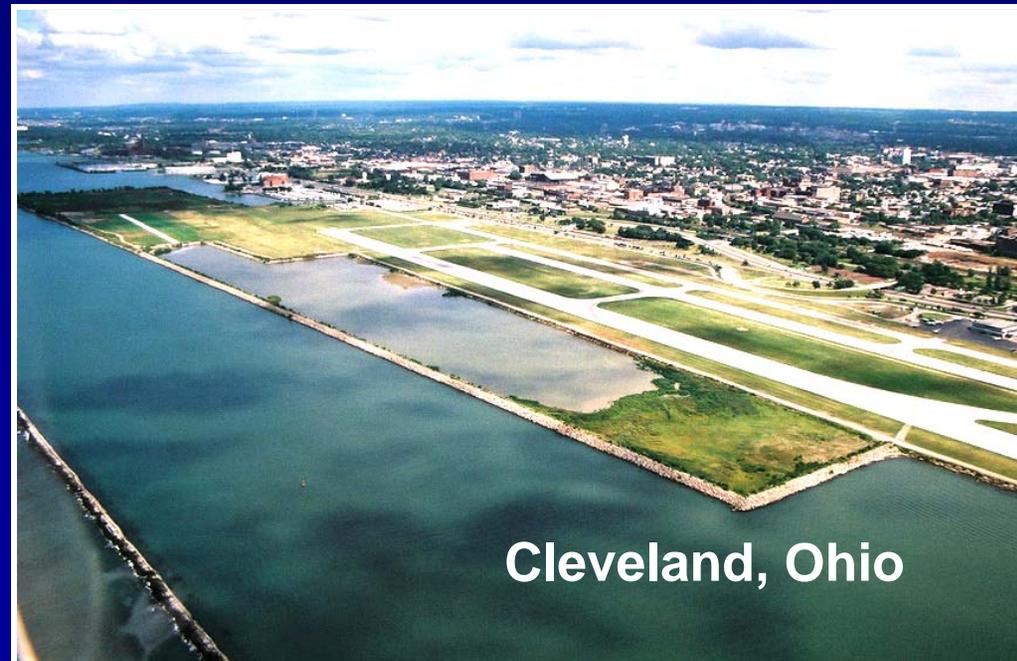
## *Confined Disposal Facilities*

Lorain, Ohio

- Dredged contaminated sediments require placement in CDF
- DMMP's reveal urgency as existing CDF's approach capacity



Toledo, Ohio



Cleveland, Ohio



## *Consequence of High Risk Level*



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- Increased transportation costs
- Loss of industry, jobs and tax revenue
- Shift from waterborne to land-based transportation
- Increased air pollution and highway accidents





# *NETS*

## *GL Application*



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## Problems & Needs

- Insufficient data to make informed decisions
- Lack data and tools for measuring impacts with a system-wide perspective
- Non-traditional benefits rarely used



# *NETS*

## *GL Application*



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### Multi-phase Effort

- Improving the level of data available
- Developing assessment tools
- Develop evaluation methods
- Develop computer models
- Develop Nontraditional benefits



# ***NETS***

## ***GL Application***



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### Short Term (FY05-06)

- Develop initial evaluation tools and method to prioritize proposed Great Lakes maintenance activities
- Assess data requirements and method to efficiently update and maintain relevant databases
- Establish groundwork for a risk and reliability framework to evaluate and prioritize the existing infrastructure repair and rehabilitation projects



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## ***Tasks (Long Term)***

# ***Non-traditional Benefits***

- Identify how to measure
- Develop methodology
- Make estimates
- Develop conceptual model in a system context



# *Tasks (Long Term)*

## *Comprehensive Risk & Reliability System for GL*



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- Develop method of projecting engineering cost based on harbor infrastructure reliability assessment
- Develop detailed comprehensive model, including required data sets, description of validation process, and output reports suitable for prioritizing investment options under unconstrained and constrained budget conditions



# Maintenance Dredging Model Inputs and Outputs



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