BINNENSCHIFFFAHRT IN DEN VEREINIGTEN STAATEN

INLAND WATERWAY TRANSPORT IN THE UNITED STATES

von / by

David GRIER

Inland Waterway Transport in the U.S.

Presentation to
NAVILOG 2002 International Workshop
University of Hannover, Germany

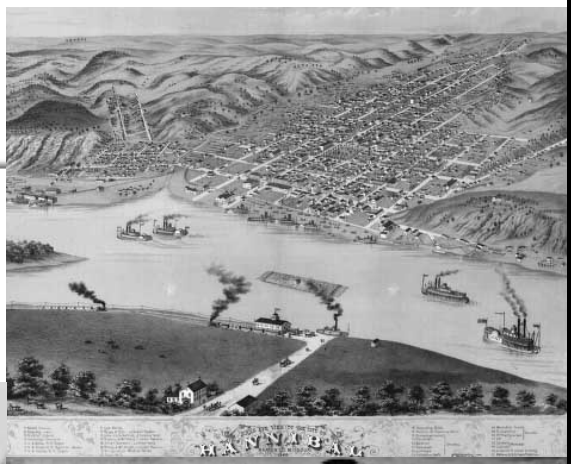
David V. Grier
Institute for Water Resources
U.S. Army Corps of Engineers

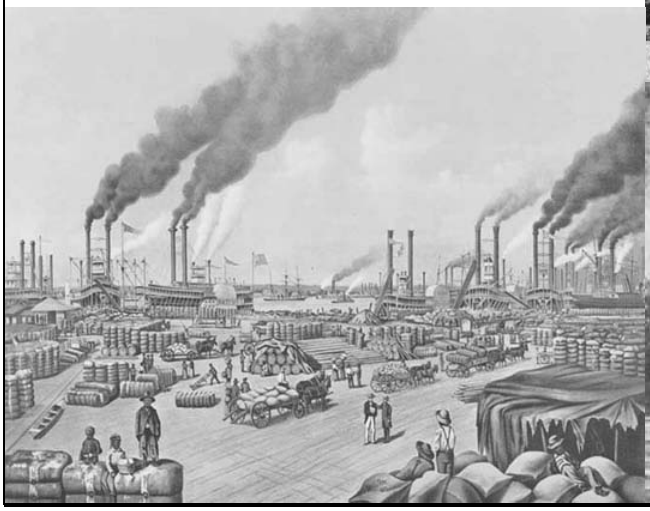
Corps of Engineers Activities

- **Civil Works Missions**
  - **Navigation**
  - **Flood Control**
  - **Hydropower**
  - **Environmental Stewardship**
  - **Emergency Response & Recovery**
  - **Shore & Hurricane Protection**
  - **Water Supply**
  - **Recreation**
  - **Regulatory Programs**

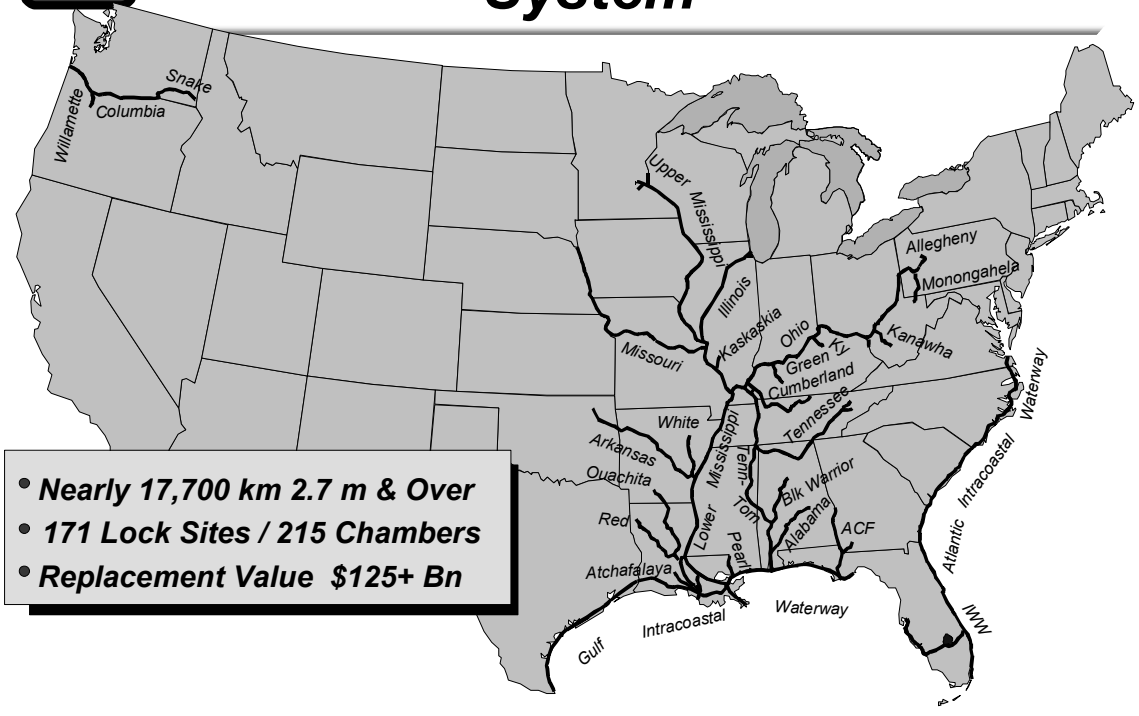
Corps' role in navigation

- **1824 – authority to clear snags and make improvements**
- **Post Civil War – suction dredging, jetties**
- **1885: 1st of 46 locks and dams on Ohio**

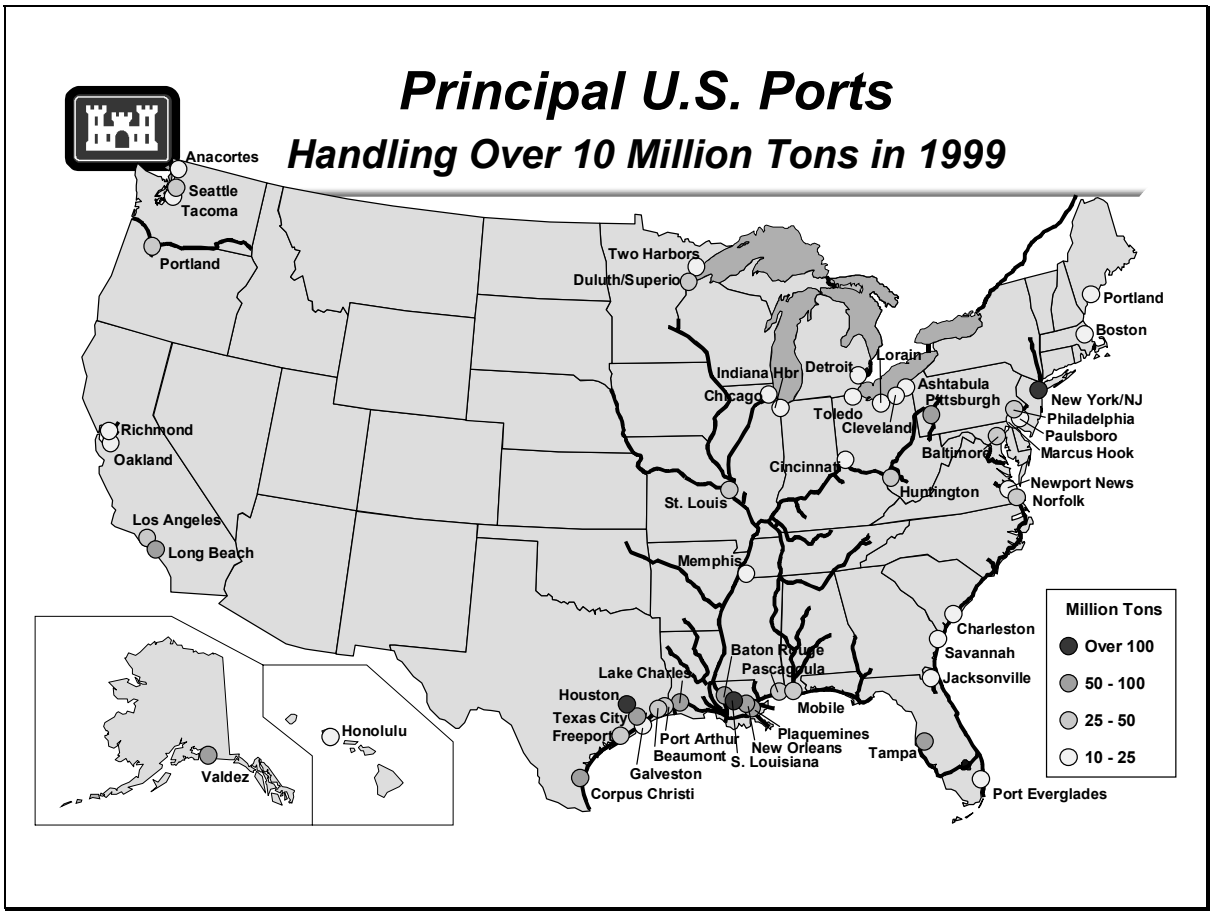




U.S. Fuel-Taxed Waterway System

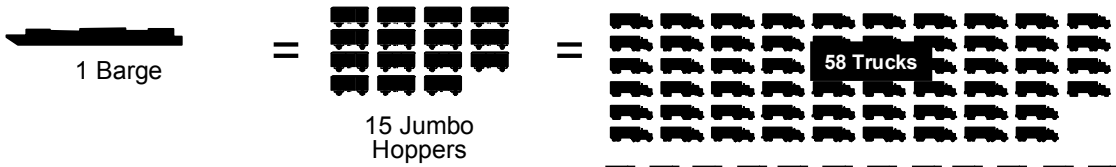


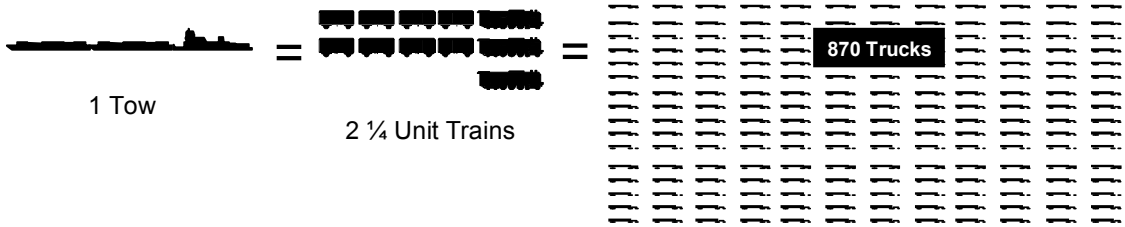
- ***Nearly 17,700 km 2.7 m & Over***
- ***171 Lock Sites / 215 Chambers***
- ***Replacement Value $125+ Bn***



Alternate Transportation Mode Comparison

Barge	15-Barge Tow	Jumbo Hopper Car	100 Car Unit Train	Large Semi
1,500 Ton	22,500 Ton	100 Ton	10,000 Ton	26 Ton
52,500 Bushels	767,500 Bushels	3,500 Bushels	350,000 Bushels	910 Bushels
453,000 Gallons	6,804,000 Gallons	30,240 Gallons	3,024,000 Gallons	7,865 Gallons





Equivalent Lengths

¼ Mile
15 Barge Tow

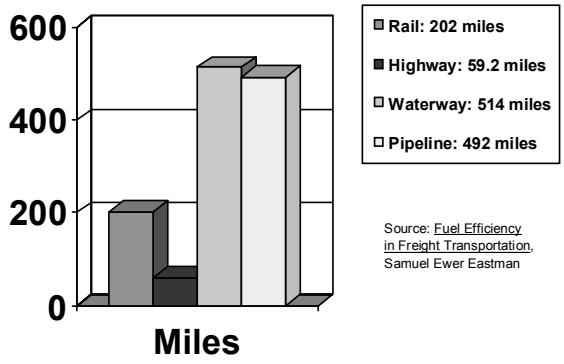
2 3/4 Miles
2 1/4 Unit Trains

34 1/2 Miles
Assuming 150 Ft. Between Trucks

Waterways Are Fuel Efficient

- **Barge transportation is the most fuel efficient method of moving the raw materials needed by the nation**

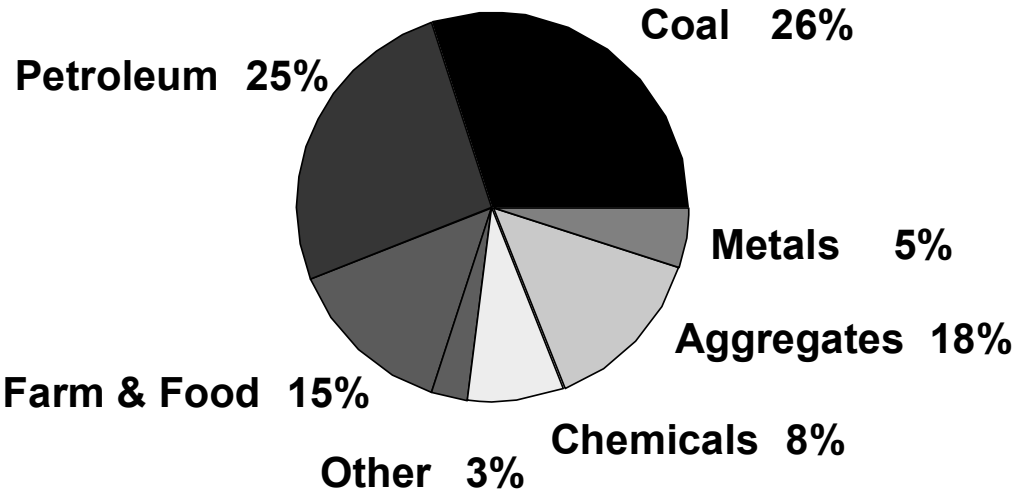
Distance One Gallon of Fuel Moves One Ton



Source: Fuel Efficiency in Freight Transportation, Samuel Ewer Eastman

Inland Waterway Commodities

Share by Tonnes, 2000

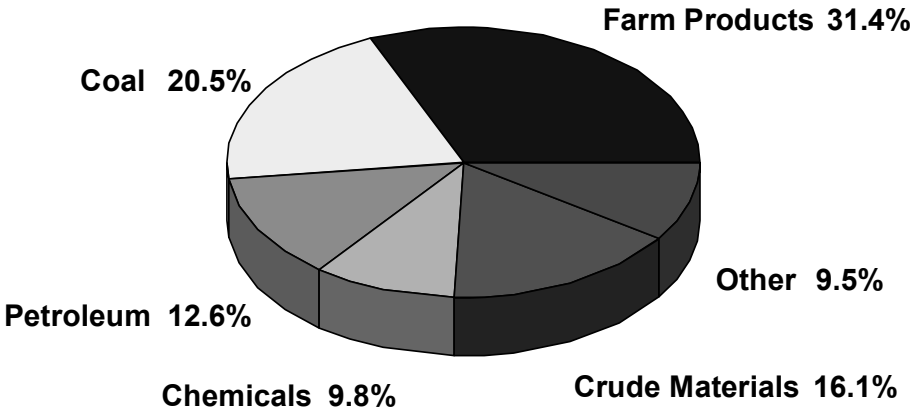


Total: 570 Million Metric Tonnes (2000)

Inland Waterway Commodities

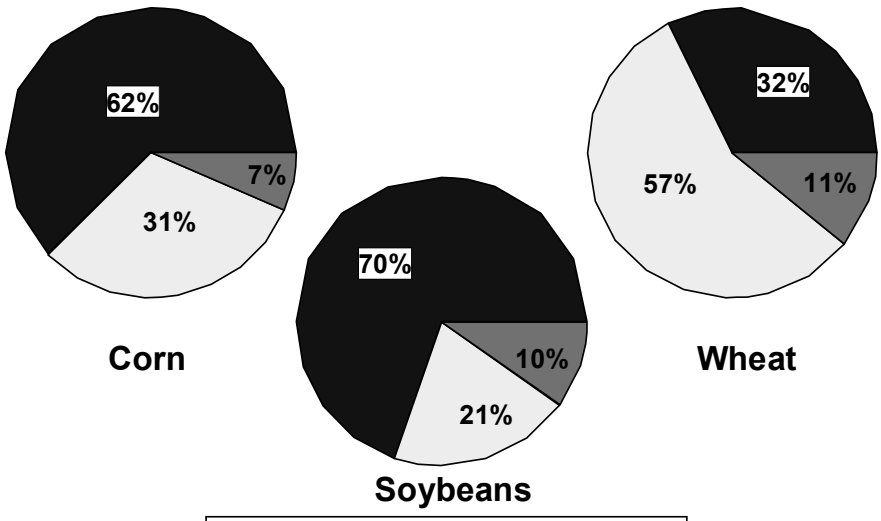
Share by Tonne-Km, 1999

Total: 445 billion tonne-km



Grain Exports by Modal Share

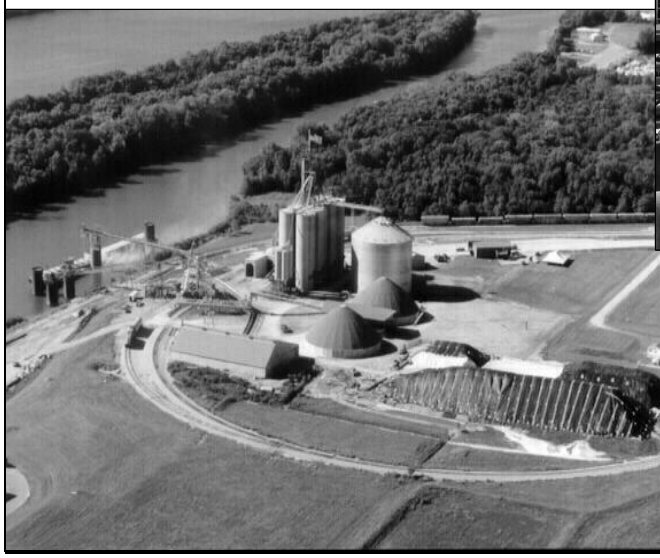
Average: 1978-95



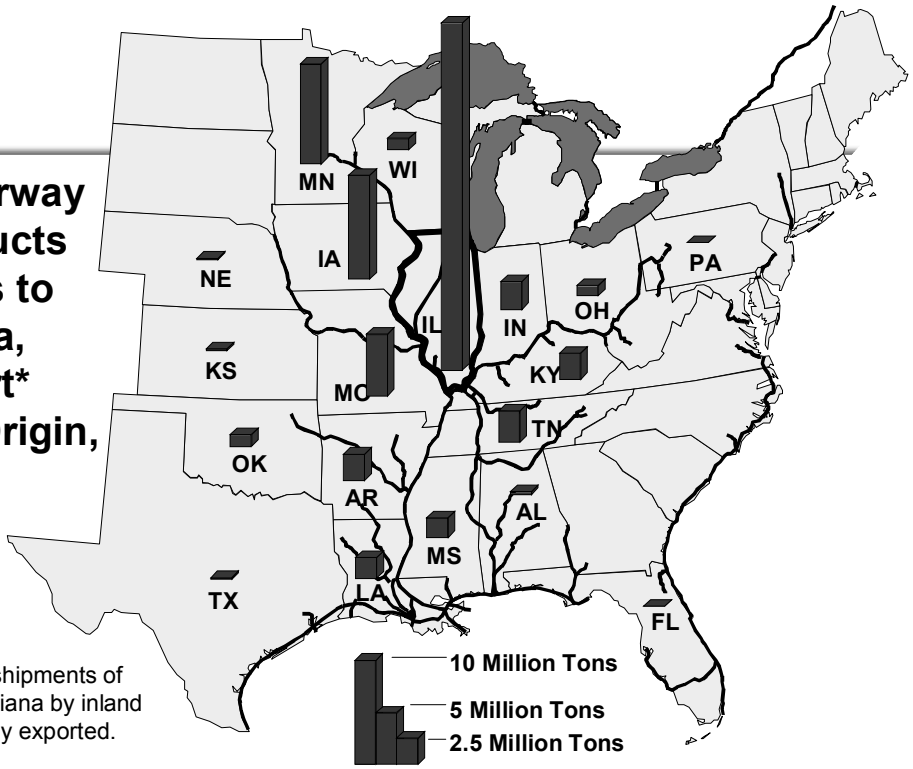
Source: USDA,
Transportation of US Grain,
March 1998

Inland Waterways Role in Economic Development

- **Grain Exports**
  - *90 million tons annually*



Inland Waterway Farm Products Shipments to Louisiana, for Export* by State of Origin, 1999

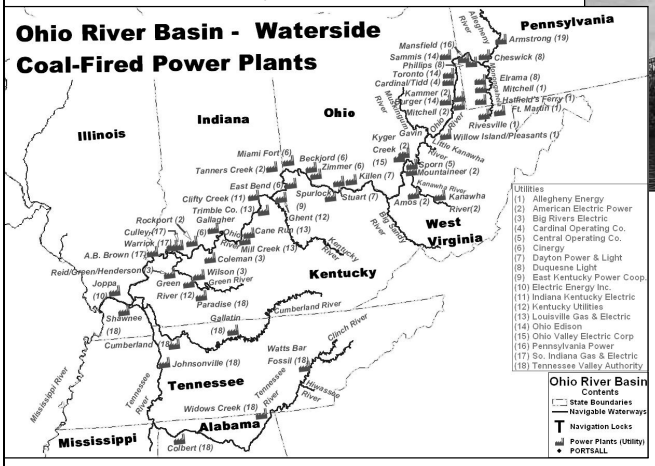


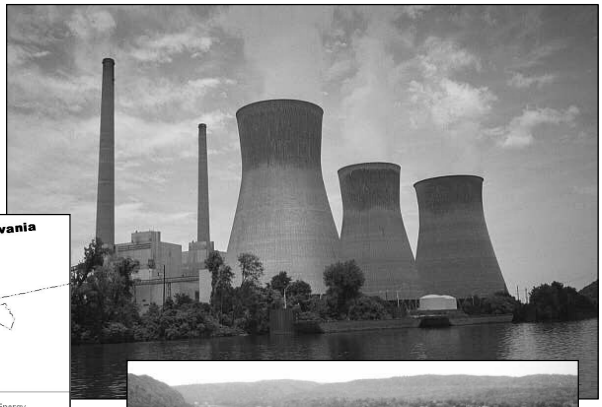
*Data suggests most shipments of farm products to Louisiana by inland waterway are ultimately exported.

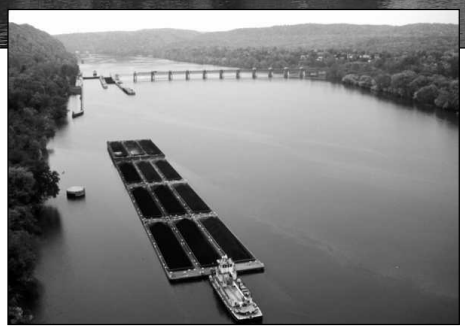
Source: Waterborne Commerce of the U.S., 1999.

Inland Waterways Role in Economic Development

- **Coal for power plants**
  - *170 million tons annually*





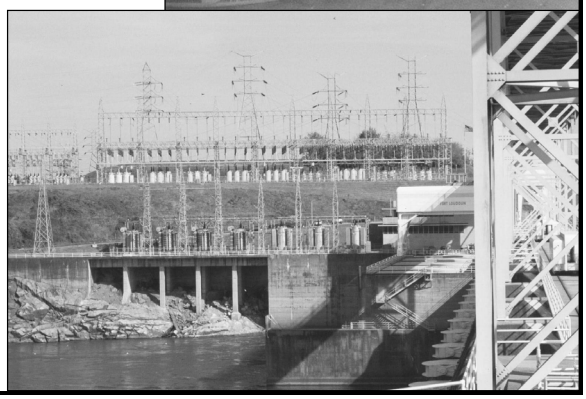


Inland Waterways Role in Economic Development

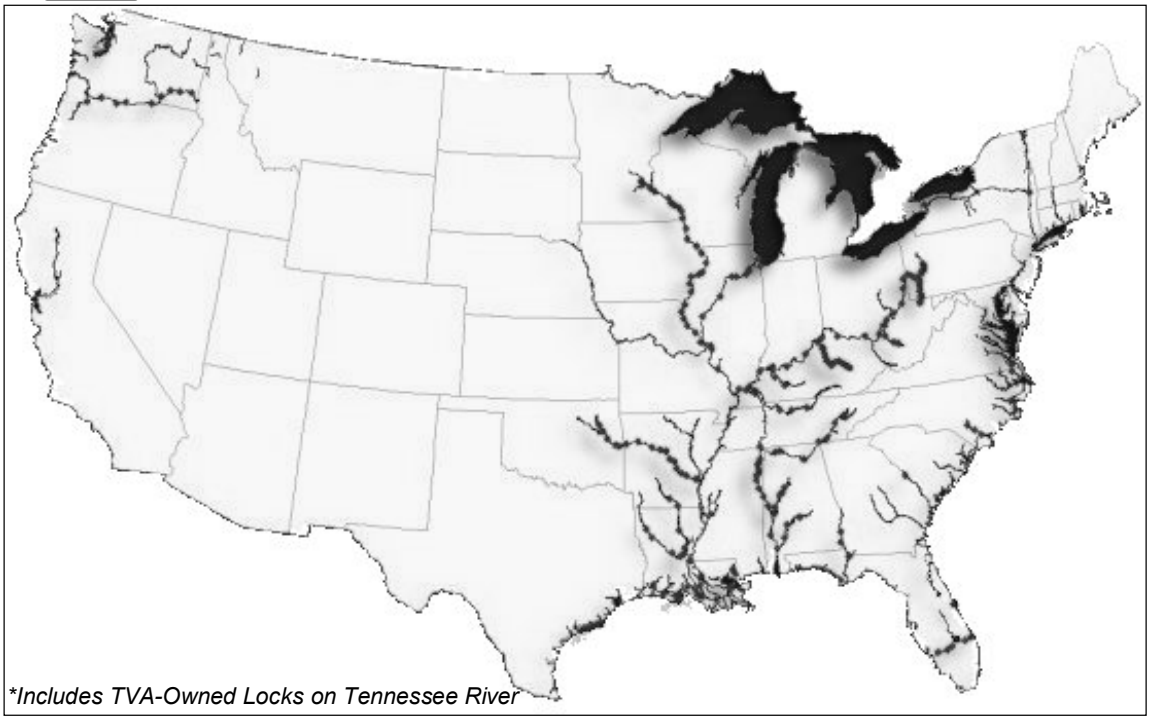
- **Petroleum**
  - *150 million tons annually*

Regional Development
other waterway uses

- **Hydropower**
- **Flood Protection**
- **Water Supply**
- **Recreation**
- **Environmental Stewardship**

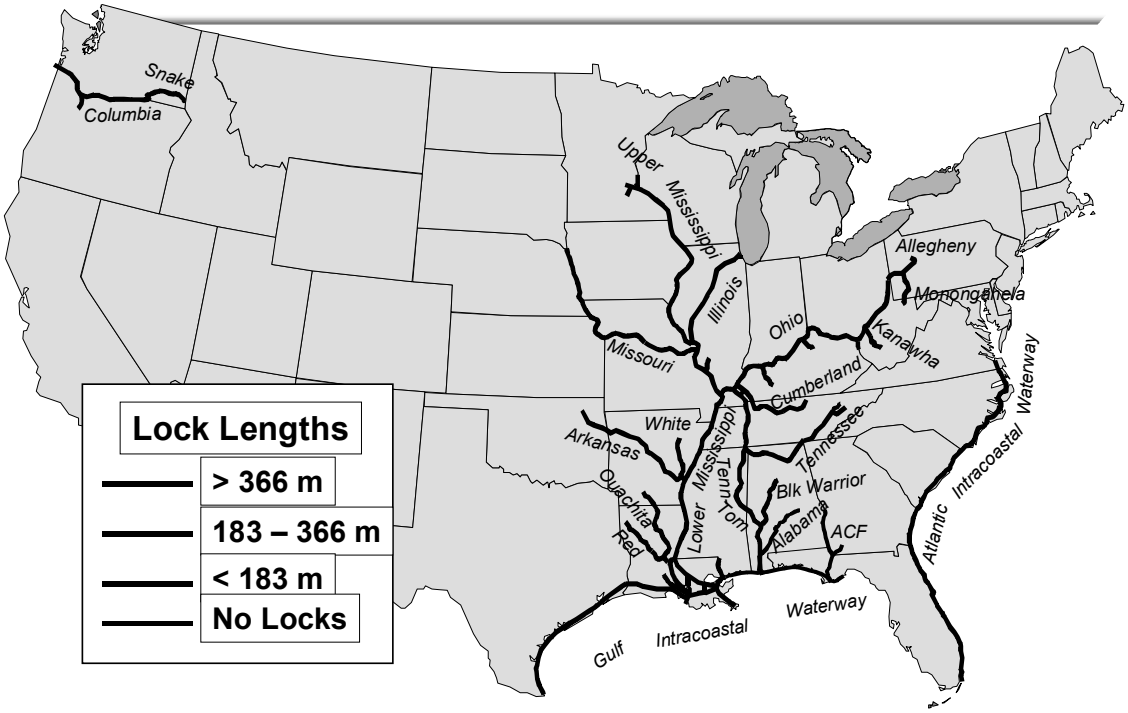


Locks Owned or Operated by US Army Corps of Engineers*



**Includes TVA-Owned Locks on Tennessee River*

U.S. Inland Waterway Lock Dimensions

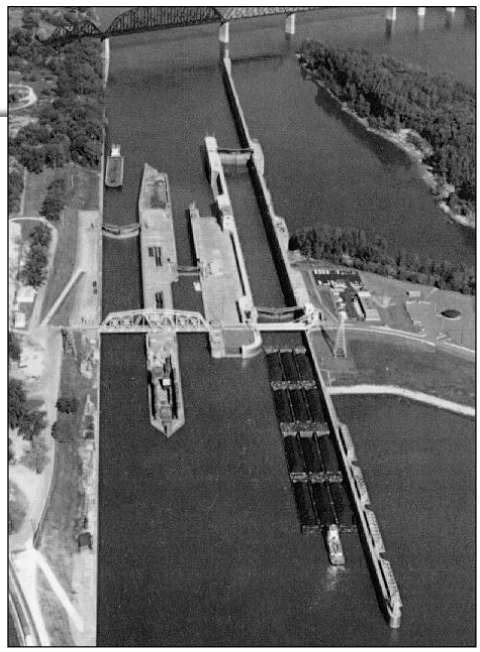


Lock Sizes

And Waterway Characteristics

Variations in capacity by waterway...

Large mixed tows of over 30 barges are common on open water stretches of the Lower Mississippi River



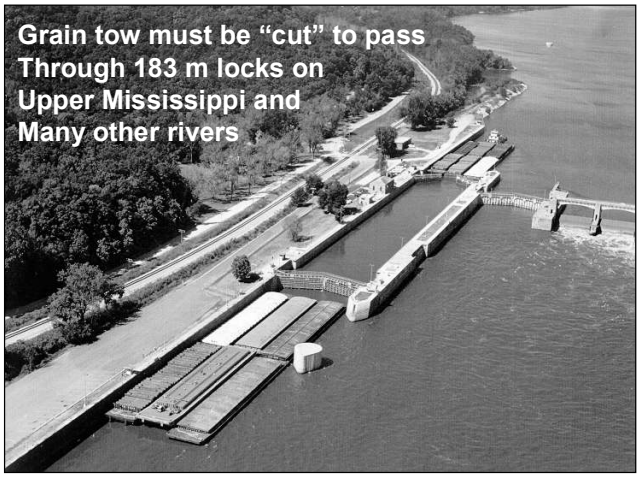
Common 15-barge coal tow at 366 m lock on Ohio River

Lock Sizes

And Waterway Characteristics

Variations in capacity by waterway...

Tows on the Gulf Intracoastal Waterway are long and narrow to pass in the channel and through flood control locks



Grain tow must be "cut" to pass Through 183 m locks on Upper Mississippi and Many other rivers

Tows on Columbia/Snake system in Pacific Northwest use unique locks with lifts over 30 meters. Tows can draft 4.3 m.

Why delays at locks?

Multiple lockages to pass a tow result in long queues that are costly and inefficient.

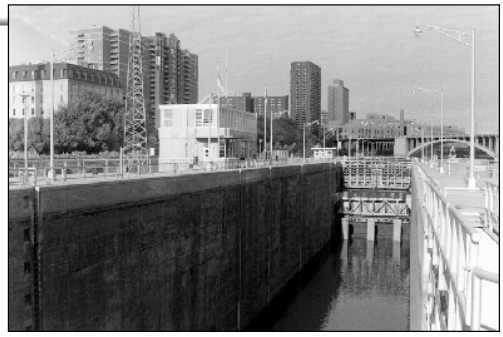
Queues at old L&D 26 on the Mississippi could last hours or even days.

A new 366-meter main chamber allows tows of 15 barges to pass in a single lockage, eliminating most of the delay.

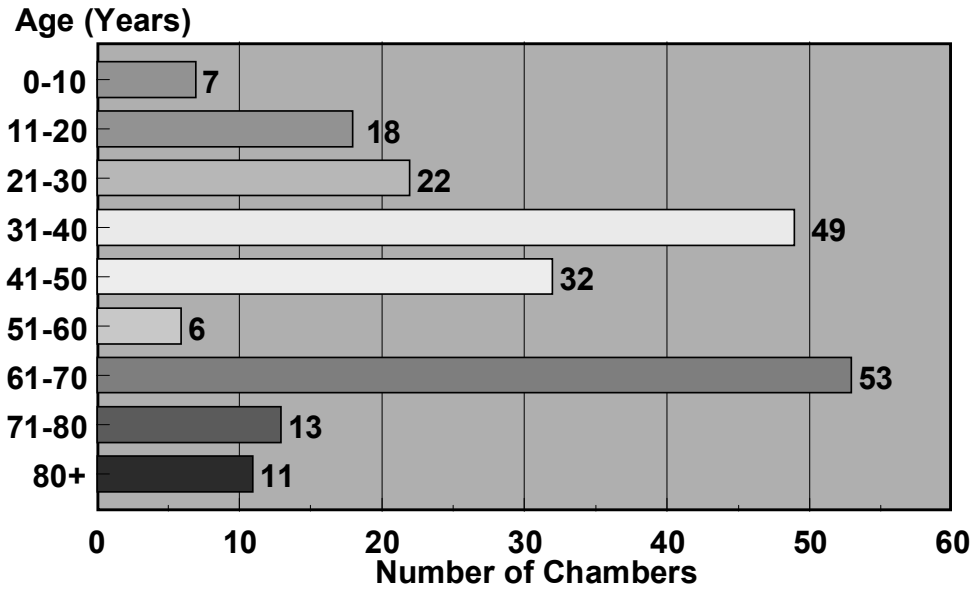
The new lock handles 64 million metric tonnes annually -- mostly export grain.

Aging Water Resources Infrastructure

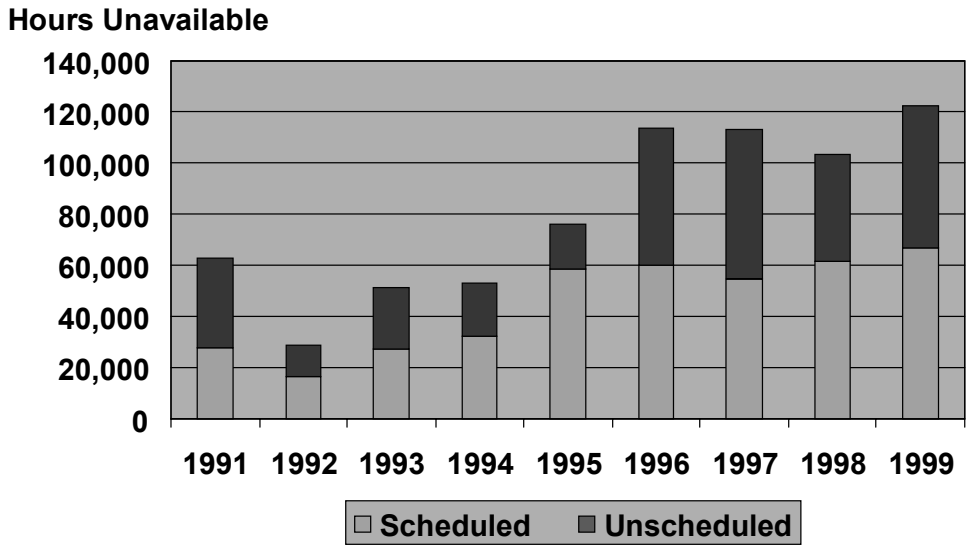
- **Investments in water resources infrastructure have declined**
- **Aging infrastructure results in more frequent closures for repairs, decreased performance and costly delays**

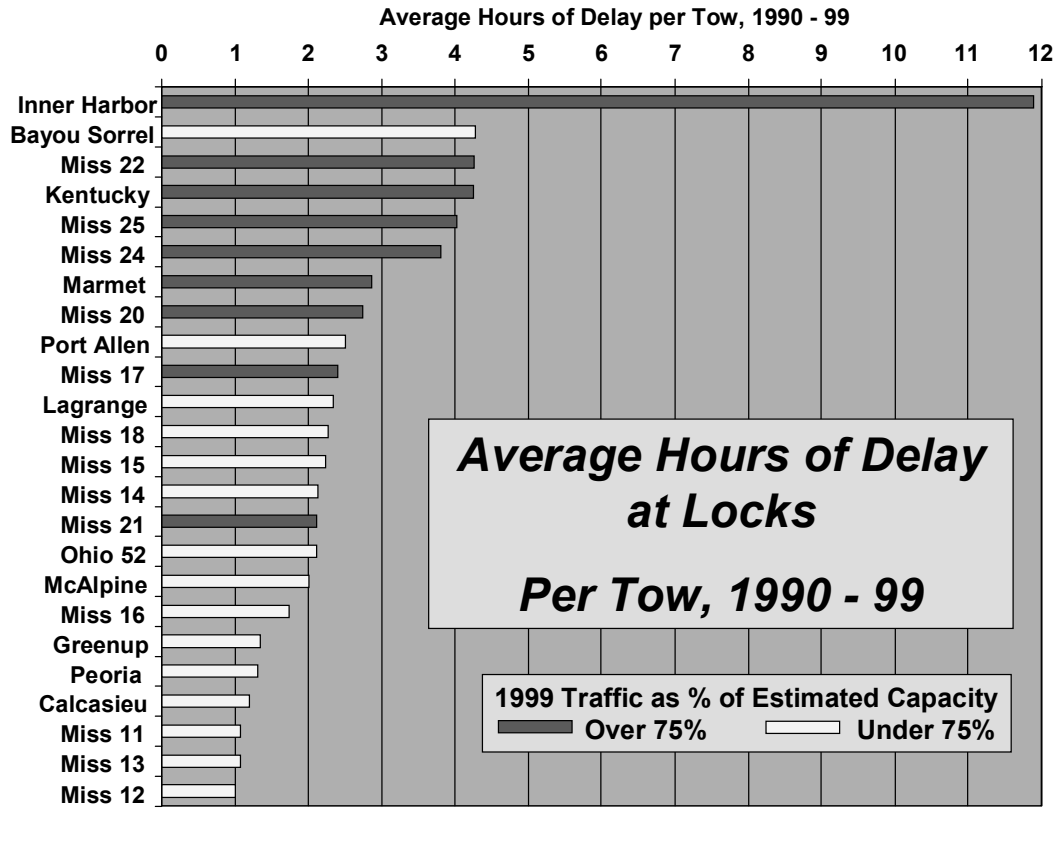


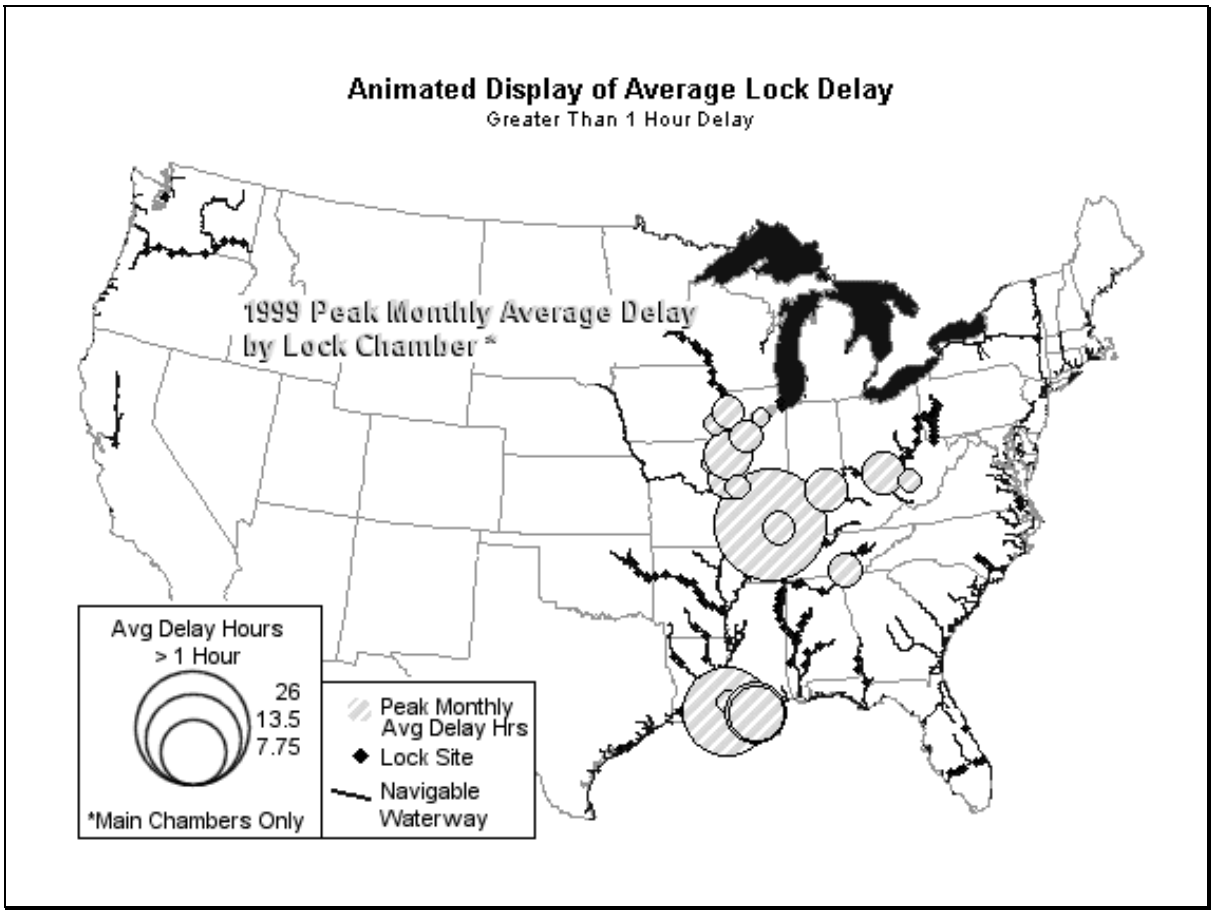
Aging Lock Inventory

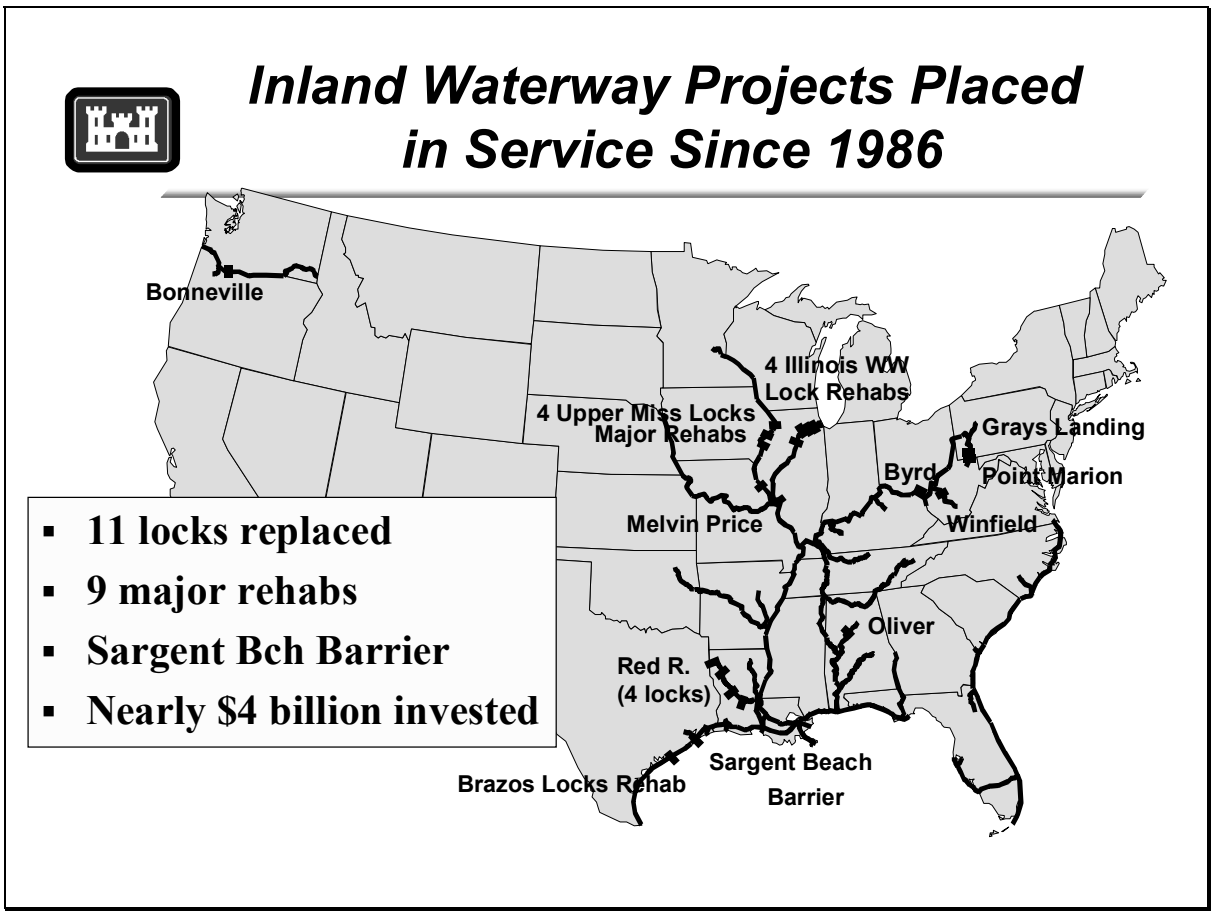


Navigation Lock Unavailability
Total Hours - Scheduled vs. Unscheduled






Animated Display of Average Lock Delay
Greater Than 1 Hour Delay
1999 Peak Monthly Average Delay by Lock Chamber *
Avg Delay Hours > 1 Hour
26
13.5
7.75
*Main Chambers Only
Peak Monthly Avg Delay Hrs
Lock Site
Navigable Waterway


Inland Waterway Projects Placed in Service Since 1986
Bonneville
4 Illinois WW Lock Rehabs
4 Upper Miss Locks Major Rehabs
Grays Landing
Byrd
Point Marion
Melvin Price
Winfield
Oliver
Red R. (4 locks)
Sargent Beach Barrier
Brazos Locks Rehab
▪ 11 locks replaced
▪ 9 major rehabs
▪ Sargent Bch Barrier
▪ Nearly $4 billion invested

Inland Navigation Locks Operational Since 1986

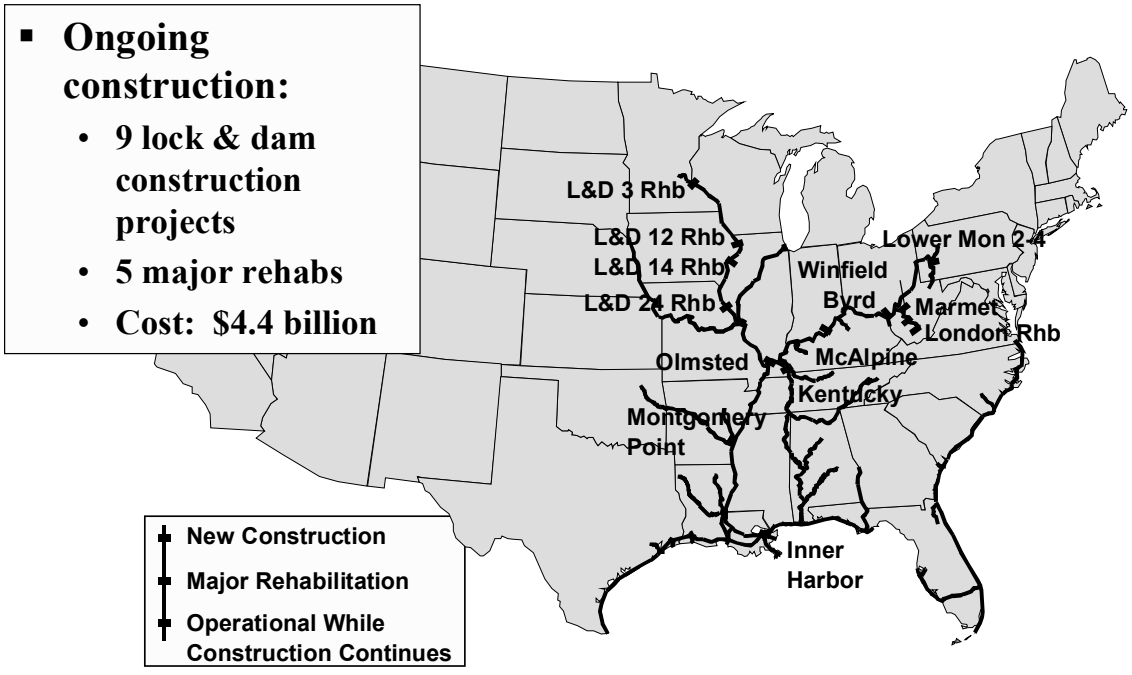
Waterway	Project	Cost ($ m)	Operational	Size (m)
Black Warrior	Oliver	120	1991	183 x 33.5
Columbia	Bonneville	341	1993	206 x 26.2
Kanawha	Winfield	222	1997	244 x 33.5
Monongahela	Grays Landing	181	1993	219 x 25.6
	Point Marion	102	1994	219 x 25.6
Ohio	Byrd Main	379#	1993	366 x 33.5
	Byrd Aux		1993	183 x 33.5
Red*	5 Locks	1,892	1987-94	215 x 25.6
Upper Miss	Price Main	741#	1990	366 x 33.5
	Price Aux		1994	183 x 33.5
Total		$3,978		

** Red River costs include all construction, including 5 locks and dams, channel alignment and stabilization, and other features.*

 # Cost includes both lock chambers.

Inland Waterway Construction Projects Underway

- **Ongoing construction:**
  - **9 lock & dam construction projects**
  - **5 major rehabs**
  - **Cost: $4.4 billion**



Olmsted Locks & Dam

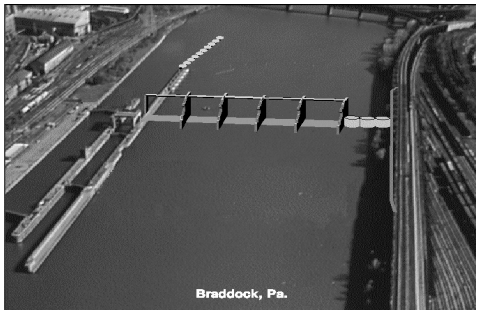
Lower Ohio River

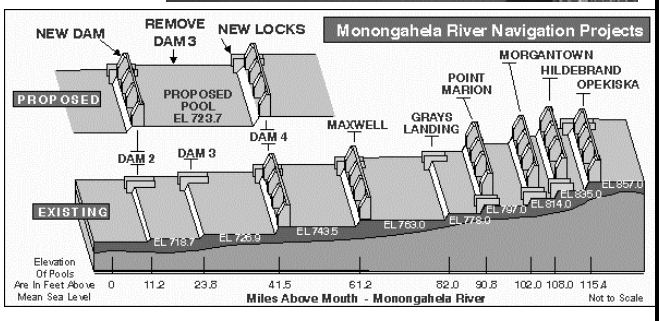
- **Replace L&D 52 and 53 on Ohio River (c. 1929)**
- **Twin 33,5 x 366 m locks scheduled for completion November 2001**
- **Phased in-the-wet construction of dam sections proposed**
- **Total cost: $1.05 Billion**
- **Completion: about 2010**
- **Funding Status:**
  - **Thru 2000: $457 million**
  - **'01: $ 55 million**
  - **'02: $ 40 million**
  - **Capability $ 90 million**

Braddock L&D (Mon L&D 2)

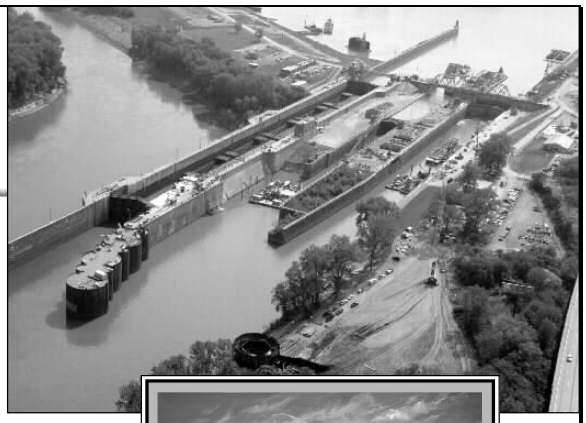
Lower Monongahela River

- **New gated dam to replace old Dam 2**
- **$107.4 M contract awarded Jul '99**
- **First use of innovative "In-The-Wet" construction techniques**
- **Complete dam in 2002**
- **Future – remove old L&D 3, new larger locks at Charleroi (L&D 4)**
- **Funding Status:**
  - **Total Cost: $705 million**
  - **Thru 2000: $120 million**
  - **2001: $ 65 million**
  - **2002: $ 40.5 million**
  - **Capability: $ 67 million**

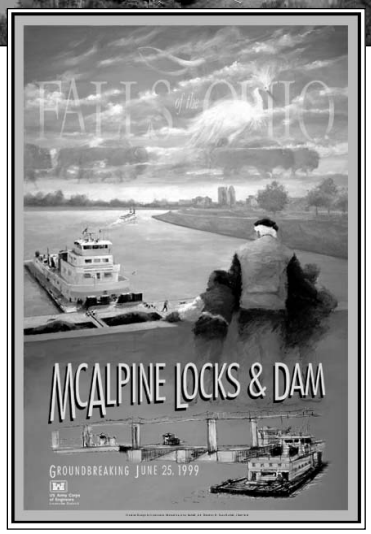




McAlpine L&D
Ohio River

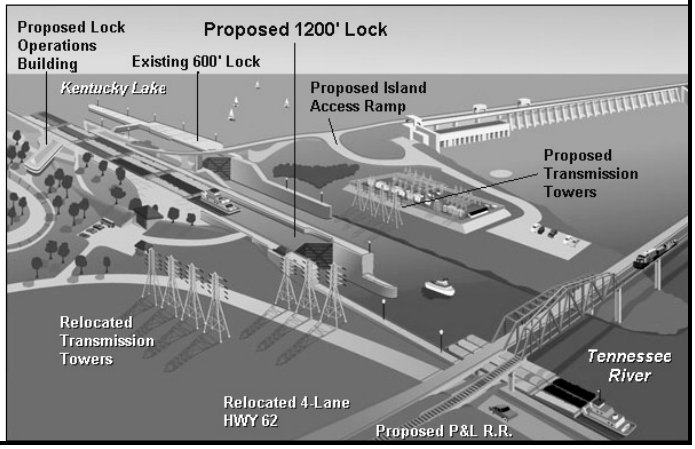


- **Second 33,5 x 366 m lock**
- **Replace 33,5 x 183 m auxiliary and inactive third chamber**
- **Cofferdam complete**
- **Complete entire project 2007**
- **Funding Status**
  - **Total cost: $276 million**
  - **Thru 2000: $ 36 million**
  - **2001: $ 24 million**
  - **2002: $ 18.6 million**
  - **Capability: $ 24 million**



Kentucky L&D
Tennessee River

- **Groundbreaking October 15, 1999**
- **New 33,5 x 366 m lock**
- **Complete about 2010**
- **Funding Status:**
  - **Total cost: $533 million**
  - **Thru 2000: $ 45 million**
  - **2001: $ 25 million**
  - **2002: $ 22 million**
  - **Capability: $ 55 million**

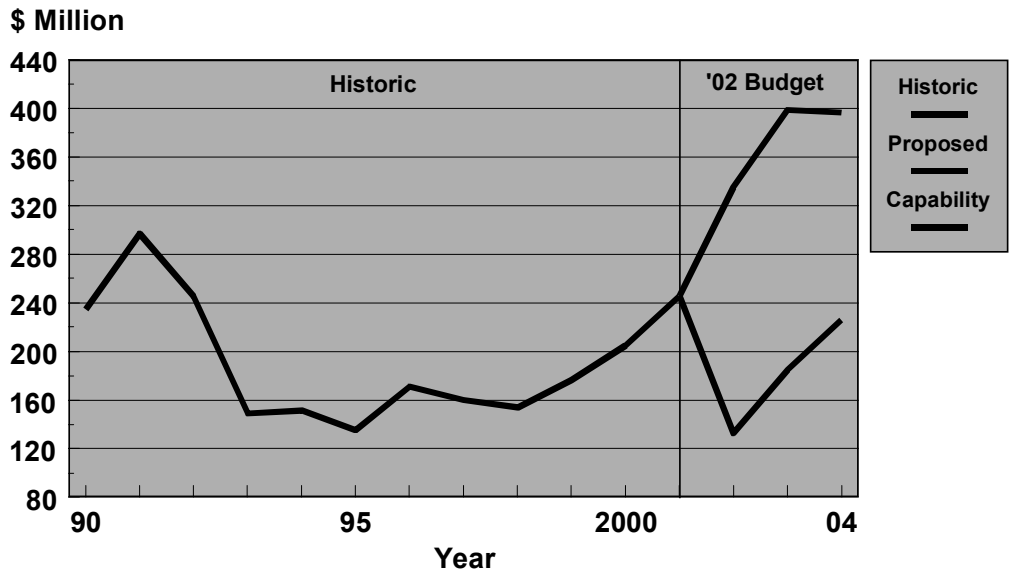


Inner Harbor Lock Replacement

Gulf Intracoastal Waterway, New Orleans

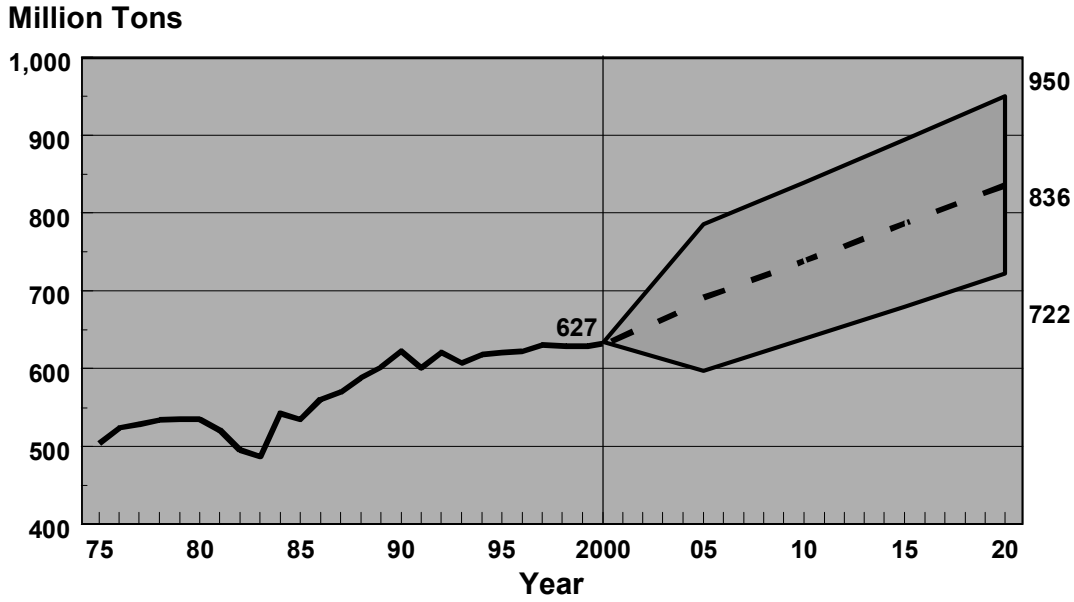
- **Replace 23 x 195 m lock, opened in 1921**
- **New 33,5 x 366 m lock further up Inner Harbor Canal**
- **$37 million for Community Impact Mitigation Plan, preserves historic neighborhood**
- **Funding Status:**
  - **Total Cost: $603 million**
  - **Thru 2000: $ 37.8 million**
  - **2001: $ 33.4 million**
  - **2002: $ 13 million**
  - **Capability: $ 42 million**

Funding for Lock & Dam Construction Cost-Shared with IWTF: 1987 - 2004



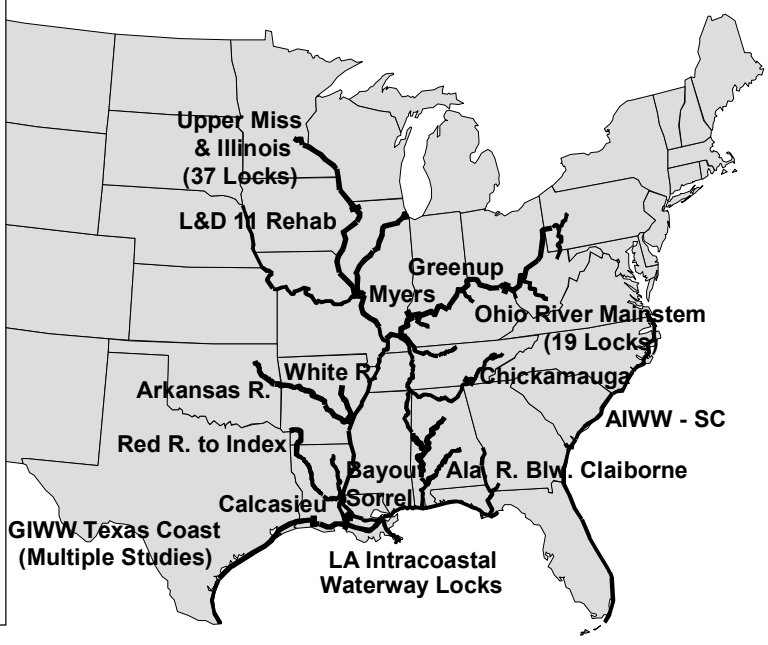
Total U.S. Inland Waterway Traffic

Historic and Forecast: 1975-2020



Major Inland Navigation Studies

- **Several major studies of inland navigation needs to and beyond 2020**
  - **Ohio River – 183 m lock extensions at Greenup and Myers authorized**
  - **Upper Miss / IL Wwy**
  - **GIWW: Bayou Sorrel & Calcasieu**
  - **Chickamauga Lock**
  - **Texas GIWW**
  - **Arkansas River**



U.S. Inland Waterways Summary

- **Critical to the U.S. economy**
  - **15% of intercity freight including 50% of grain exports, 20% of coal for electricity**
  - **Low cost and efficient with fewer environmental impacts**
- **Aging infrastructure in need of modernization**
  - **Lock downtime has doubled since 1991 – over 122,500 hours in 1999**
  - **24 critical locks average 1-12 hours of delay**
  - **Costs to industry over $155 million annually**
  - **Traffic at 9 of these locks exceeds 75% of estimated capacity**
  - **Only 2 have larger replacement locks underway**
- **Larger modern locks are costly: $200 million to over $1 billion**
- **Limited available funding slows construction and postpones new starts**
- **Funding will continue to be a major challenge to system modernization**