Our Missouri Waters
May 10. 2017

Brad Walker
Missouri Coalition for the Environment

The Lower Missouri River:
What Might Have Been!

Missouri Coalition for the Environment
Effective Citizen Action Since 1969

Lower Missouri River: Bank Stabilization & Navigation Project (BSNP)

Missouri River and Floodplain Land Type/Use changes: 1880 to 1980

- Agriculture increased from 0% to nearly 89%
- Channelized river increased from 0% to about 9%
- Natural areas were slashed from 100% to about 2%

- Since 1980 some natural areas have been restored

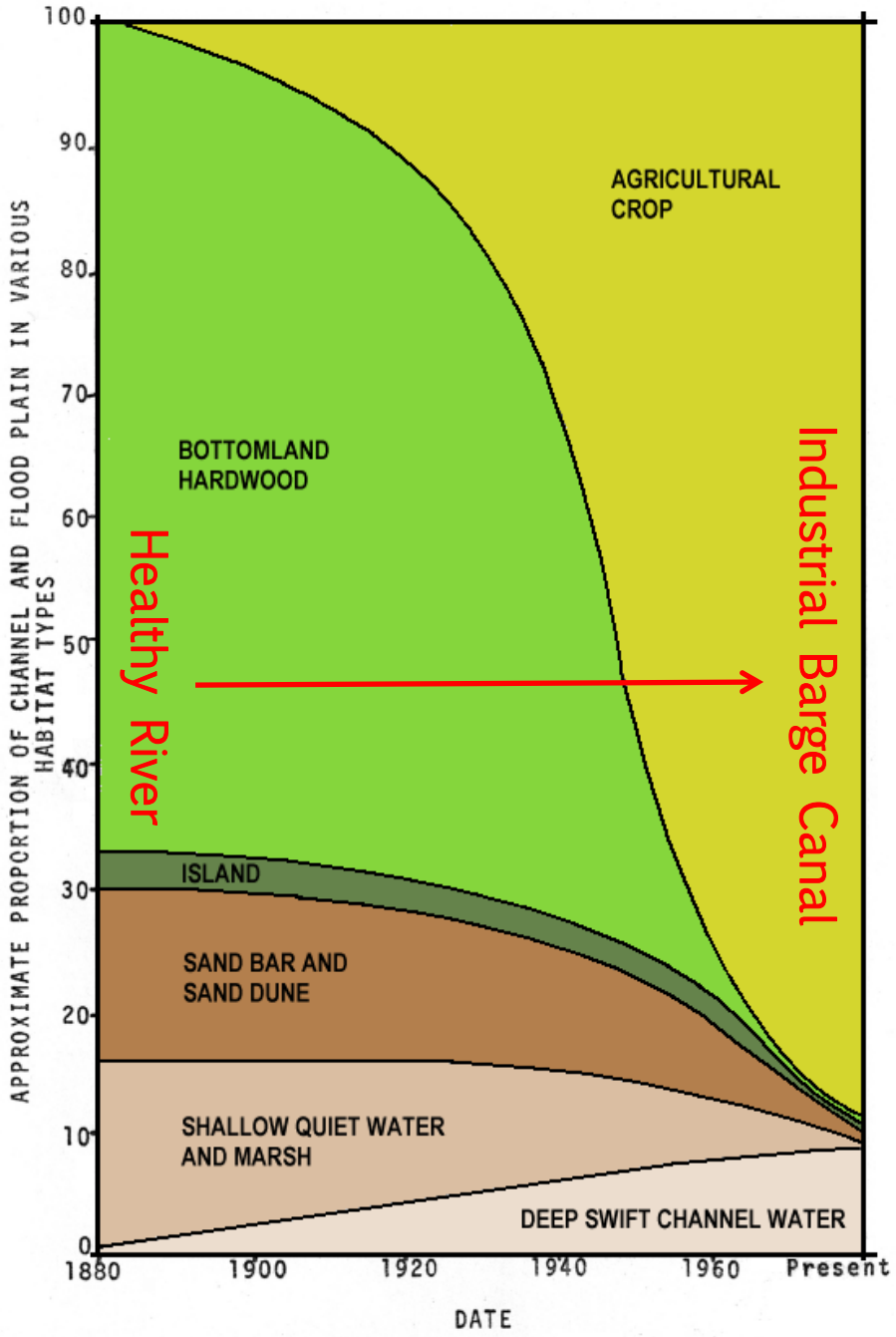
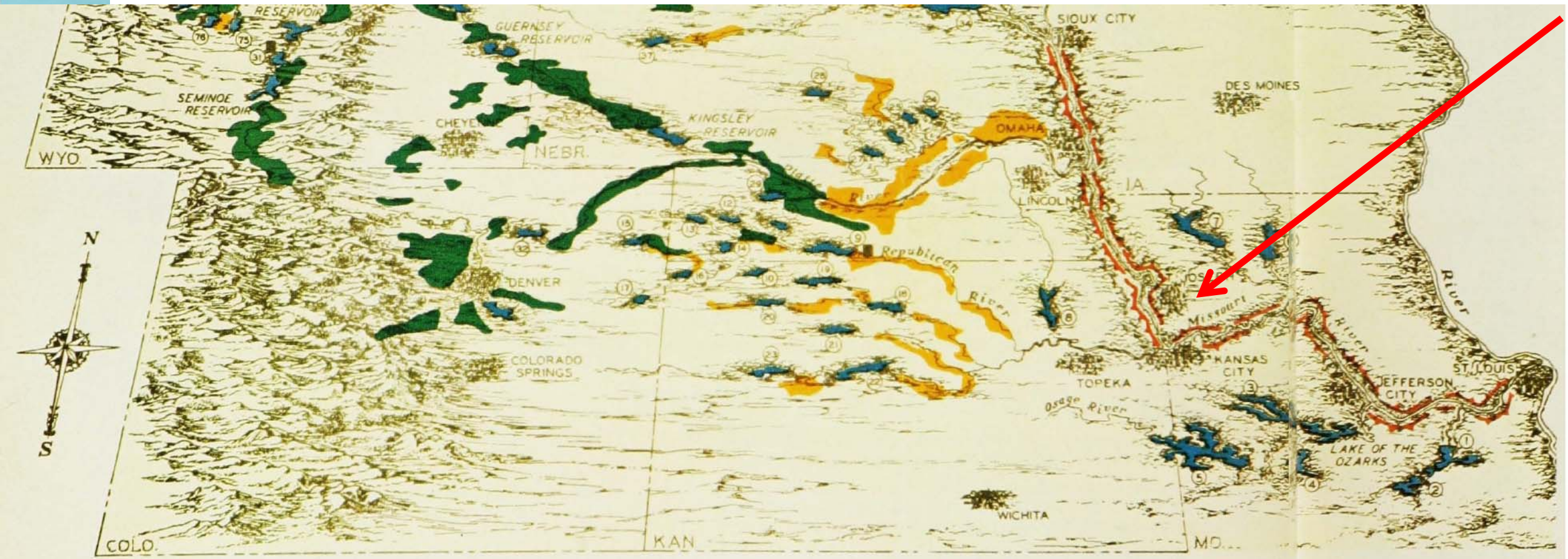


Figure 4. Estimated changes in habitat types between 1880 and present within the area influenced by the bank stabilization and navigation work. (Dr. Charles Segelquist, Eastern Energy and Land Use Team, Fish and Wildlife Service).



LEGEND

- POWER PLANT
- SYSTEM OF LEVEES
- RESERVOIRS
- EXISTING IRRIGATED LAND
- ARABLE LAND TO BE IRRIGATED UNDER BUREAU OF RECLAMATION PLAN

Pick-Sloan Plan for Missouri River Basin

Showing Corps of Engineers and Bureau of Reclamation projects as described in H.D. 475 and S.D. 191, 78th Congress and approved by Congress in the 1944 Flood Control Act.

Pick-Sloan Plan: Recommended Floodway

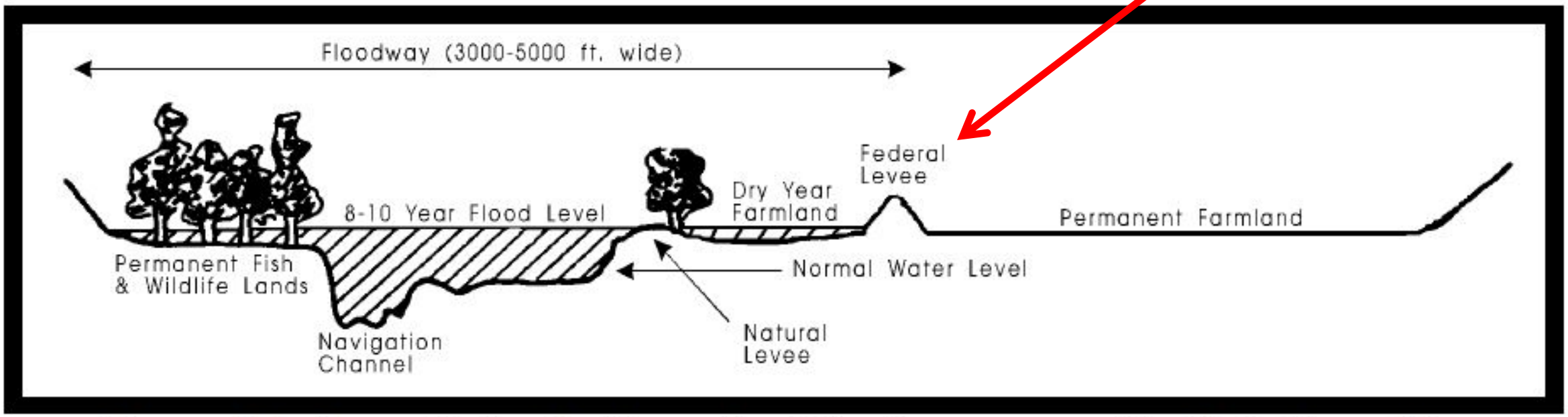
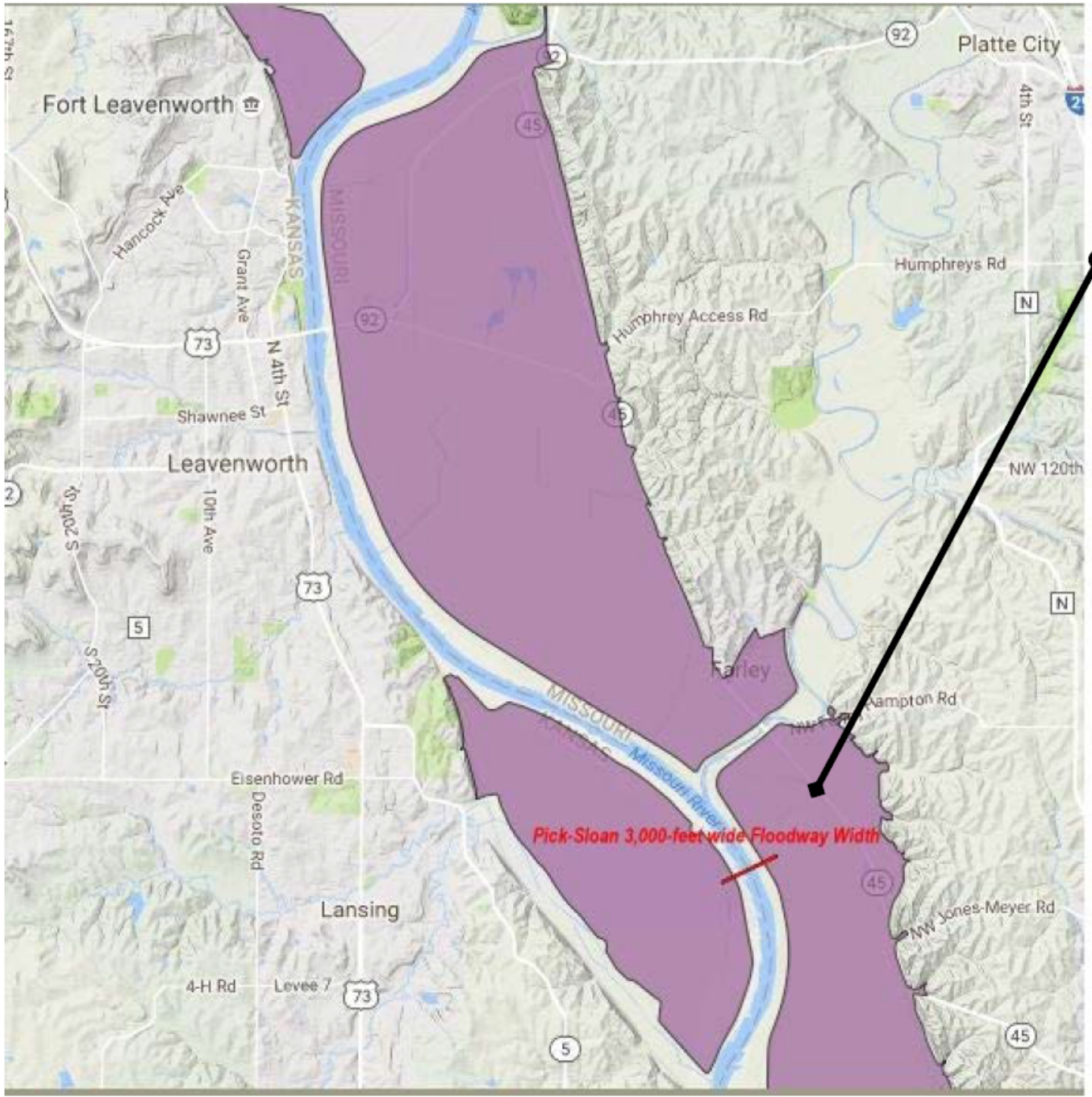
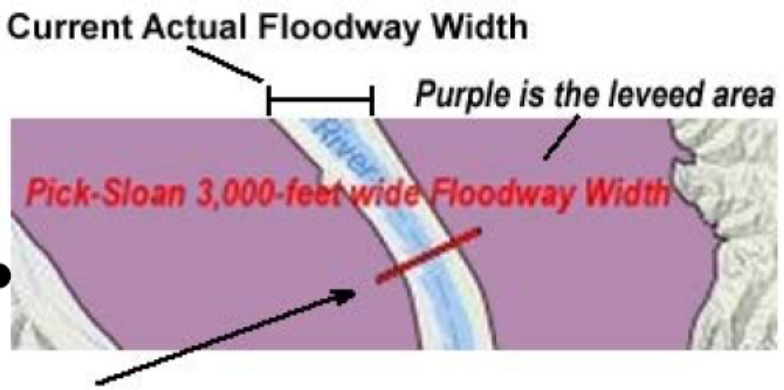


Figure 3-5: Levee Setback Alternative Floodway concept in Pick-Sloan Plan (Rasmussen 1993)

Examples of Current Floodway Width

Near Leavenworth, Kansas

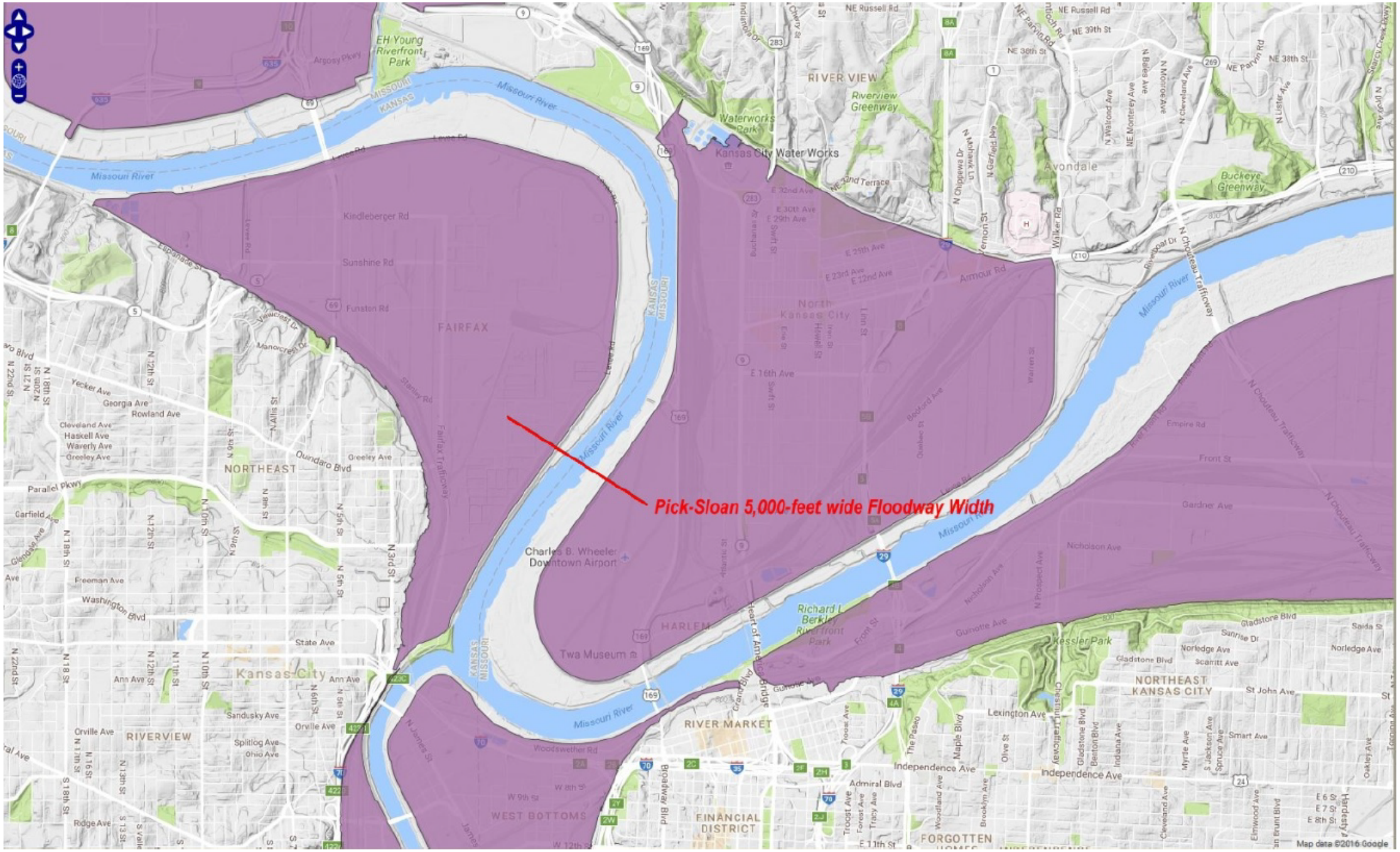




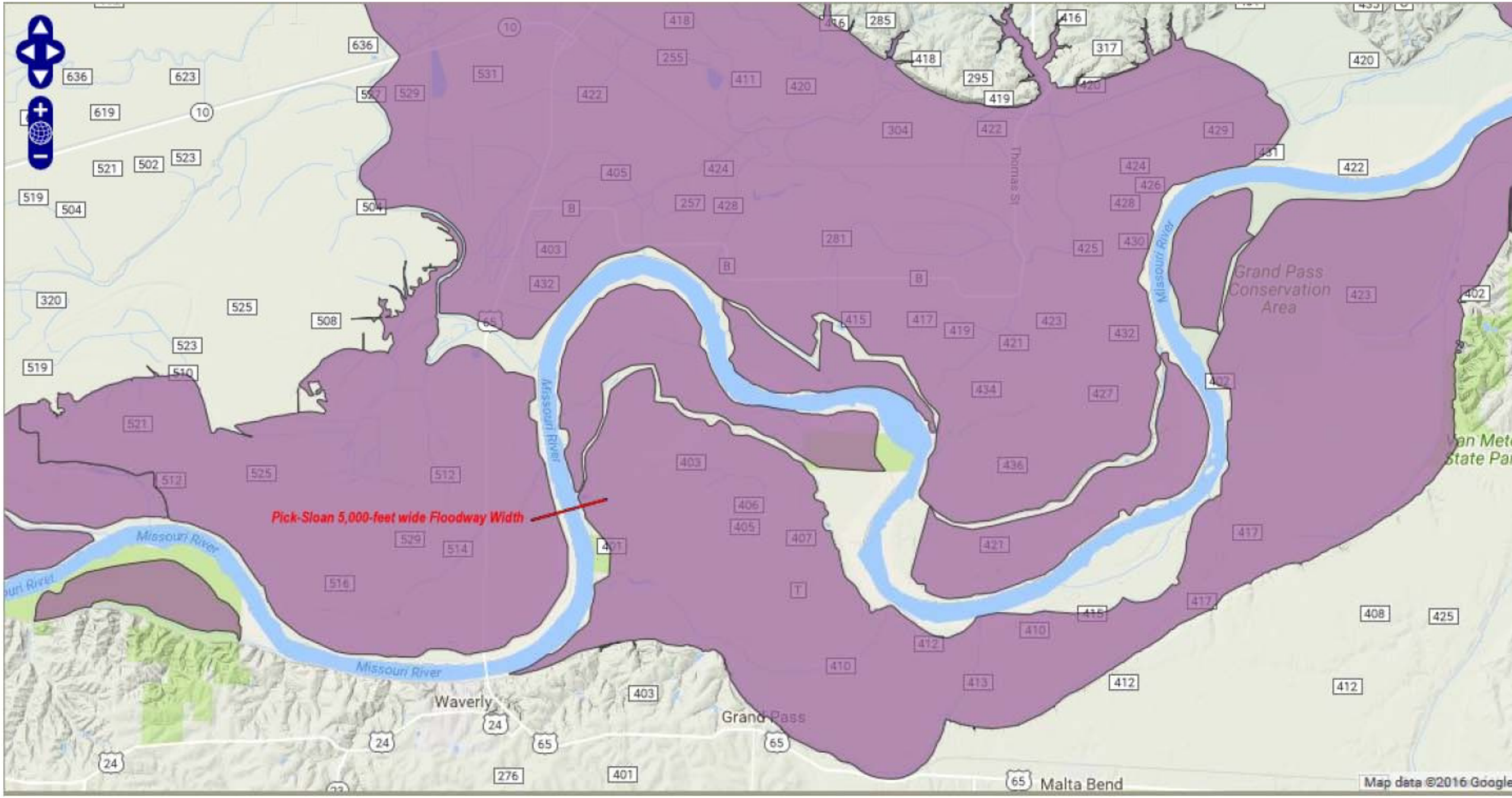
Red Line: Aproximate Pick-Sloan Floodway Width

Expected Pick-Sloan Plan Floodway Width:
Upstream of Kansas City - 3,000 feet
Downstream of Kansas City - 5,000 feet

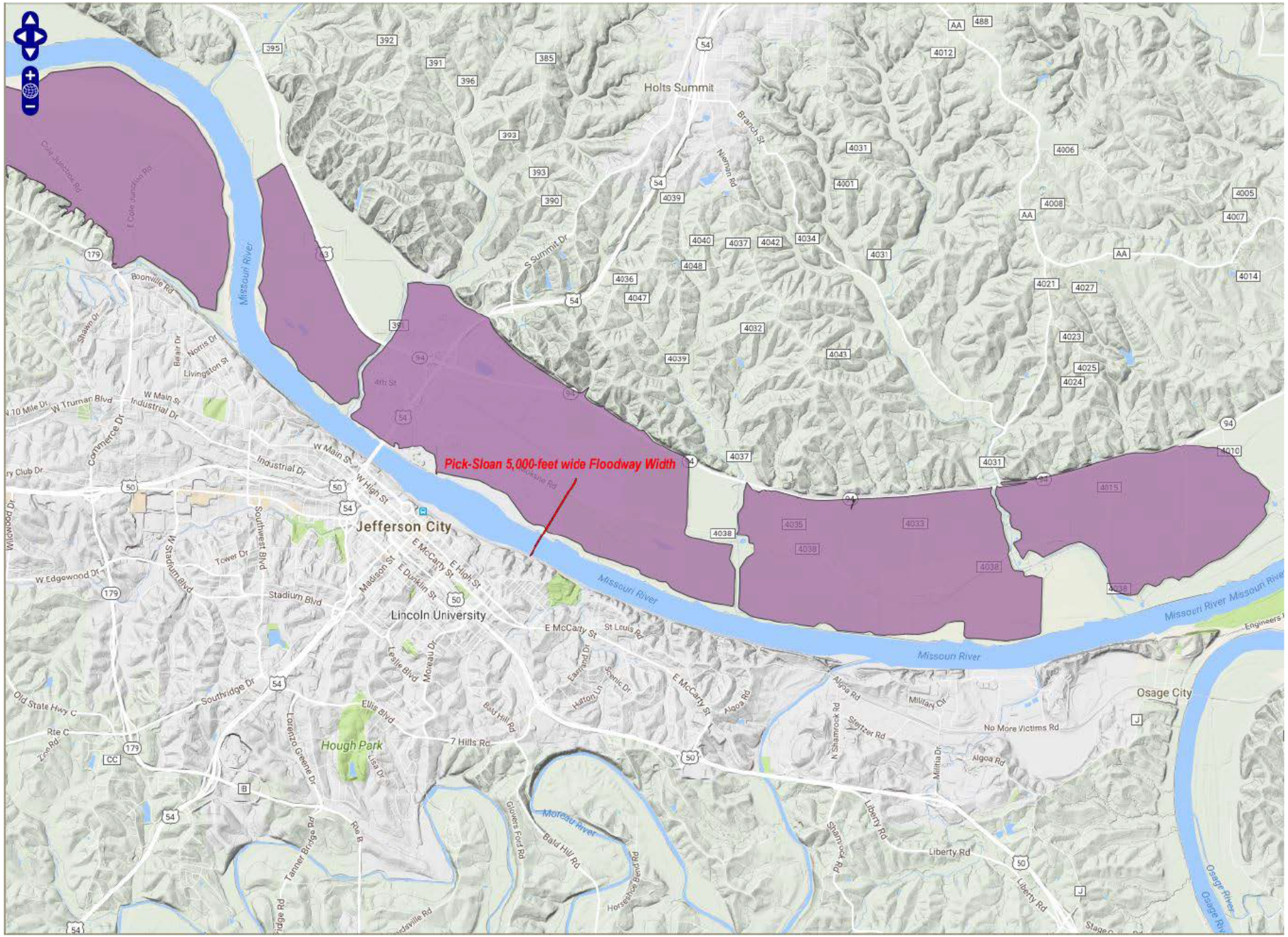
At Kansas City Missouri



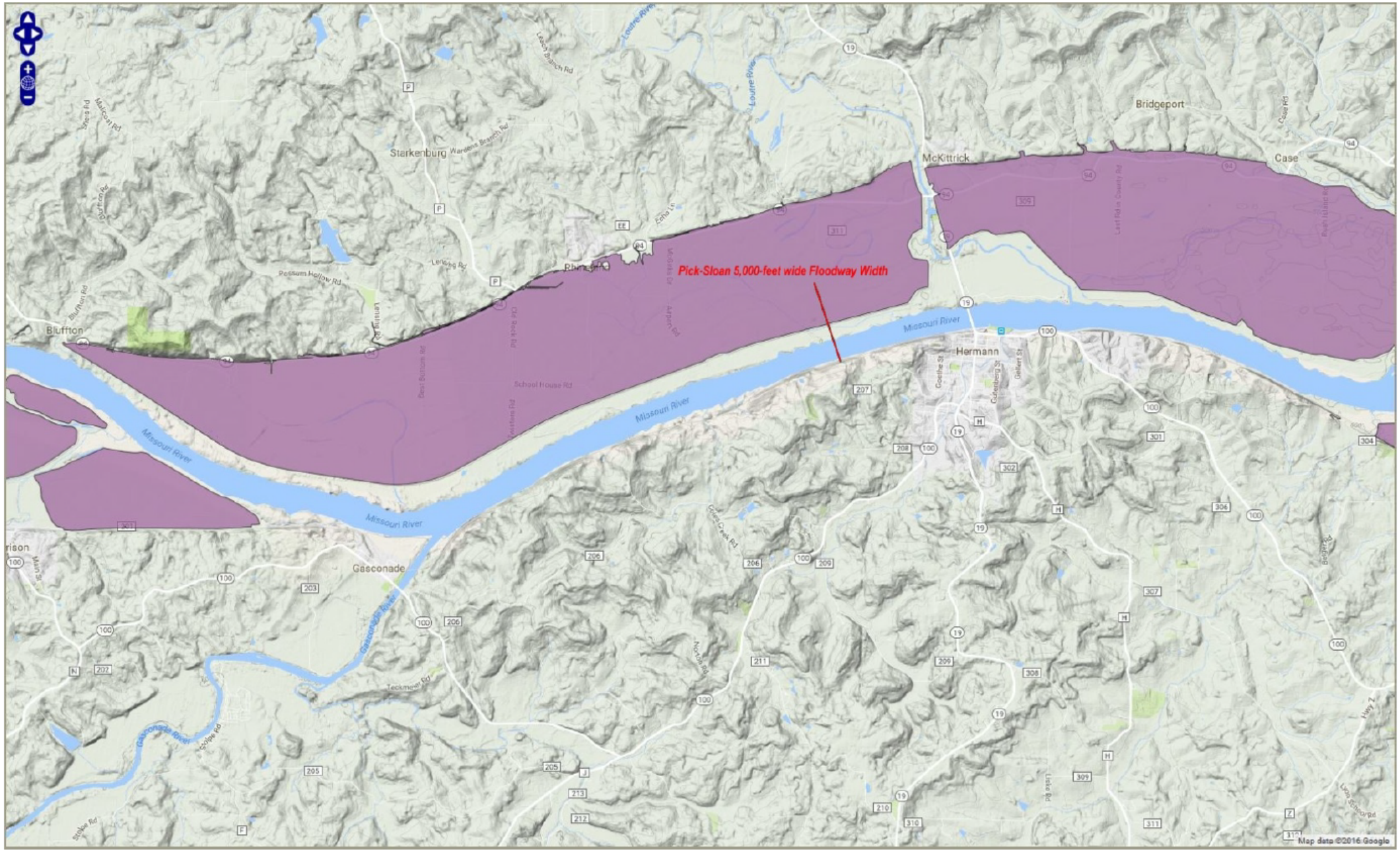
Near Waverly, Missouri



Near Jefferson City, Missouri

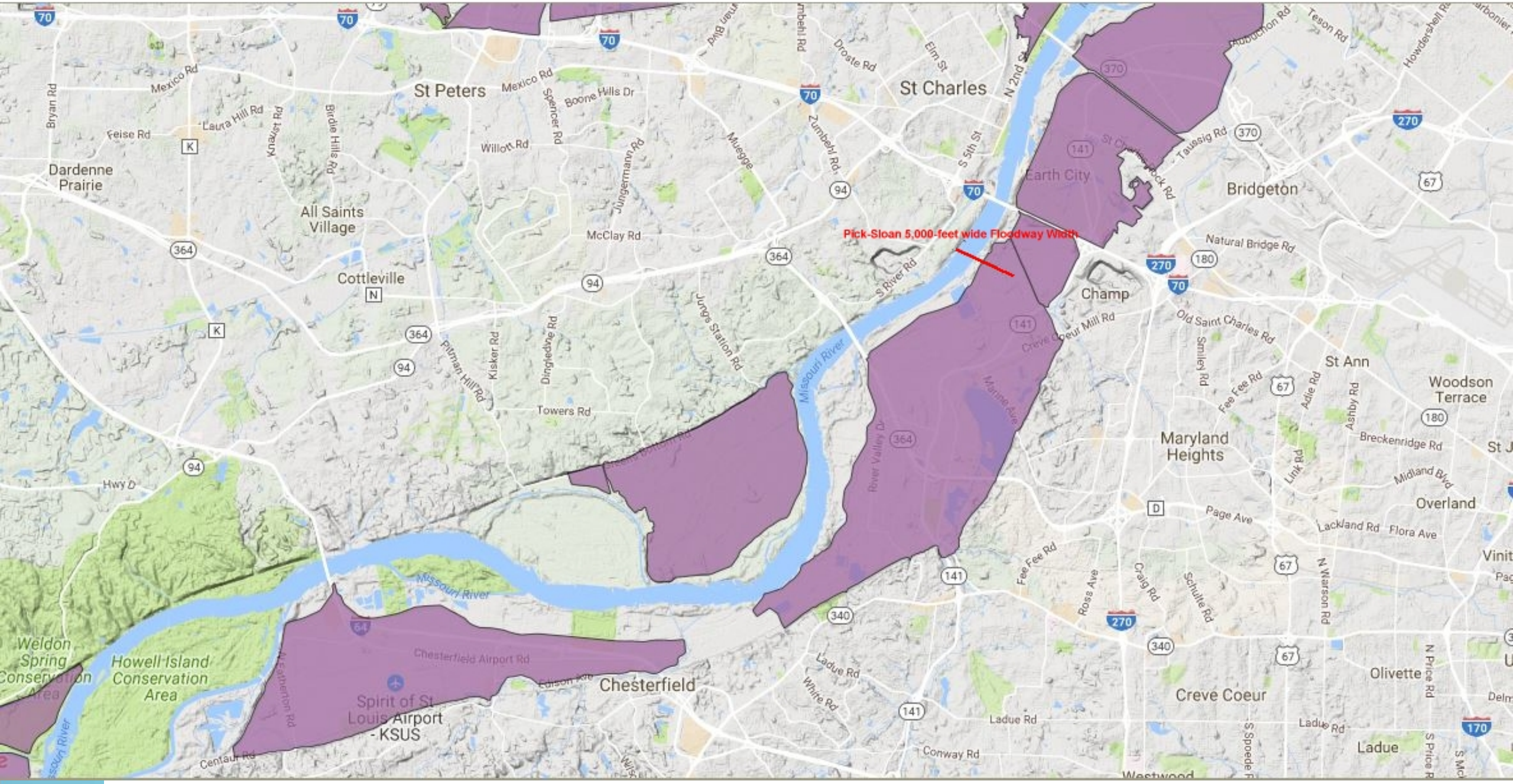


Near Hermann, Missouri

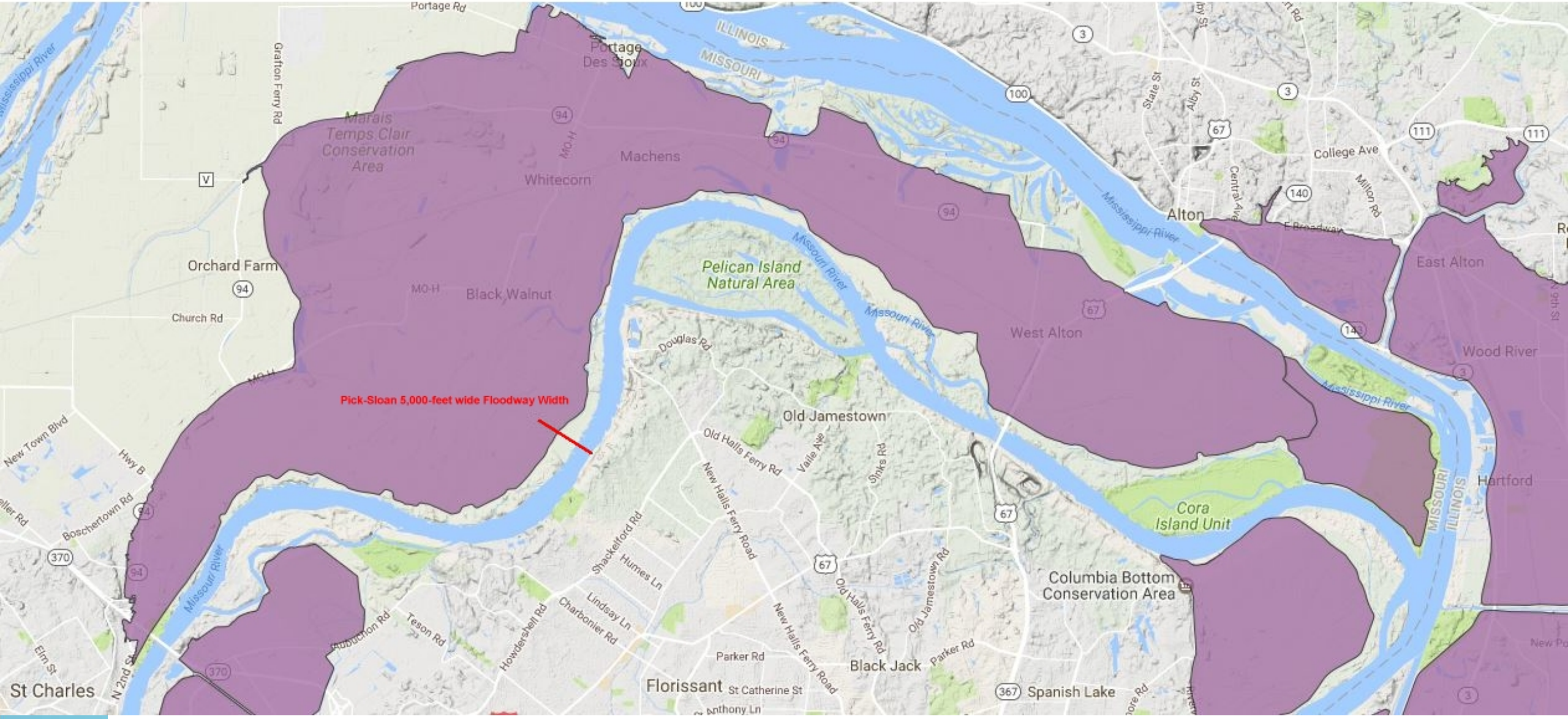


Source: Corps of Engineers National Levee Database http://nld.usace.army.mil/egis/f?p=471:1:

Near Chesterfield, MO



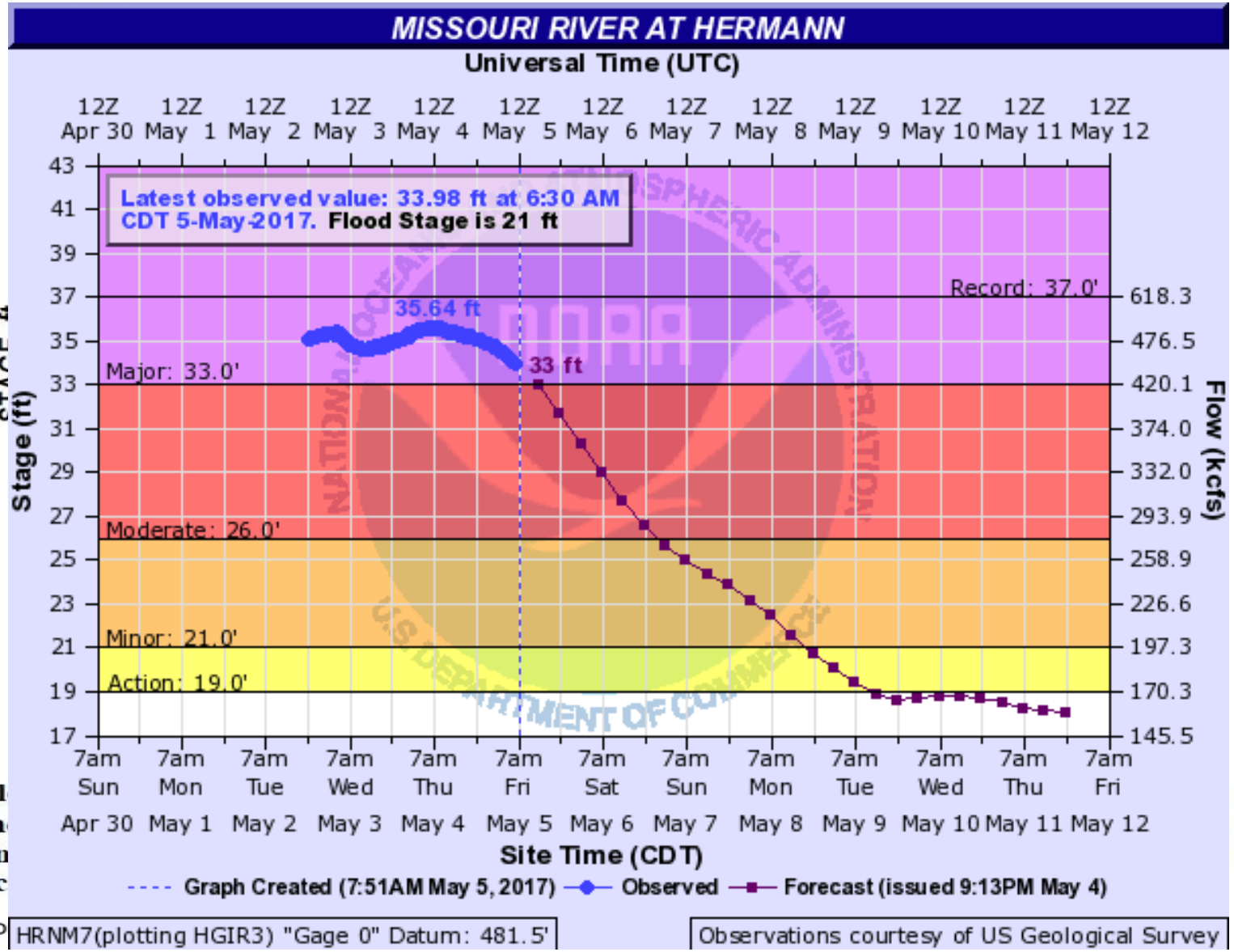
Near UMR Confluence



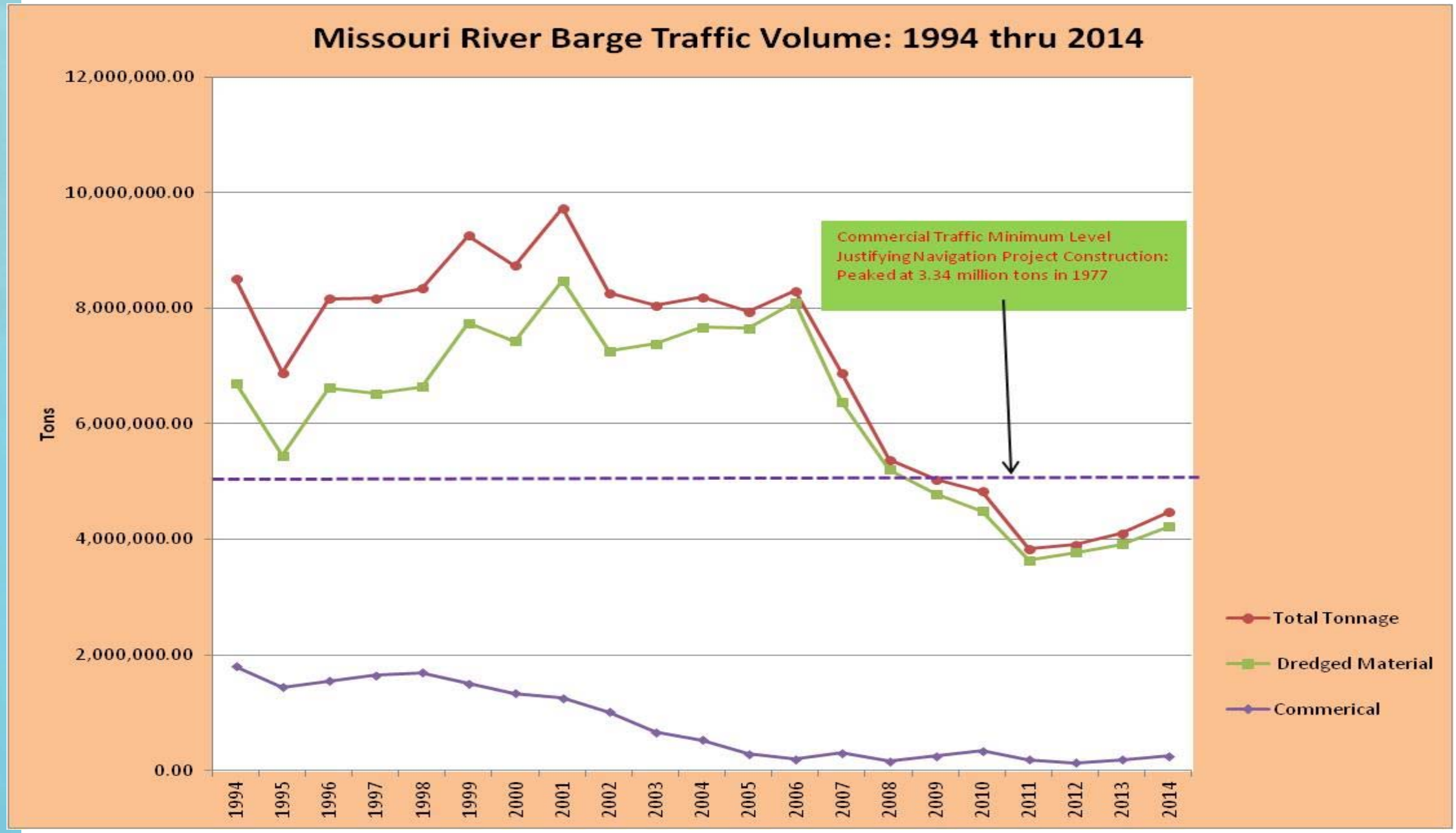
MISSOURI RIVER AT HERMANN	
Flood Categories (in feet)	
Major Flood Stage:	33
Moderate Flood Stage:	26
Flood Stage:	21
Action Stage:	19

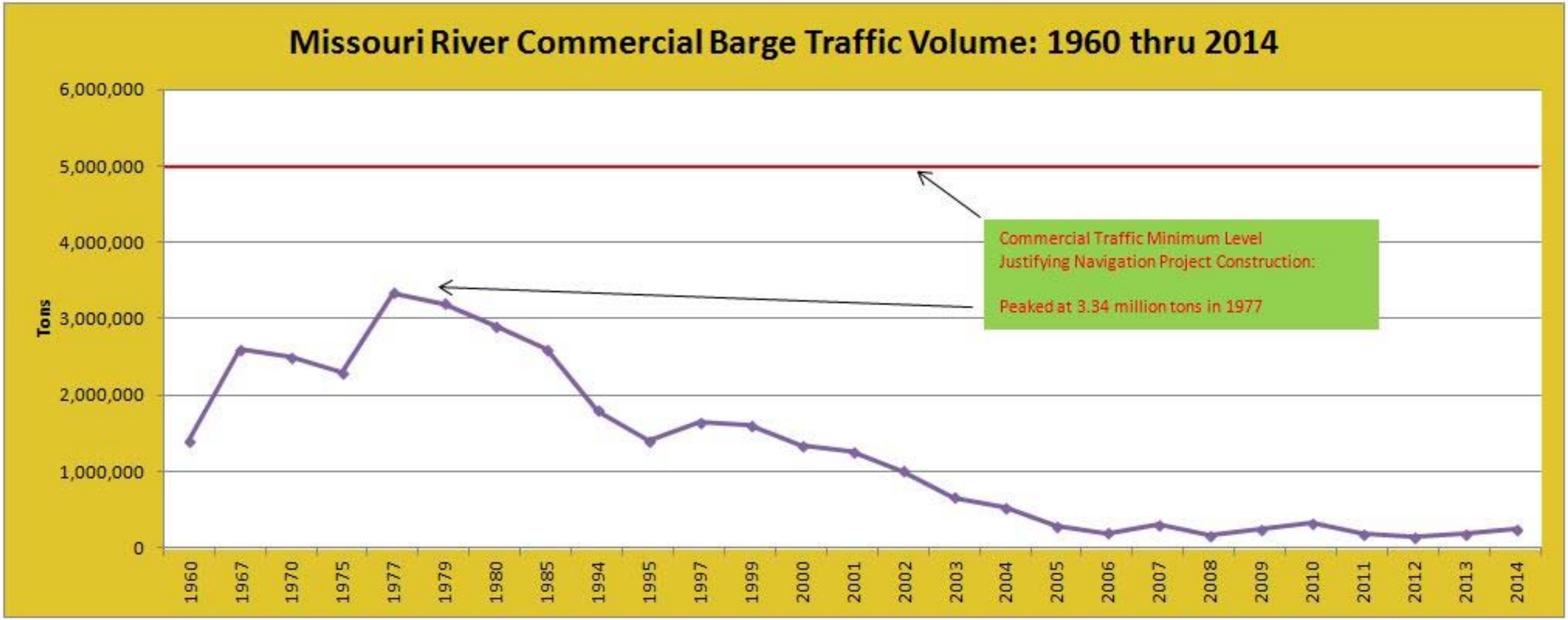
18 of 25 of the highest flood stages have occurred since 1960 with 2017 likely moving to fourth place and removing a 2001 event.

7 of the 9 major flood stages have occurred since 1973, 5 since 1986.



Historic Crests	
(1) 36.97 ft on 07/31/1993	
(2) 36.22 ft on 05/19/1995	
(3) 35.79 ft on 10/05/1986	
(4) 35.50 ft on 06/01/1844	
(5) 34.84 ft on 12/29/2015 (P)	
(6) 33.66 ft on 04/24/1973	
(7) 33.33 ft on 07/19/1951	
(8) 33.14 ft on 06/02/2013	
(9) 32.85 ft on 02/25/1985	
(10) 32.77 ft on 05/17/1990	
(11) 32.55 ft on 05/03/1983	
(12) 31.70 ft on 09/29/1993	
(13) 31.42 ft on 04/13/1994	
(14) 31.34 ft on 09/16/2008	
(15) 31.20 ft on 05/21/1943	
(16) 31.20 ft on 06/29/1947	
(17) 30.90 ft on 04/28/1944	
(18) 30.60 ft on 05/10/1961	
(19) 30.40 ft on 03/26/1978	
(20) 30.05 ft on 06/28/1967	
(21) 29.93 ft on 05/14/2002	
(22) 29.70 ft on 06/19/2015	
(23) 29.62 ft on 06/28/1942	
(24) 29.50 ft on 04/07/1903	
(25) 29.46 ft on 06/07/2001	


Missouri River Barge Traffic Volume: 1994 thru 2014
12,000,000.00
10,000,000.00
8,000,000.00
6,000,000.00
4,000,000.00
2,000,000.00
0.00
Tons
Commercial Traffic Minimum Level Justifying Navigation Project Construction: Peaked at 3.34 million tons in 1977
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Total Tonnage
Dredged Material
Commerical


Missouri River Commercial Barge Traffic Volume: 1960 thru 2014
Tons
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
1960
1967
1970
1975
1977
1979
1980
1985
1994
1995
1997
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Commercial Traffic Minimum Level
Justifying Navigation Project Construction:
Peaked at 3.34 million tons in 1977

BSNP Mitigation:
MR Recovery Program Land Acquisition Update

Acres LOST due to BSNP- 500,000
Acres PROMISED to be restored (1986 & 1999 WRDA's) 167,000
Acres RESTORED to date 67000

- Lost acres
- Promised mitigated acres by 2020
- Restored acres to date

MRRP Funding Update - $62 M loss since 2011

Note: FY 2017 is President's Budget Amount

The Cost of the Missouri River Barge Canal:

System Construction Cost

- 6' Channel: $250 million (failed due to cost, neglect, and lack of traffic)
- 9' Channel: $1 billion

System Annual Maintenance Cost (not including flood damage repair, ~$500 million in 2011)

- Estimated $7 to $9 million per year

Estimated Annual Benefit to the Public

- $3 to $4 million per year = Net Loss of between $3 and $6 million

Mitigation Project Expected Total Cost

+$740 million to $1.33 Billion (2003 estimate)

This does not include lost public benefits.

Source: Eco in the Know, 7-28-11, New York Times, N. Pinter & USACE

Levee breach on Missouri River near Hamburg, MO
Source: AP Photo/Robert Ray

Floodwaters released from the Gavins Point dam in June 2011
Source: AP Photo

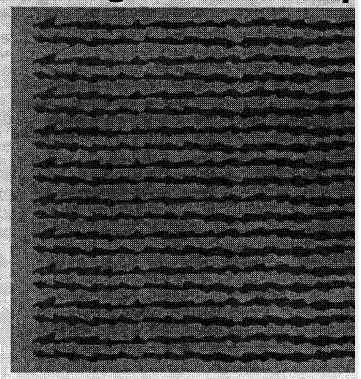
The Pick-Sloan Levee Plan Would Have Provided:

- Over 300,000 acres of connected floodplain.
- More flood storage area and fewer flood issues.
- More natural habitat.
- Some of the other Ecosystem Services a connected floodplain supply.

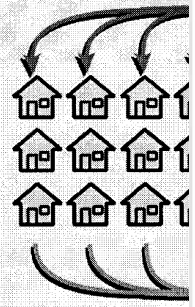
But the river would have still been severely channelized, flowed too fast, degraded the channel, and the floodplain likely would still been converted primarily to agriculture.

Curre

Agricultural Crop

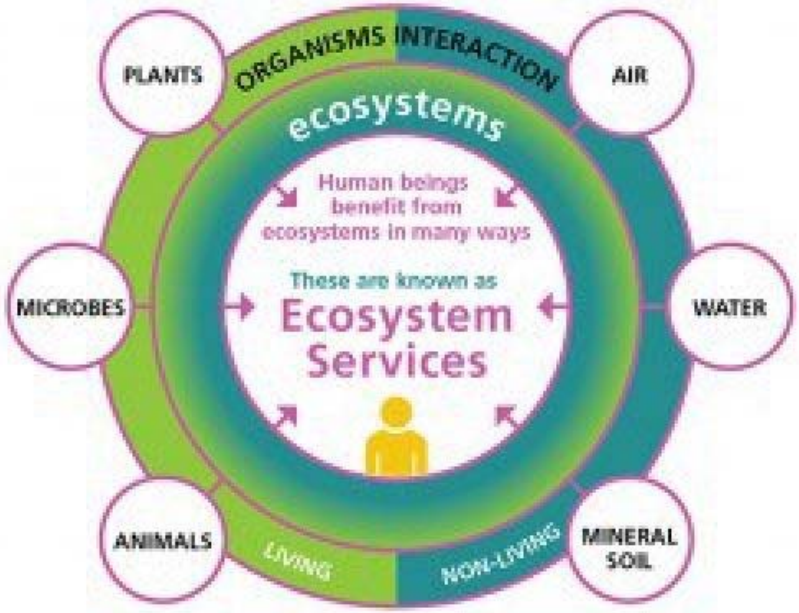


Urban Area



Ecosystem services and resilience

- Pollination
- Pest and disease management
- Fresh water, food, fibre, habitat and genetic resources
- Recreation and tourism
- Spiritual health, cultural identity



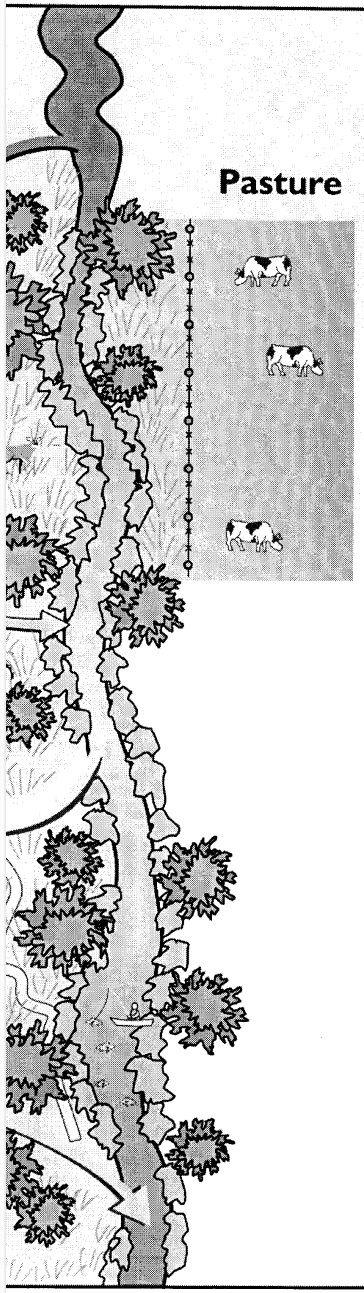
- Erosion prevention
- Protection from natural disasters
- Carbon sequestration and storage
- Air and water pollution control
- Nutrient cycling and soil fertility

Using an ecosystem service-based approach can increase agricultural productivity and strengthen the resilience of rural communities and their natural resource base.

Ecosystem services contribute to agricultural productivity

n Services

Pasture



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January 2016
42.52 feet

May 2017
41.7 feet

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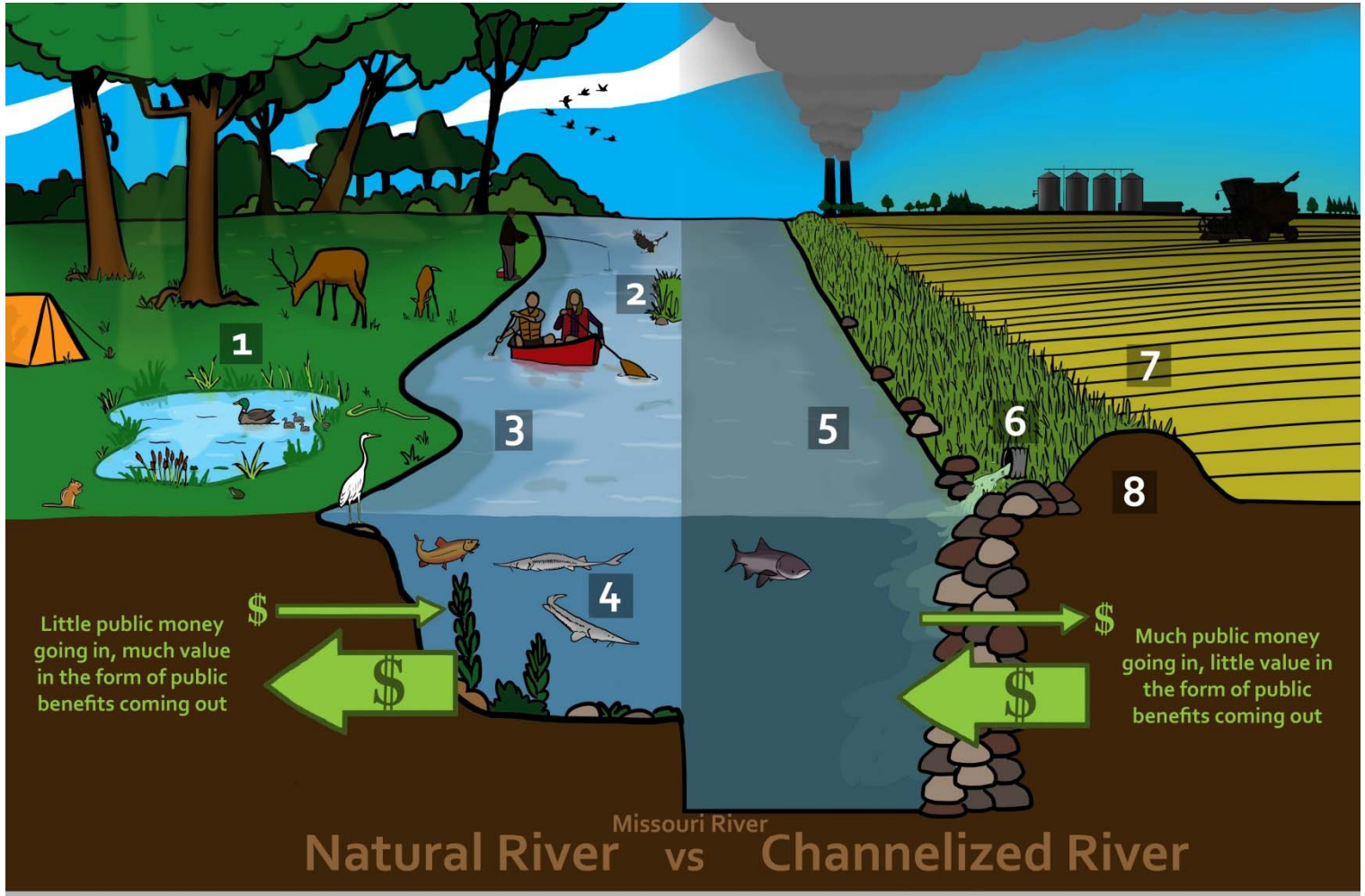
More natural versus channelized?



1. Natural floodplain areas provided high value public benefits, including flood storage pollution filtration, food, fiber, and recreation. People could hunt, fish, camp, boat and hike on large tracts of land
2. Island habitats have been lost by the structural alterations constructed for a barge canal
3. Meandering dynamic river
4. Endangered Pallid Sturgeon were once plentiful, along with other fish and aquatic species
5. Narrower, deeper, highly controlled channel
6. Drainage systems remove water and polluting fertilizers and pesticides from farm fields directly into the river
7. Industrial agriculture dominates the floodplain growing corn and soybeans for livestock and biofuels, removing the vast majority of biodiversity from the floodplain
8. Levees disconnect the floodplain from the river impacting public floodplain benefits

Illustration by Joe Mohr

Which river would you prefer?

MISSOURI RIVER AT ST. CHARLES	
Flood Categories (in feet)	
Major Flood Stage:	36
Moderate Flood Stage:	30
Flood Stage:	25
Action Stage:	23

14 of 25 of the highest flood stages have occurred since 1960

Historic Crests
(1) 40.11 ft on 06/24/1844
(2) 40.04 ft on 08/02/1993
(3) 37.50 ft on 10/07/1986
(4) 37.30 ft on 07/20/1951
(5) 36.80 ft on 06/07/1903
(6) 36.60 ft on 05/22/1943
(7) 36.50 ft on 05/21/1995
(8) 36.50 ft on 04/29/1944
(9) 36.40 ft on 04/26/1973
(10) 35.40 ft on 07/01/1947
(11) 35.40 ft on 04/15/1994
(12) 35.20 ft on 06/08/1935
(13) 35.11 ft on 12/31/2015
(14) 34.80 ft on 06/29/1942
(15) 34.60 ft on 05/19/1990
(16) 34.00 ft on 02/26/1985
(17) 33.90 ft on 12/07/1982
(18) 33.90 ft on 05/04/1983
(19) 33.81 ft on 06/03/2013
(20) 33.60 ft on 06/30/1967
(21) 33.20 ft on 03/27/1978
(22) 33.20 ft on 05/12/1961
(23) 33.00 ft on 04/24/1927
(24) 33.00 ft on 04/21/1945
(25) 32.60 ft on 07/25/1958

MISSOURI RIVER AT HERMANN	
Flood Categories (in feet)	
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18 of 25 of the highest flood stages have occurred since 1960 with 2017 moving to fourth place and removing a 2001 event.

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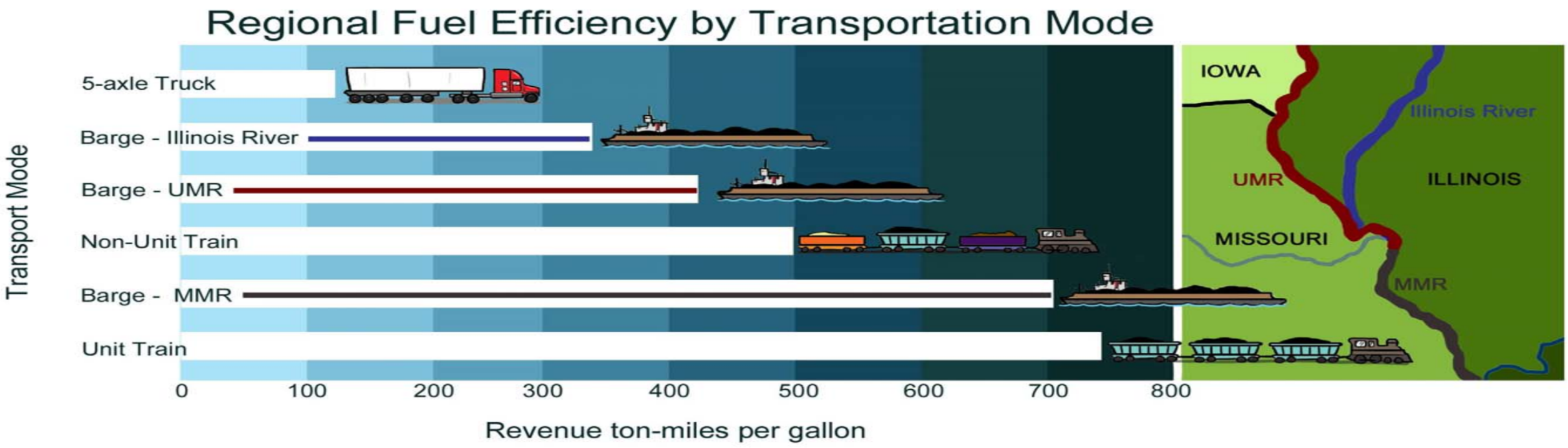
Are barges more fuel efficient?

Table 13. Summary of Fuel Efficiency.

Mode	Ton-Miles/Gallon
Inland Towing	576
Western Railroads	413
Eastern Railroads	413
Truck	155

Revised Summary of UMR Fuel Efficiency

Mode	Ton-Miles/ Gallon
Inland Towing (1.3 circuity)	443
Inland Towing (1.38 circuity)	417
Average Railroad	468
Unit Grain Train	640

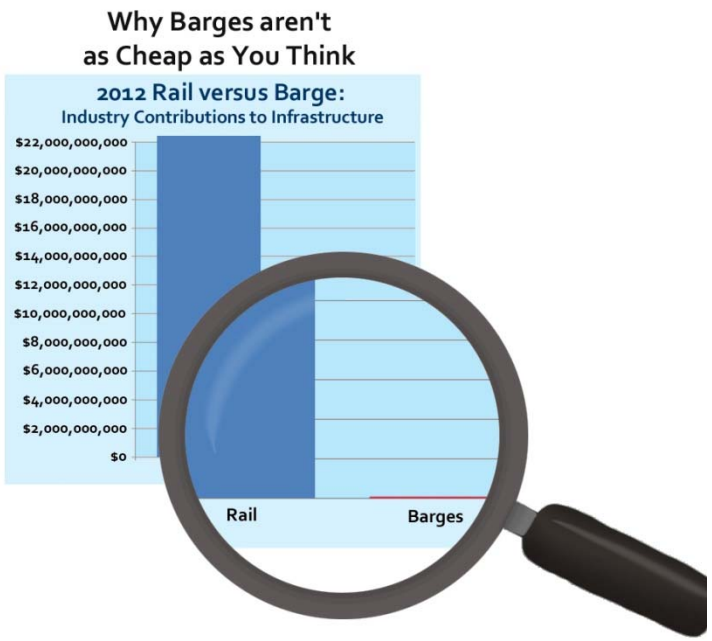


[Source: Tolliver, Denver, Pan Lu, Douglas Benson. 2013]

Fuel Tax Revenue vs. O&M Expenditures

NAS Report, Page 39

Corps of Engineers Water Resources Infrastructure:
Deterioration, Investment, or Divestment?



Notes: The 2012 dollar amounts are Rail: $22.4 billion, Barge: $85 million; Taxpayer subsidy for barge infrastructure is estimated to be $750 million annually
Sources: 2012 Railroad total annual spending for construction and maintenance, American Association of Railroads: 2013; Barge Industry contribution to the Inland Waterways Trust Fund - Inland Waterways User's Board web site, 2012 data

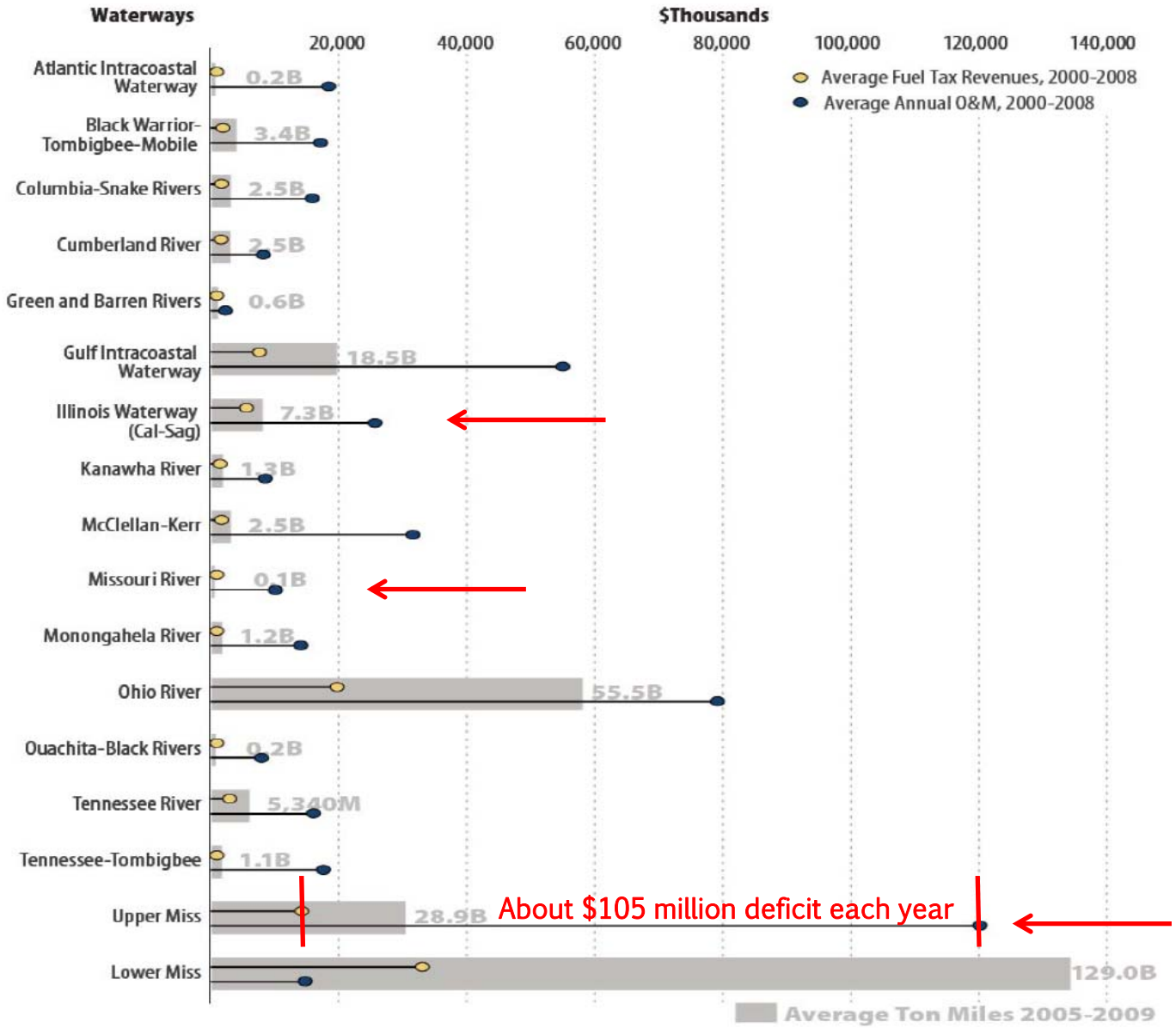
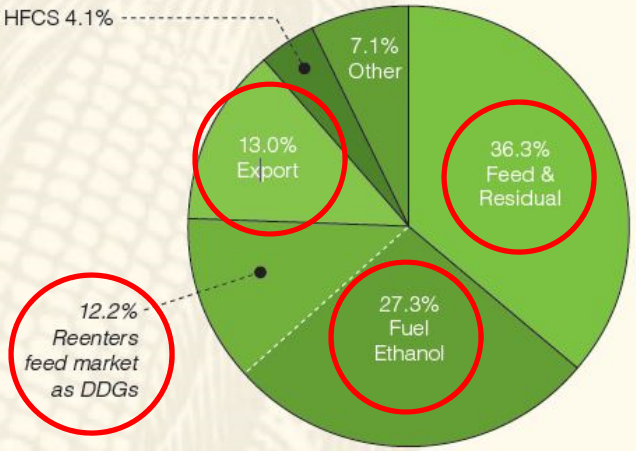


FIGURE 3-4 Fuel tax receipts relative to O&M expenditures (units in ton-miles).
SOURCE: Stern, 2012.

The Major Floodplain Crop

Corn Consumption

U.S. CORN USAGE BY SEGMENT, 2011



	Million Bushels
Feed & Residual	4,600
Export	1,650
FSI: Fuel Ethanol	5,000
Corn displaced by DDG/CGF	*(1,266)*
DDG exported	*(281)*
FSI: High-Fructose Corn Syrup	520
FSI: Sweeteners	265
FSI: Starch	260
FSI: Cereal/Other	202
FSI: Beverage Alcohol	135
FSI: Seed	24
Total FSI	6,406
Total Uses	12,656

Source: USDA ERS, Feed Outlook, 1/12
*Crop year ending 8/31/12
Note: Of the 5,000 million bushels of corn for ethanol, the equivalent of 1,266 million bushels of corn was produced in dried distillers grains and corn gluten feed for domestic use, and an additional 281 million bushels of dried distillers grains were exported.

Where does our food come from?:

The Value of California Agriculture: 1/3 rd of vegetables and 2/3 rds of fruits

Global Marketplace

Californi
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Escarole/En

Figs

Mandarins & Mandarin Hybrids [2]

Top 5 Agricultural States in Crop Cash Receipts, 2015

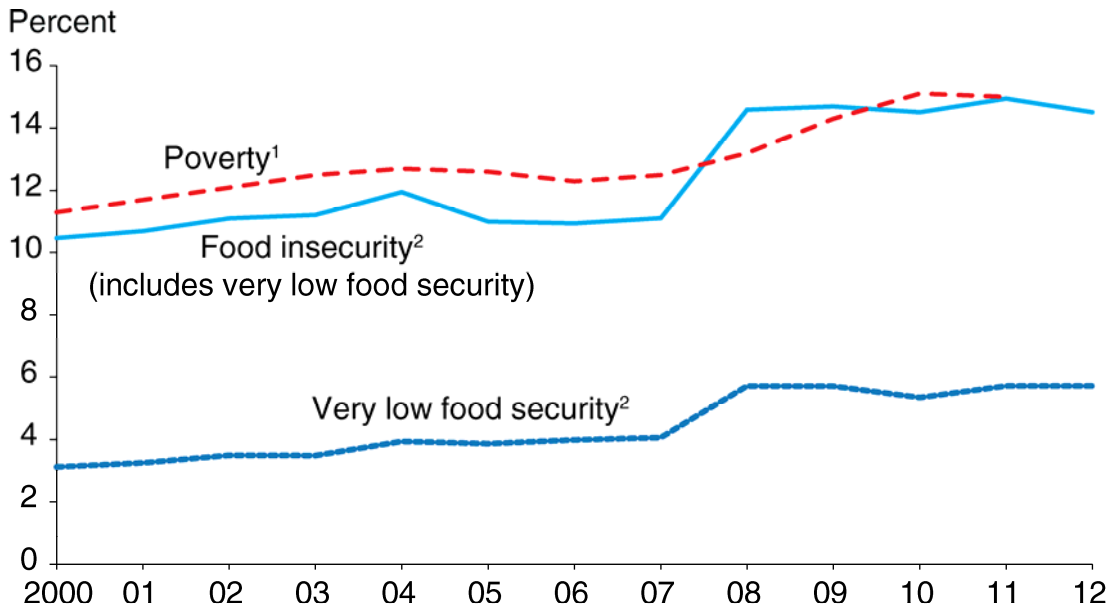
Rank	State	Crop Cash Receipts
		$1,000
	United States	379,168,941
1	California	47,071,513
2	Iowa	27,823,447
3	Texas	23,707,102
4	Nebraska	23,199,230
5	Minnesota	16,585,164

[1] *California is the sole producer (99 percent or more) of the commodities in* ***bold*** *.*

[2] *Includes tangelos, tangerines and tangors.*

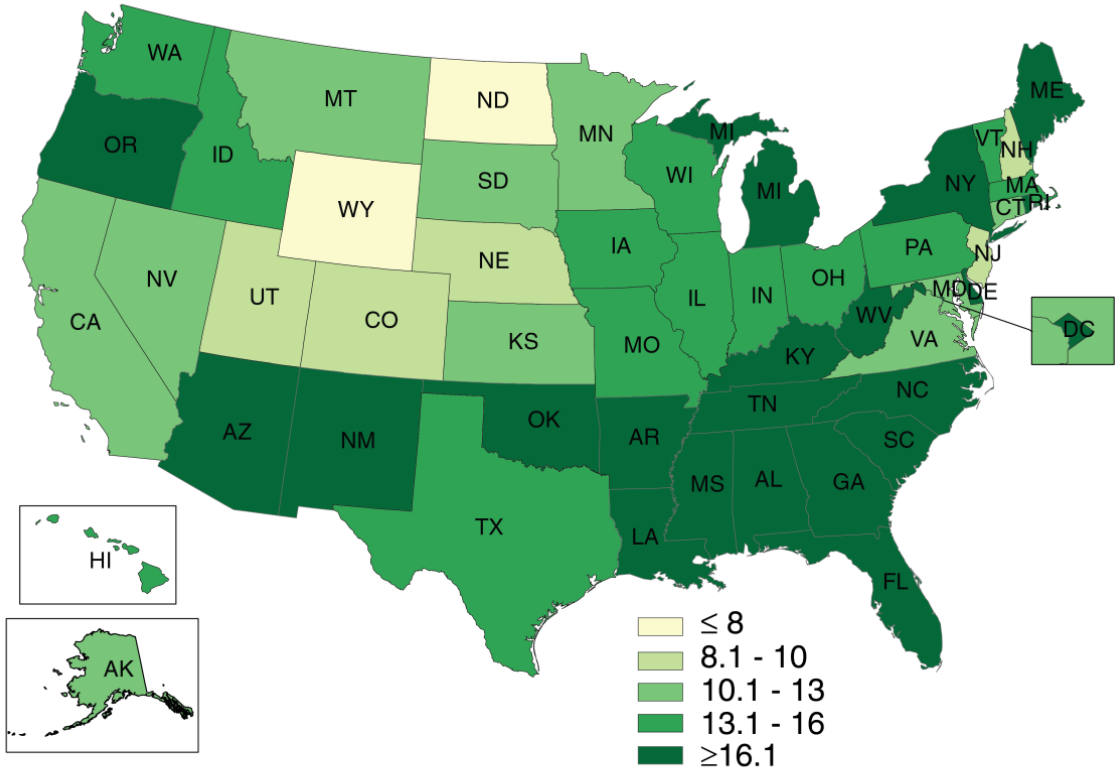
Agricultural Value & Food Security

Prevalence of food insecurity, very low food security, and poverty, 2000-2012



[1]Percent of U.S. population. [2]Percent of U.S. households.
Source: USDA, Economic Research Service calculations based on Current Population Survey Food Security Supplement data. Poverty rates from the U.S. Census Bureau.

Percent of population receiving SNAP benefits in FY2013



Source: USDA, Economic Research Service using data from USDA, Food and Nutrition Service.

Food Insecurity

Food Insecurity in the U.S. Corn Belt

		Food Insecurity %			
	Number of households	Low or very low food security		Very low food security	
State	Average 2011-2013	Prevalence	Households	Prevalence	Households
Iowa	1,239,000	11.9	147,441	4.4	54,516
Illinois	4,926,000	12.5	615,750	4.4	216,744
Indiana	2,644,000	14.1	372,804	6.1	161,284
Minnesota	2,139,000	10.8	231,012	4.4	94,116
Missouri	2,418,000	16.9	408,642	8.1	195,858
Nebraska	756,000	13.8	104,328	5.2	39,312
Wisconsin	2,324,000	11.6	269,584	5	116,200
			2,149,561		**878,030**

Source: USDA-ERS "Household Food Security in the United States in 2013"
http://www.ers.usda.gov/media/1565415/err173.pdf

Over 2.1 million households are suffering from food insecurity within the Corn Belt, over half of them in Illinois and Missouri. With an average household size of 2.54 people, that equates to just under 5.5 million people. So while our government pushes to grow and ship even more Corn Belt animal feed overseas, over five million people in Illinois and Missouri are too often lacking food.