Areawide Suppression of European Corn Borer with Bt Corn Reaps Benefits for Non-Bt Growers

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March 9, 2011

Goal Today

- Quick overview of Hutchison et al. (2010) in *Science*
- Where we are going next in this research
  - Estimate value of market level benefits of Bt corn and where economic surplus went
  - Estimate impacts of Bt corn/ECB suppression on Midwestern vegetable production

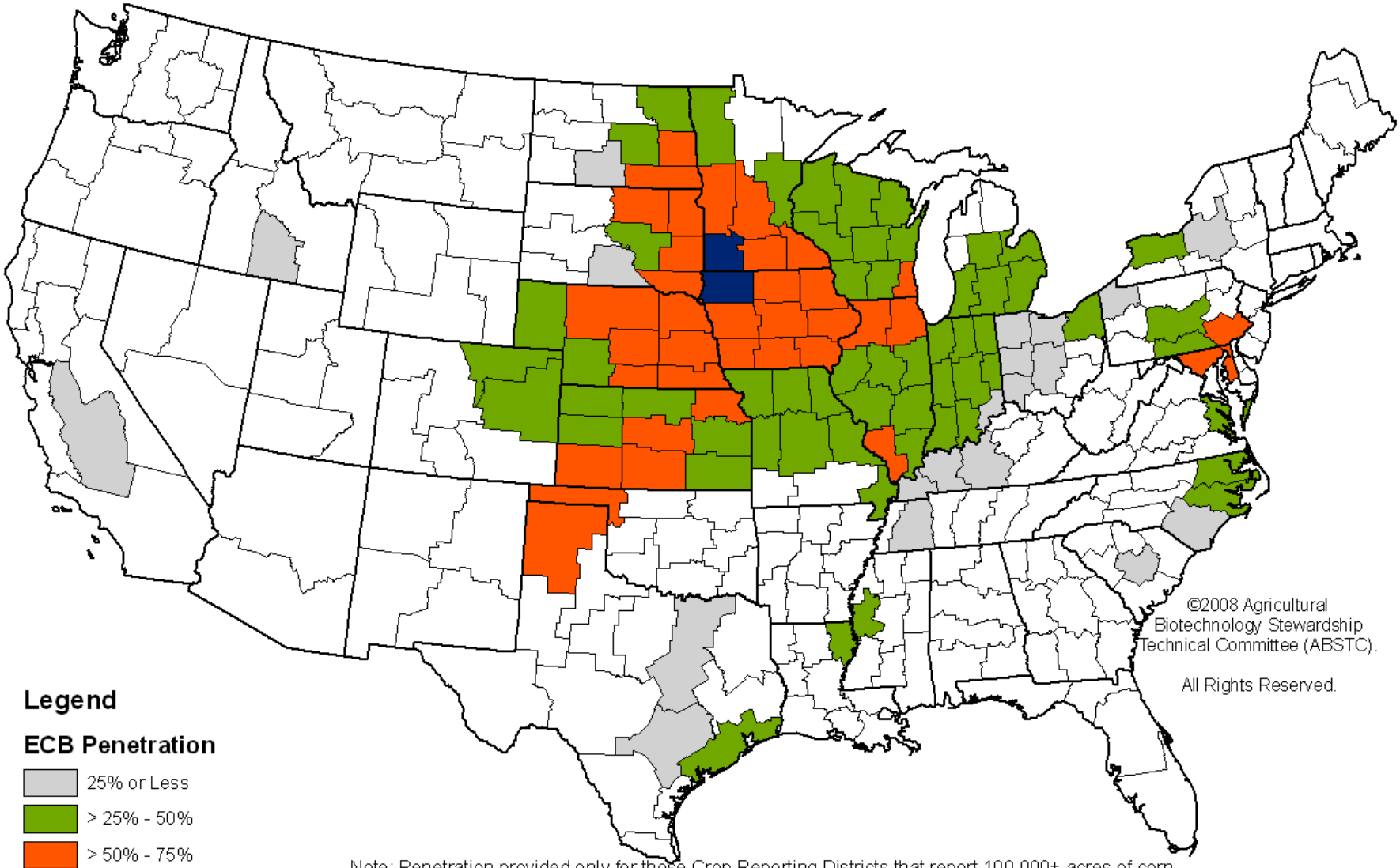
Areawide Suppression of European Corn Borer with Bt Corn Reaps Benefits for Non-Bt Growers

- Widespread Bt corn planting in Midwest has suppressed ECB population
- Creates value for both Bt & non-Bt corn acres
  - $6.9 billion in MN, WI, IL, IA & NE since 1996
- More of the value went to non-Bt corn acres
  - 75% to non-Bt acres in MN/WI/IL
- Bt corn more valuable than originally thought
  - Stewardship/IRM even more important
  - Nations give up more value than realize if do not use Bt corn

ECB Suppression and Bt Corn

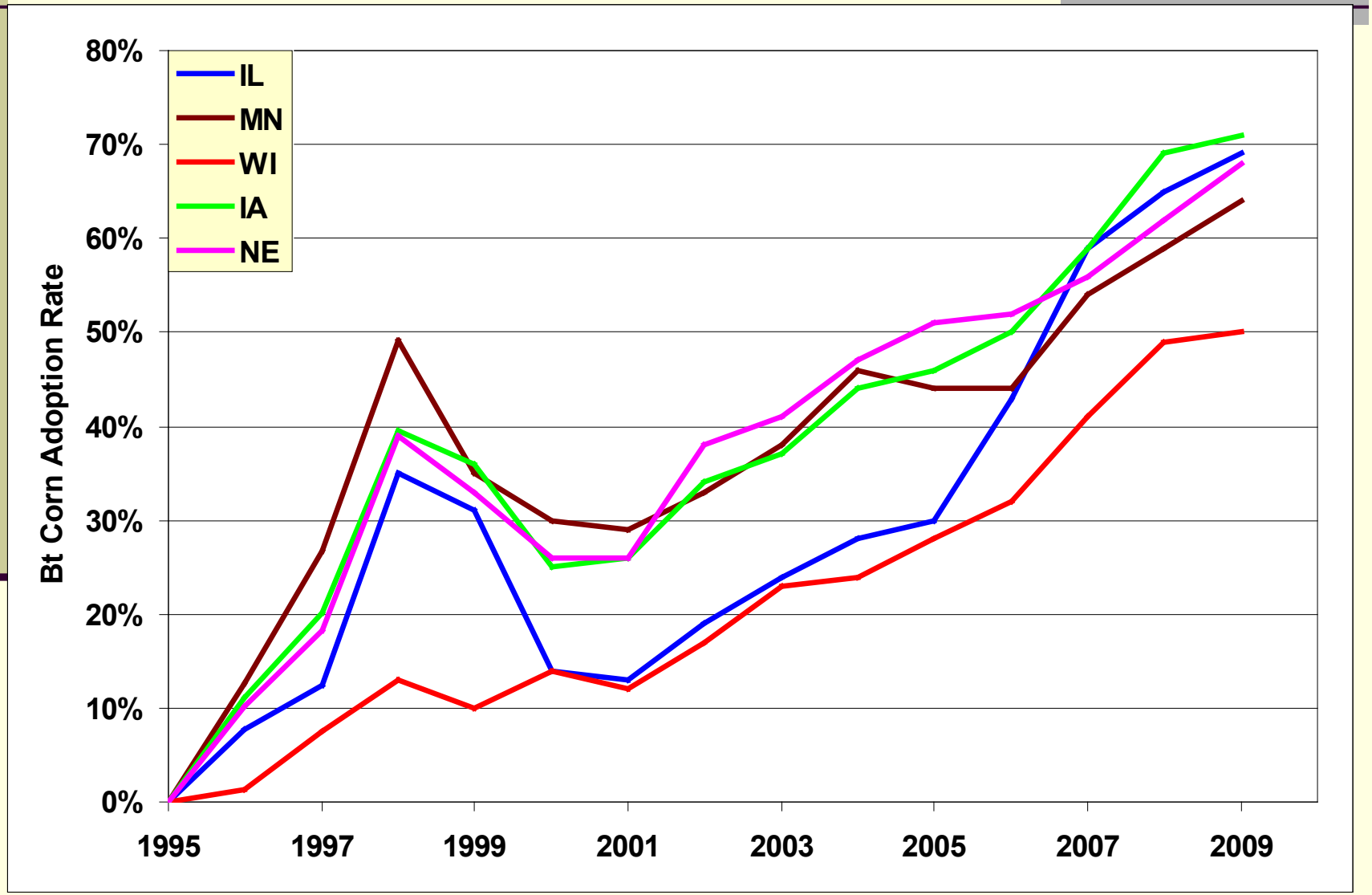
- WI and IL collecting ECB larval population data from hundreds fields annually since mid-1940's when pest first arrived in region
- MN did same starting in 1963
- Shows population decline in recent years
- % corn acres planted to Bt corn has increased since 1996 when released
- Statistical analysis showed ECB population decline associated with increased Bt corn planting
- Suppression not clear as ECB lives on 100+ plants, many crops (e.g., sweet corn, green bean, potato)

2006 Bt Corn Borer Penetration

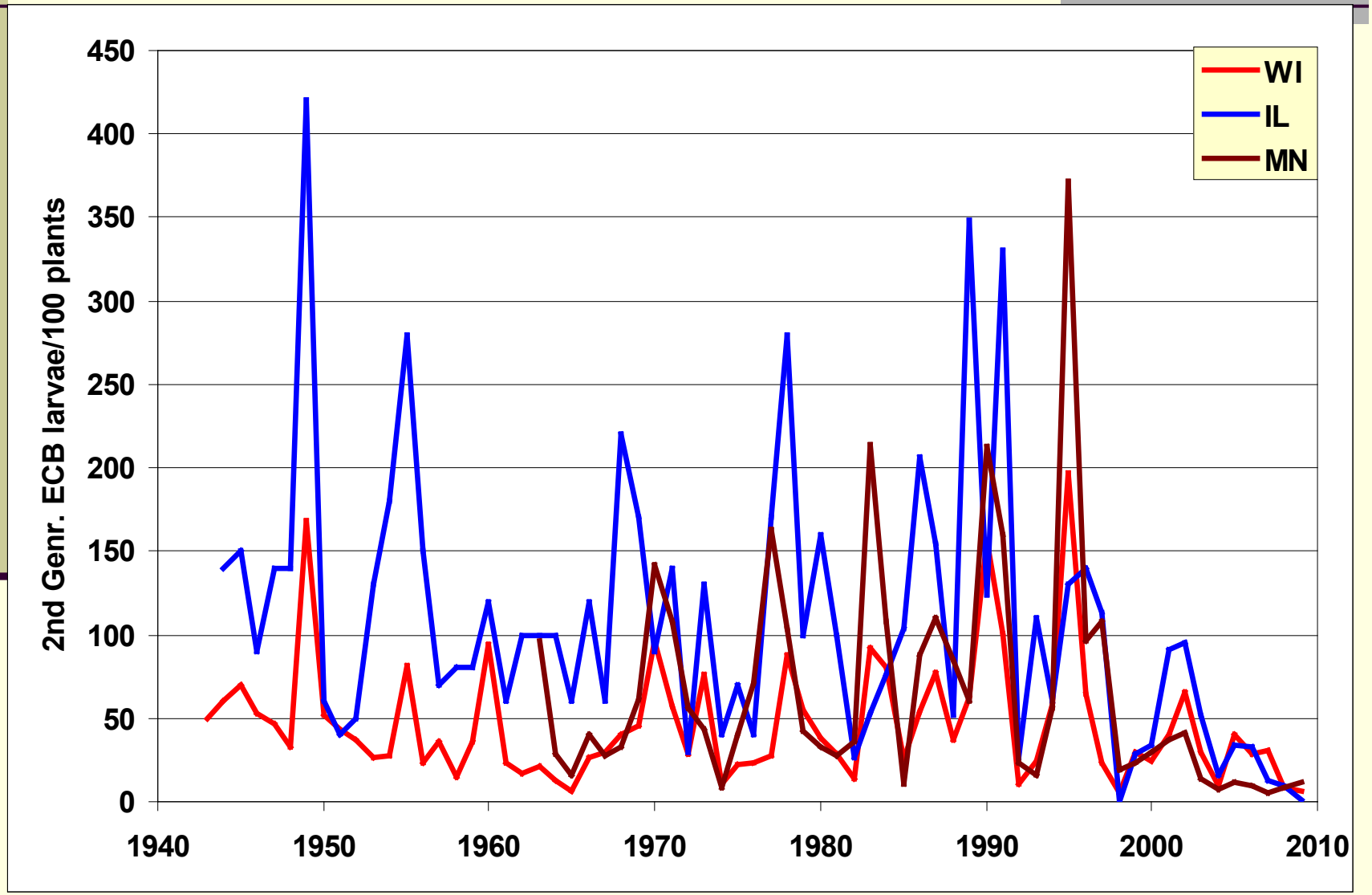


Note: Penetration provided only for those Crop Reporting Districts that report 100,000+ acres of corn. The data is based on seed sales and represents the address on the customer or retail outlet sales account, which may not always indicate the cropping district in which the seed was ultimately planted.

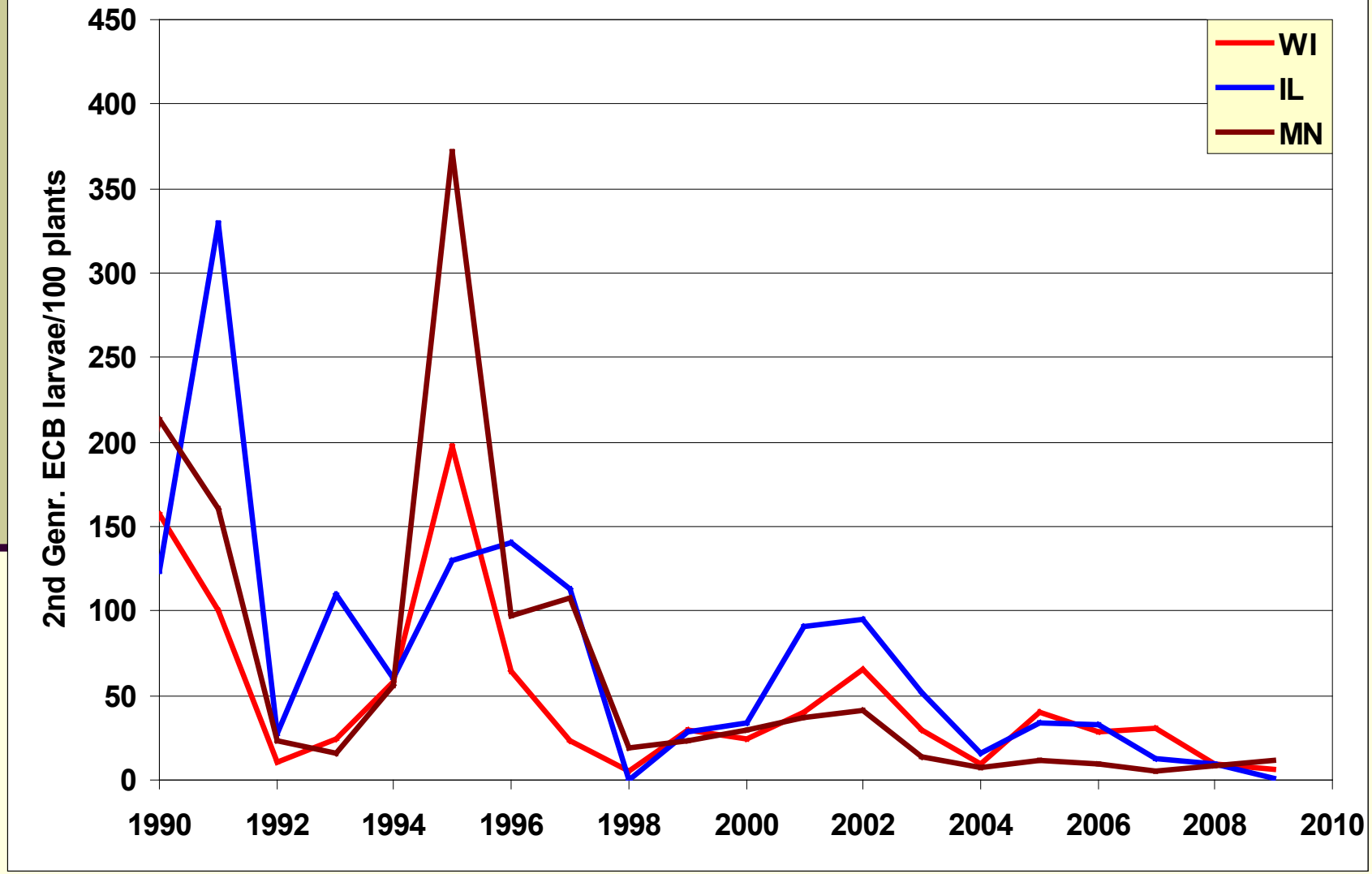
Bt Corn Adoption Rate by State



ECB Population Data 1940 to 2009



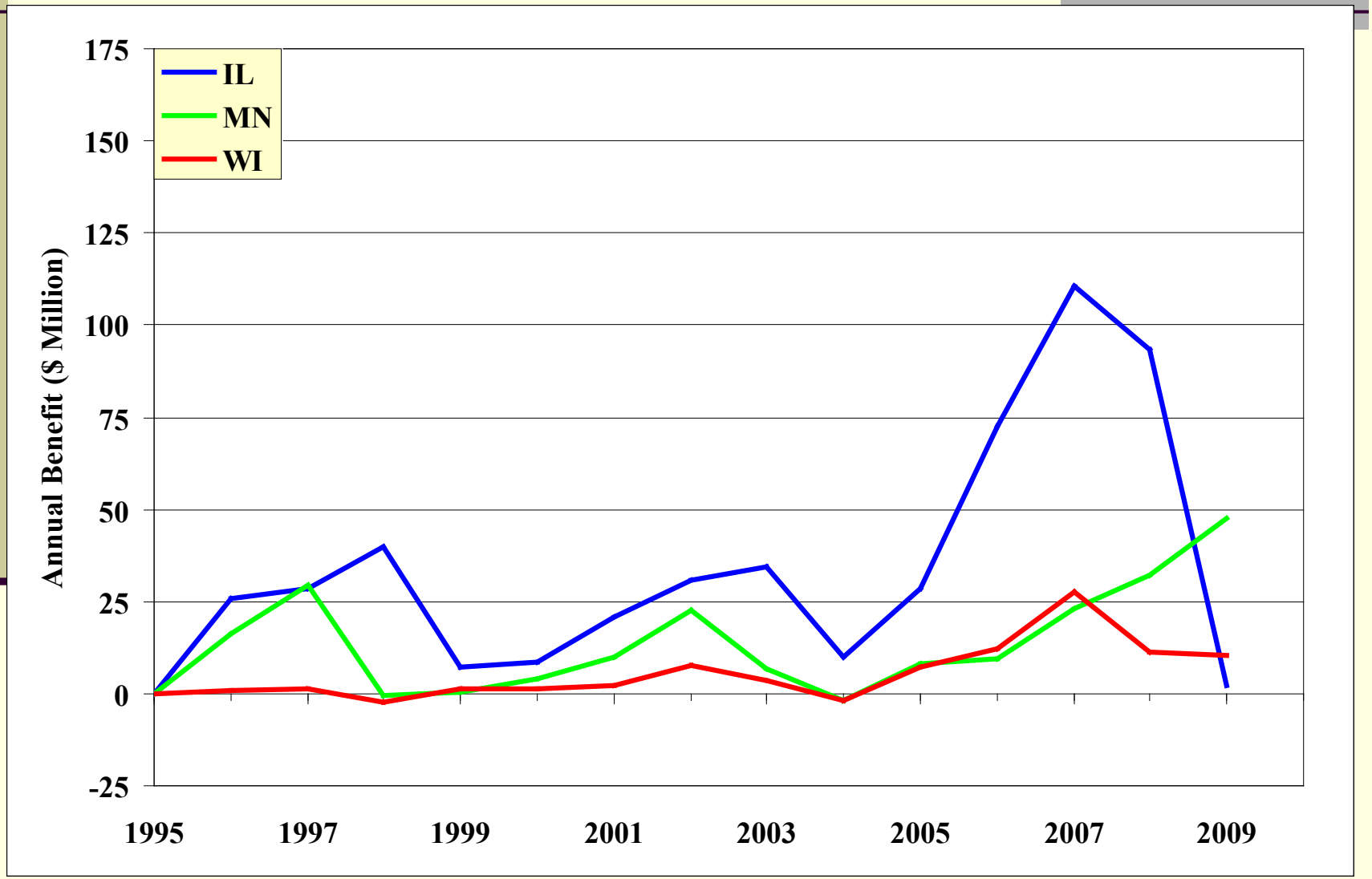
ECB Population Data Since 1990



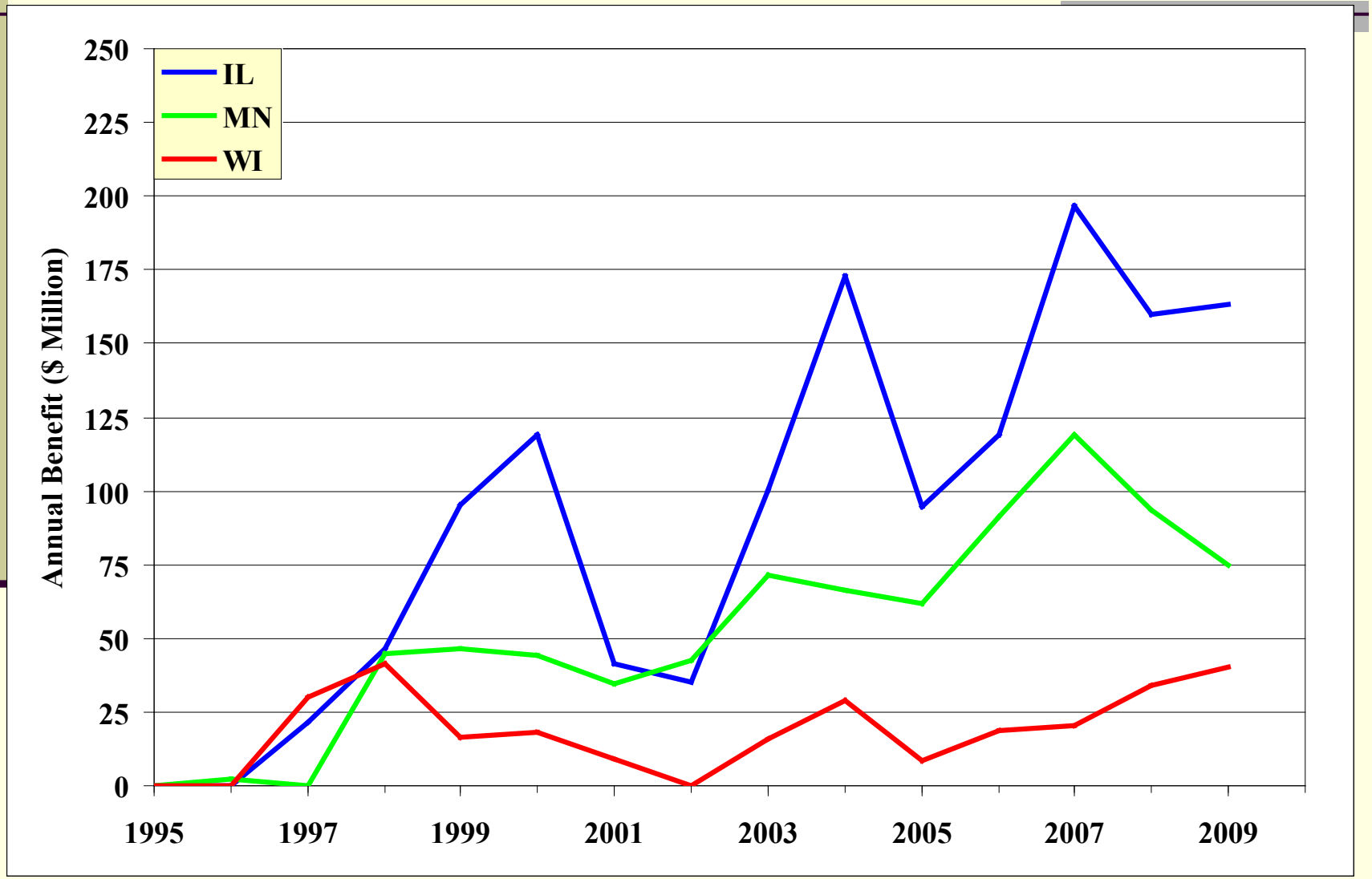
Annual Benefits

- Estimated annual yield losses implied by ECB larval populations, then total corn produced
- Corn Produced with Observed ECB
- Corn Produced with Long-term Average ECB
- Corn Produced with No ECB
- Benefit: corn produced x price that year
- Bt Corn Benefit: Difference between No ECB and Observed ECB
- Non-Bt Corn Benefit: Difference between Observed ECB and Long-term Average ECB

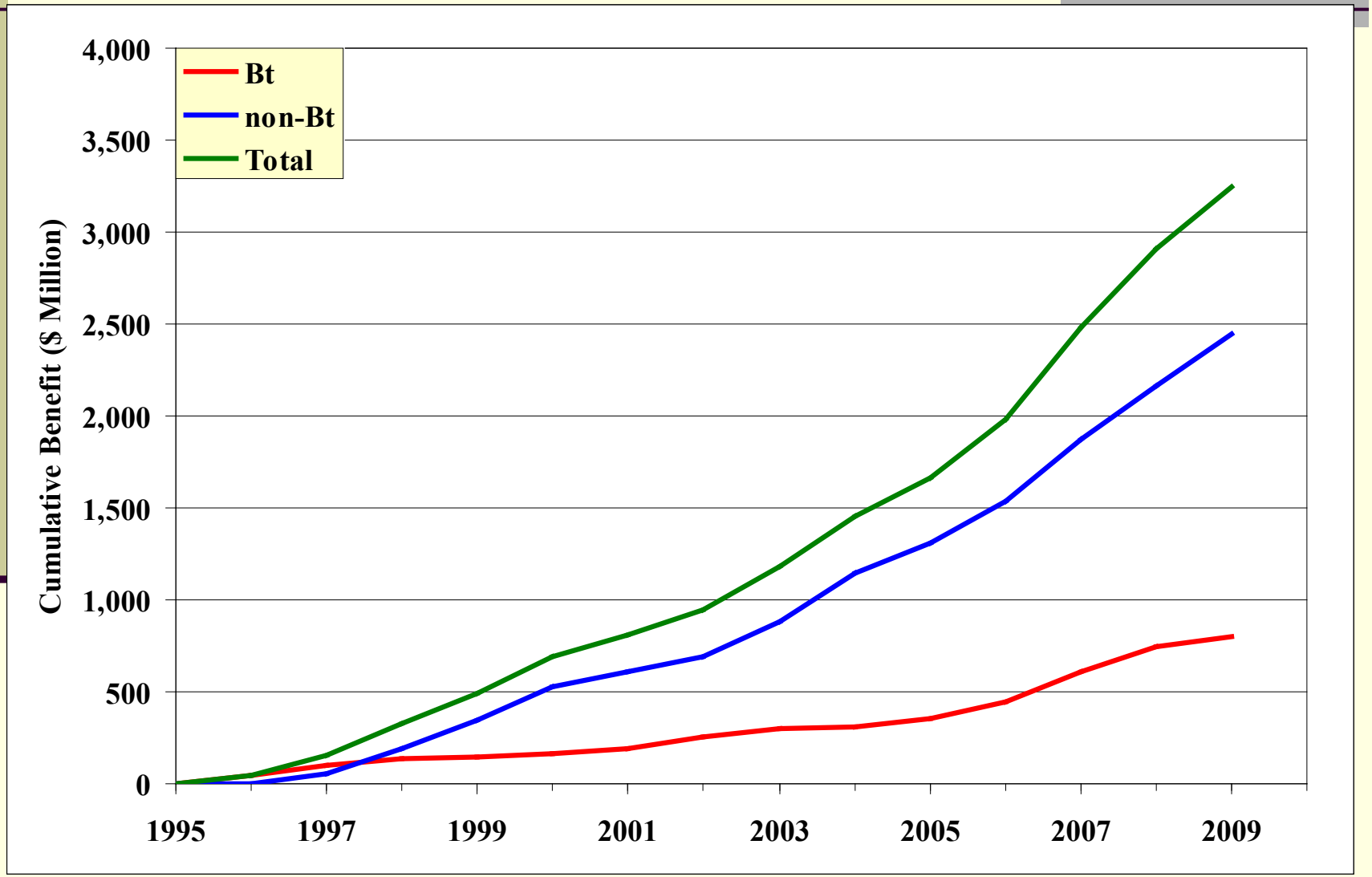
Annual Benefits to Bt Corn Acres



Annual Benefits to Non-Bt Corn Acres



Cumulative Benefits MN, WI, IL



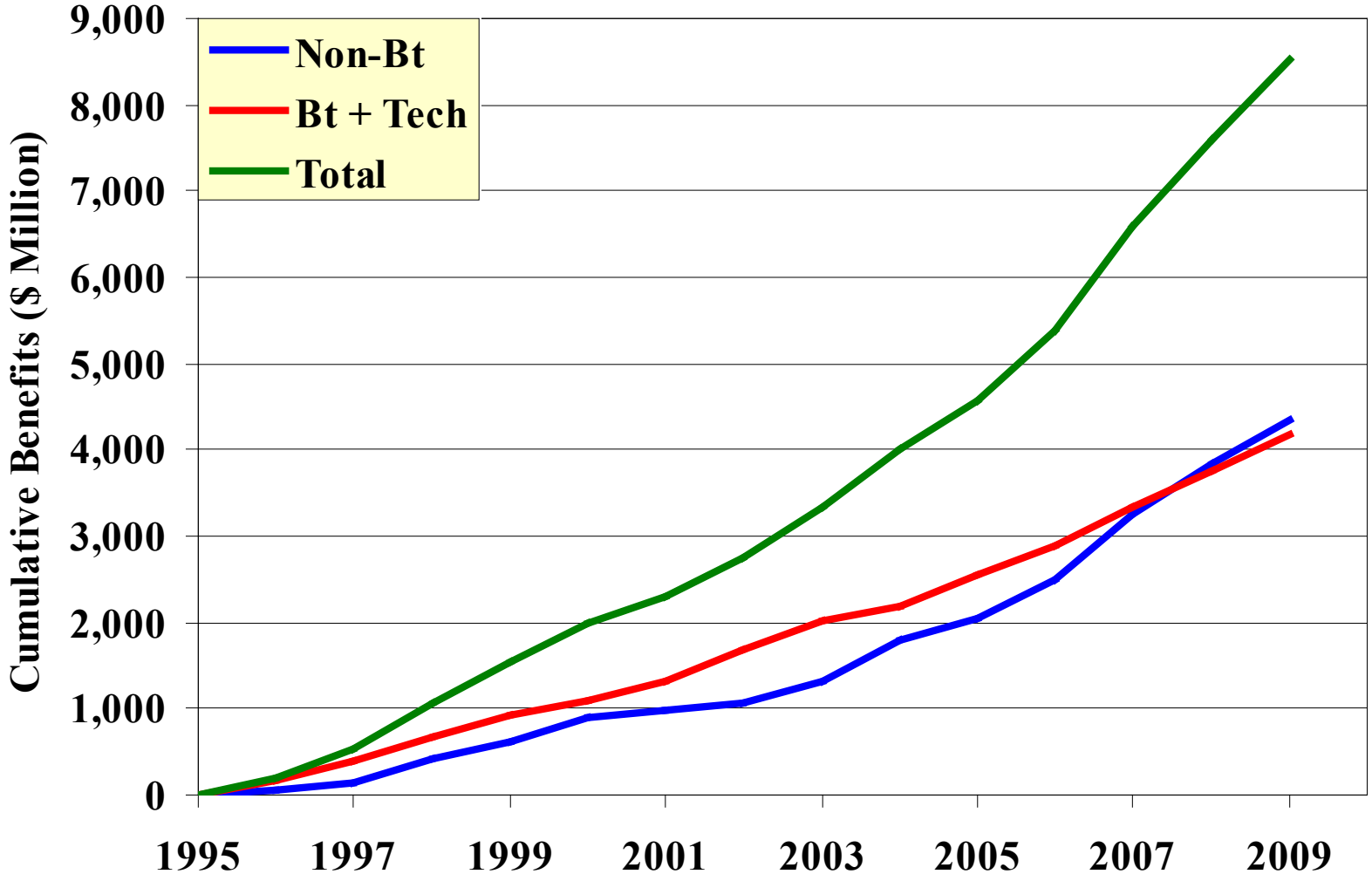
Implications

- Bt corn more valuable than originally thought
- Stewardship/IRM even more important
  - Saving a more valuable tool
- Nations give up more value than realize if do not use Bt corn
  - Giving up a more valuable tool

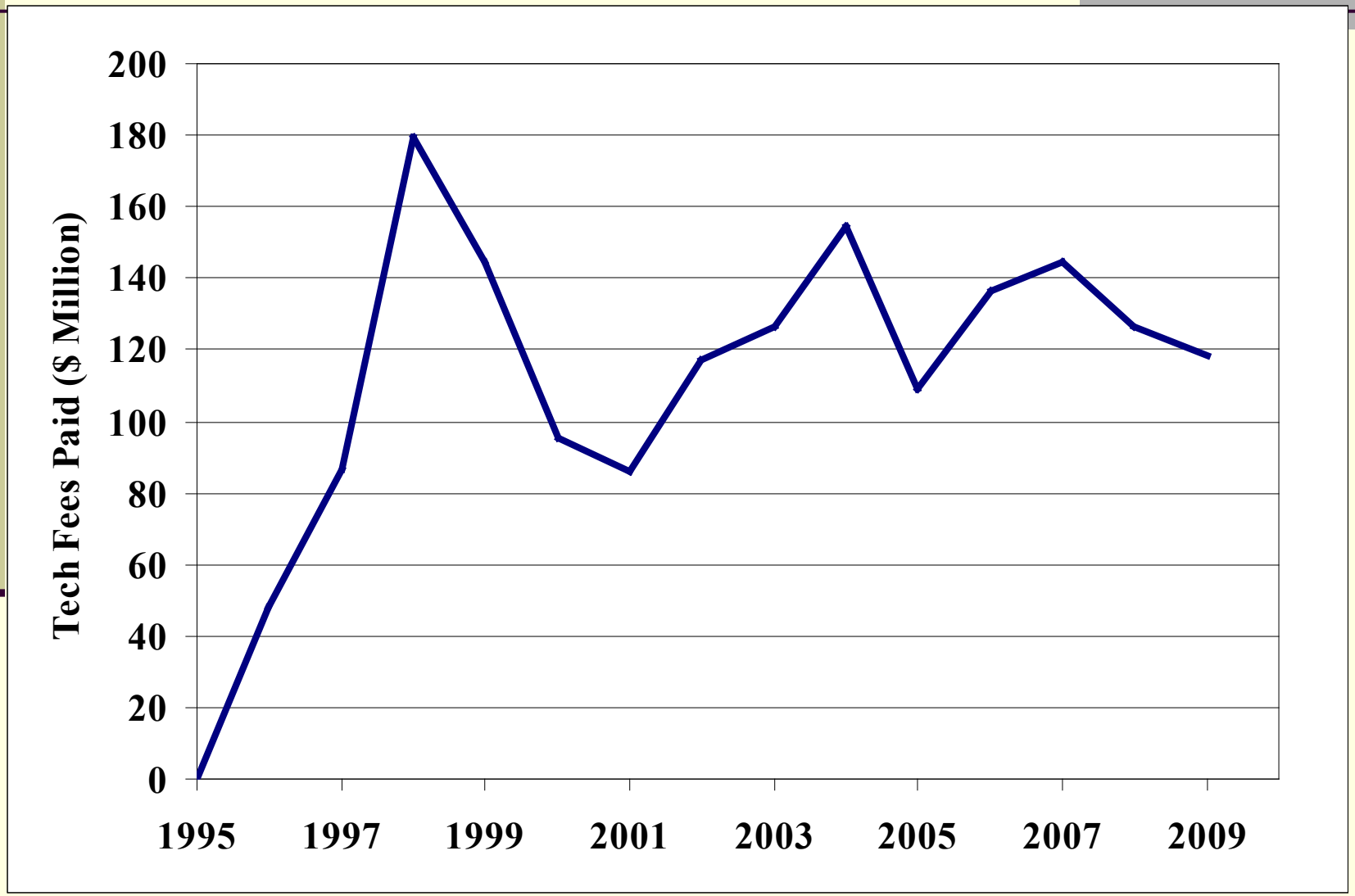
Summary

- Similar analysis in IA and NE, but ECB data not as extensive, so done separately
- Overall, ECB suppression creates value for both Bt & non-Bt corn acres
  - $6.9 billion in MN, WI, IL, IA & NE since 1996
- More of the value went to non-Bt corn acres
  - 75% to non-Bt acres in MN, WI, and IL
  - 50% to non-Bt acres in IA and NE
  - Why? Non-Bt acres had some ECB control at zero cost, but Bt growers had to pay tech fee

With Tech Fee, Bt and Non-Bt about Same, Total Benefit about $8.5 Billion



Estimated Total Tech Fees Paid in MN, WI, IL, IA, NE by Year



What's Next?

- Estimate total economic surplus generated by Bt corn, including ECB suppression effect
- Portion of benefits captured by Bt farmers, non-Bt farmers, by seed companies and consumers and how changes over time
- Effect of Bt corn and ECB suppression on corn prices
- Benefits of ECB suppression for vegetable crops: sweet corn, potatoes, green beans

Questions or Comments?

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