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Biofuels: An Emerging Water Resources Hazard

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Prepared by

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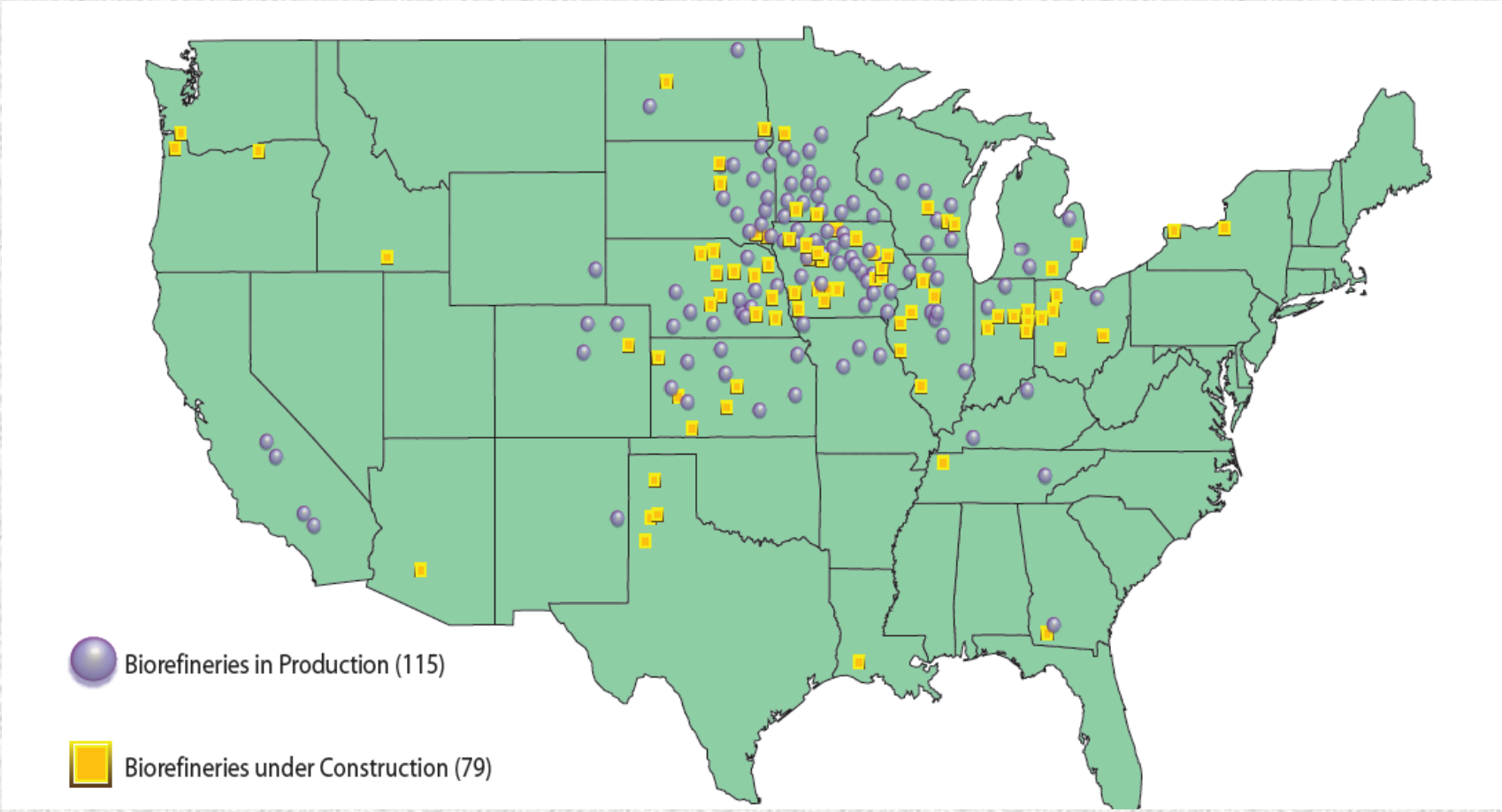
Biofuel Plants Operating or Under Construction, Spring 2007

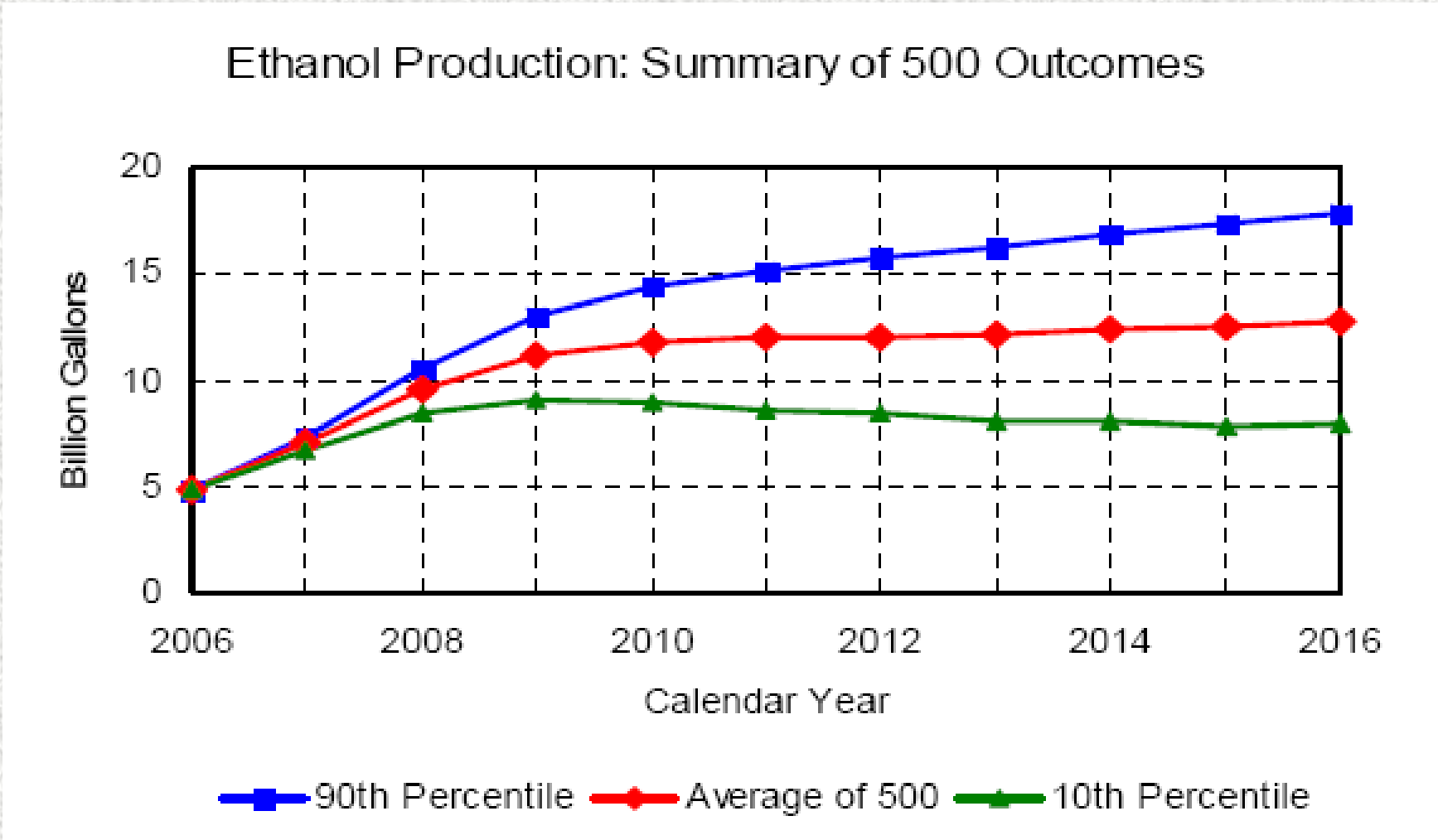


POLITICAL FORCES

Hon. Collin Peterson, Minnesota (D)
Chair, U.S. House Agricultural Committee.
Sen. Tom Harkin, Iowa (D)
Chair, U.S. Senate Agriculture Committee.

Rural lawmakers would like to see a 15 billion gallon mandate by 2012, up from the current 7.5 billion gallons.

Bush Administration also Encouraging ethanol production.



Source: FAPRI 2007 Outlook Report

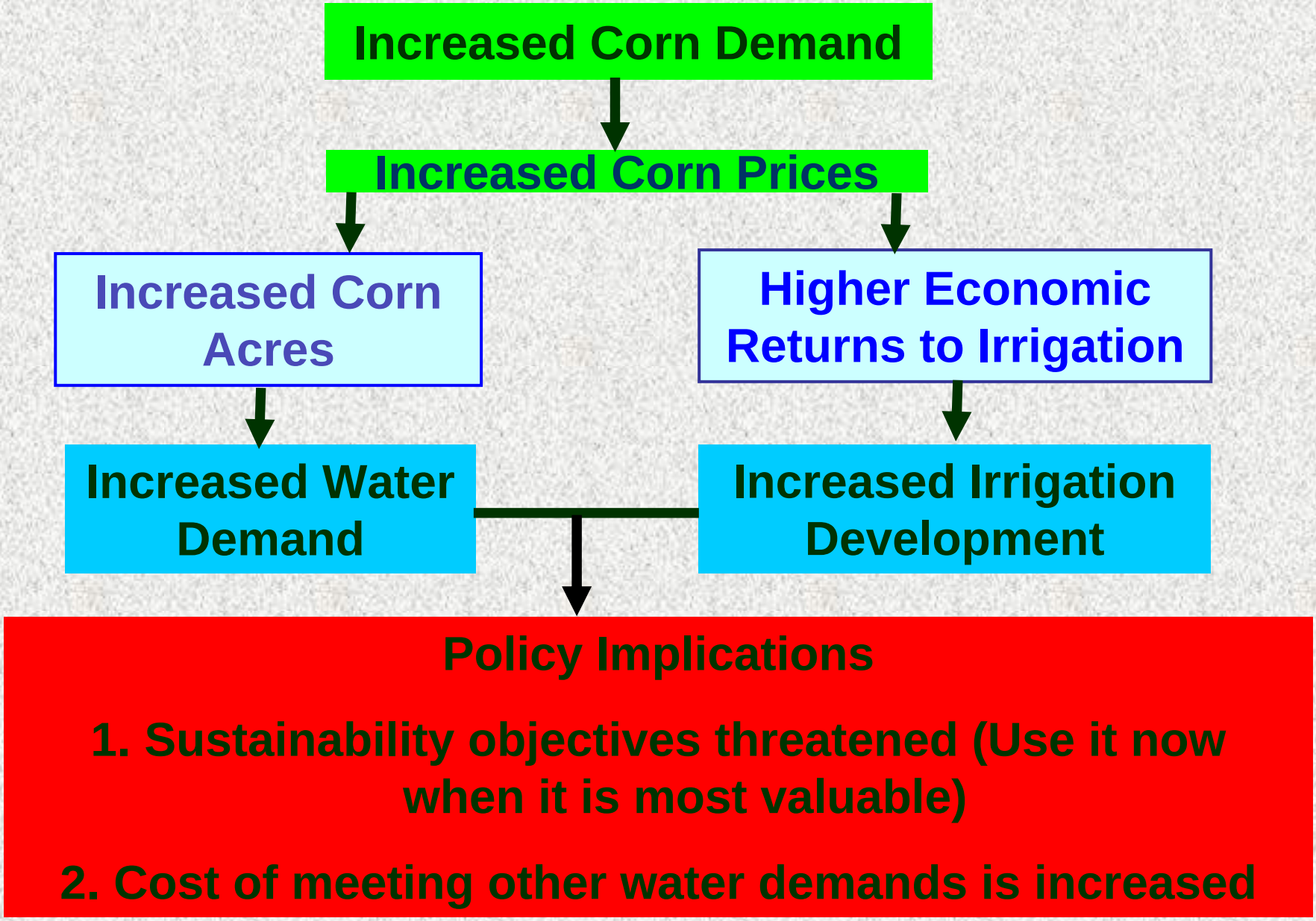
Potential Water Resource Implications

- **Increase in *direct* demand for water (Water used by the ethanol plant)**
- **Increase in *indirect* demand for water. (Water used to produce the feedstock for ethanol production, usually corn)**
- **Water quality impacts.**

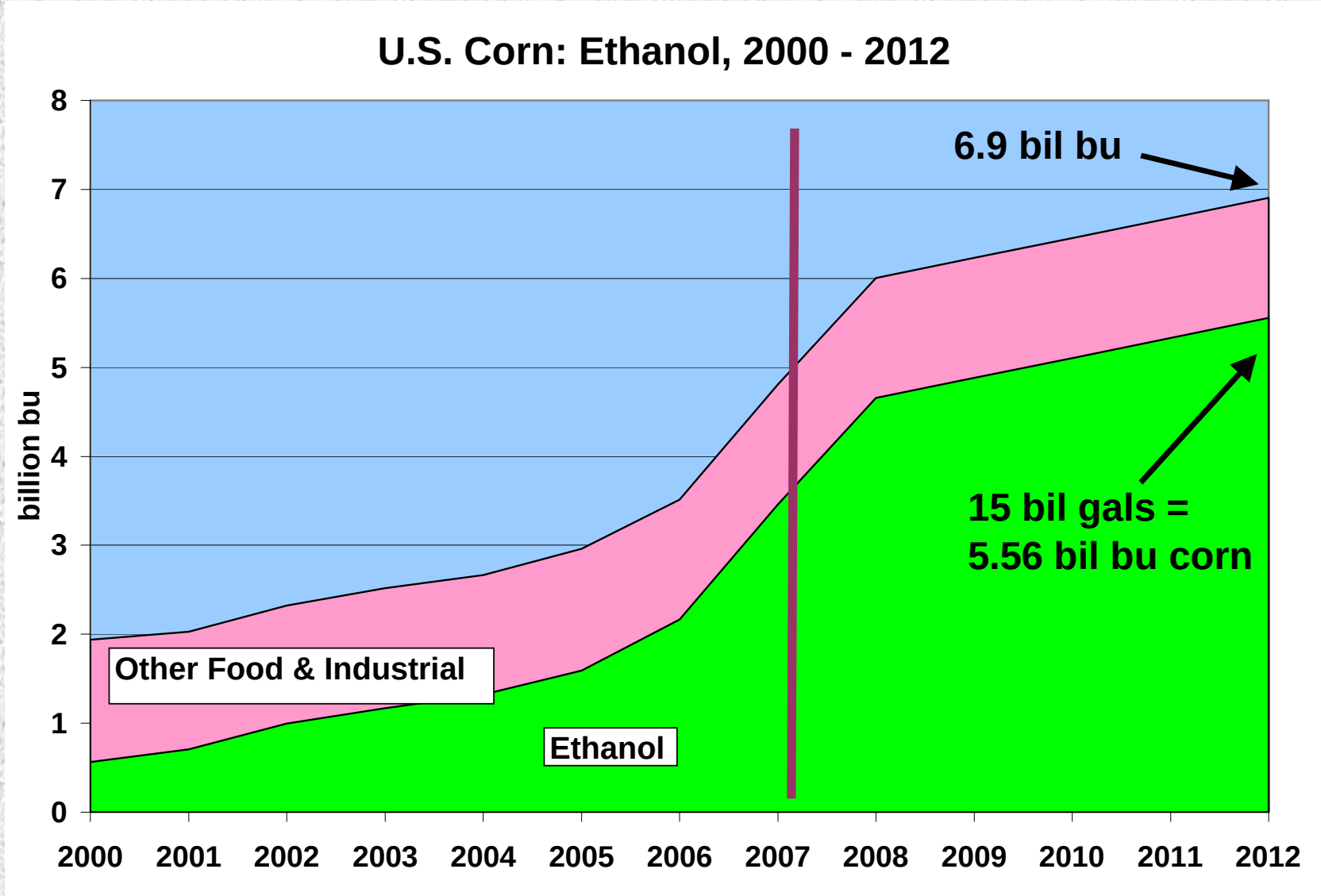
Direct Water Requirements

- Direct requirement is only about 3 gallons of water per gallon of ethanol.
- A plant producing 40 M. gallons of ethanol per year would use only 120 M. gallons of water. This is equivalent to the water requirement for irrigating about 320 acres of land.
- Direct requirement is insignificant compared to indirect effects on water demand.

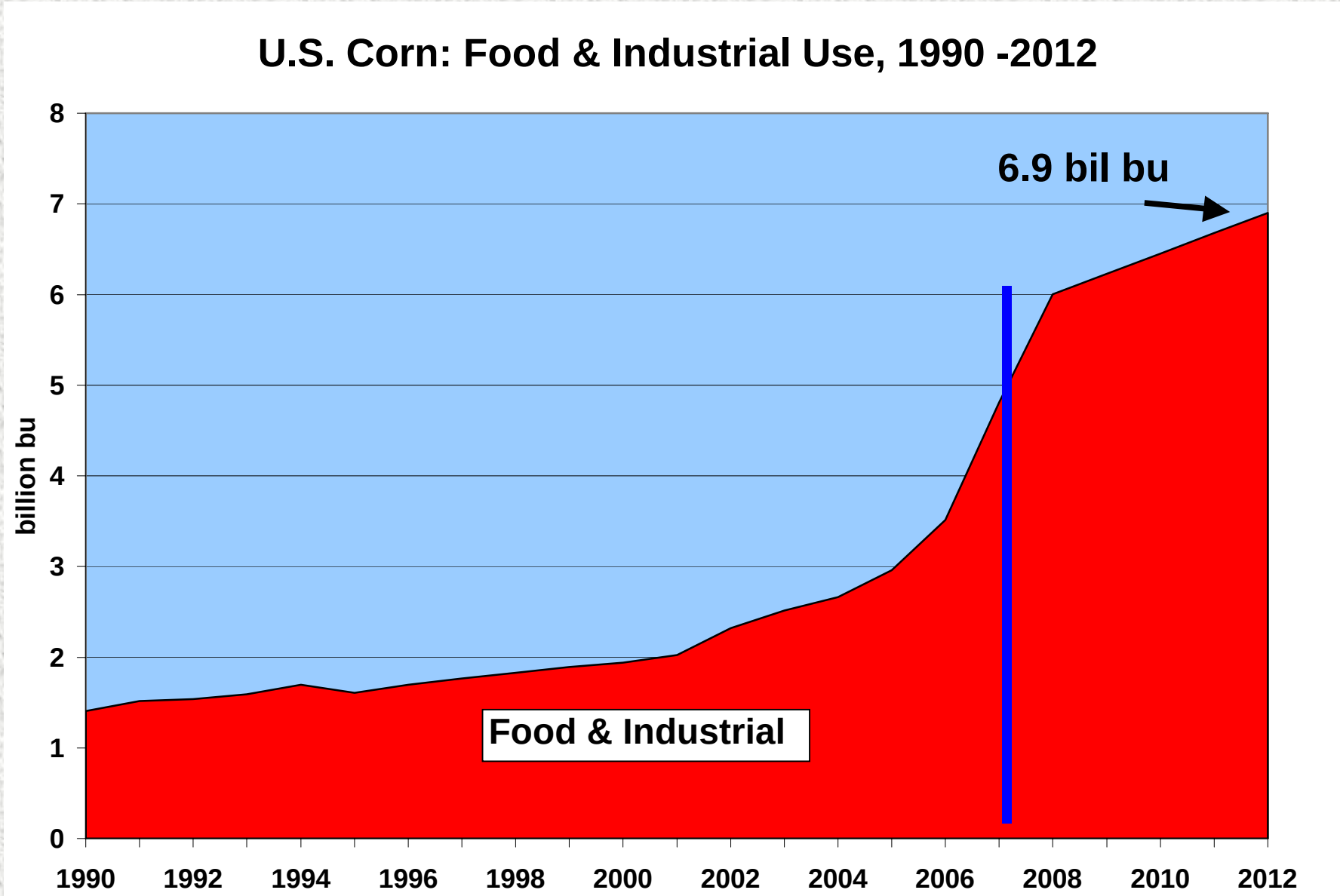
Indirect Effects of Ethanol on Water Quantity



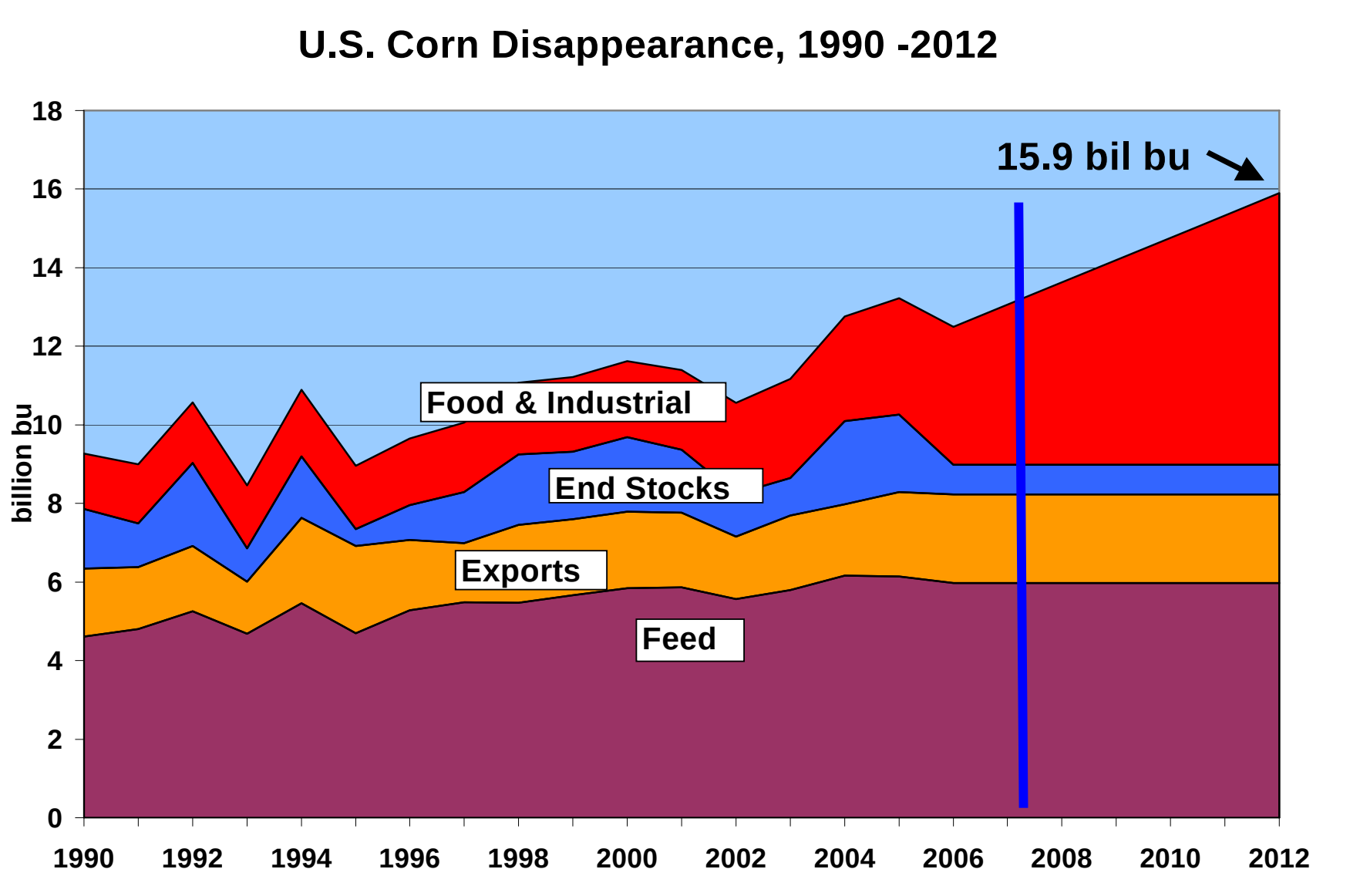
15 bil gals of ethanol production would use 5.56 bil bu of corn



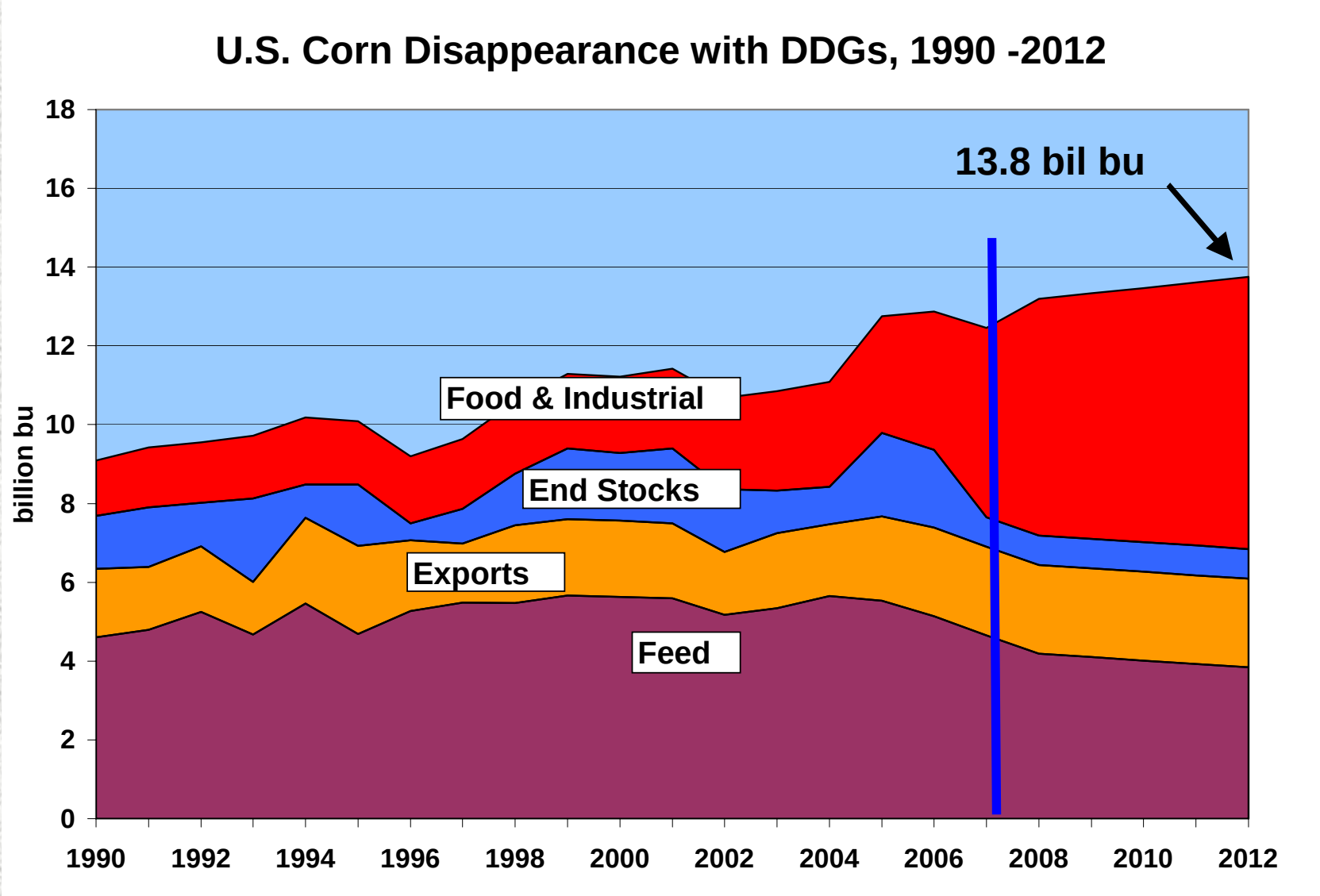
Food & Industrial Use, including ethanol, would use 6.9 billion bushels of corn



Disappearance would be 15.9 bil bu with uses for feed, exports and ending stocks fixed at 2006/2007 levels



Corn disappearance declines to 13.8 bil bu when distillers grains replace corn for feed



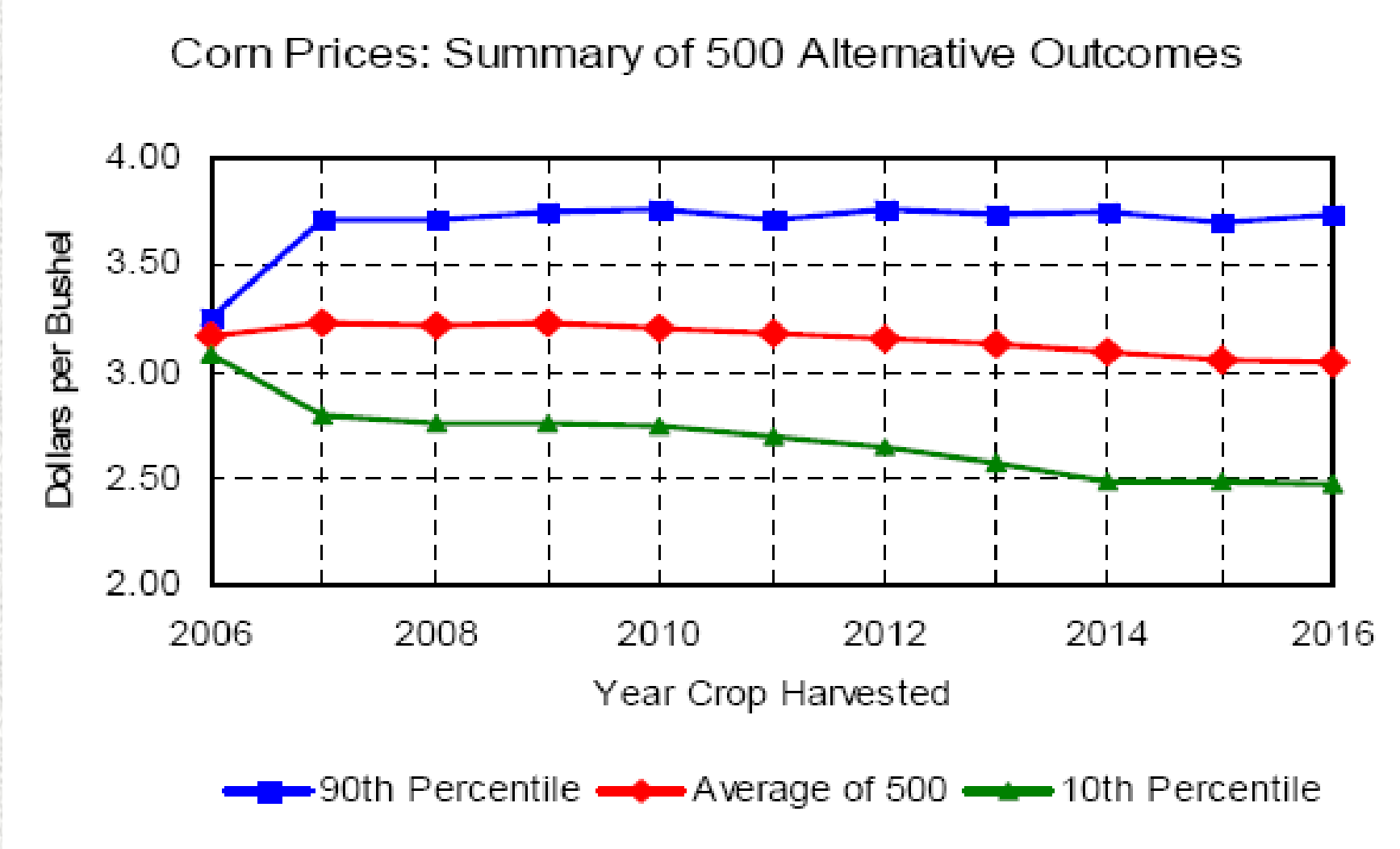
Conclusions

- **A goal of 15 billion gallons of ethanol per year is possible,**
- **While sustaining exports & stocks at levels projected for 2007.**
- **How?**

Increase corn production from 10.5 bil bu in 2006 to 13.5 bil bu by 2012. Replace 2.1 bil bu of corn for feed with distillers grain.

Ethanol Impact on Grain Prices

Crop	Historical (96-05)	Current
Corn	$2.40	$3.50
Soybeans	$5.50	$8.00
Grain Sorghum	$2.30	$3.35
Wheat	$3.50	$5.10



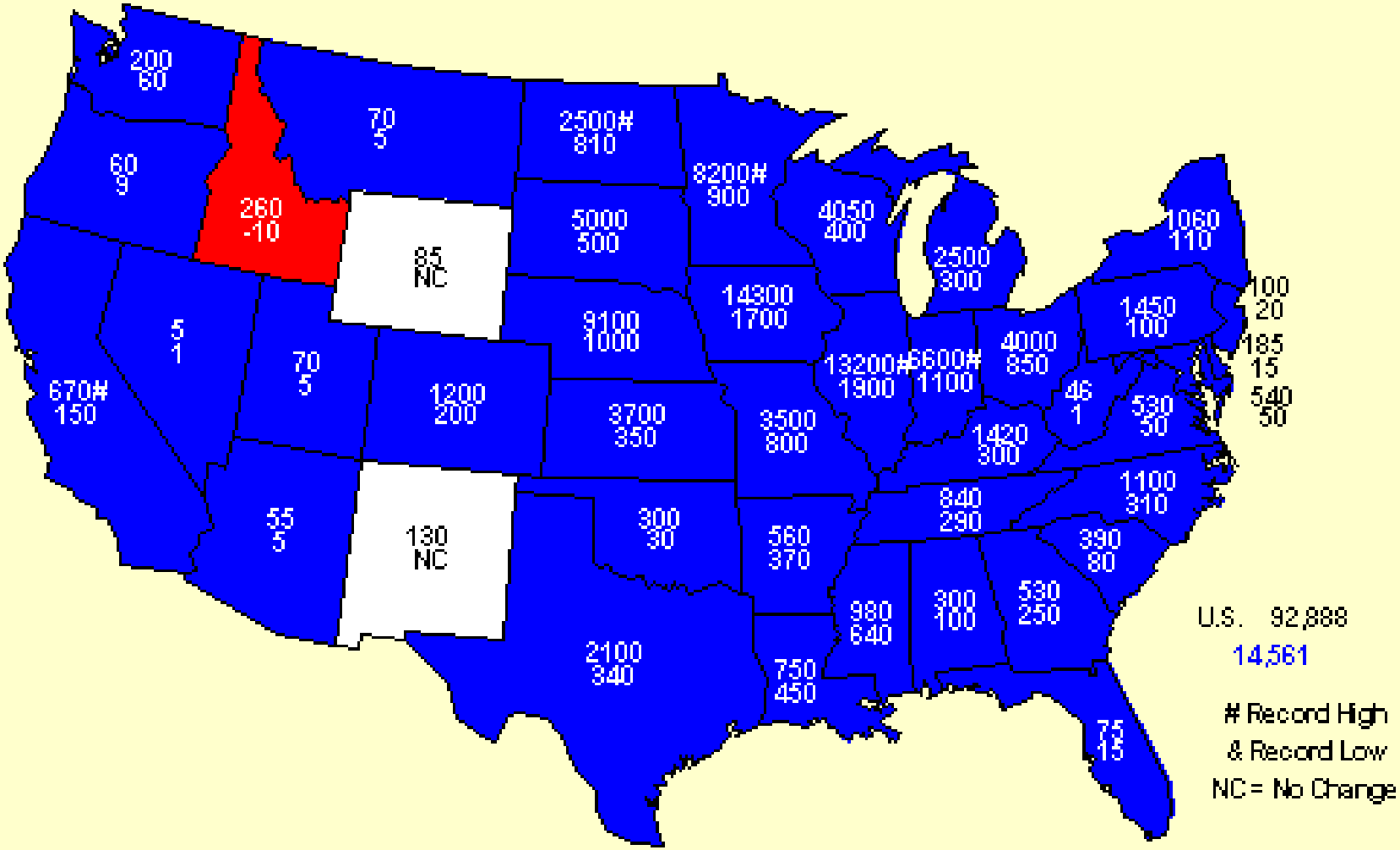
Source: FAPRI 2007 Outlook Report

If current grain prices are sustained?

- Some current irrigated acres will shift from lower water using crops to corn production.
  - 2007 irrigated corn acreage up 19%
  - 2007 soybean acreage down 15%
  - 2007 cotton acreage down 28%
- Amount of irrigation water applied and consumed will increase

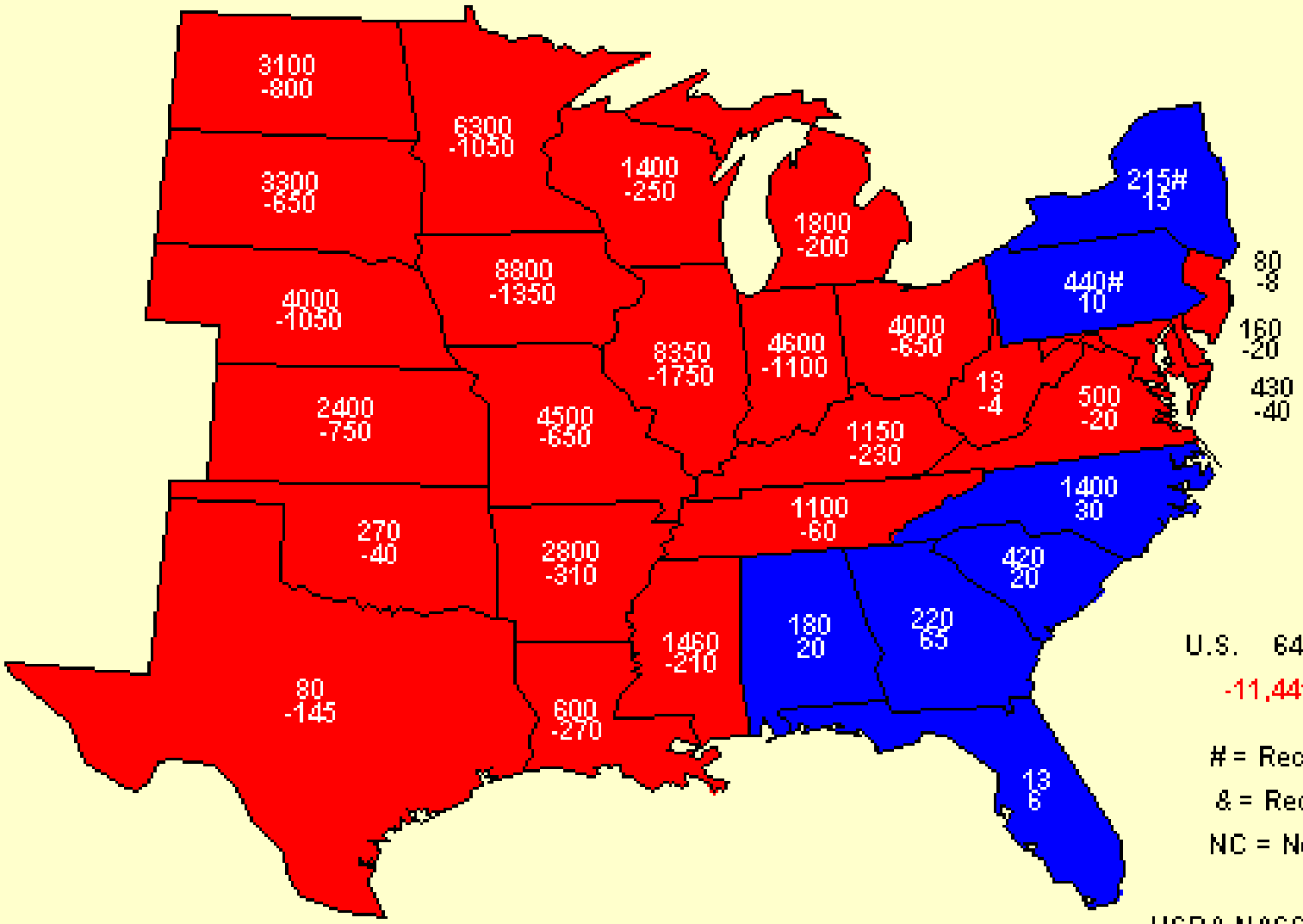
2007 Corn Planted

Acres (000) and Change From Previous Year



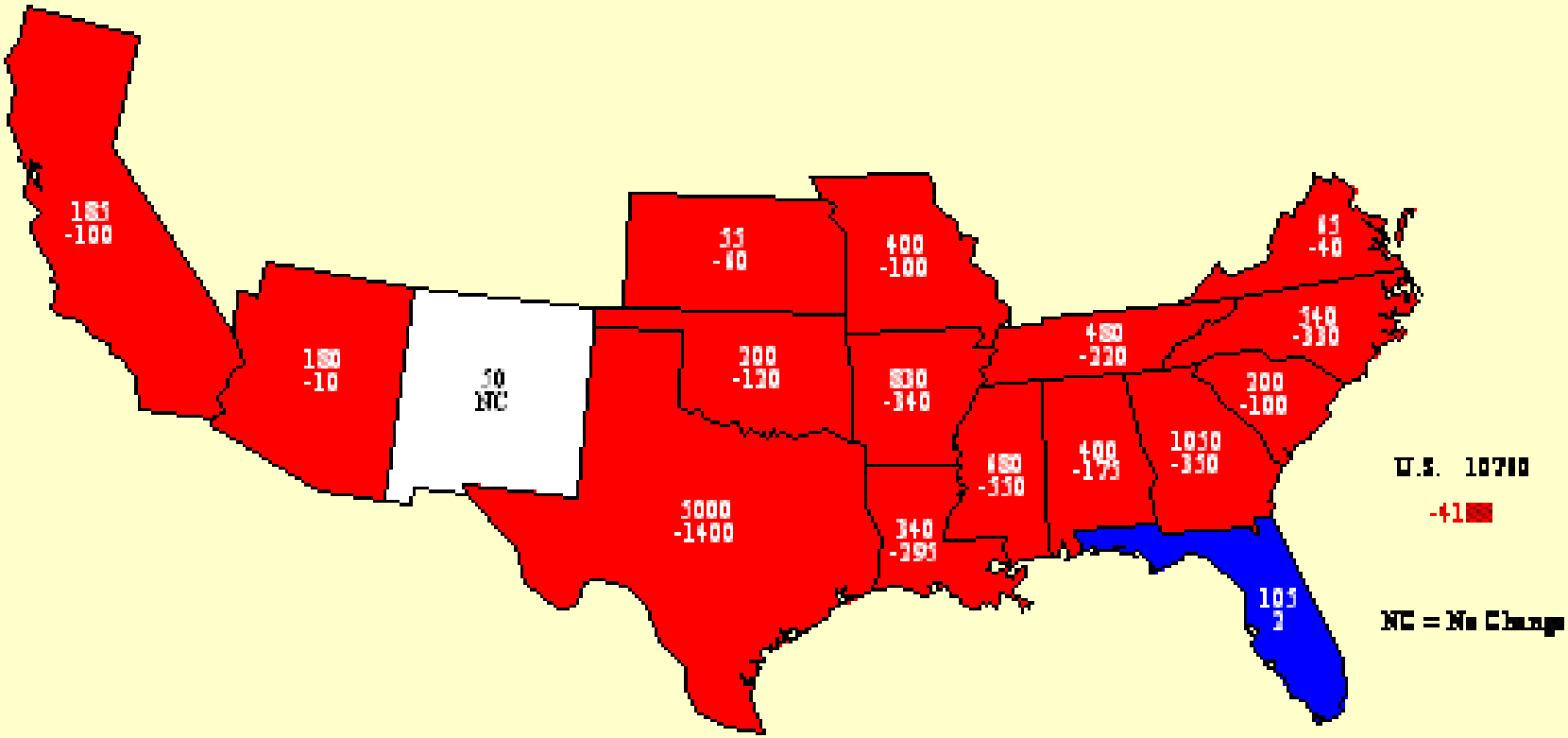
2007 Soybeans Planted

Acres (000) and Change From Previous Year



2007 Upland Cotton Planted Acres

Acres (000) and Change From Previous Year



USDA-NASS
06-29-07

Water Demand from 2007 Increase in Corn Acres: Nebraska Case

- 600,000 acre increase in irrigated corn (60% of total change in state corn acres)
- Acres of irrigated soybeans and some other crops decrease by 600,000.
- Assume crop shift causes 15% increase in consumptive use (from 12 to 13.8 inches) on 80% of the shifting acres.
- Result is annual increase in CU of 72 kaf or **25 billion** gallons.

If current grain prices are sustained?

- The economic returns to irrigation will double from about $125 to $250 per acre.
- This will create strong incentives to:
  - **Develop additional irrigated acreage in uncontrolled areas.**
  - **Remove or modify current policy limits on new irrigation development.**
  - **Increase the cost of reducing irrigation to meet other water resource**

If current grain prices are sustained?

- The cost of retiring irrigated acres to meet other needs will more than double, perhaps reaching $3,000 per acre in typical Central Plains case.
- The cost of reducing the amount of irrigation water applied per acre to meet other objectives will increase by over 250%.

Water Quality Impacts

- Increased grain prices increase the likelihood of excess nitrogen leading to nitrate pollution of groundwater.
- Feeding of distillers grains to cattle increases phosphorous content of manure, presenting a water quality threat in some regions.

Increased returns to irrigation presents a major threat to water policy objectives

- The economic cost of retiring acres in over appropriated basins at least doubles.
- The cost of reducing water applied per acre more than doubles.
- Efforts to maximize yield will increase leaching of nitrates to groundwater.
- Final outcome will depend on political will, research and education.

Water Hazards Presented by Ethanol

- Pressure to cash-in on profits from ethanol induced crop prices threatens resource sustainability.
- Water quality consequences will be ignored as individuals and communities collect their gold.
- A $7.6 billion annual subsidy for a 15 billion gallon ethanol industry will damage our ability to meet future water needs, with few offsetting benefits.