

# Changing Course: Implications of a Lower Mississippi River Avulsion

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# Background

- Importance of Lower Mississippi for Commerce
  - Bulk Commodities in Particular
- Proximity with respect to Panama Canal creates transportation efficiencies for U.S. exports and imports.
  - Current expansion of Panama Canal enhances those efficiencies for all bulk and container traffic.
- Agricultural Trade is an important (but not only) component of lower Mississippi transport.

# Important Bulk Commodities, Mississippi River

## **Inbound**

- Crude Oil
- Fertilizers
- Chemicals
- Petrochemicals
- Concrete and Stone Products
- Steel Products
- Ores and Phosphate rock
- Coal
- Wood and Wood Chips
- Lignite
- Coke
- Edible Oils

## **Outbound**

- Animal Feeds
- Soybeans
- Wheat
- Maize
- Coal
- Milo
- Lignite
- Petrochemicals
- Rice
- Fertilizers
- Chemicals
- Crude Oil
- Edible Oils

# 2021 U.S. Agricultural Exports, tons Total and through New Orleans Customs District

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	U.S. Total	New Orleans Customs District	N.O.C.D. Percent of U.S. Total
Soybeans	58,348,789	29,354,770	50.31%
Corn	76,931,722	44,514,773	57.86%
Bulk Total	178,667,988	79,988,736	44.77%

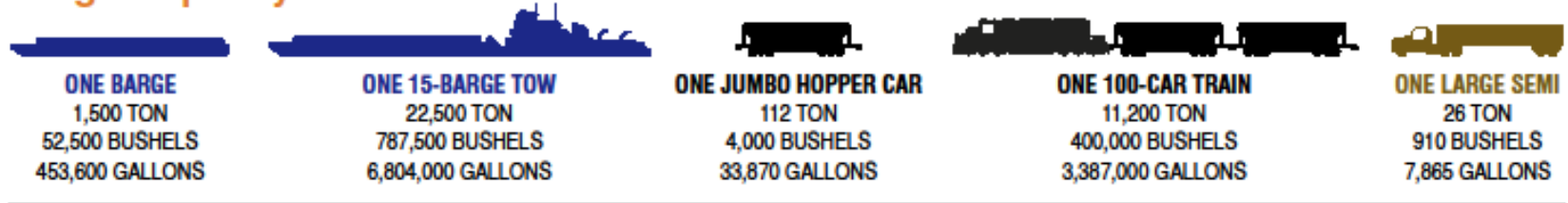
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# Compare ...

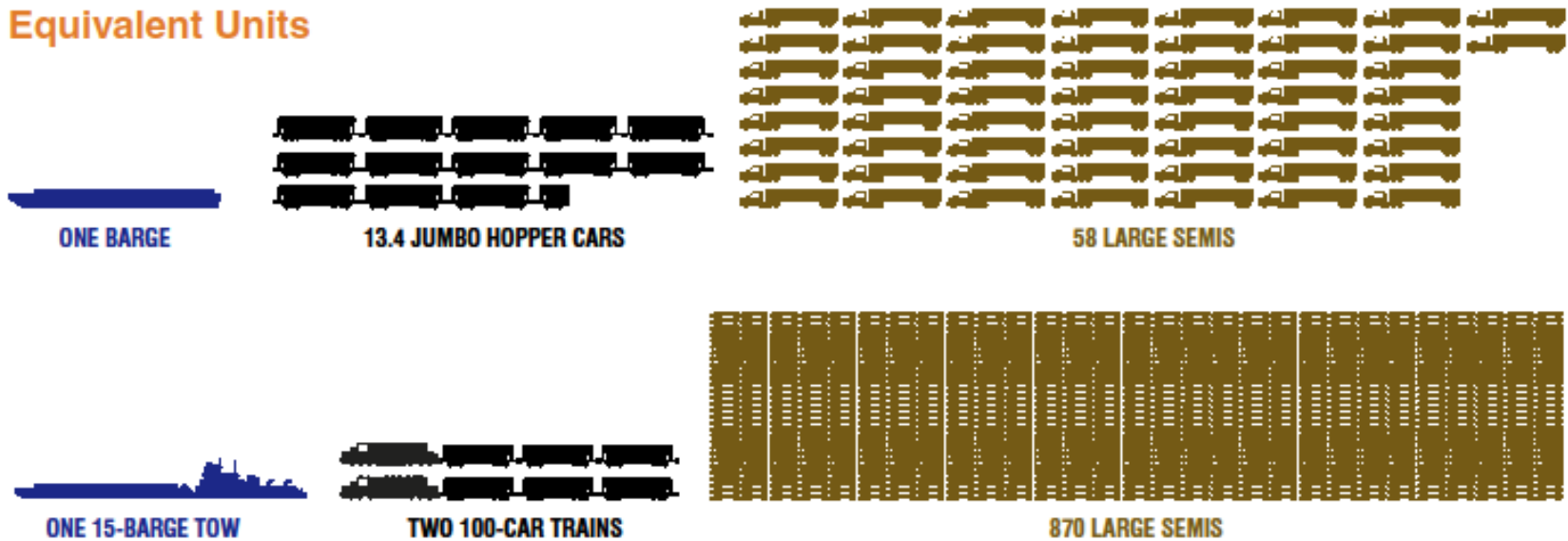


Source: Iowa Department of Transportation - 800 Lincoln Way - Ames, IA 50010 - 515-238-1520

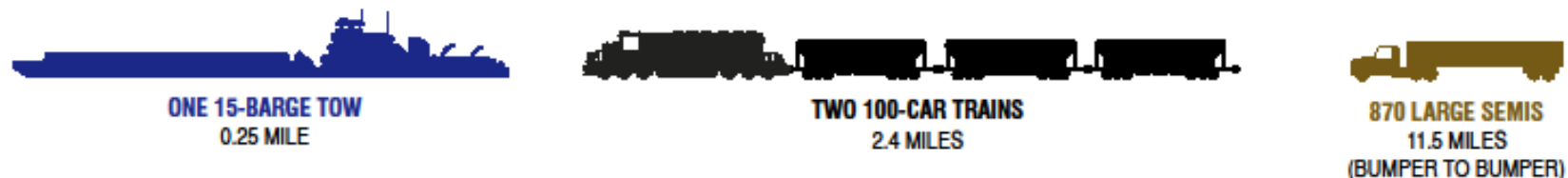
## Cargo Capacity



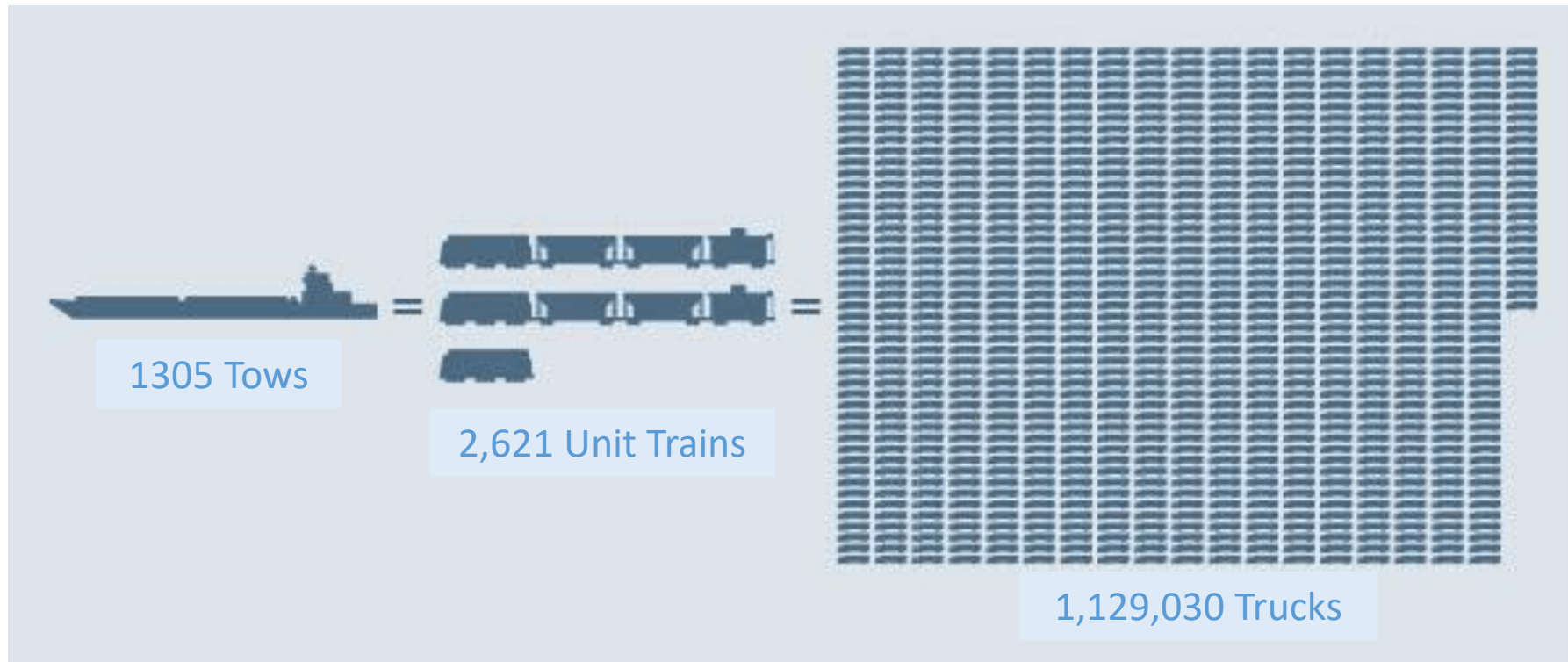
## Equivalent Units



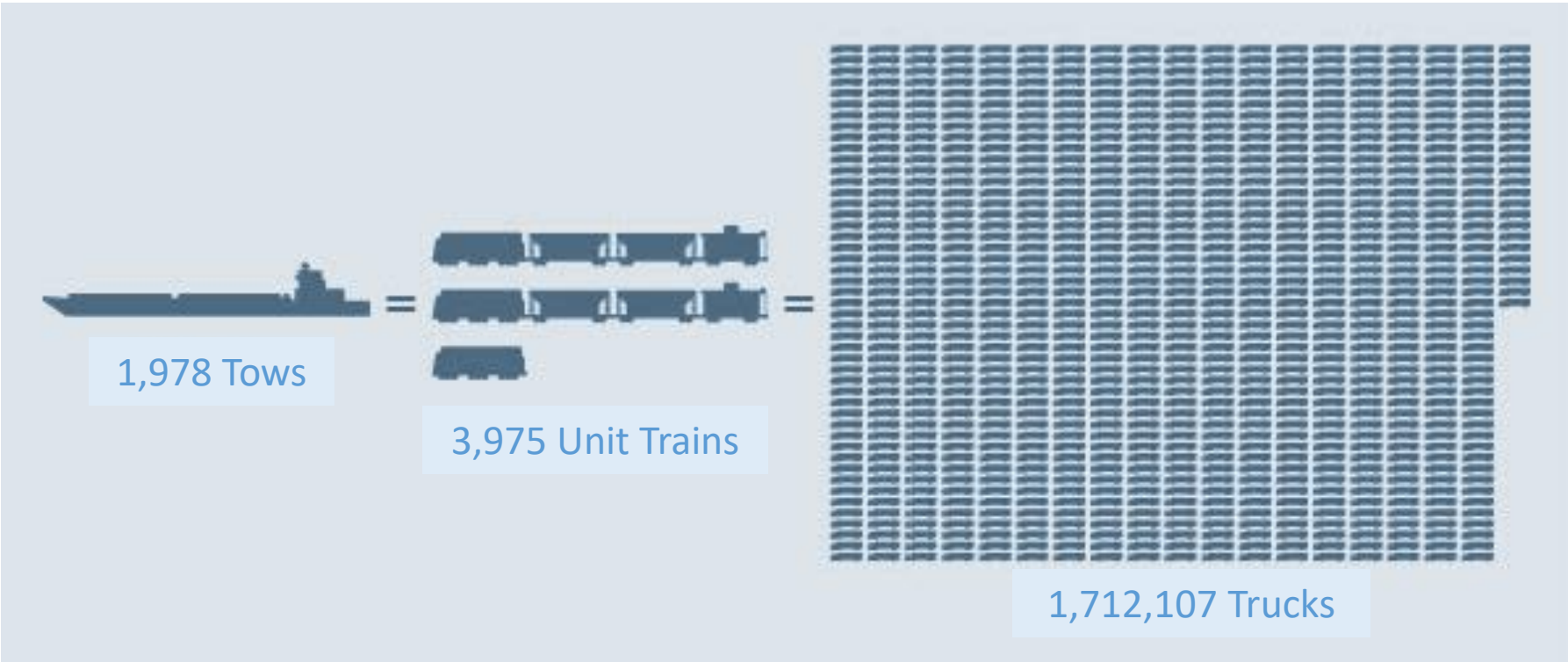
## Equivalent Lengths



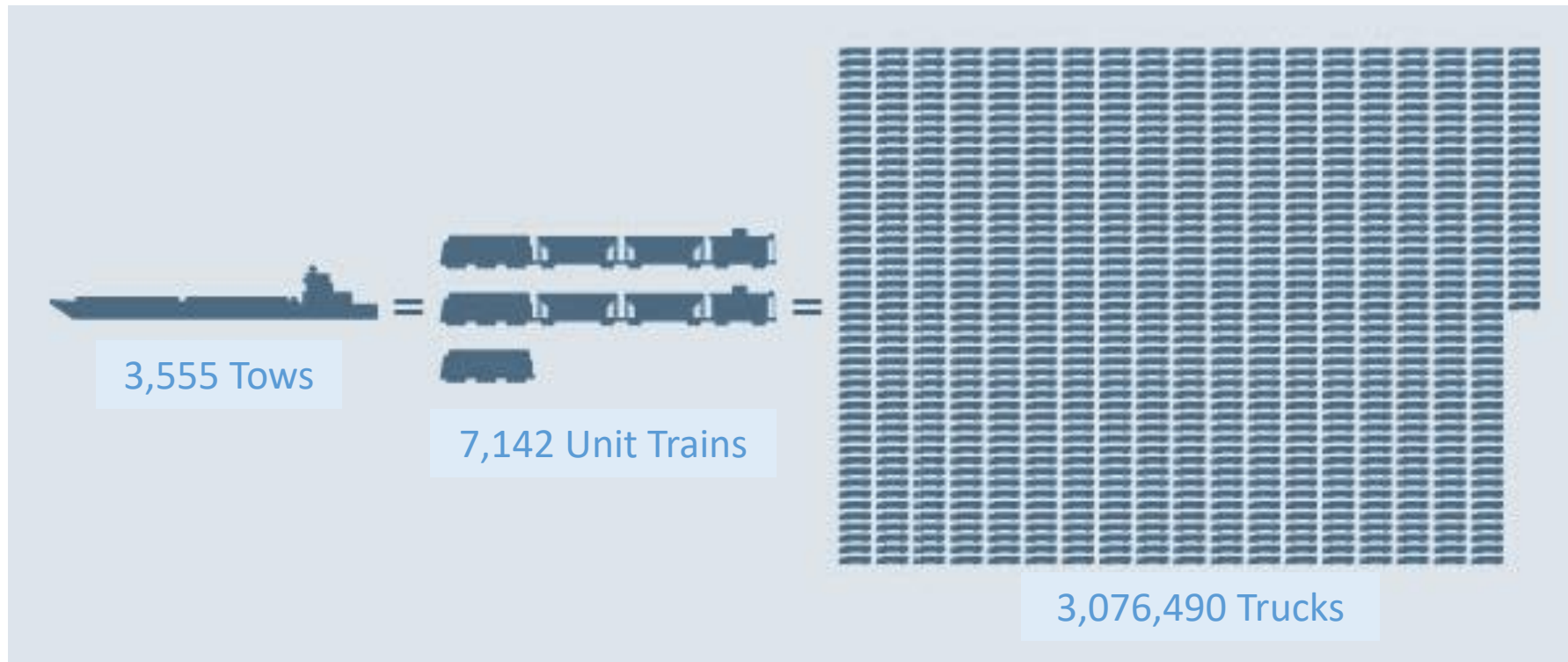
# 2021 Soybean Export Volume, New Orleans



# 2021 Corn Export Volume, New Orleans



# 2021 Bulk Ag Export Volume, New Orleans



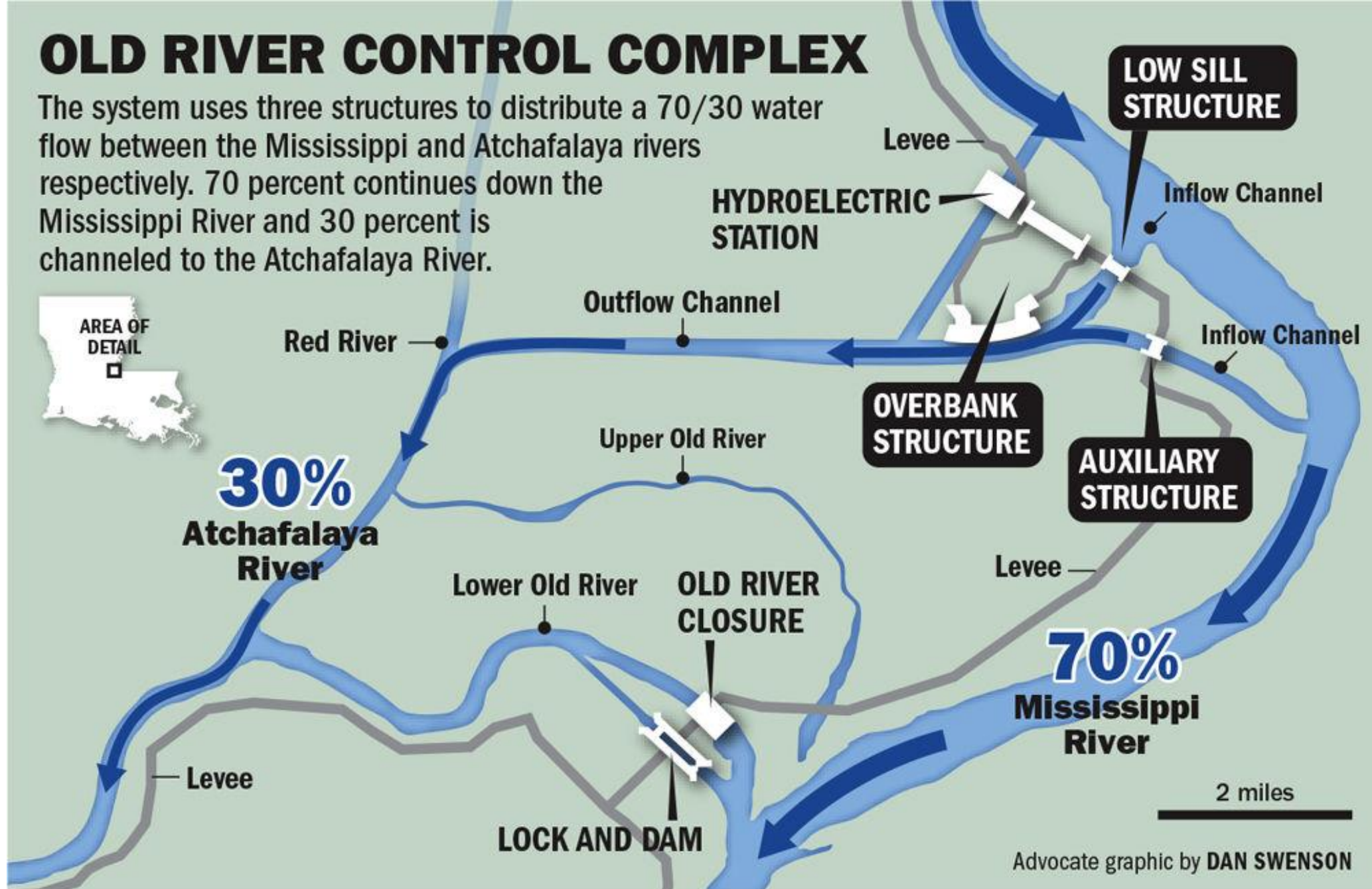


# Potential for Avulsion

- Some maintain that an Avulsion is inevitable (Barnett, 2017)
- Previous studies have attempted to quantify the impacts of an avulsion of the MS River (Kazmann and Johnson, 1980)

# OLD RIVER CONTROL COMPLEX

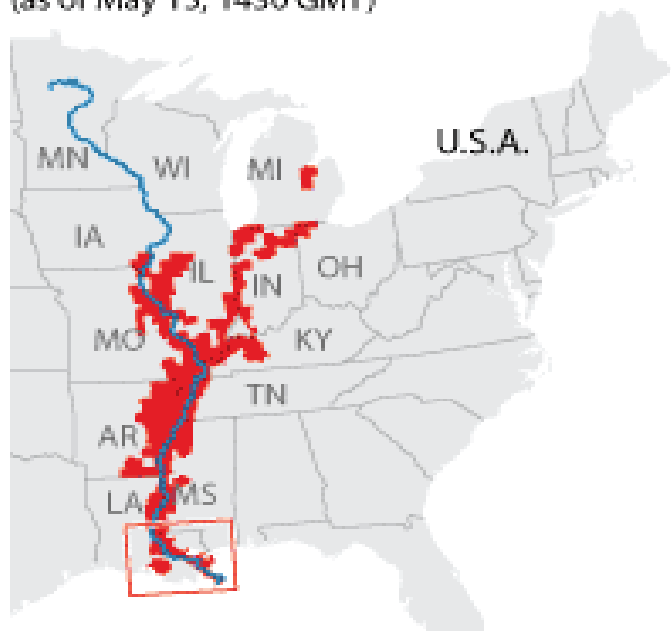
The system uses three structures to distribute a 70/30 water flow between the Mississippi and Atchafalaya rivers respectively. 70 percent continues down the Mississippi River and 30 percent continues down the Atchafalaya River and 30 percent is channeled to the Atchafalaya River.



# Mississippi River flooding

- ▶ The U.S. Army Corps of Engineers opened seven more floodgates at the Morganza Spillway on Sunday after opening two of the 125 floodgates on Saturday
- ▶ The move, last taken in 1973, will channel water away from the Mississippi River and into the Atchafalaya River Basin

Flood Warning Areas  
(as of May 15, 1430 GMT)



Source: NOAA, Army Corps of Engineer

Potential Inundation\*  
Flood depth (in feet)

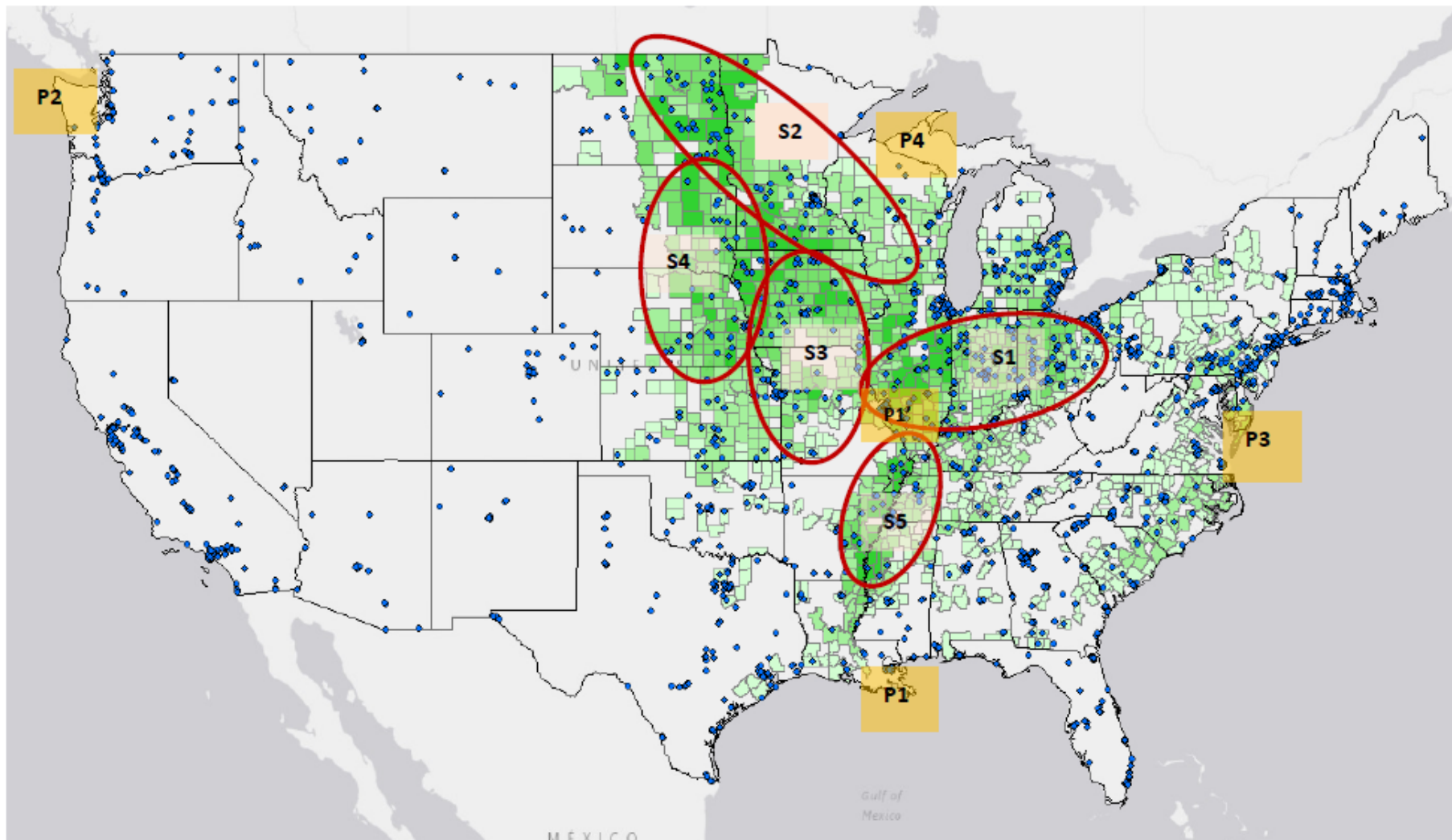
0 ft    5    10    15    20    25

A horizontal color scale bar ranging from 0 to 25 feet. The colors transition from light orange at 0 feet to dark red at 25 feet.



\*Based on Scenario 1A released on May 12

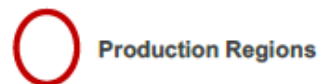
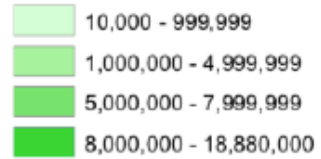
REUTERS



### Bushels Produced in 2017

- Intermodal Facilities

#### Bushels



# Calculated CIF Soybean Prices, China

Route	2017 FOB	Pre-Avulsion			Post- Avulsion			Change in CIF Price (%)
	Price Intermodal Facility (\$)	Trans- portation Cost (\$/MT)	CIF Price (\$/MT)	CIF Price (\$/bu)	Trans- portation Cost (\$/MT)	CIF Price (\$/MT)	CIF Price (\$/bu)	
Region 1 to Gulf	353.11	59.35	412.46	11.23	83.24	436.35	11.86	5.79
Region 2 to Gulf	333.72	68.26*	401.98	10.94	–	–	–	–
Region 2 to PNW	333.72	81.47	415.19	11.30	81.47	415.19	11.30	0.00
Region 2 to Great Lakes	333.72	80.32	414.04	11.27	80.32	414.04	11.27	0.00
Region 3 to Gulf	334.00	63.22	397.22	10.81	80.01	414.01	11.27	4.23
Region 4 to Gulf	334.00	–	–	–	92.47*	426.47	11.61	–
Region 4 to PNW	334.00	81.79	415.79	11.32	81.79	415.79	11.32	0.00
Region 5 to Gulf	357.42	51.47	408.89	11.13	89.43	446.85	12.16	9.28

# Reactions to / Preparation for a Lower Mississippi River Avulsion

- Impact on Agricultural and Bulk Transport
- Scenario: Avulsion at Old River Structure
  - Option 1: River shifts to follow the current Atchafalaya, current transportation and manufacturing infrastructure follows.
  - Option 2: River shifts to follow the current Atchafalaya, steps are taken to maintain current Lower Mississippi River as a Slack Water Estuary to allow for and maintain current transport and manufacturing infrastructure.
  - Option 3: River shift to Atchafalaya viewed as temporary; steps are taken to rebuild/maintain Old River Structure.

# Qualitative Loss Estimates

- Relocation costs of residents and movable property located in the Basin
- Capital costs of water conservation equipment , mostly cooling towers, in the Baton Rouge-New Orleans industrial corridor and subsequent increased operating cost
- Construction and maintenance of additional levees and flood control measures in the Basin and possible increases in dredging;
- Disruption of oil and gas production and exploration in the Basin and damage to the facilities due to flood waters
- Possible brownouts or selective blackouts due to the salt water wedge immobilizing electric generating plants located along the Mississippi River south of the ORCS. Also, there would be additional costs in retrofitting these plants for saline water
- High mortality rates for deer, rabbits, squirrels and other animals domiciled in the Basin
- High mortality rates for shrimp and oysters in central Louisiana in the first and second year following the failure but possibly greater harvests in the long run
- Shoaling in the Mississippi immediately downstream from the O. R.C. S., which would hamper, or even eliminate barge navigation

# Transportation Loss Estimates

	Millions of Dollars (1977 Prices)		Millions of Dollars (2018 Prices)	
	High	Low	High	Low
<b>Transportation</b>				
Damages to Bridges , Approach & Roadways	74	44	299	179
Additional Operating Costs (one year)	573	75	2,118	277
Value of Time Loss (one year)	420	56	1,552	207
Additional Operating Costs of Railroads	38	38	140	140
<b>Transportation Totals</b>	<b>1,105</b>	<b>213</b>	<b>4,110</b>	<b>804</b>

- Estimates
  - High: I-10, U.S. 190, LA 1, U.S. 90 closed for one year
  - Low: I-10 and U.S. 190 closed for one year
- To update, take into account
  - Replacement costs of bridges, approaches, and roadways
  - Operating costs and value of time
    - Number of vehicles traveled today, passengers and their wages
    - Maintenance costs
    - Number of railways crossing the Basin



# Updated Quantitative Loss Estimate Totals

	Millions of Dollars (1977 Prices)		Millions of Dollars (2018 Prices)	
	High	Low	High	Low
<b>Transportation</b>	1,105	213	4,110	804
<b>Flood Damage</b>	685	533	2,634	2,072
<b>Pipeline Failure</b>	1,519	212	5,619	785
<b>Replacement of Municipal and Industrial Water</b>	730	600	3,145	2,585
<b>Total Qualitative Economic Losses</b>	<b>4,039</b>	<b>1,558</b>	<b>15,508</b>	<b>6,246</b>

# Factors to Consider

## Transition of Infrastructure:

- Would a System of Levies be needed on LMR to maintain viable transport system?
- What preparations would be needed to prepare for
  - Option I – Shift in Commerce from LMR to Atchafalaya;
  - Option II – Maintaining current infrastructure on LMR with majority of water avulsed to the Atchafalaya; and
  - Option III – Providing temporary options to maintain commerce while measures are taken to rebuild an improved Old River Structure.

# Future Direction

- This discussion only touches the tip of the iceberg with respect to potential options for LMR Avulsion and options for the interface between commercial activities and coastal restoration.
- A variety of issues must be dealt with as policymakers and analysts determine the viability of these numerous options.
- Approaching this issue from a Benefit-Cost perspective will provide useful information to decision makers as they seek to maintain the transportation capacity of the LMR and provide a viable long-term course of action.

# Discussion