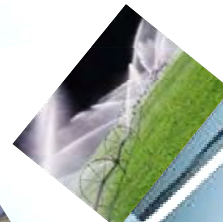




Characterizing water-use in the Ohio River basin

John Spaeth

Water Resources Meeting
November 27th, 2012





Ohio River basin Freshwater-use

2005

Estimated (Bgal/day)

Withdrawals:	43.82	134,000 Acre-ft
Consumption:	1.92 (4.4%)	5,900 Acre-ft

Definitions

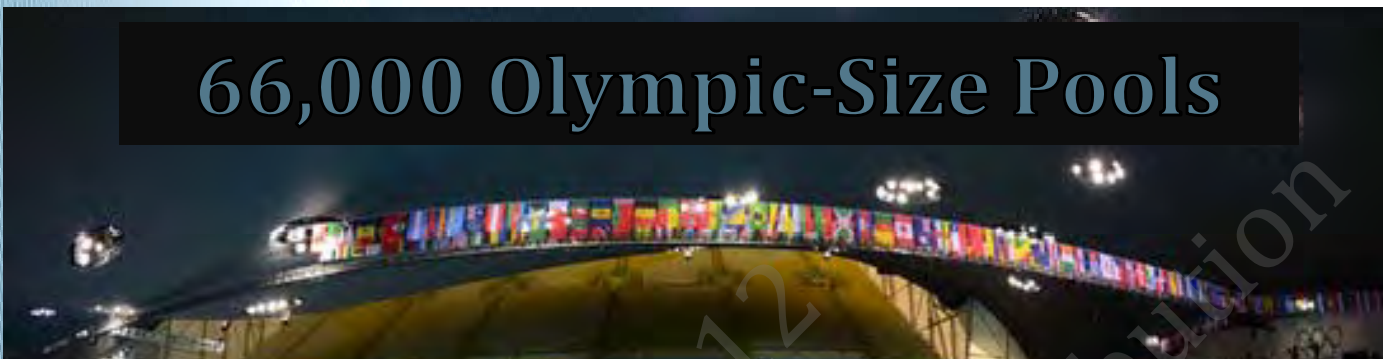
- **Water-use**
 - *water withdrawn from a source*
- **Consumption**
 - *water withdrawn and subsequently rendered unavailable for other withdraws.*
 - evaporated, transpired
 - consumed by humans or livestock
 - assimilated into crops or products.

Acre-Foot = Volume of water that will cover an area of one acre to a depth of one foot



43.82 Bgal/day

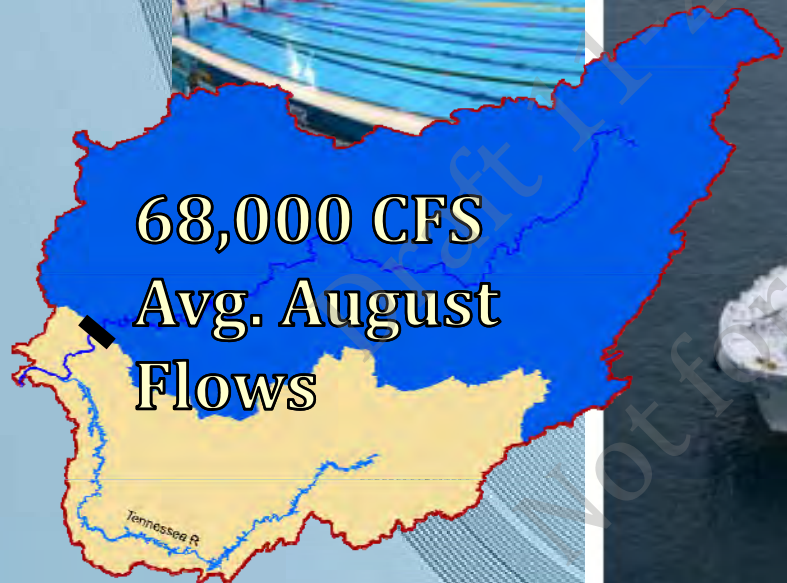
66,000 Olympic-Size Pools



329 TI Supertankers



68,000 CFS
Avg. August
Flows





1.92 Bgal/day

Full Crew Capacity for 26 years



1,920,000,000 Milk Jugs



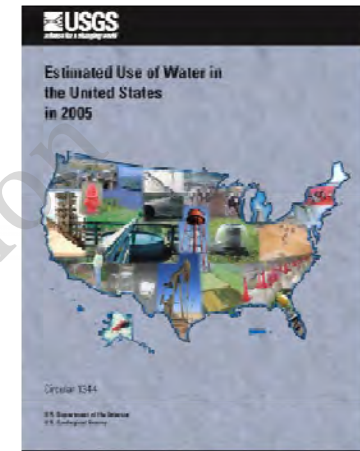
7x's around the earth

Data Availability



Water Withdrawals

- **USGS publicly available data**
 - 2005
 - County-level
 - State Agencies
 - 2010 water data publicly available in 2014
 - *GLBC
 - *TVA



Consumption

- **Consumption Coefficients – meta-analysis**
 - Shaffer & Runkle - 2007 - Consumptive Water-Use Coefficients for the Great Lakes Basin and Climatically Similar Areas
- **US Energy Information Administration (EIA)**
 - Thermoelectric facilities

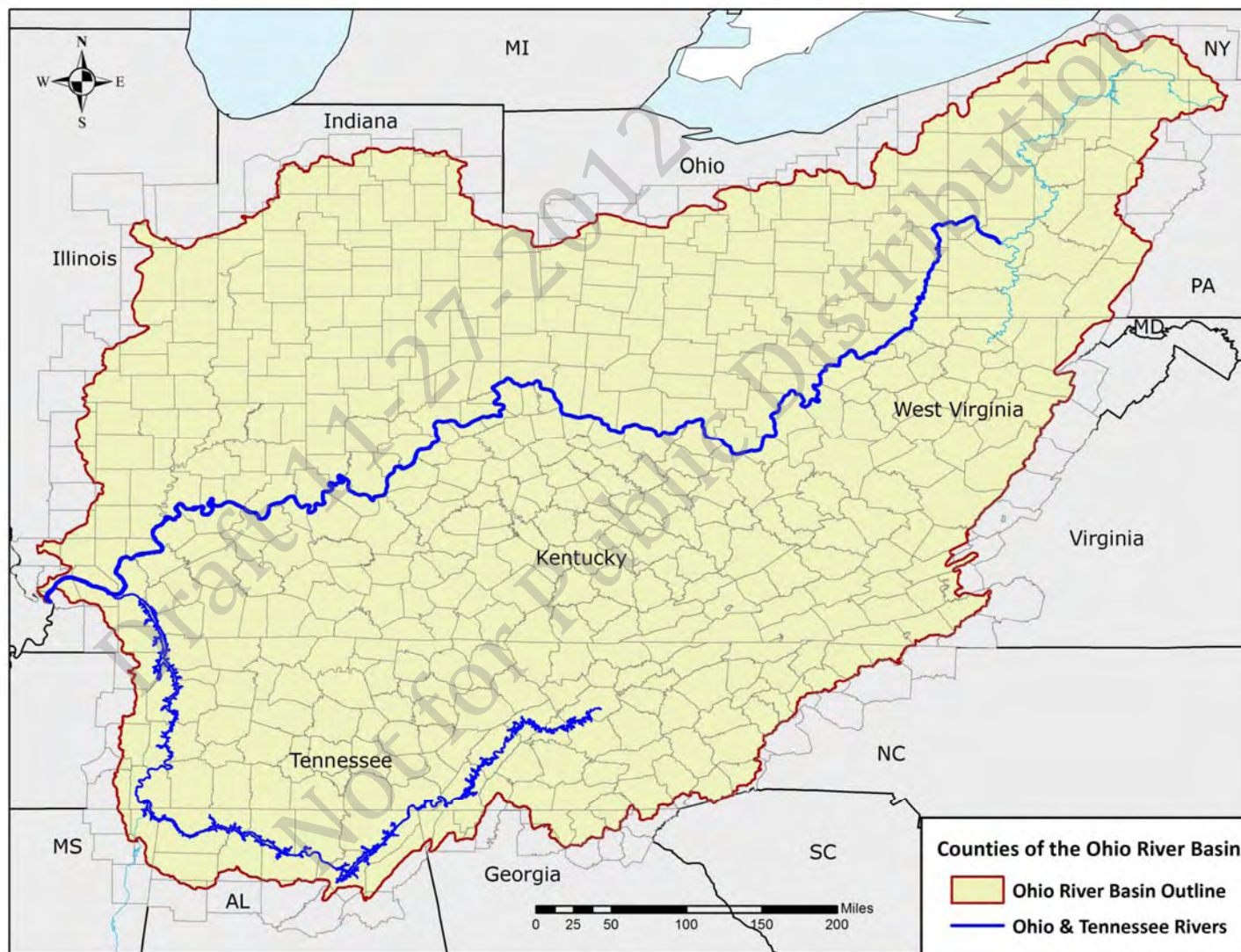


County Land-Area Adjusted

43.8 Bgal/day ±3.4%

Min
42.1

Peripheral
Counties
Excluded



Max
45.1

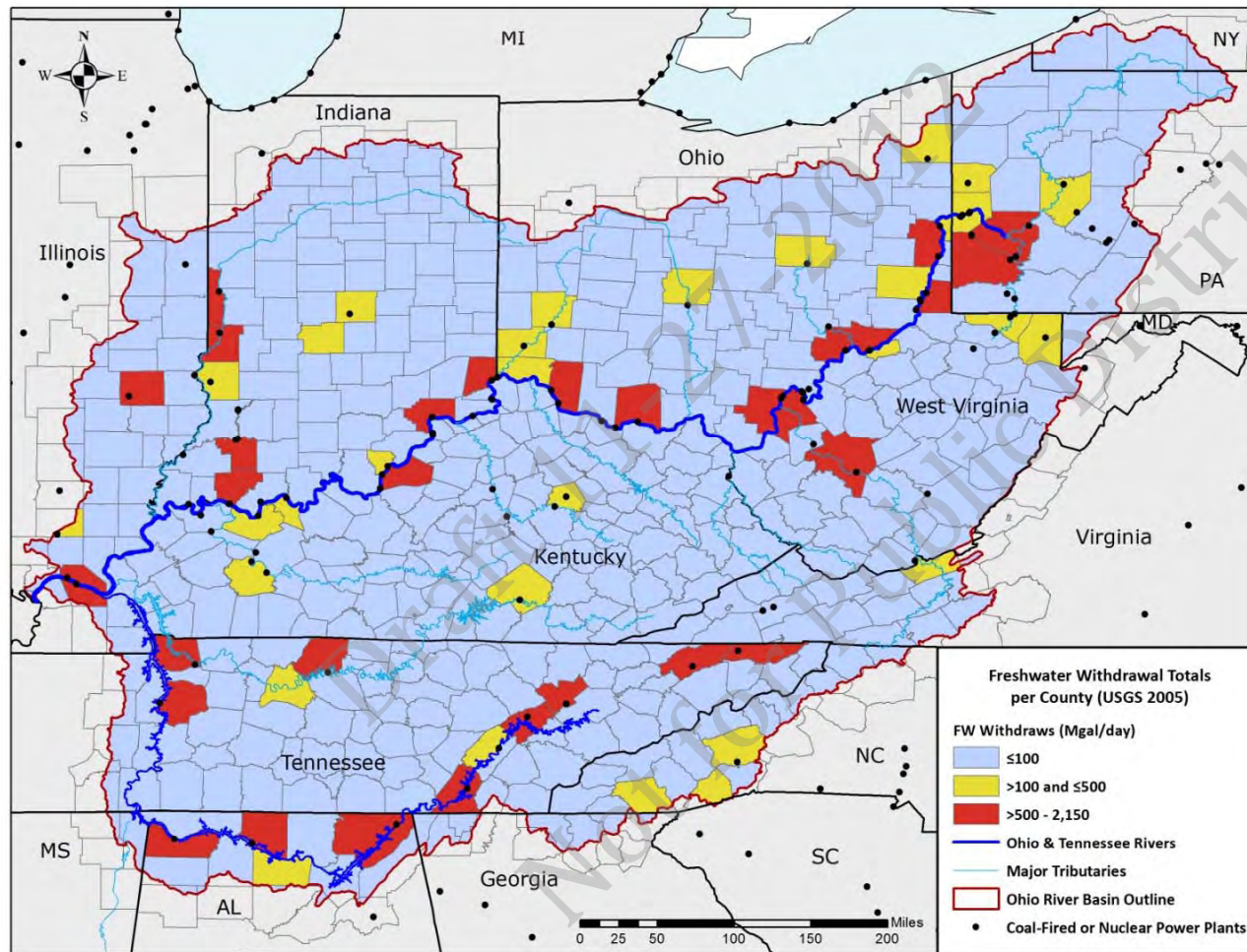
Peripheral
Counties
Included

2005 Total Freshwater-use in the Ohio River basin



Trends in water withdrawals:

- 1) Juxtapose to a large water body
- 2) Thermoelectric facility
- 3) Contain a metropolitan area

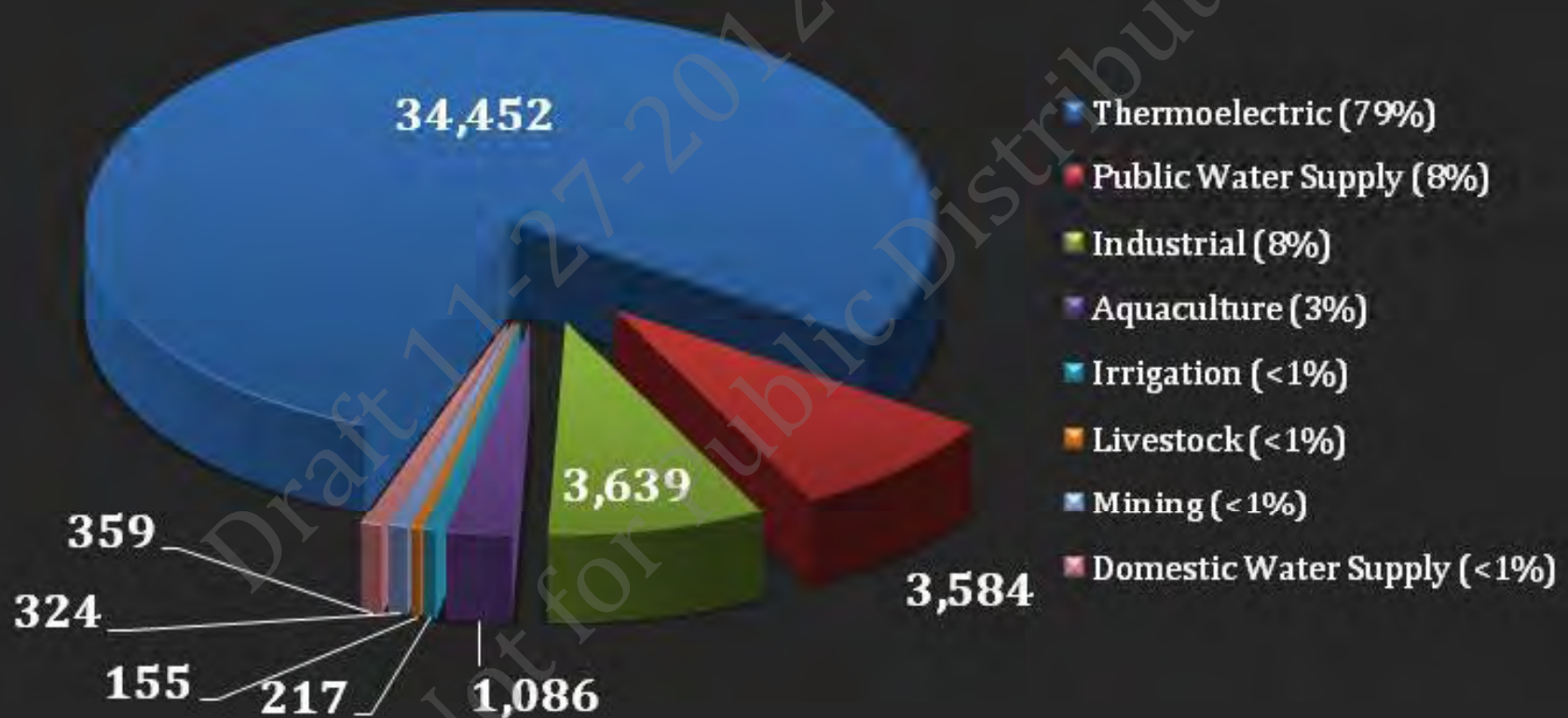


Categorical Withdrawals

43,817 Mgal/day



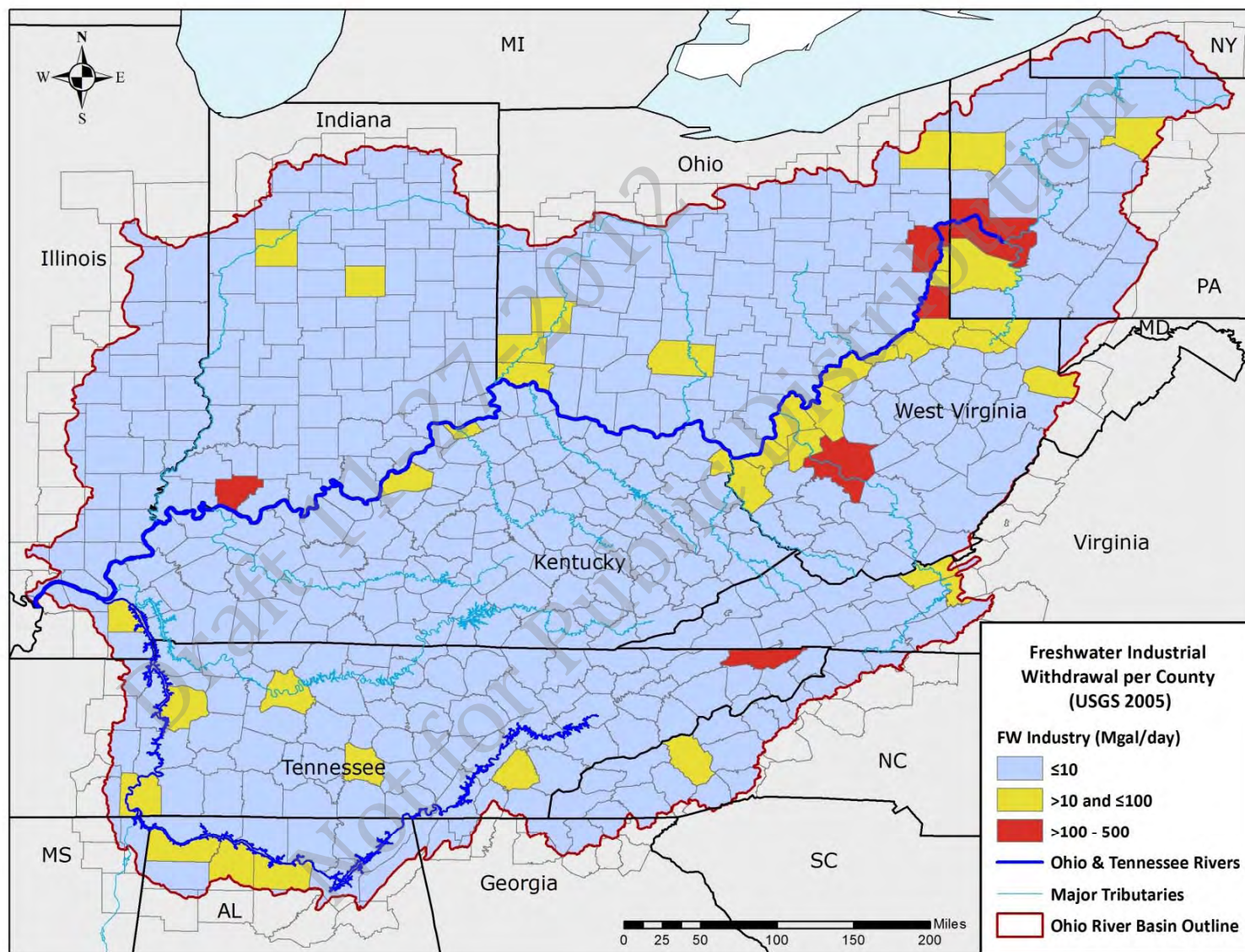
2005 Freshwater Use in Ohio River basin (Mgal/ day)





Industry

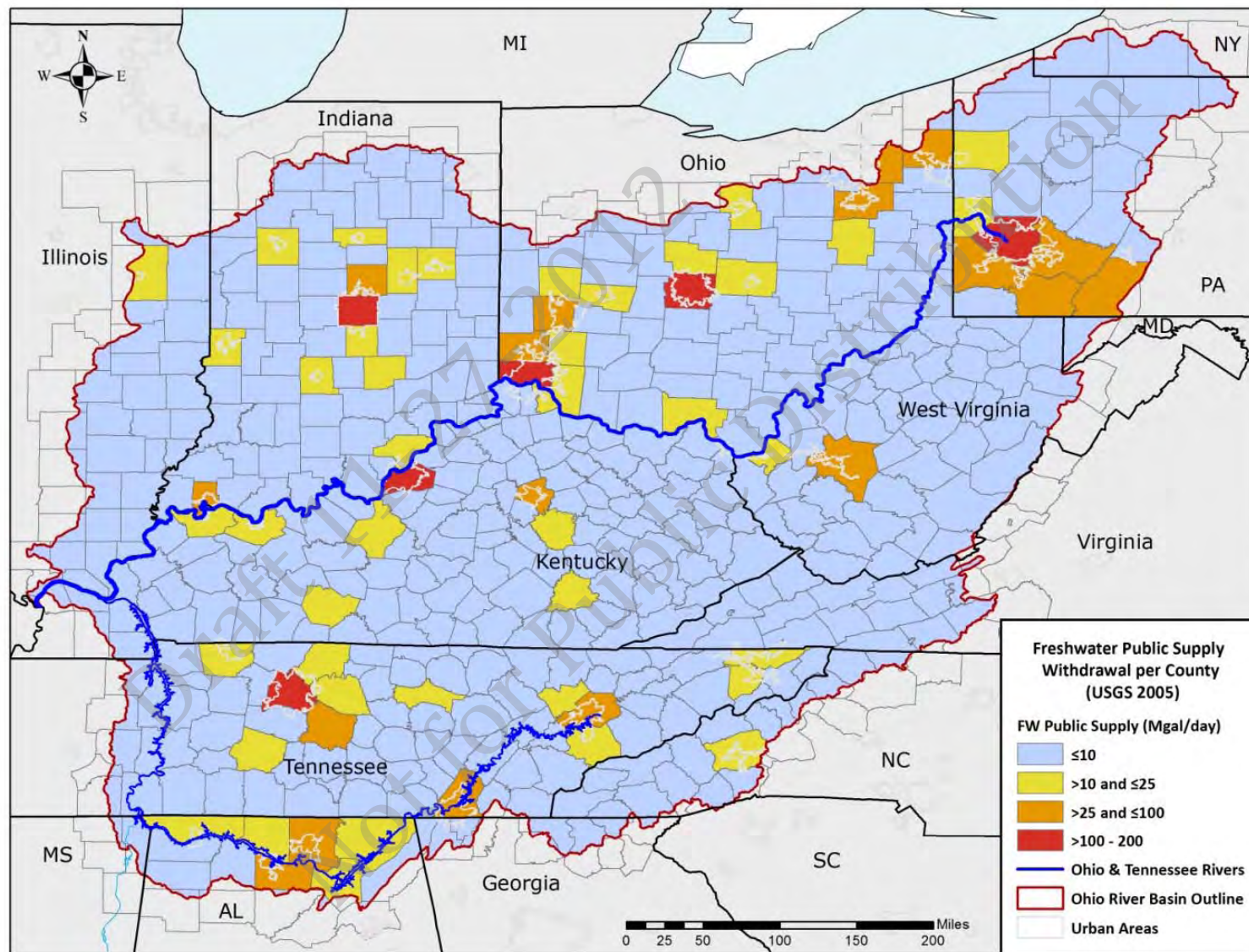
(3,639 Mgal/day or 8.3% total use)





Public Supply

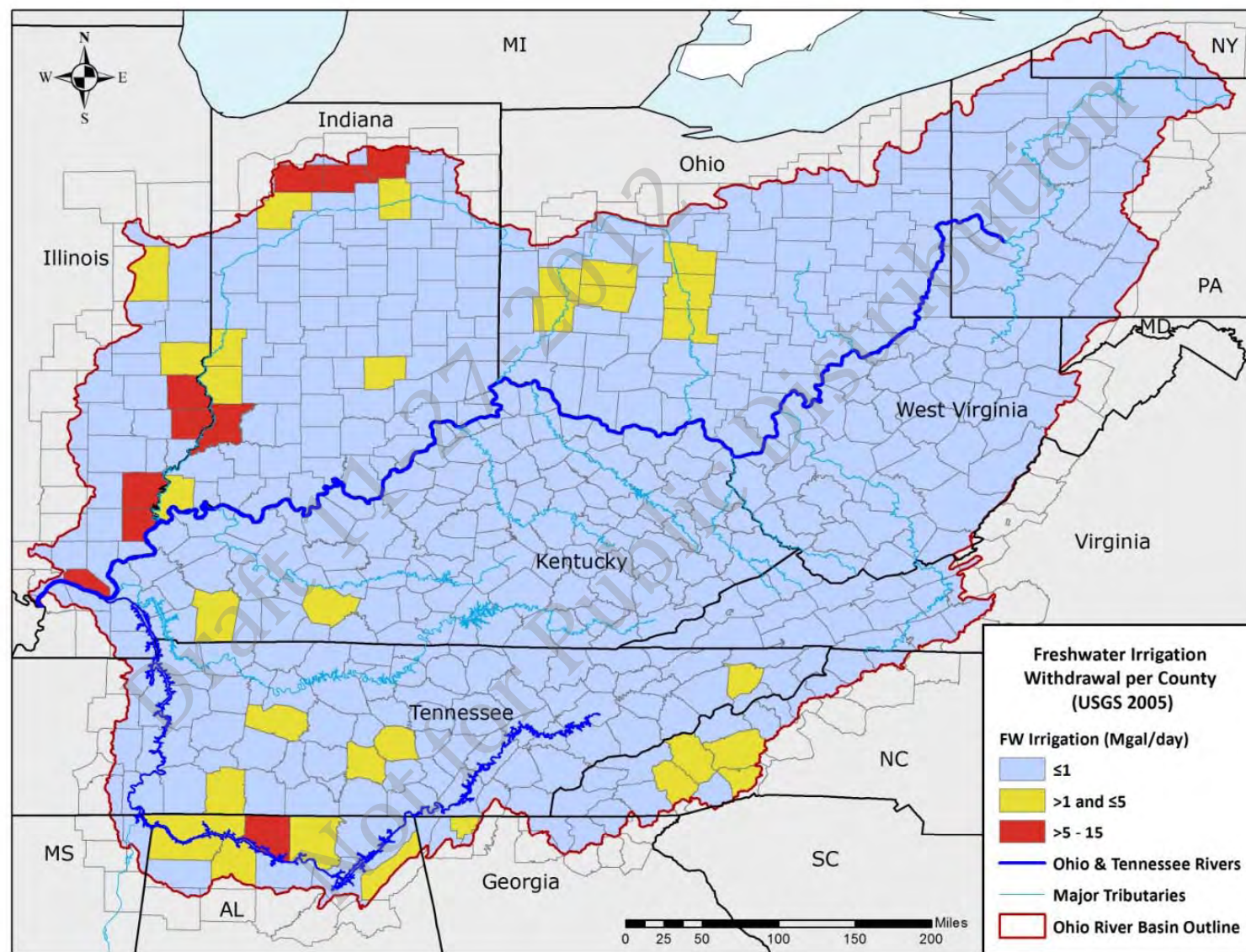
(3,584 Mgal/day or 8.2% total use)





Irrigation

(217 Mgal/day or 0.5% total use)

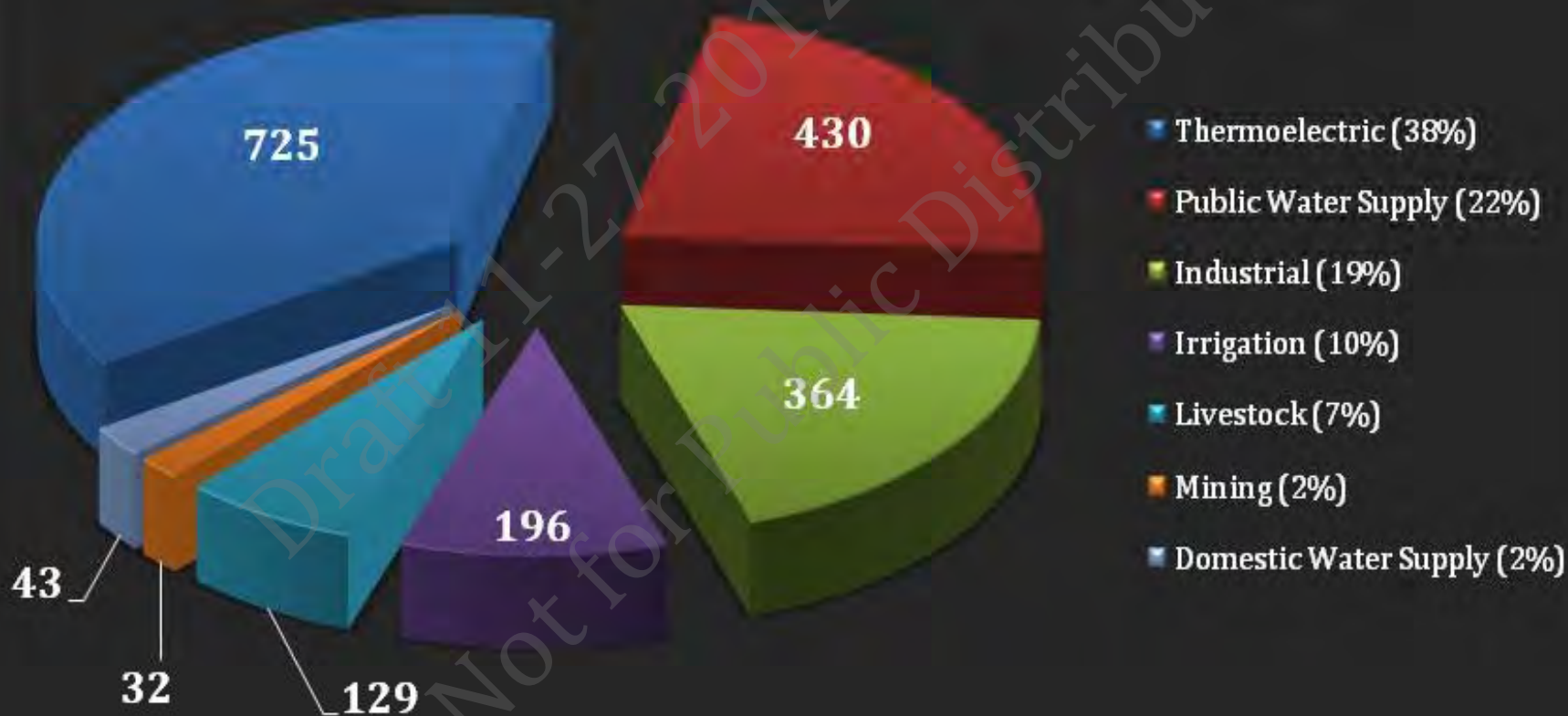




Consumptive-uses

1,919 Mgal/day

2005 FW Consumption in Ohio River basin (Mgal/day)



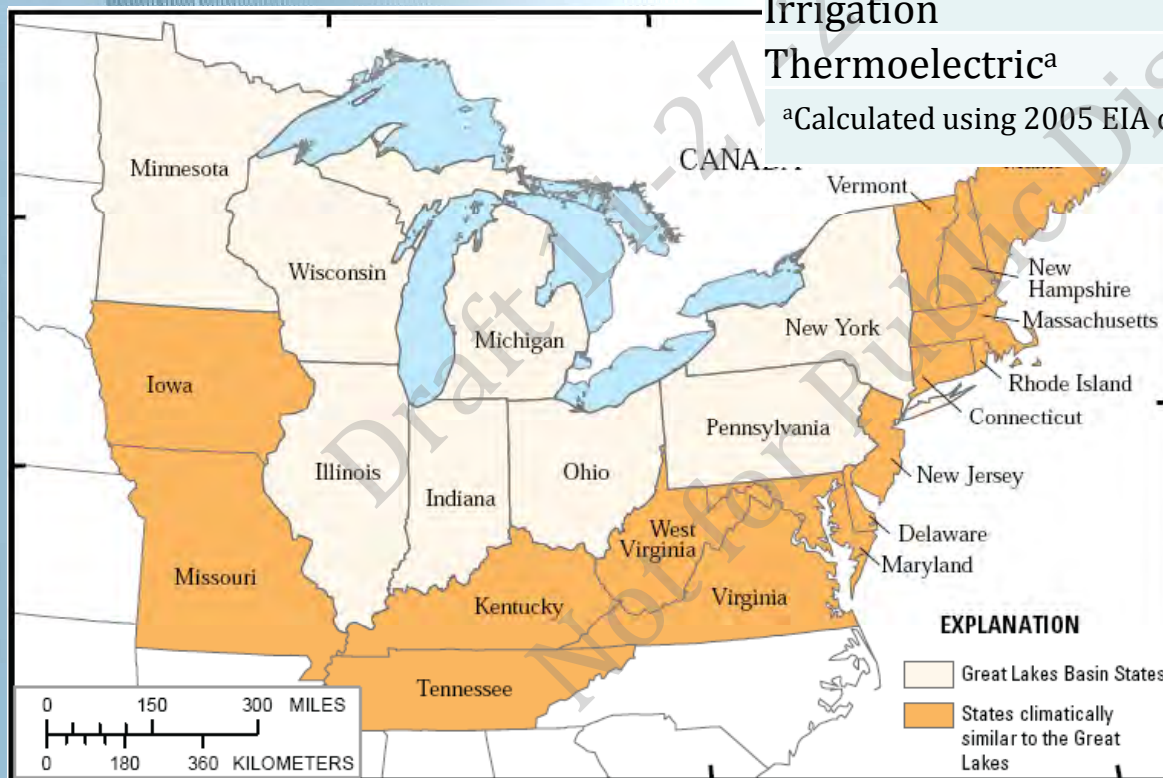


Consumption Coefficients

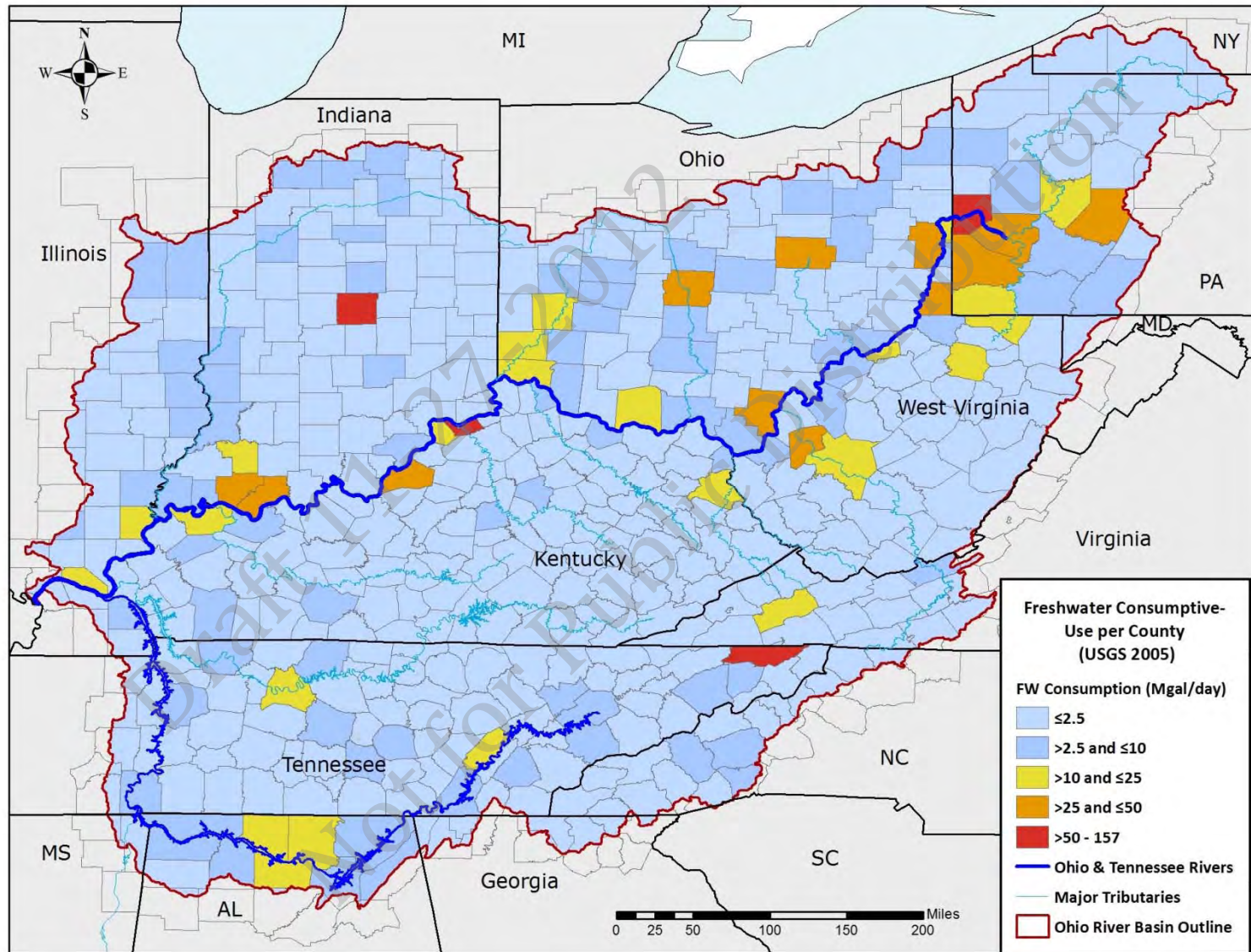
Percentage of the water withdrawn that is consumed

Water-use category	Consumption Coefficients(%)
Industrial	10
Mining	10
Aquaculture	0
Domestic Water Supply	12
Public Water Supply	12
Livestock	83
Irrigation	90
Thermoelectric ^a	2.1

^aCalculated using 2005 EIA dataset



Consumption (1,919 Mgal/day)

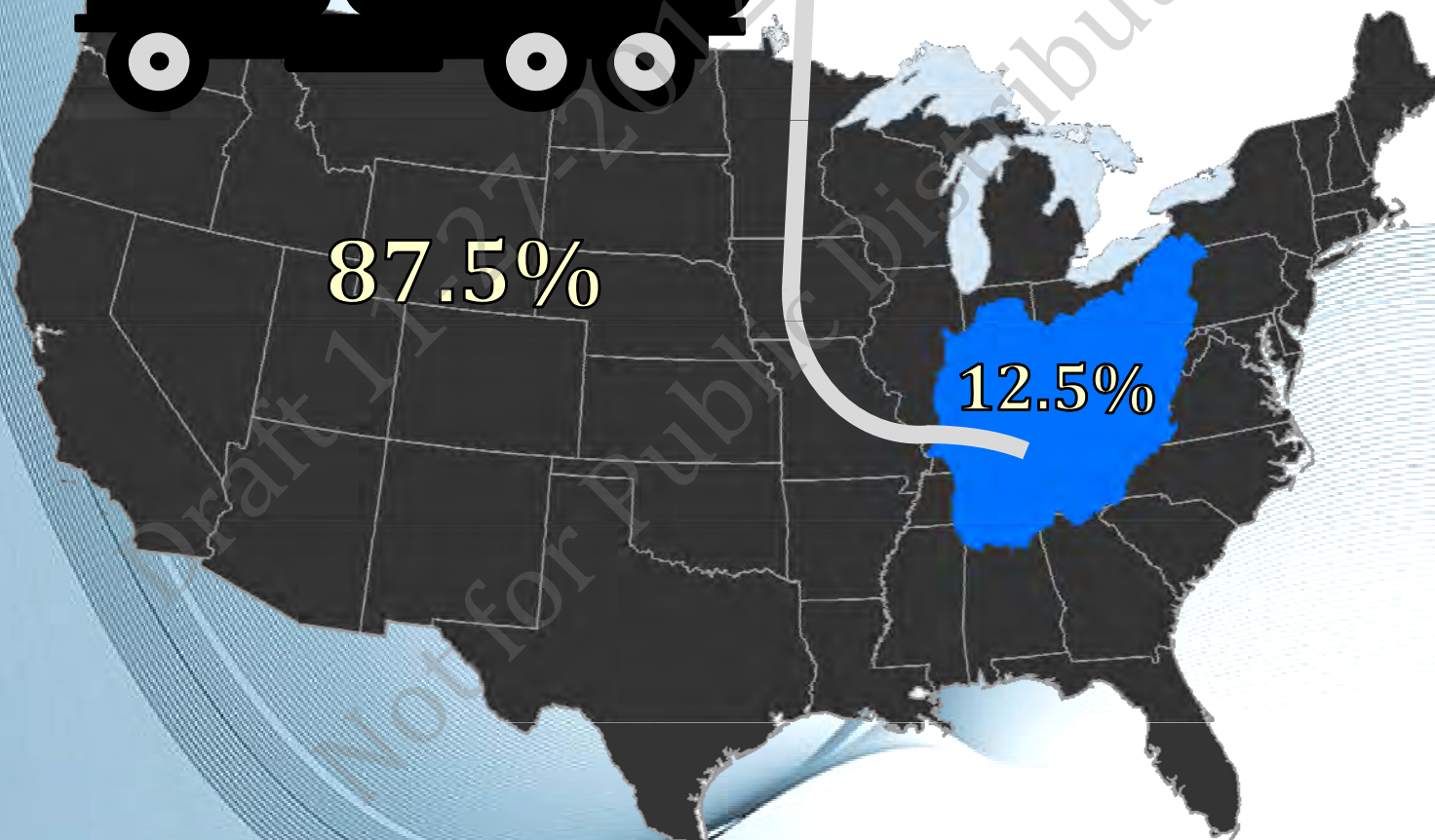


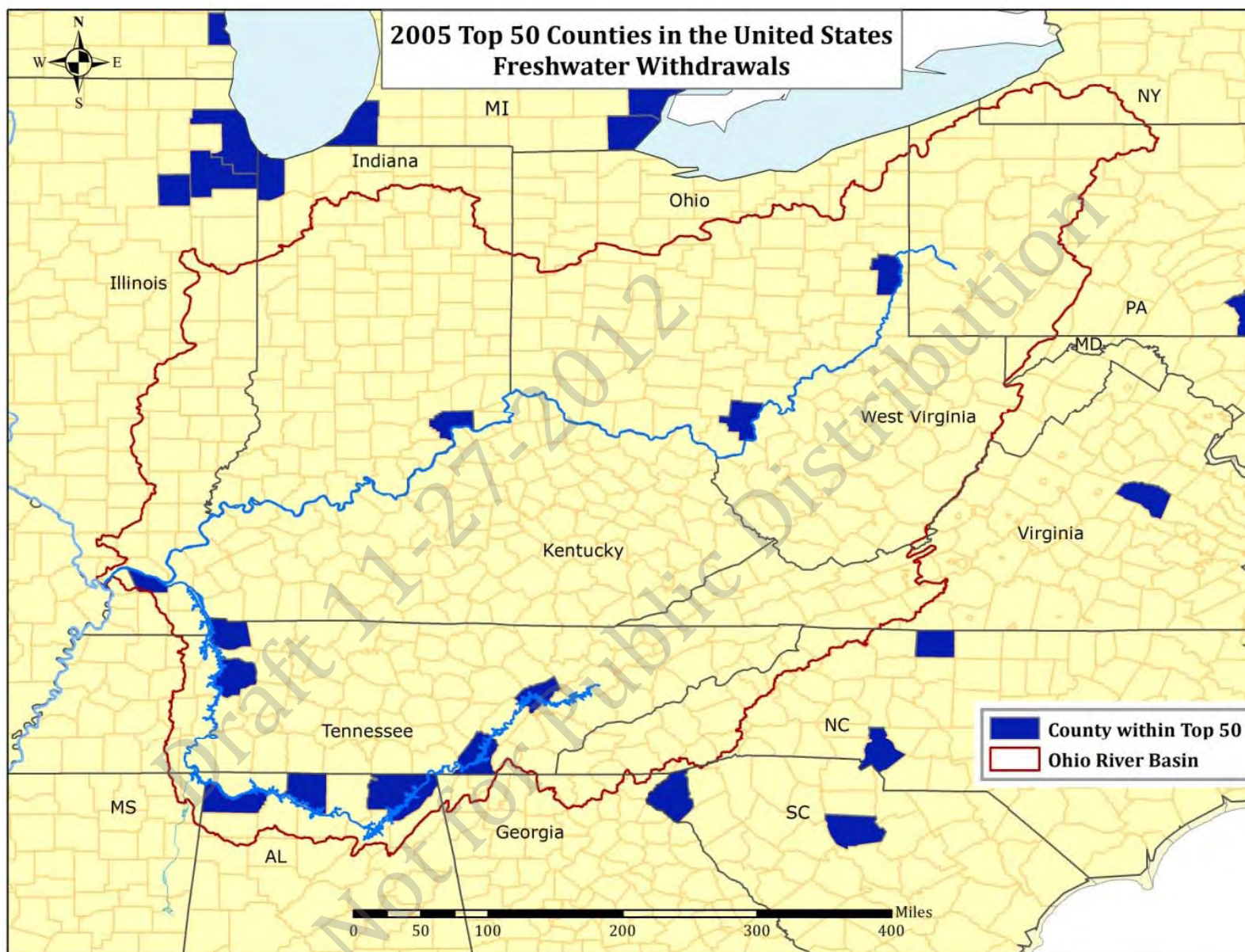


Perspective

ORB vs National

National - 349 Bgal/day



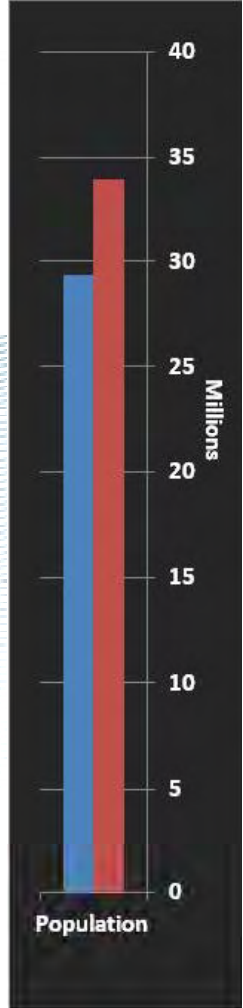
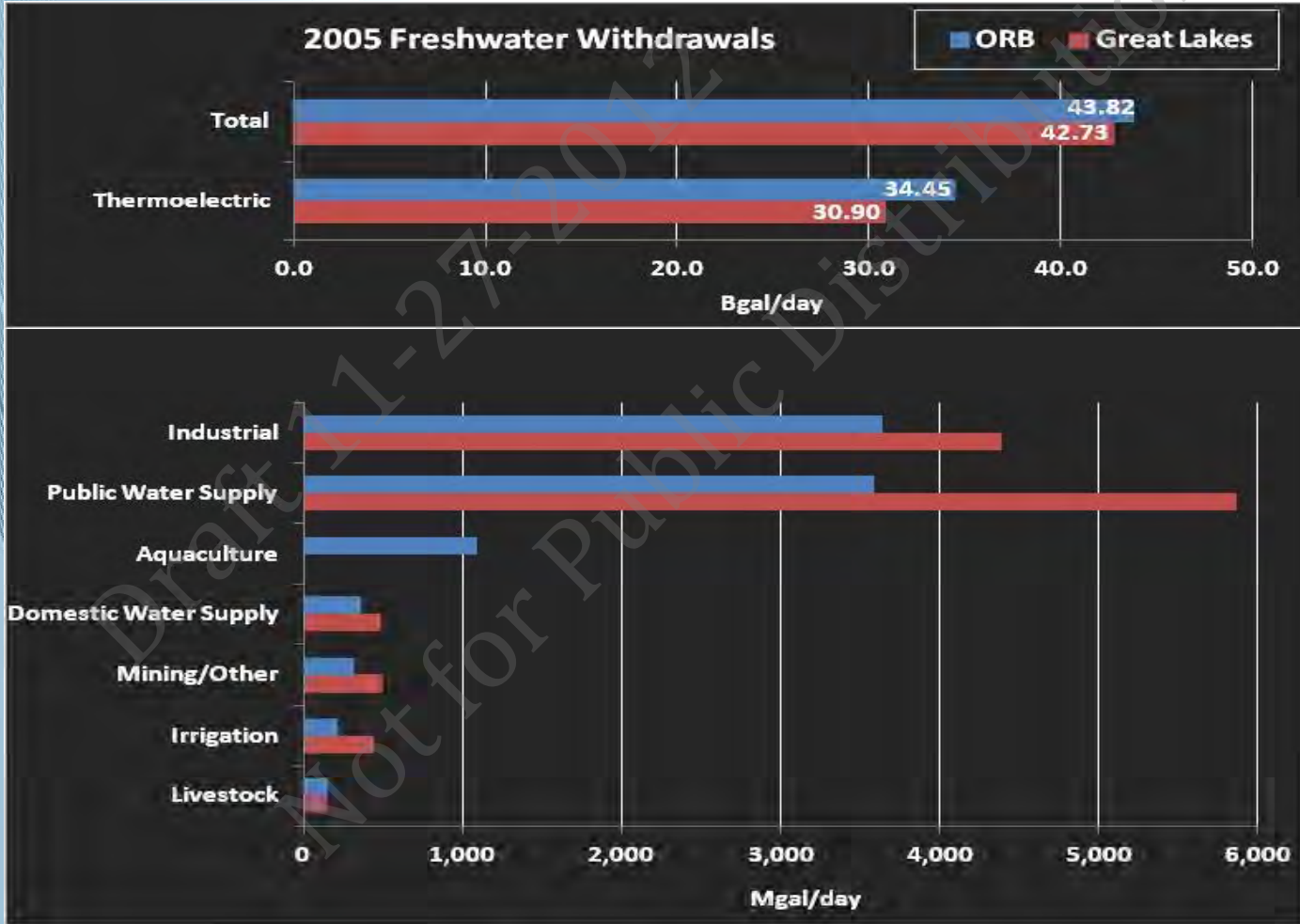
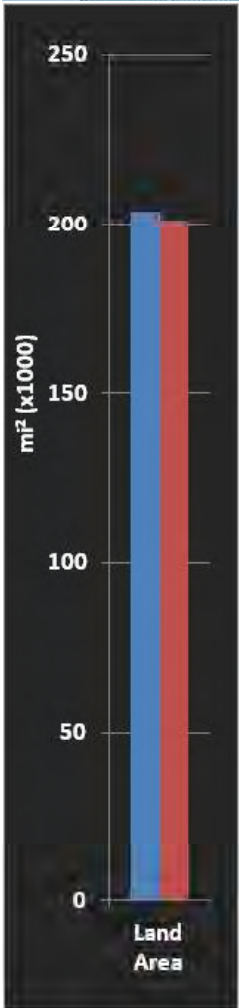




Perspective ORB vs Great Lakes



	ORB	Great Lakes
Land Area (mi ²)	203,826	201,460
Population (2010)	29 million	34 million



Sources: Kenny et al. 2009 Shaffer & Runkle 2007 Great Lakes Commission 2011

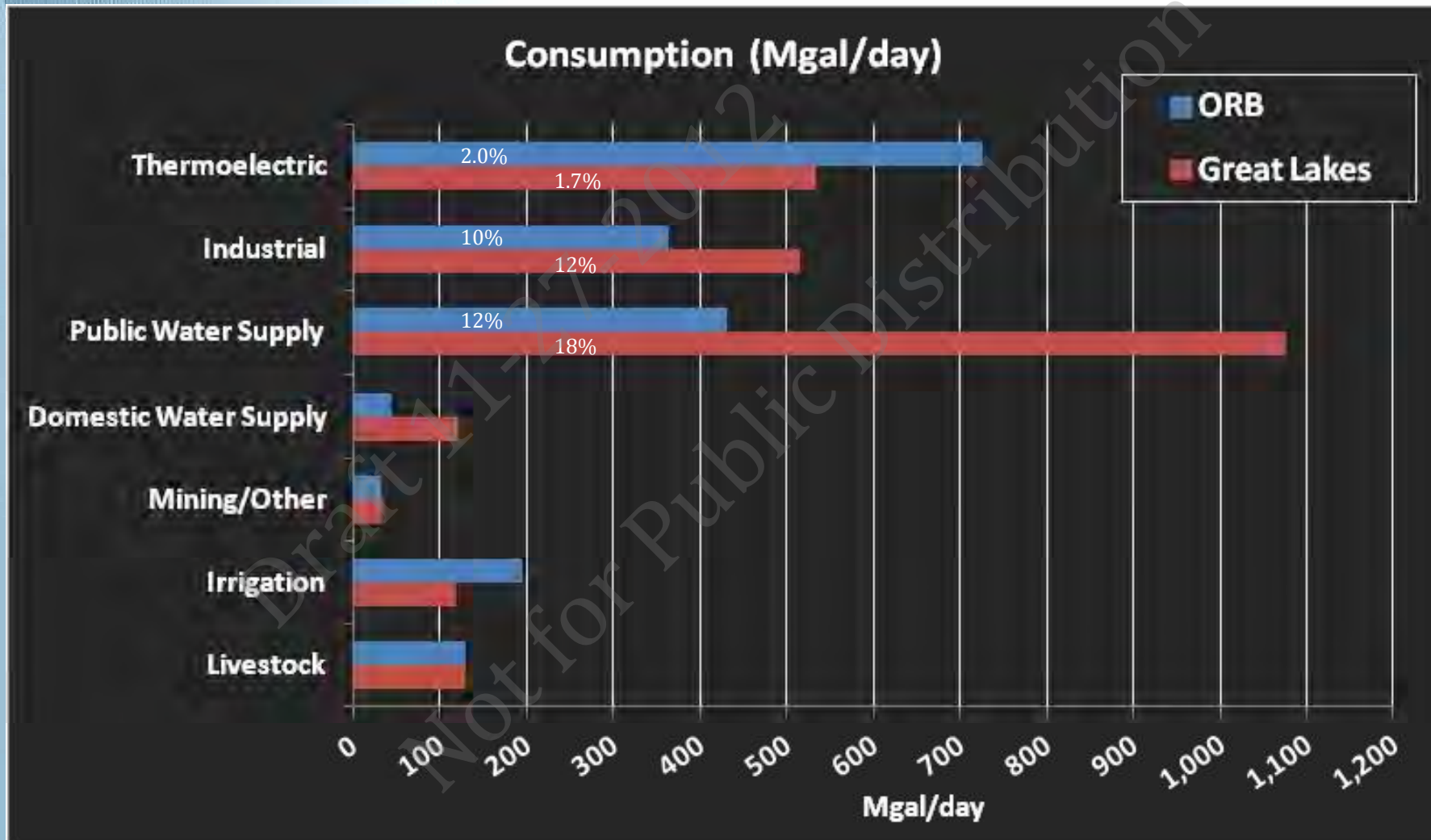


Perspective ORB vs Great Lakes



1,919 Mgal/day

2,529 Mgal/day



Sources:

Kenny et al. 2009

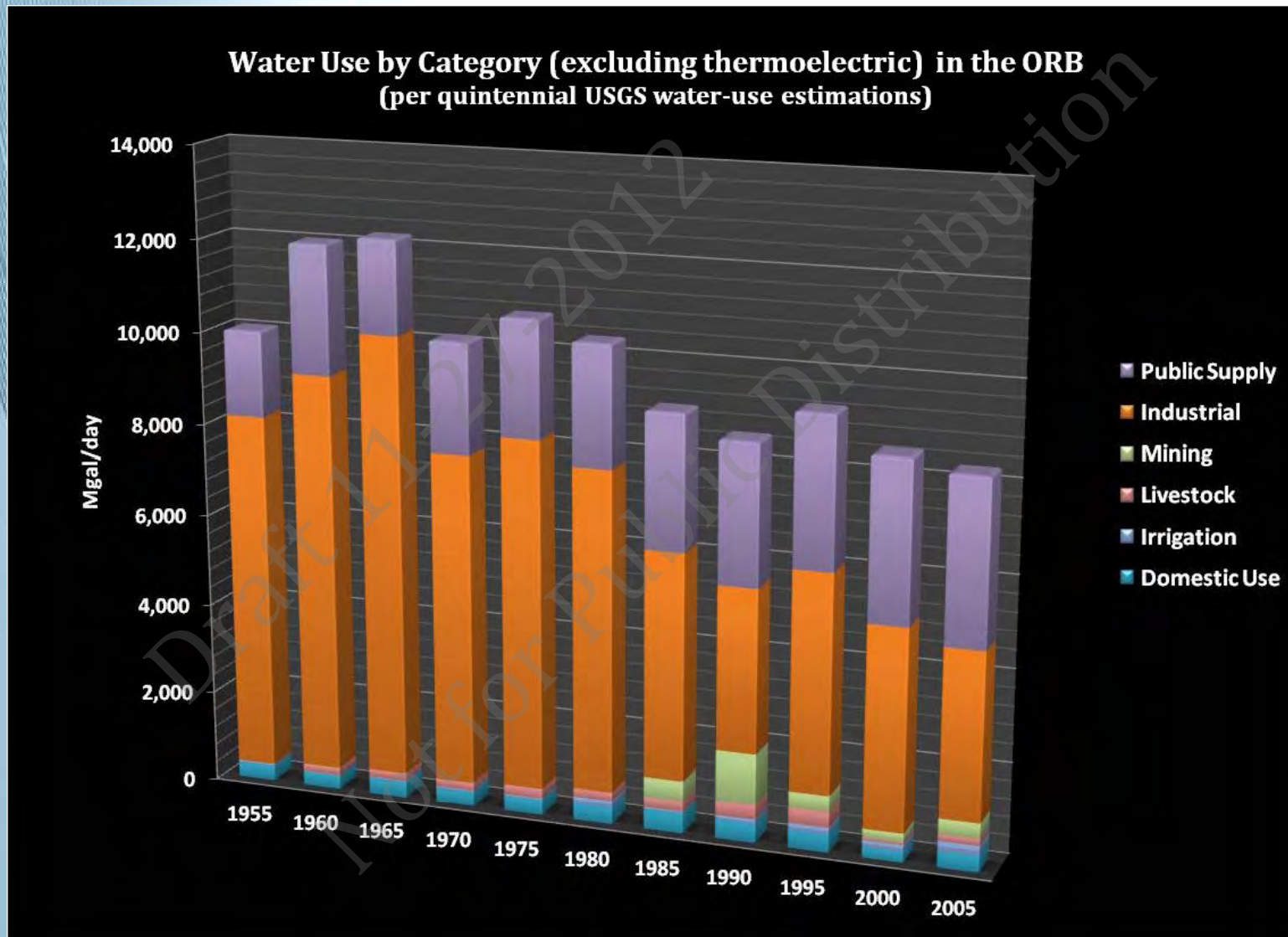
Shaffer & Runkle 2007

Bohac & McCall 2008

Great Lakes Commission 2011

Quintennial water withdrawals

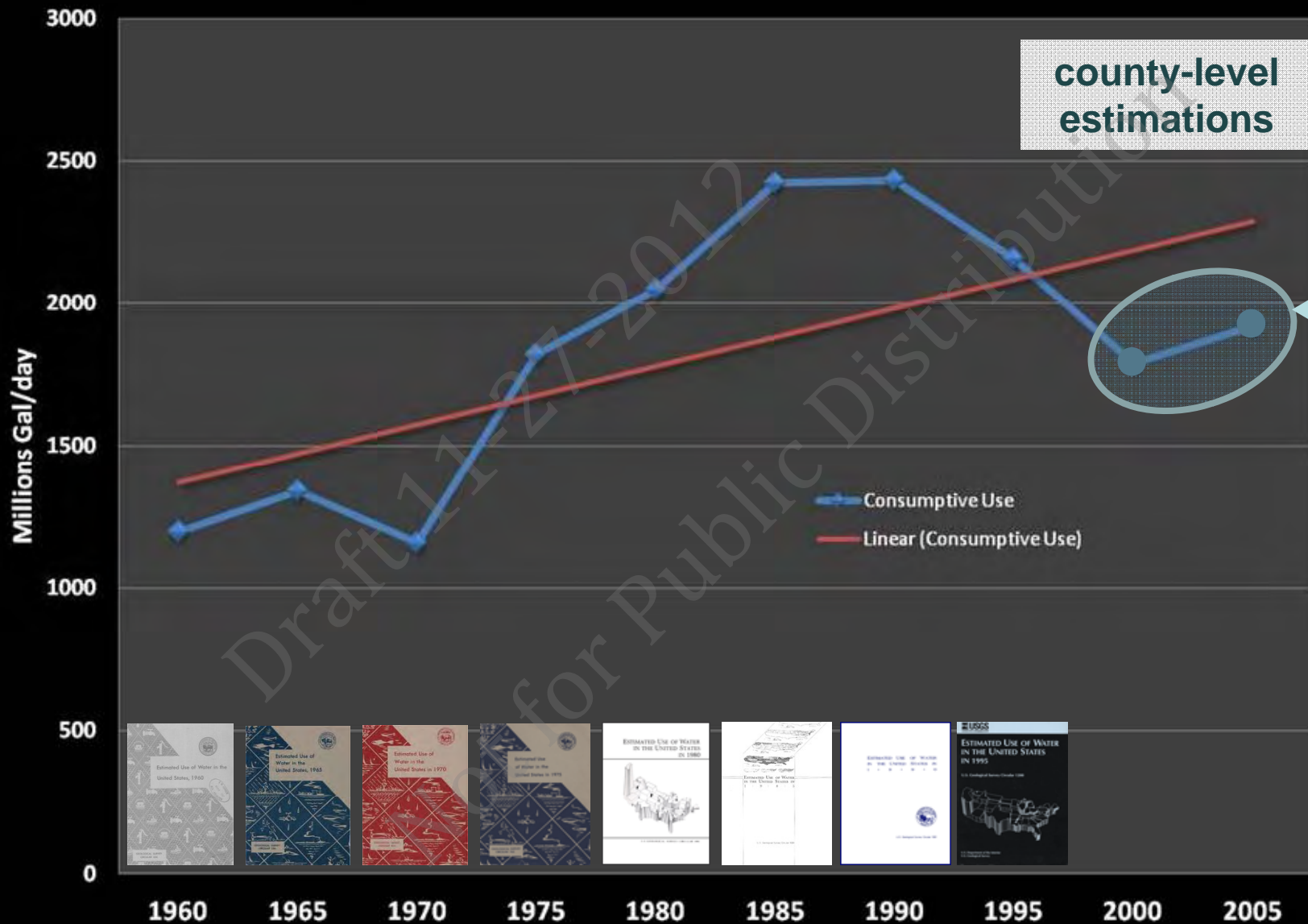
in ORB (1955-2005)
--Excluding Thermoelectric--



Quintennial Consumption



Consumptive Use Trends in the Ohio River Basin since 1960





Next Steps

- Phase 1 – Characterizing Water-Use
 - Distribute draft in early 2013
- Other topic areas
 - Future Trends in Water-Use
 - Population Changes
 - Irrigation – Economics, Ethanol Production
 - Thermoelectric Changes
 - Climate Change
- Future consumptive investigations
 - Identify areas of water stress
 - Follow Lead of TVA
 - 25-year projections
 - Net-Water Budget
- Questions?

