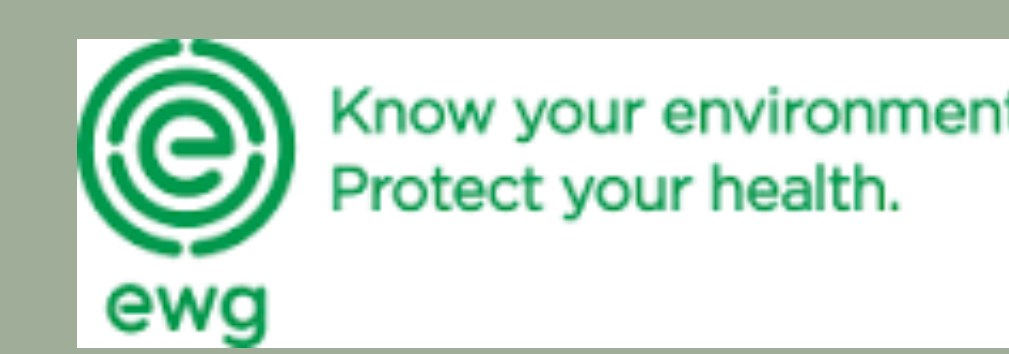


Farm Policy, Not Biotechnology, Explains Trends in U.S. Soil Erosion

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It is widely believed that herbicide-resistant crops promote soil conservation

"Herbicide-resistant (HR) crops...[and]...herbicides such as glyphosate minimized the need for tillage as a weed control tactic; the resulting crop production systems have been primary enablers for the success of USDA NRCS [soil conservation] programs."¹

"... glyphosate-resistant crops (GRCs) ... facilitate reduced- or zero-tillage systems, which contribute to reductions in soil erosion from water and wind ..."²

This belief even frames USDA regulatory decisions on herbicide-resistant crops.³

But where's the evidence?

"...there is a remarkable paucity of refereed publications on the influence of glyphosate-resistant crops on tillage practices and associated environmental effects."²

New data synthesis refutes this belief

- Corn Belt erosion rates remained entirely flat from 1997 to 2012 despite massive adoption of herbicide-resistant soy and corn (Fig. 1).
- Use of conservation tillage is at best only weakly correlated with adoption of herbicide-resistant crops (Fig. 2).
- Glyphosate-resistant crop systems have generated an epidemic of glyphosate-resistant weeds that farmers often use tillage to control, increasing rather than reducing soil erosion.
- Hence, conservation tillage in soybeans declined for the first time in decades from 2006-2012 (Fig. 2A).
- "Next-generation" crops resistant to combinations of glyphosate and 2,4-D, dicamba, glufosinate and/or other herbicides will lead to more intractable weeds resistant to multiple herbicides, which in turn will make soil-eroding tillage an increasingly attractive control option.

Herbicide-resistant crops have produced little or no reduction in soil erosion

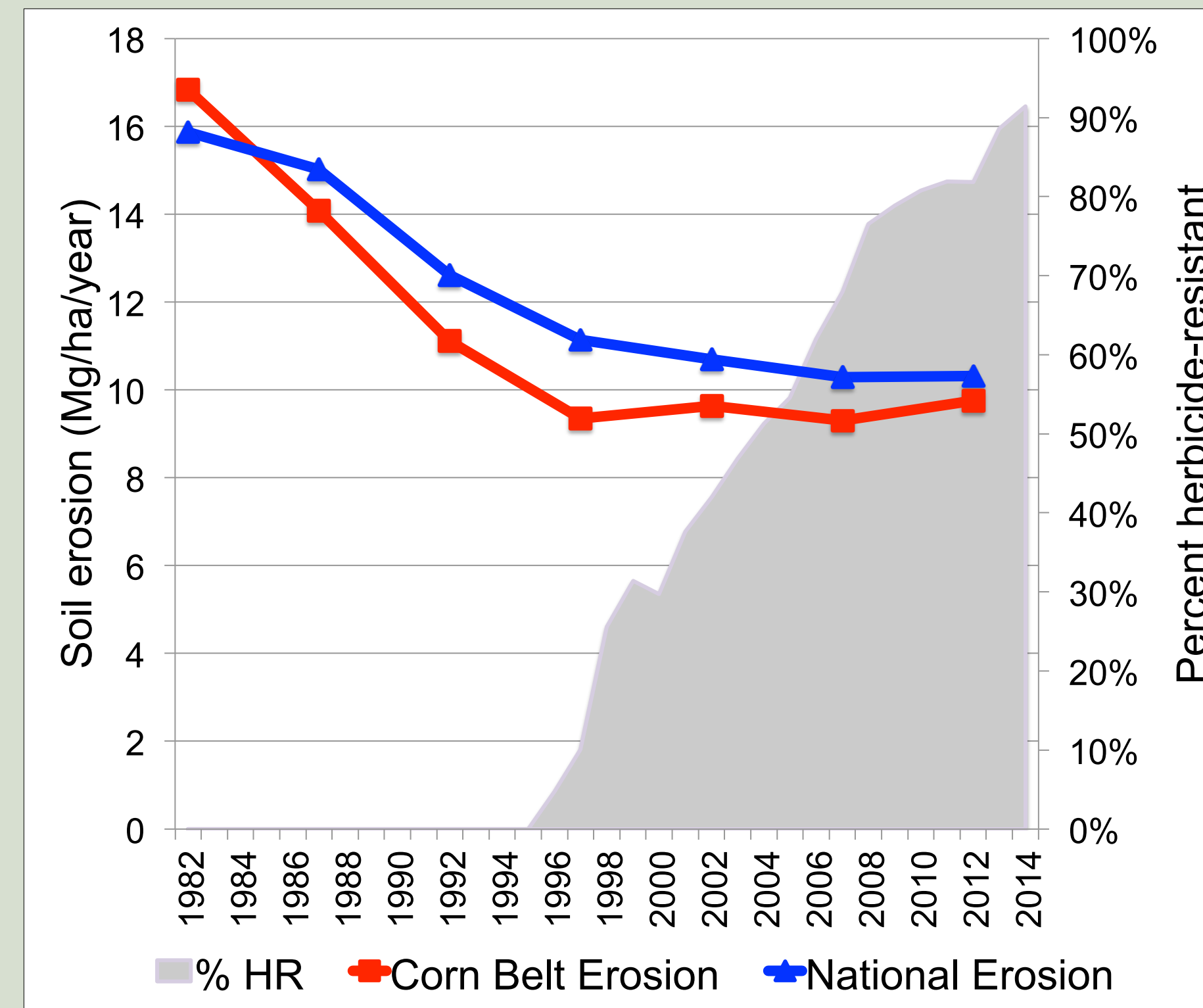


Figure 1: U.S. cropland soil erosion rates vs. percent total corn/soy area planted to herbicide-resistant (HR) corn/soy, 1982-2014.⁴

Past farm policy triggered massive reductions in soil erosion

- The 1985 Food Security Act was largely responsible for a 30% reduction in average U.S. soil erosion rates from 1982 to 1997 (Fig. 1).
- Conservation Compliance required farmers to implement conservation practices on erodible cropland in exchange for subsidies, leading to a reduction of **267 million Mg/yr**⁷ in soil loss.
- The Conservation Reserve Program (CRP) removed 13.3 million hectares of cropland from production, saving **263 million Mg/yr**⁷ of soil.

Soil erosion rates have flat-lined in response to lapses in policy

- Lax enforcement of soil conservation plans suggests that many hectares are only conservation tillage "on paper."
- In response to high crop prices, generous corn ethanol subsidies, and deep cuts in CRP funding, 3.5 million hectares of CRP land have been planted to row crops since 1997 (Fig. 3).

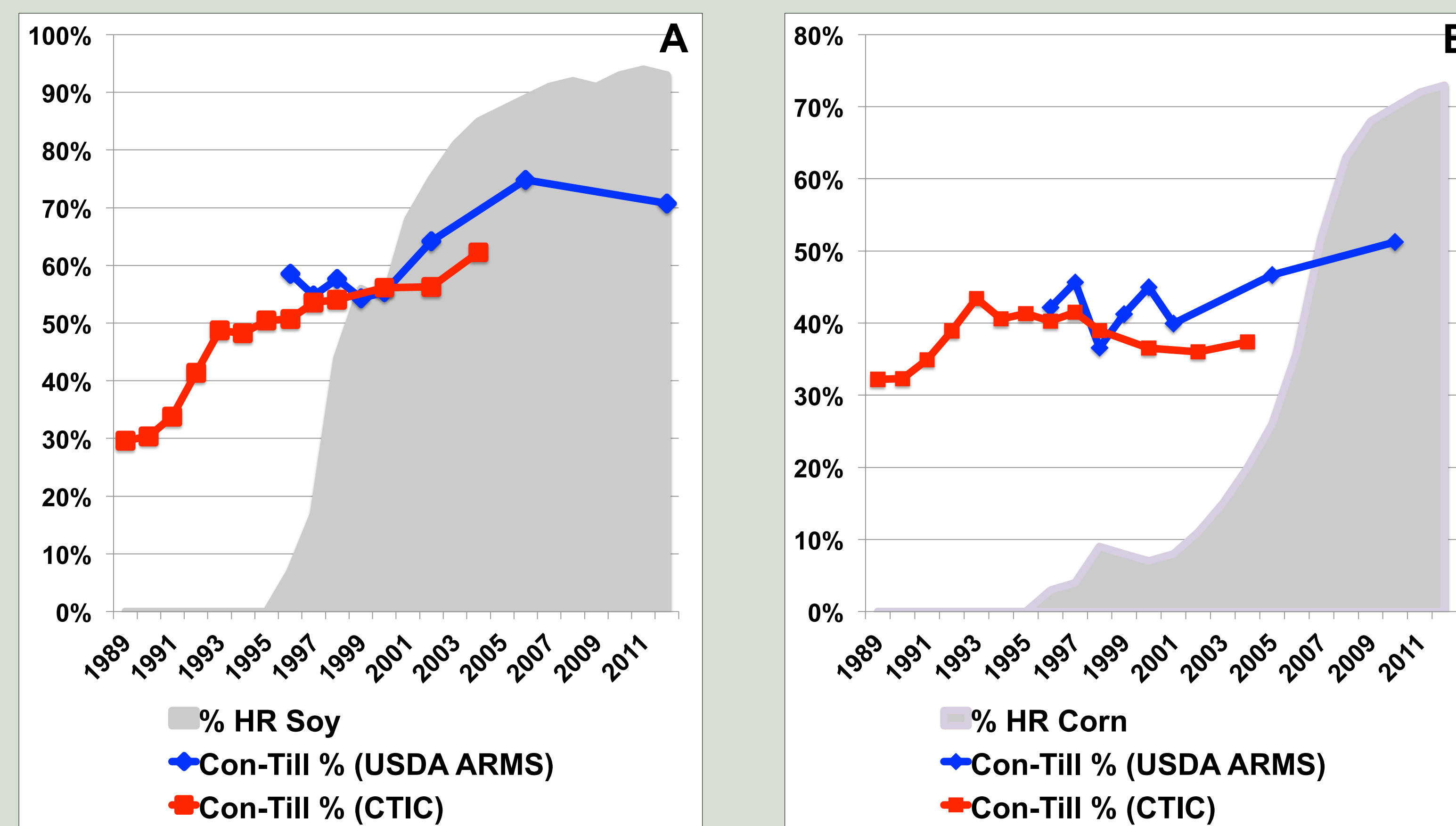


Figure 2: Farmer adoption of conservation tillage practices as percent of total crop area vs. percent adoption of HR soybeans (A) and HR corn (B).⁵

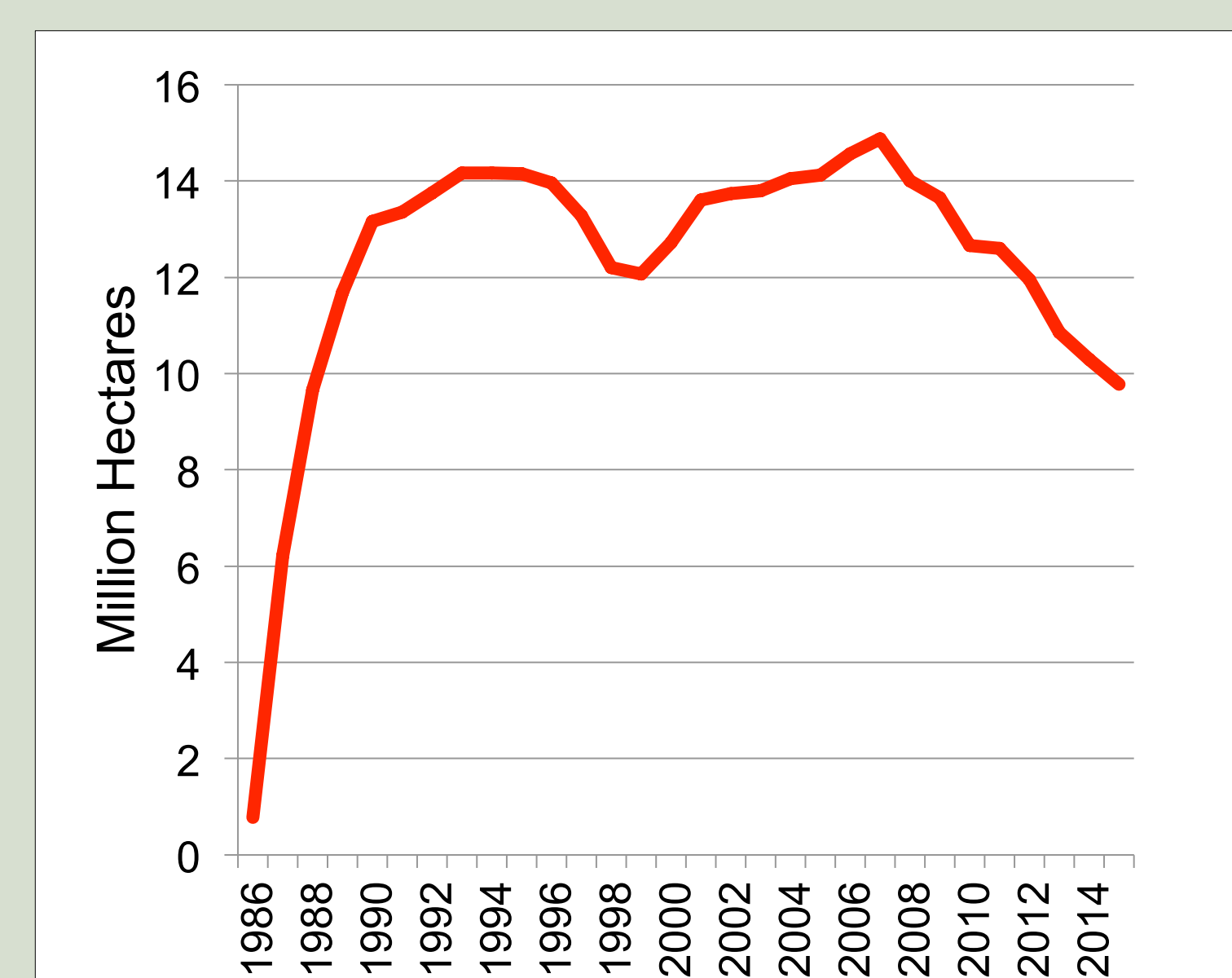


Figure 3: Land enrolled in USDA's Conservation Reserve Program: 1986-2015⁶



Ephemeral gully in Iowa

Better farm policy can restore progress in soil conservation

- Reinvigorate enforcement of soil conservation plans.
- Restore funding of the Conservation Reserve Program.
- Create strong incentives for diverse crop-rotations, cover crops, and perennial prairie strips.

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