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THE COST OF RENEWABLE FUEL INCENTIVES:
A TWO-PART POLICY ANALYSIS SERIES

Part 2: How the RFS Has Damaged the Environment and Burdened Taxpayers

By Nan Swift

Policymakers have spent hundreds of millions of taxpayer dollars to mitigate water-quality problems and other harmful effects of the RFS, such as lost income and lower property values—dollars that could have been put to better use if not spent combating the problem Congress created.

Introduction

Abundant, clean water is an essential part of daily life, from drinking and sanitation to fishing and recreation. The Renewable Fuel Standard (RFS) has put this vital resource at risk for nearly one-third of Americans by artificially boosting acreage dedicated to corn production, resulting in degraded water quality from the Great Lakes to the Gulf of Mexico.[1] In part 2 of this series, we demonstrate that policymakers have spent hundreds of millions of taxpayer dollars to mitigate these water-quality problems and other harmful effects, such as lost income and lower property values—dollars that could have been put to better use if not spent combating the problem Congress created.

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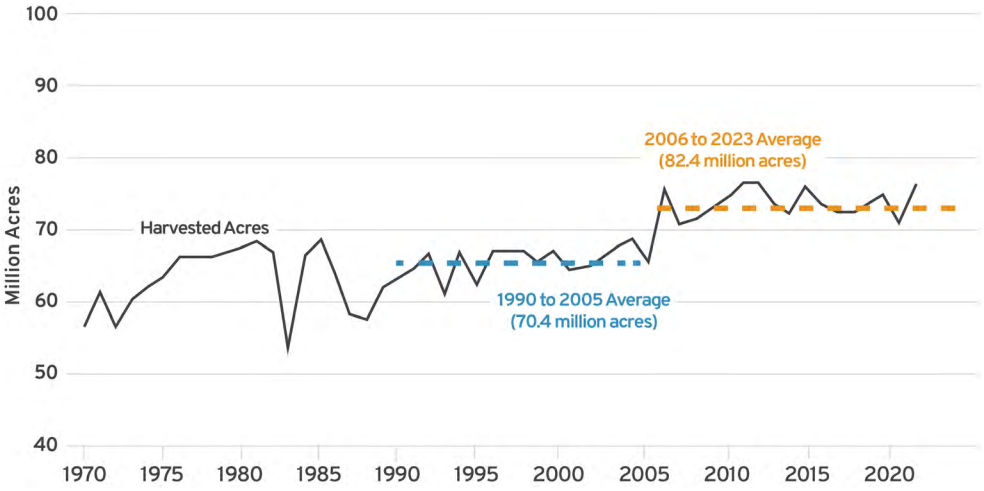
The Problem with Corn

The RFS, originally enacted in 2005 and expanded in 2007, required that ever-increasing gallons of renewable biofuels be blended into the nation's vehicle fuel supply.[2] This led to a dramatic spike in acres dedicated to corn, the primary feedstock for domestic ethanol production (Figure 1).[3]

Figure 1: Acres of U.S. Corn Harvested, 1970 to 2023



Source: Nick Paulson and Gary Schnitkey, "Impacts of Corn Acreage Increases on National Corn Yields," *farmdoc daily* 14:59 (March 26, 2024). https://farmdocdaily.illinois.edu/2024/03/impacts-of-corn-acreage-increases-on-national-corn-yields.html.

To eke out more acreage for corn, growers turned to less productive ground—marginal areas where, without a new incentive, the cost and effort of crop production would have otherwise outweighed the value of the crop.[4] In the first five years of the RFS, it is estimated that 1 million acres of environmentally sensitive lands previously set aside for conservation were put into production.[5] More specifically, the very habitats that played an essential role in preventing runoff of soil and chemicals into waterways—wetlands and riparian zones—fell victim to the plow just when they were needed most.[6]

This new market for corn had an especially troubling environmental impact. Compared to other row crops, corn can be particularly hard on the land. It requires significantly more fertilizer—nitrogen, phosphate, and potash—than cotton, soybeans, or wheat.[7] Soybeans can "fix" their own nitrogen from the air and re-enrich the soil, but corn cannot use atmospheric nitrogen, which is why the two crops are often rotated to prevent nutrient depletion.[8] However, increased demand for corn quickly disrupted this historical relationship, incentivizing more corn-corn growing cycles.[9] Repeatedly growing corn on the same soil requires more fertilizer applications, acidifying the soil and disrupting the nitrogen cycle.[10] Efforts to address this soil degradation create a problematic cascade of effects. Corn depletes the topsoil, so it requires extra fertilizer, but the extra fertilizer further depletes the ground, requiring even more fertilizer.[11] In addition, corn's deep roots are not adept at holding delicate topsoil in place.[12] Combining this issue with intensive farming methods and long months of bare fields exposed to the elements, excessive production on depleted land has led to a massive loss of topsoil across the Corn Belt.[13]

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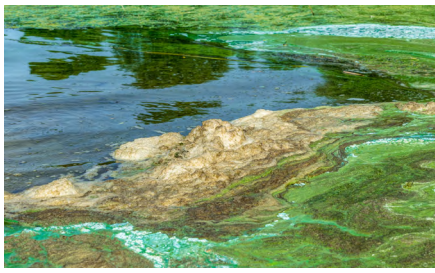
Downstream Effects

After the implementation of the RFS, as more and more marginal land continued to be converted into active farmland, the loss of these critical natural buffers meant that increasing amounts of topsoil and fertilizers began running off into waterways where it began to give rise to massive algal blooms.[14] These harmful algal blooms (HABs) are not only eyesores, but they can also be malodorous, detrimental to aquatic life, and toxic to humans and animals.[15] Moreover, when the rafts of algae die, they consume oxygen, creating hypoxic areas or "dead zones" that are dangerous to people and marine life.[16]



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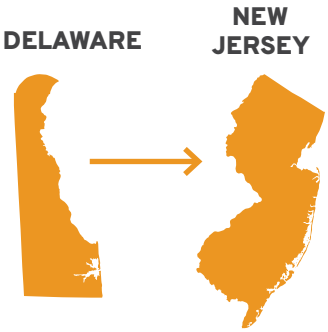
This cycle has proliferated in parts of the Great Lakes and the Gulf of Mexico—two regions directly downstream from heavy corn and corn ethanol production. Figure 2 shows the relationship between corn production, waterways, algal blooms, and resultant dead zones.[17]

Figure 2: Interrelated Areas of Corn Production, Waterways, Algal Blooms, and Dead Zones

HABs have affected all of the Great Lakes to varying degrees. Lake Erie is particularly prone to blue-green HABs because of its shallowness, and HABs have increased in severity there since the enactment of the RFS.[18] Lake Michigan, surrounded on nearly all sides by corn production, also experiences HABs frequently.[19] Even Lake Superior, with its deep and once-frigid waters, has recently fallen victim to HABs.[20] In short, increasing temperatures and nutrient run-off from heavier precipitation over agriculture-heavy areas has created an ideal environment for the algae to flourish.[21]

In addition, the Mississippi River watershed is a super highway of nutrient-rich water that drains from the Corn Belt directly into the warm waters of the Gulf of Mexico where many harmful HABs now thrive.[22] Although cyanobacteria—the culprit behind blue-green algae—primarily live in freshwater, they are increasingly able to survive in the brackish areas where the Mississippi River and Gulf of Mexico meet and where a 2019 bloom was described as being "[l]ike swimming through chocolate mousse."[23]

Even after the blooms die off, damage still remains in the form of oxygen-starved dead zones; the Gulf of Mexico hosts the second-largest such dead zone in the world.[24] Though the size of the Gulf's dead zone fluctuates, the affected area was nearly the size of New Jersey in 2024, up from a Delaware-sized area in 2018.[25] This is disastrous for the area's ecosystem. Marine life flee as oxygen dips too low to sustain life, and any sea life that does survive might be cut off from spawning grounds.[26] This mass exodus impacts commercial fishing, which is forced further offshore, taking more hours and more fuel to capture fewer available fish.[27]



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Counting the Cost

Lawmakers have repeatedly tasked agencies and educational institutions with studying the HAB problem and implementing plans to mitigate it.[28] Because many task forces or appropriations can have overlapping purposes, it is difficult to say precisely how much total funding has been spent on HAB mitigation. Still, Table 1 provides examples of projects that have totaled more than $750 million over 10 years.

Table 1: Example Projects that Spend Funds on HAB Mitigation

Year	Agency	Project	Funding (in millions of dollars)
2022	National Oceanic and Atmospheric Administration	Grants for research and monitoring	18.9[29]
2014-2024	Great Lakes Restoration Initiative	Nonpoint source pollution (agriculture) grants	641.9[30]
2015-2024	Ohio Sea Grant	HAB Research Initiative	24[31]
2019-2024	Centers for Disease Control and Prevention	Surveillance, prevention, and response to HAB-related illnesses	6.2[32]
2021-2026	Gulf Hypoxia Program	Research and education	60[33]

The Government Accountability Office provides a more concrete view of federal engagement in HAB mitigation efforts. The Office found that from 2013 to 2015—a three-year period in the heart of the RFS initiative—12

different federal agencies spent $101 million on activities like researching, monitoring, and forecasting various aspects of the HAB problem.[34]

In 2014, Toledo, Ohio, which is on the banks of Lake Erie, experienced a catastrophic HAB that shut down the city's drinking water system for three days and cost the city (and nearby Pelee Island, Ontario) an estimated $65 million in damage to property values, business disruption, tourism, recreation, and emergency water treatment.[35] Since then, Toledo has spent more than $500 million upgrading their water treatment system to address these issues.[36] The Lake Erie area alone could lose $12.9 billion in water tourism and fishing if HABs continue to plague the lake.[37]

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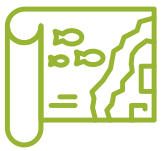
Further south, HABs have also inflicted significant economic harm and threatened key industries. In 2011, the National Oceanic and Atmospheric Administration estimated that "[h]armful algal blooms and hypoxia cost the U.S. seafood and tourism industries approximately $82 million per year."[38] The problem has only worsened with time: A more recent 2020 nonpartisan report estimated related damages of more than $2.4 billion a year to commercial and recreational fishing industries alone.[39]

Pathways to Improvement

Viewed broadly, the causes of HABs are multifaceted; pollution is not the only factor. Weather and climate change also play important roles.[40] Moreover, agriculture runoff is not the only contributor to nonpoint source pollution, nor is corn production the only source of agriculture runoff.[41] That said, corn production is demonstrably a significant factor in the development of HABs in the Great Lakes and Gulf of Mexico where the input intensity of the "greedy crop" is compounded by the Midwest's unique geography.[42]

In the same way, the RFS is not the sole cause of corn production pollution. Federal crop insurance and other federal subsidies like the Agriculture Risk Coverage and Price Loss Coverage programs also incentivize soil-depleting monoculture and planting on marginal lands.[43] But the jump in corn acreage, followed by increasing and expanding HABs after RFS enactment is unlikely to be mere coincidence.[44]

There is more than one solution to the costly problem of HABs. Water treatment after the fact can be expensive; families in Toledo are paying an additional $100 per year to monitor and treat HABs in Lake Erie.[45] The Environmental Protection Agency suggests targeted HAB-prevention strategies, like aeration or erecting physical barriers to inhibit algae growth but notes that these "are expensive and best suited to small, affected bodies of water."[46] Once major dead zones appear, treating the problem directly is not feasible.[47]



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Preventing nutrient runoff from reaching lakes and oceans in the first place should be a top priority. Improving farming practices is part of that solution. Maintaining natural barriers between fields and freshwater ecosystems, planting cover crops, and using crop rotation would help.[48] New technologies also offer some hope for reducing the overall need for fertilizer. For example, precision agriculture tools can carefully target the application of fertilizer, and new gene-edited microbes can fix nitrogen from the air for crops that would otherwise require fertilizer.[49]

Policy Recommendations

The most comprehensive and least expensive path toward HAB reduction is to end the federal incentives for corn overproduction by focusing on two essential steps:

Eliminating or reforming the RFS to halt the artificial demand for corn monoculture. Corn ethanol would likely continue to be used in most traditional vehicle fuels, and supply would be driven by consumer demand.

Reducing and reforming the agriculture safety net to prevent HABs. By better aligning the cost of risk with farming practices, farmers would be less likely to plant in risky, environmentally sensitive areas. The current farm safety net subsidizes the status quo and impedes the adoption of more environmentally friendly technologies and methods.[50]

Conclusion

HABs and the federal policies that help them proliferate are ecological and fiscal crises. As the first paper in this series demonstrated, the RFS, specifically, has been a costly policy failure that has fallen short of its climate goals. Moreover, as this second paper has shown, the RFS has contributed to a compounding series of environmental harms. Rather than correcting the RFS's underlying problems, lawmakers have layered on new spending in the form of more subsidies, more programs, and more taxpayer dollars. Much like layers of sediment settling in a riverbed, each new fix further obscures the underlying issue. To disrupt the flow of bad congressional spending and fixes, we must return to the source. Shrinking the federal footprint in the farm economy—by reforming the RFS and modernizing agricultural subsidies—is the clearest path to cleaner water, healthier ecosystems, and more accountable stewardship of public resources.

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About the Author

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