AMENDED PETITION
TO THE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

TO AMEND ITS "AGGREGATE COMPLIANCE" APPROACH TO THE DEFINITION OF "RENEWABLE BIOMASS" UNDER THE RENEWABLE FUEL STANDARD IN ORDER TO PREVENT THE CONVERSION OF NATIVE GRASSLAND

SUBMITTED BY
EARTHJUSTICE AND CLEAN AIR TASK FORCE

ON BEHALF OF:

NATIONAL WILDLIFE FEDERATION
ACTIONAID USA
AMERICAN BIRD CONSERVANCY
ASSOCIATION OF NORTHWEST STEELHEADERS
CONSERVATION NORTHWEST
ENVIRONMENTAL WORKING GROUP
HEALTHY GULF (AKA GULF RESTORATION NETWORK)
HOOSIER ENVIRONMENTAL COUNCIL
ILLINOIS STEWARDSHIP ALLIANCE
MIGHTY EARTH
NATIONAL AUDUBON SOCIETY
POLLINATOR STEWARDSHIP COUNCIL
SIERRA CLUB
UNION OF CONCERNED SCIENTISTS
WILD IDEA BUFFALO

DATE: January 18, 2019

Via mail and e-mail

January 18, 2019

Acting Administrator Andrew Wheeler
& Office of the Science Advisor
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

RE: Petition of National Wildlife Federation et al. to Amend EPA's "Aggregate Compliance" Approach to the Definition of "Renewable Biomass" Under the Renewable Fuel Standard Program in Order to Prevent Conversion of Native Grassland, 75 Fed. Reg. 14,670, March 26, 2010.

Dear Mr. Wheeler:

Earthjustice and Clean Air Task Force, on behalf of National Wildlife Federation, ActionAid USA, American Bird Conservancy, Association of Northwest Steelheaders, Conservation Northwest, Environmental Working Group, Healthy Gulf (aka Gulf Restoration Network), Hoosier Environmental Council, Illinois Stewardship Alliance, Mighty Earth, National Audubon Society, Pollinator Stewardship Alliance, Sierra Club, Union of Concerned Scientists, and Wild Idea Buffalo Co. (collectively, "Petitioners"), respectfully request that the Environmental Protection Agency ("EPA") amend its regulations regarding what land can permissibly be used to produce renewable biomass under the Energy Independence and Security Act ("EISA")'s Renewable Fuel Standard ("RFS"). Specifically, Petitioners request that EPA modify its RFS rule as follows:

First, EPA should eliminate aggregate compliance as a permissible approach to satisfying EISA's land-use restrictions. Instead, in order to comply with EISA, EPA should require biofuel producers to demonstrate ***individualized compliance*** with EISA's land-use restrictions by showing that each source of crop-based biomass used to meet the renewable fuel standard is grown on EISA-compliant land, i.e., land that was cleared or cultivated prior to 2007, and that was actively managed or fallow and nonforested in 2007.

Second, to further protect against the harms from land conversion resulting from increased corn and soy production, EPA should further require proof that only EISA-compliant land is used to grow crops displaced by renewable biomass production. Only by doing so can EPA ensure that production of renewable biomass on land that complies with EISA's land-use restrictions does not lead to indirect conversion whereby crops displaced by corn and soy are grown on non-EISA-compliant land.

This petition amends the October 30, 2018, petition submitted by a subset of these petitioners.

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SUMMARY

Under EISA, Congress sought to address – among other things – the growing threat of climate change by requiring transportation fuel to contain an increased volume of renewable biomass while at the same time restricting the type of land that could be used to produce the renewable fuel sources. These requirements were premised on the idea that burning renewable biomass releases far less net carbon into the atmosphere than burning fossil fuels. This is because growing biomass pulls carbon dioxide out of the atmosphere, while producing crops on previously cleared or cultivated lands avoids the oxygenation of carbon-rich soil – and thus the emission of carbon dioxide – that occurs when new land is cultivated. The overall objective was to reduce greenhouse gas emissions released into the environment, which itself would both lead to and accompany other environmental benefits as well as the protection of wildlife habitat and water quality.

To accomplish these goals, EISA defined the type of land that can be used for the production of renewable biomass as follows: "agricultural land cleared or cultivated at any time prior to the enactment of this sentence that is either actively managed or fallow, and nonforested."[1] Thus, Congress built into the statute fundamental protections against converting land not cultivated or in production in 2007 for the purpose of producing renewable biomass, ensuring that growing renewable fuel sources would not cause the release of harmful greenhouse gases into the atmosphere and undercut the very benefits the program sought to achieve.

Despite these important goals, EPA devised a regulatory scheme – aggregate compliance – that entirely undermines what Congress set out to accomplish under EISA. Under this approach, EPA turns a blind eye to whether crops used as renewable fuel sources are grown on

[1] EISA, Pub. L. No. 110-140, § 201(1)(I)(i), 121 Stat. 1492 (2007).

previously cultivated land, despite the EISA mandate. Instead, EPA looks only at whether the ***aggregate*** amount of land in cultivation at any given time remains at or below the 2007 level. This scheme is inconsistent with the ***individual compliance*** approach that EPA initially proposed, an approach that would have restricted all land used to grow renewable biomass to land cleared or cultivated prior to the passage of EISA, ***as required by the statute***. In adopting this scheme, EPA ignored countless comments that emphasized the need for individual compliance and recordkeeping to protect against land conversion and the consequent harms to ecological systems and wildlife.

Rather than protecting climate and the environment by restricting land use, aggregate compliance permits conversion of land not cultivated or actively farmed in 2007. It ignores the reality that land use in the United States is not static and that agricultural land is frequently converted to other uses so that remaining below a cap does not at all indicate that grasslands, forests, or other previously uncultivated land has not been converted to agriculture. Indeed, numerous studies – including by EPA itself – indicate that even though the amount of land in cultivation since EISA's passage may have remained below the 2007 aggregate level, ***millions of acres of native land have been converted to cropland to grow corn for ethanol*** during this time, in contravention of both the text and purposes of EISA. Specifically, in a recent report, EPA concluded that since the passage of EISA, ***actively managed cropland has increased by roughly 4 - 7.8 million acres***, and that production of biofuels – corn for ethanol and soy for biodiesel – is responsible for much of this land conversion.[2] During this same time, ***corn acreage has gone up***

[2] EPA, *Biofuels and the Environment: Second Triennial Report to Congress* 44 (2018), https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=536328&Lab=IO ("EPA Triennial Report 2018").

by approximately 10 million acres*, *while acreage of soy has increased by between 7 and 13 million acres.[3]

Conversion of previously uncultivated grassland and forestland affects the climate and harms the environment by releasing tremendous amounts of greenhouse gases into the atmosphere. The process by which it does so is a matter of basic biology. Healthy soil contains large quantities of carbon. When land is cultivated, the carbon stored in the soil is exposed to oxygen, which then converts the organic carbon into carbon dioxide (CO_2). The CO_2 – a harmful greenhouse gas – is then released into the atmosphere, depleting the soil of the carbon that previously enriched it and polluting the air in the process.

Land conversion also requires clearing of vegetation to prepare the grassland for arable cropland use. This results in the burning or decomposition of existing vegetation, both of which emit CO_2 into the atmosphere. At the same time, elimination of grassland ecosystems modifies or destroys wildlife habitats for pollinators, birds, and other species. This includes crucial habitats for federally listed endangered and threatened species.

Also problematic, newly cultivated land requires greater fertilization. Fertilizers – especially those used for corn production – usually contain nitrogen. Excess nitrogen not absorbed by crops may be converted by bacteria in the soil into nitrous oxide (N_2O) gas, a very potent greenhouse gas, that rises to the atmosphere and harms air quality. Additionally, unabsorbed fertilizer compounds may runoff into surface water or leach into groundwater, causing significant harm to the water supply, the soil, and wildlife, including federally listed species.

[3] *Id*. at 10-11.

By abrogating its legal obligation to ensure that each fuel producer complies with EISA's land-use restrictions, EPA has allowed ***millions of acres of land not in cultivation or production in 2007 – between 4-7.8 million acres by EPA's own estimate[4] – to be converted to cropland***. This has had drastic environmental consequences. Specifically, the aggregate compliance approach has led to:

- The emission of at least 87 - 280 million tons of greenhouse gases into the atmosphere, equivalent to the annual emissions of 20-70 coal fired power plants;
- Increased use of a quarter billion to a billion pounds of nitrogen fertilizer, of which on average 25-35% runs off, impairing water quality;
- The need for perhaps 85 billion gallons of additional irrigation water, further straining already-depleting water supplies;
- Destruction and degradation of wildlife diversity and habitat, especially for waterfowl and aquatic life;
- Loss of agricultural bioservices worth at least many tens of millions of dollars and harm to the agricultural economy;
- Damage to and erosion of land that is marginal for agriculture and yet especially ecologically sensitive, such as wetlands and stream buffers; and
- Soil deterioration through loss of over 50% of original root mass and many soil nutrients after conversion.

Aggregate compliance thus unravels the critical climate and environmental protections that form the very fabric of EISA.

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[4] *Id.* at 37.

Not only does the aggregate compliance approach harm both the climate and the environment, but it is also unlawful. It is contrary to the text and antithetical to the purposes of EISA in three primary ways:

- ***First***, this scheme violates the ***text*** of the statute by allowing for the conversion of land that was not in cultivation in 2007 for the production of renewable biomass, despite EISA's clear and unambiguous restriction on such land conversion.
- ***Second***, the scheme violates the ***climate purposes*** of the statute by leading to the release of tremendous volumes of greenhouse gases – volumes that far exceed and thus undermine any climate and environmental benefits achieved by meeting the renewable fuel standards.
- ***Third***, the conversion of land for renewable biomass production leads to water pollution, air pollution, loss of biodiversity, and other environmental harms, undermining EISA's fundamental ***environmental objectives***.

EPA should not use this approach to determine compliance with EISA's land-use mandates, but rather should require individualized determinations to ensure that the production of biomass used for renewable fuel does not lead to the use of land that was uncultivated in 2007.

Just as land conversion for the production of renewable biomass contravenes EISA's text and fundamental climate and environmental objectives, so too does indirect conversion resulting from the cultivation of crops displaced by the production of renewable biomass. This indirect conversion causes the very climate and environmental harms that EISA was designed to prevent. Though not contrary to a specific provision of the statutory text, this indirect conversion of land is antithetical to the purposes of the statute.

EPA's authority to issue the RFS is not unlimited, but rather is rooted in EISA. *See, e.g.*, *Lyng v. Payne*, 476 U.S. 926, 937 (1986) ("an agency's power is no greater than that delegated to it by Congress."). Accordingly, the RFS must be consistent with EISA's text and purpose, and cannot be arbitrary, capricious, an abuse of discretion, or otherwise not in compliance with EISA. *See* Administrative Procedure Act § 1, 5 U.S.C. § 706(2)(A); *see also Massachusetts v. EPA*, 549 U.S. 497, 534 (2007) ("EPA must ground its reasons for action or inaction in the statute," and failure to do so is "arbitrary, capricious, . . . or otherwise not in accordance with law" (internal citation omitted)). The aggregate compliance approach in the RFS is contrary to the text of the statute and undermines the climate and environmental goals. It is therefore arbitrary and capricious and not in compliance with EISA. As a result, EPA should grant this petition and modify the RFS to bring it in line with the governing law.

PARTIES

The National Wildlife Federation is America's largest conservation organization, made up of 51 state and territorial affiliates and representing more than 6 million members and supporters. The National Wildlife Federation's mission is to unite all Americans to ensure wildlife thrive in a rapidly changing world.

ActionAid USA stands in solidarity with people living in poverty and exclusion in 45 countries around the world. These are the people who know what is needed to change lives within their own communities and have the power to mobilize and inspire others. ActionAid supports communities around the world to challenge government policies and power imbalances that negatively affect their daily lives. When these communities claim their rights, including women's rights, the right to food, rights to natural resources, and the right to a sustainable livelihood, they help bring about lasting change locally and globally. As one of their areas of focus, ActionAid supports communities that are trying to cope with the disastrous effects of climate change and they are challenging world leaders to do something about it.

American Bird Conservancy is a not-for-profit membership organization whose mission is to conserve native birds and their habitats throughout the Americas. American Bird Conservancy acts by safeguarding the rarest species and preventing extinctions, conserving and restoring habitats, and reducing threats, while building capacity in the bird conservation movement.

Association of Northwest Steelheaders was founded in 1960 as an organization of anglers dedicated to enforcing and protecting fisheries and their habitats for today and tomorrow. Its vision is responsible and enjoyable sport angling with good access to healthy, abundant and sustainable fisheries in Northwest's healthy watersheds.

Conservation Northwest protects, connects and restores wildlands and wildlife from the Washington Coast to the British Columbia Rockies. Founded in Bellingham in 1989, the organization represents 4,000 members and engages more than ten thousand activists, supporters and online followers.

The Environmental Working Group's mission is to empower people to live healthier lives in a healthier environment. With breakthrough research and education, we drive consumer choice and civic action.

Plaintiff Healthy Gulf (aka Gulf Restoration Network) is a network of environmental, social justice, and citizens' groups and individuals whose purpose is protect and restore the natural resources of the Gulf of Mexico for future generations. Healthy Gulf's members live in the five Gulf states of Louisiana, Texas, Mississippi, Alabama, and Florida, and nationwide. Healthy Gulf has for 25 years been engaged in efforts to reduce pollution flowing into the Gulf. Specifically it has long engaged in efforts to reduce the impact of nutrient pollution from agriculture that causes the Dead Zone (hypoxia) to form in the Gulf each year.

Founded thirty-five years ago, the Hoosier Environmental Council ("HEC") is the largest statewide environmental policy organization in Indiana. HEC aims to set a new path for Indiana, embracing practices and policies that dramatically reduce the footprint of transportation, industry, commerce, and agriculture on the environment.

Illinois Stewardship Alliance is a statewide nonprofit membership organization founded in 1974 and based in Springfield, Illinois. Its mission is to cultivate a local food and farm system that is economically viable, socially just and environmentally sustainable. The Alliance provides programs that drive consumer demand for local food; provide training and technical assistance for stewards of the land on soil health practices; and engage its members in policy to transform how we feed ourselves, how our land is cared for, and by whom.

Mighty Earth is a global environmental campaign that works to protect forests, conserve oceans, and address climate change. Mighty Earth works in Southeast Asia, Latin America, Africa, and North America to drive large-scale action towards environmentally responsible agriculture that protects native ecosystems, wildlife, and water, and respects local community rights.

Founded in 1905, National Audubon Society is a non-profit organization that protects birds and the places they need throughout the Americas using science, advocacy, education, and on-the-ground conservation. Audubon has 22 state offices, 41 nature centers and sanctuaries and over 450 local chapters and 1.4 million members. Working across all landscapes urban and rural, coasts, water and working lands, Audubon collaborates with landowners and managers, government agencies and private industry across the hemisphere to increase the quality of habitat on privately owned lands.

The Pollinator Stewardship Council's mission is to defend managed and native pollinators vital to a sustainable and affordable food supply from the adverse impact of pesticides. The Pollinator Stewardship Council works to: affect regulatory processes of pesticide risk assessment, label, and enforcement; provide advocacy, guidance and tools to document the detrimental effect of pesticides on pollinators; and raise awareness about the adverse impact of pesticides on pollinators critical to the supply of food and the ecosystem.

The Sierra Club is an organization that believes in the power of people working together to make change happen. As the largest and most influential grassroots environmental organization in the U.S., for more than 126 years, Sierra Club has helped shape the way people can participate in local, state, and national advocacy work, so that they can better protect the planet – and each other. Its over 3.5 million members and supporters have helped in advancing climate solutions, acting for justice, getting people outdoors, and protecting lands, air, water, and wildlife. Sierra Club still has a lot more change to make, because so much more is possible. Sierra Club works alongside other local and national groups because together, they are more powerful.

The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with people across the country, it combines technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

Wild Idea Buffalo Company is dedicated to preserving and restoring the Great Plains grasslands ecosystem by returning buffalo back to their native homeland. The organization was founded to pursue this mission and to offer an alternative to the industrialized food system. By returning bison to their native homeland, Wild Idea Buffalo is not only re-wilding a threatened ecosystem, but it is also keeping prairies intact, with carbon stored safely underground, while also producing the healthiest red meat on the planet.

I. LAND CONVERSION FOR CORN AND SOY PRODUCTION HAS INCREASED AND HAS HARMED THE CLIMATE AND THE ENVIRONMENT.

In the decade following the passage of EISA, there has been a measurable increase in the amount of land cultivated for corn and soy in the United States. Indeed, according to EPA, actively managed cropland resulting from both intensification and extensification has increased by between ***4 and 7.8 million acres*** during this time.[5] There are approximately ***10 million acres more of planted corn now than before EISA's enactment***: between 2000-2007, there were "roughly 80 million acres" while between 2007-2016, there were "roughly 90 million acres."[6] Soy cultivation also increased during this time, from 70-75 million planted acres between 2000-2007 to roughly 82-83 million acres between 2014-2016.[7] This increase in acreage reveals that the dramatic rise in corn and soy production cannot be explained by yield intensification alone, but rather has resulted in the cultivation to cropland of millions of acres of land that was not in cultivation in December 2007. Thus, despite EISA's aspirational goals of ameliorating the harms of global warming and its promises of a plethora of environmental protections, since the statute's implementation, the amount of land uncultivated as of December 2007 that has been converted to cropland to meet the renewable fuel standard has skyrocketed. This has led to a number of far-reaching and deleterious environmental consequences.

[5] EPA Triennial Report 2018 at 37.
[6] *Id*. at 10.
[7] *Id*.

Much of the increase in land conversion and the environmental impacts result from EPA's aggregate compliance approach to renewable biomass production. This approach allows the production of renewable biomass on ***whatever land is available*** – whether or not the land was in cultivation at the time of EISA's passage – as long as the cumulative amount of land in cultivation remains at or below the level as of December 2007.

A. Millions of Acres of Land Have Been Converted to Cropland Over the Last Ten Years.

Since the passage of EISA in 2007, millions of acres of uncultivated land have been converted to cropland despite the clear restrictions on land use contained in the statute.[8] Studies of satellite maps reveal that between 2008 and 2012 there was a gross increase of 7.34 million acres of cropland.[9] ***Over 75% of the new cropland (5.7 million acres) was converted from native grasslands, including at least 1.6 million acres of prairie that had remained untouched since the 1970's.***[10] *See infra* Figure 1. During this same time period, corn was grown as the first crop on at least 1.94 million acres (26%) of the newly converted cropland, and soy was first grown on approximately 1.48 million acres (20%) of the newly converted cropland.[11] More recent studies suggest that this expansion has continued.

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[8] Tyler J. Lark, J. Meghan Salmon & Holly K. Gibbs, *Cropland expansion outpaces agricultural and biofuel policies in the United States*, 10 Envtl. Res. Letters 1 (2015), http://iopscience.iop.org/article/10.1088/1748-9326/10/4/044003/pdf; Christopher K. Wright & Michael C. Wemberly, *Recent land use change in the Western Corn Belt threatens grasslands and wetlands*, 110 Proc. Nat'l Acad. Sci. 4134 (2013), http://www.pnas.org/content/pnas/110/10/4134.full.pdf; *see also* EPA Triennial Report 2018 at 111.

[9] Lark et al., *supra* note 8, at 5.

[10] *Id.*

[11] *Id.* at 6.

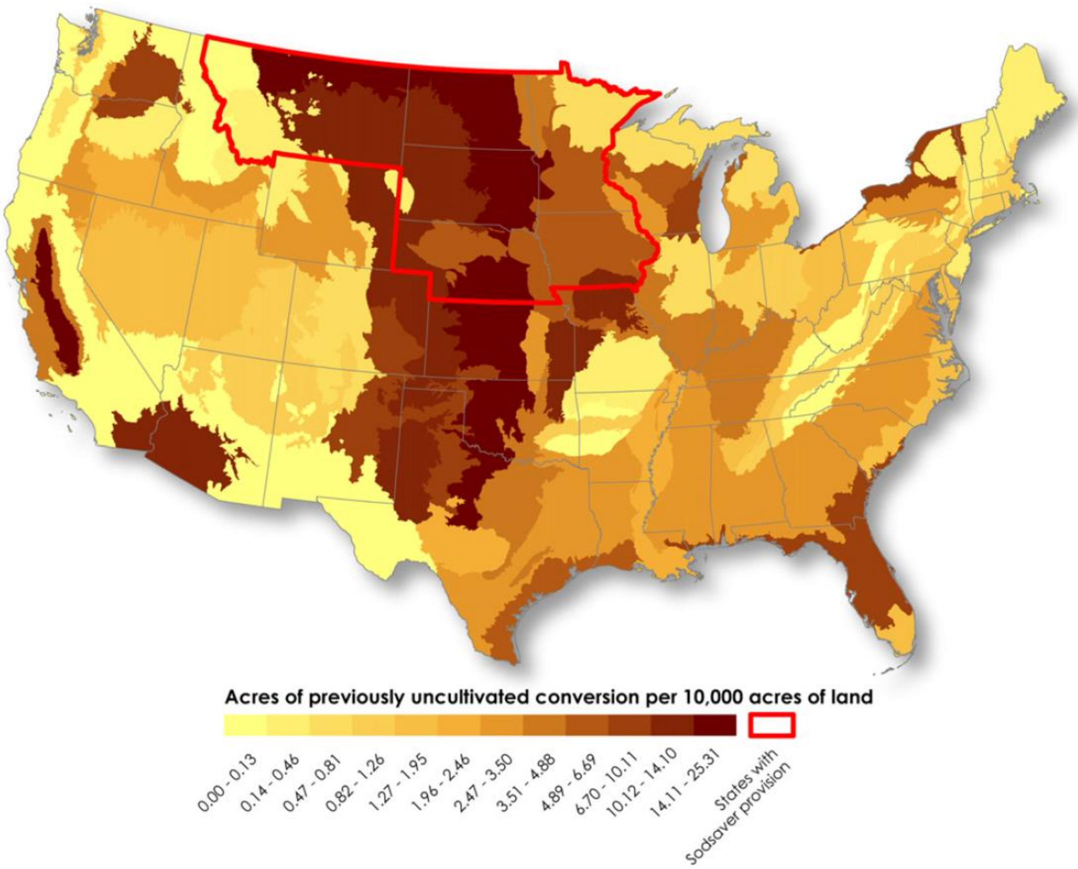

Figure 1. Conversion of uncultivated land as of December 2007 (confirmed back to the early 1970's) to cropland between 2008 and 2012. Display units represent average number of previously uncultivated acres converted per 10,000 acres of total land within each EPA Level III Ecoregion. *See* Lark et al., *supra* note 8, at 6 fig. 4.

EISA's requirement that industry increase its annual volume of renewable fuel has been a significant driver for observed conversions. EPA reports that "[f]rom 2007-2016 corn production ranged from a low of 10.8 billion bushels in 2012 to a high of 15.1 billion bushels in 2016," while during this same period, "soybean production ranged from a low of 2.7 billion bushels in 2007 to a high of 4.3 billion bushels in 2016."[12] Following EISA's passage, the ***acreage for planted corn increased by 10 million acres***, growing from roughly 80 million acres between 2000-2007 to roughly 90 million acres between 2007-2016, while the acreage for soy likewise saw a dramatic increase, from 70-75 million acres from 2000-2007 to roughly 82-83

[12] EPA Triennial Report 2018 at 11.

million acres between 2014-2016.[13] Corn grown for ethanol feedstock now comprises 40% of total corn production, as compared to only 23% in 2007.[14] And it has increased not just as a percentage of corn grown, but also in amount: "Corn used for ethanol production has increased since [the] enactment of EISA," increasing to "a high of 5.21 billion bushels of corn in 2016."[15] The number of corn ethanol refineries multiplied four-fold, from 49 plants in 2002 to 194 plants in 2012,[16] to 198 as of January 1, 2017.[17] Between 2008 and 2012, 2.7 million acres of arable grassland within 50 miles of a refinery were converted to corn production.[18] In fact, 77% of the nation's total corn cropland area was located within 50 miles of an ethanol refinery during this time.[19] Soybean production for biodiesel reveals a similar trend – in 2009, only 9% of soybean oil produced in the U.S. was used for biodiesel, compared to the 31% used for biodiesel in

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[13] *Id*. at 10.

[14] *Feed Grains Database*, U.S. Dep't of Agric. Econ. Res. Serv., https://www.ers.usda.gov/data-products/feed-grains-database/ (last updated Sept. 13, 2018) (figures drawn from running a query after selecting "corn" in "group" query field, then "alcohol for fuel use" in "data attribute" query field, then "annual" in "frequency" query field, then "all years" in "year" query field).

[15] EPA Triennial Report 2018 at 11.

[16] U.S. Energy Info. Admin., *U.S. Fuel Ethanol Plant Production Capacity Archives*, (May 30, 2012), https://www.eia.gov/petroleum/ethanolcapacity/archive/2012/index.php [https://perma.cc/74XL-6W83]; Yehushua Shay Fatal & Walter N. Thurman, *The Response of Corn Acreage to Ethanol Plant Siting*, 46 J. Agric. & Applied Econ. 157 (2014), https://ageconsearch.umn.edu/bitstream/168993/2/jaae575.pdf; Mesbah Motamed et al., *Corn Area Response to Local Ethanol Markets in the United States: A Grid Cell Level Analysis*, 98 Am. J. Agric. Econ., 726, 726-743 (2016), https://academic.oup.com/ajae/article/98/3/726/2195670.

[17] U.S. Energy Info. Admin., *U.S. Fuel Ethanol Plant Production Capacity Archives*, (July 30, 2018), https://www.eia.gov/petroleum/ethanolcapacity/archive/2017/index.php [https://perma.cc/NXY4-4VRT]

[18] Christopher K. Wright, Ben Larson, Tyler J. Lark & Holly K. Gibbs, *Recent Grassland Losses Are Concentrated Around US Ethanol Refineries*, 12 Envtl Res. Letters 044001, 5 (2017), http://iopscience.iop.org/article/10.1088/1748-9326/aa6446/pdf.

[19] Forty-nine percent of corn crop (by area) in 2008 was located less than 25 miles from a refinery, and 28% at 25-50 miles. *Id*. at 2.

2018.[20] Today, biodiesel is produced in 93 plants across the country.[21] Higher rates of conversion from grassland to potential feedstock cropland near refinery plants suggest that biofuel production is directly driving the observed land conversion.[22]

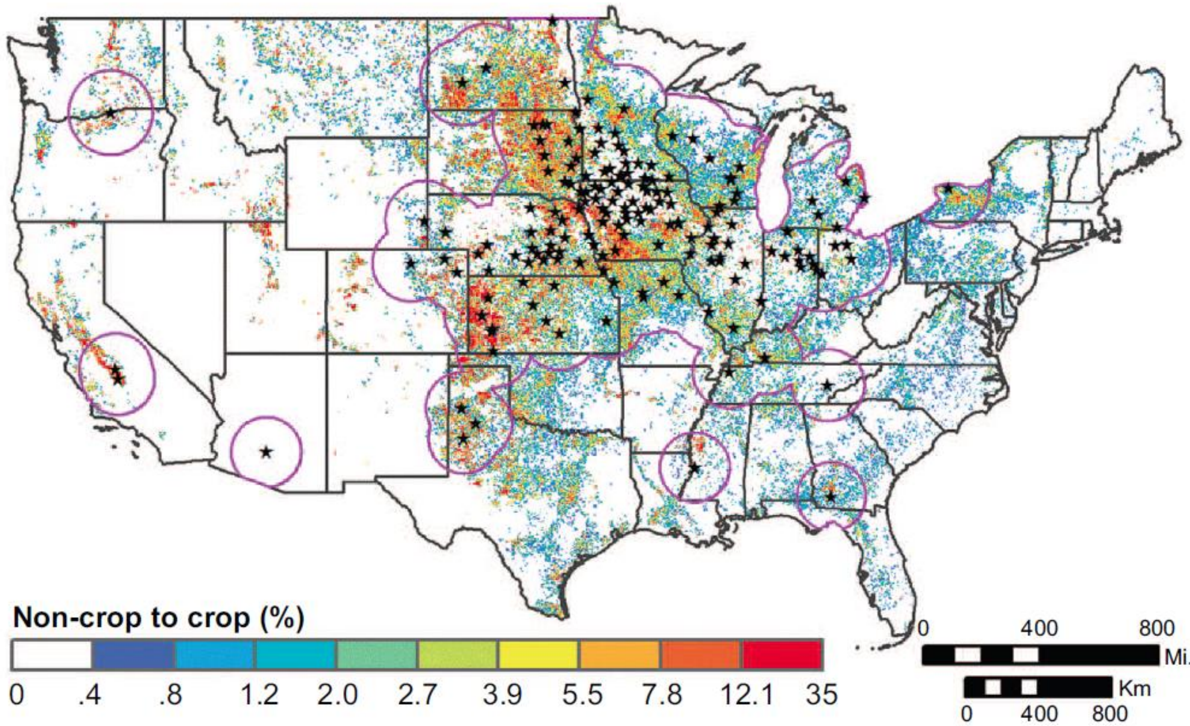

Figure 2. Relative conversion rates of non-cropland to cropland between 2008 and 2012. Stars indicate locations of active ethanol refineries; purple outline represents a 100-mile radius from the refineries. *See* Wright et al., *supra* note 18, at 8 fig.6.

A close look at the five states of the Western Corn Belt (North Dakota, South Dakota, Nebraska, Minnesota, and Iowa) highlights these land conversion trends. In this region, nearly two million acres of grassland were converted for corn and soybean cultivation between 2006

[20] *U.S. Bioenergy Statistics*, *Table 6. Soybean oil supply, disappearance, and share of biodiesel use*, U.S. Dep't of Agric. Econ. Res. Serv., https://www.ers.usda.gov/data-products/us-bioenergy-statistics/ (last updated Sept. 7, 2018).

[21] The number of biodiesel plants does not disaggregate feedstock source; some plants may produce biodiesel using other feedstocks such as canola oil, yellow grease, etc. U.S. Energy Info. Admin. Indep. Stat. & Analysis, *Monthly Biodiesel Production Report with data for June* (2018), https://www.eia.gov/biofuels/biodiesel/production/biodiesel.pdf.

[22] Motamed et al., *supra* note 16; Wright et al., *supra* note 8; *see supra* Figure 2.

and 2011.[23] The most intensive loss of grassland happened in the Prairie Pothole Region ("PPR") of North and South Dakota, which is a critical hotspot for wildlife biodiversity.[24] In Minnesota, the average annual rate of conversion between 2008 and 2012 was four times greater than the rates in the previous 15 years.[25] More than 80% of this conversion to cropland occurred in prairie areas designated by the Minnesota Prairie Plan Working Group (2011) as conservation priority zones.[26] Meanwhile, between 2008 and 2012, national land enrollment in the Conservation Reserve Program – which plays a critical role in prairie conservation – steadily declined by over five million acres, and resulted in up to three million acres of new croplands.[27] Recent United States Department of Agriculture ("USDA") Farm Service Agency data shows that loss of native prairie to crop expansion continues to this day in the Western Corn Belt states. Nearly 480,000 acres were tilled for crop production between 2014 and 2018.[28] For a state-by-state table of acres of land converted since EISA's passage, *see* Appendix A.

Originally, EPA anticipated that the increased demand for renewable fuel under the EISA RFS would be satisfied by yield intensification.[29] Under this assumption, efforts to comply with

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[23] Wright & Wimberly, *supra*, note 8, at 4136.
[24] *Id*.
[25] Tyler J Lark et al., *Accelerated Conversion of Native Prairie to Cropland in Minnesota*, Environmental Conservation 1, 3 (2018), https://www.cambridge.org/core/services/aop-cambridge-core/content/view/1CFE4984A38E544B4102904E5B554980/S0376892918000437a.pdf/accelerated_conversion_of_native_prairie_to_cropland_in_minnesota.pdf.
[26] *Id.*
[27] Lark et al., *supra* note 8, at 5.
[28] Native Sod Spreadsheet, Farm Services Agency, 2018 (produced in response to a FOIA request), attached as Exhibit 1 (showing state conversion of native sod in Iowa, Minnesota, Montana, Nebraska, North Dakota, and South Dakota, from 2014-2018).
[29] *See* Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, 75 Fed. Reg. 14,670, 14,701 (Mar. 26, 2010) (to be codified at 40 C.F.R. pt. 80) ("EPA believes that existing economic factors for feedstock producers favor more efficient utilization practices of existing agricultural land rather than converting non-agricultural lands to crop production");

the RFS would result in minimal carbon emissions from newly cleared land, and instead would come from increased corn production on already cultivated land.[30] New farming technology, substitution of less lucrative crops – such as wheat, small grains (like barley and oats), and cotton – for corn, and consecutive planting ("corn-on-corn") would help to enhance yields.[31] However, these assumptions have not been borne out by the facts. Instead, while mean yields for corn reflect a steady increasing trend between 1980 and today,[32] corn production for ethanol surged

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see also id. at 14,703 ("EPA expects that new lands are unlikely to be cleared for agricultural purposes" because "[c]rop yields are projected to increase, reducing the need for farmers to clear new land for agricultural purposes.").

[30] EPA, *Biofuels and the Environment: First Triennial Report to Congress* (2011), http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=506091 ("EPA Triennial Report 2011"); Randy Schnepf & Brent D. Yacobucci, *Renewable Fuel Standard (RFS): Overview and Issues* Cong. Res. Serv. (2013), https://fas.org/sgp/crs/misc/R40155.pdf.

[31] Meimei Lin & Mary C. Henry, *Grassland and Wheat Loss Affected by Corn and Soybean Expansion in the Midwest Corn Belt Region, 2006– 2013*, 8 Sustainability 1177 (2016), www.mdpi.com/2071- 1050/8/11/1177/pdf ; USDA, Econ. Res. Serv. *Background*, USDA https://www.ers.usda.gov/topics/crops/corn-and-other-feedgrains/background/ (last updated May 15, 2018); Barry K. Goodwin et al., *Is Yield Endogenous to Price? An Empirical Evaluation of Inter-and Intra-seasonal Corn Yield Response* (2012), https://ageconsearch.umn.edu/bitstream/124884/2/Goodwin_Marra_Piggott_Mueller.pdf; Ritvik Sahajpal et al., *Identifying representative crop rotation patterns and grassland loss in the US Western Corn Belt*, 108 Computers & Electronics Agric. 173-182 (2014), http://www.academia.edu/28534095/Identifying_representative_crop_rotation_patterns_and_grassland_loss_in_the_US_Western_Corn_Belt. Corn-on-corn production raises a separate set of environmental concerns, as it requires more herbicide and fertilizer and thus has a much greater impact than maintaining a regular crop rotation.
Laura F. Gentry, Matias L. Ruffo & Fred E. Below, *Identifying Factors Controlling the Continuous Corn Yield Penalty*, 105 Agronomy J. 295- 303 (2013), https://pdfs.semanticscholar.org/043c/f14d69a4c5c6966efc03dce6a72ffb4981c5.pdf.

[32] Note that corn yields dropped anomalously low in the year 2012 due to extreme temperature and drought conditions associated with La Niña. Paul C. Westcott & Michael Jewison, *Weather Effects on Expected Corn and Soybean Yields*, USDA, Econ. Res. Serv. (2013), http://usda.mannlib.cornell.edu/usda/ers/FDS/2010s/2013/FDS-07-26-2013.pdf; Bradley R. Rippey, *The U.S. Drought of 2012*, 10 Weather & Climate Extremes 57, 57-64 (2015), https://ac.els-cdn.com/S2212094715300360/1-s2.0-S2212094715300360-main.pdf?_tid=07a5174b-8bff-4c96-896d-4e445c3a1447&acdnat=1537980601_d06c4b4b9c4ba6cdc1a14d3571246f54; Scott Irwin, *Should We Be Surprised about the U.S. Average Yield of Corn and Soybeans in 2017?* farmdoc daily, Dep't Agric. Consumer Econ., U. Ill. (2017), https://farmdocdaily.illinois.edu/wp-

exponentially in the years immediately following EISA.[33] *See infra* Figure 3. Thus, yield intensification alone cannot explain the increase in corn production, as it has not expanded enough to meet the growing demand for ethanol by itself. Instead, ***corn croplands are expanding onto previously uncultivated grasslands in order to meet the EISA volume mandate***. The result is disastrous for the environment.

A similar trend is seen in soybean yield and production of soybean oil for biodiesel purposes. *See infra* Figure 4. According to EPA's Regulatory Impact Analysis, "soy-based biodiesel production induced ***a large increase in harvested soybean acres***, largely due to the low yield of soy-based biodiesel in terms of gallons produced per acre."[34]

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content/uploads/2017/11/fdd011117.pdf; *see also* USDA, *Charts and Maps: Corn: Yield by Year, US*, https://www.nass.usda.gov/Charts_and_Maps/Field_Crops/cornyld.php (last visited Sept. 26, 2018).

[33] USDA Econ. Res. Serv., *supra* note 14. For data on historical corn yield, select "corn" in "group" query field, then "yield per harvested acre" in "data attribute" query field, then "United States" in "geography" query field, then "all years" in "year" query field, and run query. *See* Schnepf et al., *supra* note 28; *see infra* Figure 3.

[34] EPA, *Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis* 320 (2010), https://nepis.epa.gov/Exe/ZyPDF.cgi/P1006DXP.PDF?Dockey=P1006DXP.PDF (emphasis added) ("EPA Regulatory Impact Analysis").

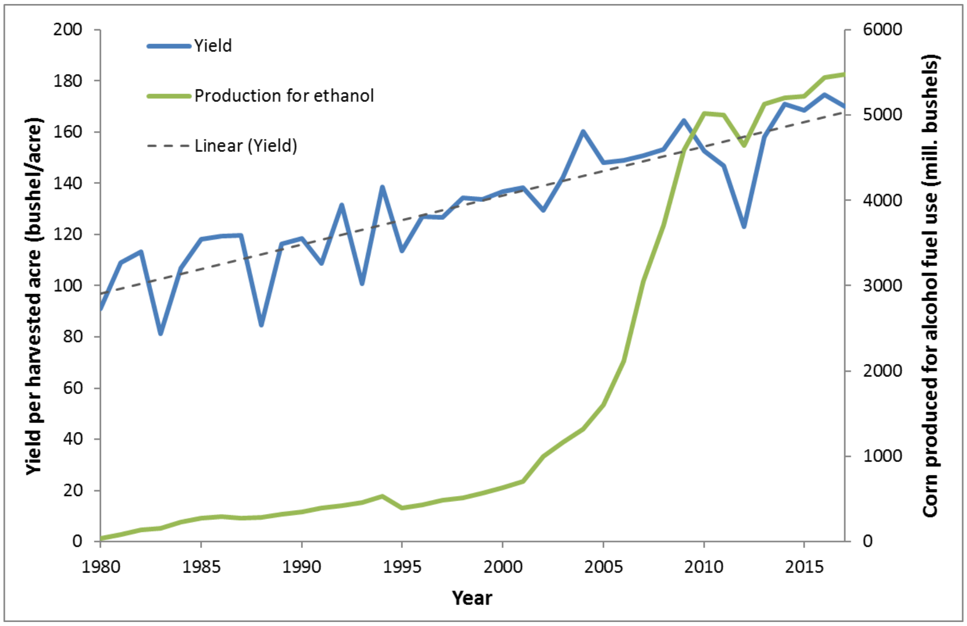

Figure 3. Growth in corn yield versus corn production for ethanol between 1980 and 2017. A linear regression trend line was fit for the yield data. Data derived from USDA's Feed Grains Database.

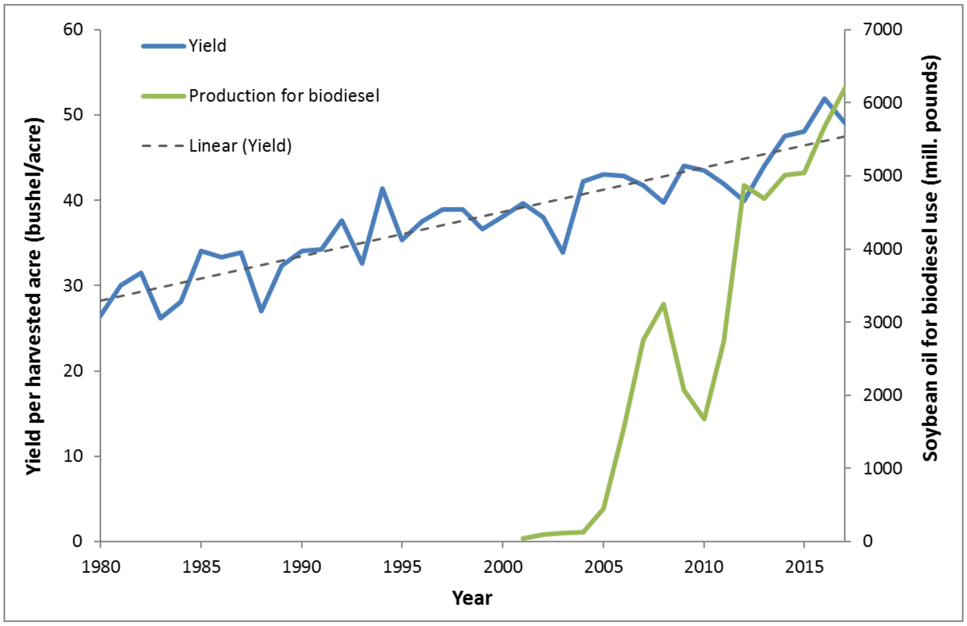

Figure 4. Growth in soybean yield versus soybean bean oil used for biodiesel between 1980 and 2017. A linear regression trend line was fit for the yield data. Data derived from USDA's Oil Crops Yearbook. USDA does not have data on soybean oil for biodiesel production prior to 2003. *See* USDA Econ. Res. Serv., https://www.ers.usda.gov/data-products/oil-crops-yearbook/oil-crops-yearbook/#Soy%20and%20Soybean%20Products (last updated Mar. 30, 2018). (In Excel Spreadsheet, see Tab 2 for yield and Tab 5 for biodiesel use).

B. Land Conversion Over the Past Decade Has Had Drastic Environmental Impacts.

The unanticipated increase in land conversion resulting from the production of corn and other renewable biomass under the aggregate compliance scheme has caused – and continues to cause – significant environmental harm. Indeed, our air, water, land, and wildlife are all suffering as a result.

1. Millions of Tons of Greenhouse Gases Have Been Emitted.

Aggregate compliance's land conversion consequences completely frustrate EISA's core purpose of reducing greenhouse gas emissions. Land conversion of previously uncultivated land releases into the atmosphere significant amounts of carbon dioxide (CO_2) and nitrous oxide (N_2O) that counteract the intended greenhouse gas reduction. EPA required that qualifying renewable fuels must have "lifecycle greenhouse gas emissions that are at least 20 percent less than baseline lifecycle greenhouse gas emissions[35] based on the theory that feedstock production would offset the greenhouse gas emissions from biofuel refinement and combustion, such that net emissions are less than those of fossil fuels.[36] However, even assuming that there is a climate benefit from renewable biomass production in terms of offsetting petroleum use – an assumption that many dispute[37] – this offset only works if grasslands and other uncultivated lands are not converted to grow the necessary corn and soy. If instead native soil is converted to cropland, this

[35] 75 Fed. Feg. at 14,865.

[36] Not all subscribe to the theory that ethanol production is better for the climate. *See, e.g.*, David Pimentel, Tad Patzek & Gerald Cecil, *Ethanol Production: Energy, Economic, and Environmental Losses*, 189 Reviews Envtl. Contamination & Toxicology 25-41 (2007), https://pdfs.semanticscholar.org/5af6/1768587862f8201502c5dc8dbd2cb556a6a9.pdf.

[37] Some studies reveal that ethanol production may not reduce greenhouse gas emissions overall. Envtl. Working Group, *Ethanol's Broken Promise: Using Less Corn Ethanol Reduces Greenhouse Gas Emissions* (2014), https://static.ewg.org/reports/2014/ethanol_broken_promise/pdf/ethanol_broken_promise_ewg_2014.pdf?_ga=2.119196234.2101745258.1535661702-1011223048.1532525647. Even if production methods have improved and become more efficient, the weight of the evidence indicates that at best, use of renewable biomass is on par with or only slightly better than petroleum in terms of climate impact.

creates a carbon deficit that will take years to overcome with any greenhouse gas emissions improvements resulting from the use of renewable biomass. Quantified estimates of this time lag, termed the "carbon debt," are described in greater depth below. While, according to the most optimistic models, ethanol produced from an acre of corn may reduce annual greenhouse gas emissions by 0.73 metric tons, emissions from grassland conversion release anywhere from 30 to 120 metric tons per acre upfront, rendering meaningless the reduction in greenhouse gas emissions from use of renewable fuel.[38] Unfortunately, that is precisely what has happened with the aggregate compliance approach under EISA.

Land conversion increases greenhouse gas emissions in two ways. ***First***, soil organic carbon ("SOC") is lost when land is converted to cropland. Soil stores large quantities of carbon, which it retains as long as the carbon is not exposed to oxygen. Globally, soil and plant biomass can store 3.3 times more carbon than the atmosphere.[39] When grassland and pastures are cleared and tilled, oxygen in the air combines with the carbon in the soil (a process called "oxidation"), and CO_2 is released.[40] Additionally, farmers often clear the new cropland by burning native vegetation or leaving the plants on the field to decompose, leading to chemical and microbial

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[38] Timothy Searchinger et al., *Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land- Use Change*, 319 Science 1238 (2008), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.337.4853&rep=rep1&type=pdf.

[39] R. Lal, *Soil Carbon Sequestration Impacts on Global Climate Change and Food Security*, 304 Sci. 1623 (2004), http://sites.unice.fr/coquillard/UE36/Science%20-%20R%20Lal%202004.pdf.

[40] A. Edward Johnston, Paul R. Poulton & Kevin Coleman, *Chapter 1 Soil Organic Matter: Its Importance in Sustainable Agriculture and Carbon Dioxide Fluxes*, *in* 101 Advances in Agronomy 1 (Donald L. Sparks 2009); Tristram O. West et al., *Carbon Management Response Curves: Estimates of Temporal Soil Carbon Dynamics*, 33 Envtl . Mgmt. 507-518 (2004), https://pdfs.semanticscholar.org/7b02/4af9719027d7cf2a39bf87dad7a3115fb820.pdf?_ga=2.18357881.1986925512.1537993308-2076078948.1537993308.

processes that further contribute gaseous CO_2 emissions to the atmosphere.[41] At a carbon emission rate of 54 metric tons of CO_2 per acre,[42] ***conversion of 1.6 million acres of native grassland***[43] ***would release 87 million metric tons of CO_2, equivalent to annual emissions from 18 million cars on the road or 22 coal-fired power plants.***[44] And this is the most conservative estimate of converted land. Greater land conversion increases these figures across the board:

Table 1. Estimate of CO_2 emissions from land conversion[45]

Acres converted to cropland	Conversion CO_2 emissions rate[1] (Metric Tons ("Mg") CO_2 per acre)	Total Emissions (Mg CO_2)	Equivalent to: Number of Vehicles' Emissions	Equivalent to: Number of Coal-Fired Powerplants
1,600,000[2]	54.25101215	86,801,619	18.6 million	22
5,700,000[3]	38.21862348	217,846,154	46.6 million	54
7,340,000[4]	38.21862348	280,524,696	60 million	70

[1] Fargione et al., *supra* note 39; Ilya Gelfand et al., *supra* note 45; *see also* Lark et al., *supra* note 8 for detailed methodology.
[2] Amount of grasslands that was uncultivated for more than twenty years prior to the passage of EISA that was converted to crop production between 2008-2012.
[3] Amount of any type of grassland converted to crop production between 2008-2012.
[4] Amount of any land uncultivated since 2001 that was converted to crop production between 2008-2012.

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[41] Joseph Fargione et al., *Land Clearing and the Biofuel Carbon Debt*, 319 Science 1236 (2008), https://pdfs.semanticscholar.org/dc89/11f9e54f9b8b35a8303bd7960041eef6c742.pdf.
[42] Converted from reported emission factor of 134 Mg CO_2 per hectare for intact grasslands converted with conventional tillage. *Id*. at 1236.
[43] An estimate of 1.6 million acres of converted grassland is the most conservative estimate in the many studies on this issue. Several studies have suggested much higher estimates. Indeed, EPA itself estimates that there has been an "an increase in actively managed cropland in the U.S. since the passage of EISA by roughly 4-7.8 million acres, depending upon the source." EPA Triennial Report 2018 at 111.
[44] *Greenhouse Gas Equivalencies Calculator*, EPA (2018), https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator (last visited Sept. 26, 2018).
[45] This table uses estimates of land conversion acreage from *Cropland expansion outpaces agricultural and biofuel policies in the United States*. Lark et al., *supra* note 8.

Unsurprisingly, soil carbon loss rates are most rapid in the year immediately after fields are cleared for planting.[46] In fact, in the first year after clearing, 15% of all potential CO_2 emissions from an acre of converted land will be released.[47] Future decomposition and forgone soil sequestration forms the majority (75%) of a converted acre's total CO_2 emissions.[48] Tilled converted lands release more carbon than no-till lands, as tilling exposes carbon to oxygen, which creates more CO_2, and likewise requires more on-farm energy. Thus, soil tillage practices can triple the length of time it takes for projected ethanol use to offset the greenhouse gas emissions, from 40 to 123 years.[49]

EPA itself recognizes that land conversion leads to the loss of soil organic carbon that in turn leads to increased greenhouse gas emissions. In its Regulatory Impact Analysis of the new RFS, it explained:

> GHG emissions could be released through time if new acres are needed to produce corn or other crops for biofuels. The GHG emissions associated with converting land into crop production would accumulate over time with the largest release occurring in the first few years due to clearing with fire or biomass decay. After the land is converted, moderate amounts of soil carbon would continue to be released for approximately 20 years. Furthermore, there would be foregone sequestration associated with the fact that the forest would have continued to sequester carbon had it not been cleared for approximately 80 years.[50]

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[46] Kristina J. Anderson-Teixeira et al., *Changes in Soil Organic Carbon Under Biofuel Crops*, 1 GCB Bioenergy 75 (2009), https://pdfs.semanticscholar.org/c1e6/52a11cbb96056180b3e62ca8829b65b66526.pdf.
[47] Ilya Gelfand et al., *Carbon Debt of Conservation Reserve Program (CRP) Grasslands Converted to Bioenergy Production*, 108 Proc. Nat'l Acad. Sci. 13864 (2011), http://lees.geo.msu.edu/pubs/Gelfand2011.pdf.
[48] *Id.*
[49] Hyungtae Kim, Seungdo Kim & Bruce E. Dale, *Biofuels, Land Use Change, and Greenhouse Gas Emissions: Some Unexplored Variables*, 43 Envtl. Sci. & Tech. 961 (2009); Gelfand et al., *supra* note 45.
[50] EPA Regulatory Impact Analysis at 422.

Like forests, grasslands are also able to sequester carbon, a long-term service that will be lost if the grassland is tilled.[51]

Second, in addition to increasing CO_2 emission, land conversion also leads to significant emissions of nitrous oxide (N_2O), which has a warming potential that eclipses that of CO_2 by nearly 300 times.[52] N_2O emissions occur not from physical land-use change, but rather from use of nitrogen fertilizer on newly converted cropland.[53] Native grasslands naturally recycle soil nutrients without requiring additional nitrogen inputs. By contrast, biofuel row crops require fertilizer to replenish soil nutrients that are removed during harvest, and to maintain productive yields. However, the crop only takes up around 40 to 50% of the nitrogen fertilizer applied to soil.[54] The remaining 50 to 60% of nitrogen fertilizer remains in the soil, where it either runs off

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[51] M. B. Jones & Alison Donnelly, *Carbon Sequestration in Temperate Grassland Ecosystems and the Influence of Management, Climate and Elevated CO_2*, 164 New Phytologist 423, 423-439 (2004), http://www.southwestnrm.org.au/sites/default/files/uploads/ihub/jones-mb-donnelly-2004carbon-sequestration-temperate.pdf; Gelfand et al., *supra* note 45.

[52] Susan Solomon et al., *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (2007), https://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4_wg1_full_report.pdf.

[53] Paul J. Crutzen et al., *N2O release from agro-biofuel production negates global warming reduction by replacing fossil fuels*, 7 Atmospheric Chemistry and Physics Discussions 11191, 11191-11205 (2007), https://www.atmos-chem-phys.net/8/389/2008/acp-8-389-2008.pdf.

[54] United Nations Environment Programme ("UNEP"), *Drawing Down N2O to Protect Climate and the Ozone Layer: A UNEP Synthesis Report*, UNEP) 20, https://wedocs.unep.org/bitstream/handle/20.500.11822/8489/- Drawing%20down%20N2O%20to%20protect%20climate%20and%20the%20ozone%20layer_%20a%20UNEP%20synthesis%20report- 2013UNEPN2Oreport.pdf?amp%3BisAllowed=&sequence=3;*see also* Kenneth G. Cass man et al., *Agroecosystems, Nitrogen use, Efficiency, and, Nitrogen Management*, 31 Ambio, 1 32, 133 (2002), http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1356&context=agronomyfacpub; Vaclav Smil, *Nitrogen in Crop Production: An Account of Global lows*, 13 Global Biogeochemical Cycles 647, 653 (1999), http://vaclavsmil.com/uploads/smil- article- global- biogeochemical- cycles.1999.pdf; James N. Galloway & Ellis B. Cowling, *Reactive nitrogen and the world: 200 years of change*, 31 *Ambio* 64, 65- 66 (2002), https://www.researchgate.net/profile/James_Galloway/publication/11297112_Reactive_Nitrogen_and_The_World_200_Years_of_Change/links/00b7d5304e858afb66000000/Reactive-Nitrogen-and-The-World-200-Years-of-Change.pdf.

with surface water or leaches into ground water, or is converted by soil bacteria into N_2O, which is then emitted into the atmosphere.[55] N_2O gas may also be emitted indirectly when excess nitrogen from fertilizer is lost to the environment via run-off or leaching, and is later converted to N_2O. And as discussed in more detail below, nitrogen from fertilizer not only impacts climate, but it also harms the environment. For example, run-off fertilizer in the form nitrate (NO_3^-) pollutes water supplies and leads to eutrophication, the process by which excessive nutrients in a body of water cause dense growth of plant life and death of animal life due to a lack of oxygen.

On average, the U.S. application rate of 140 pounds of nitrogen fertilizer per acre of corn[56] releases 1.3 pounds of N_2O per acre.[57] To further exacerbate the problem, the N_2O emission response to nitrogen input in agriculture is non-linear: higher rates of nitrogen fertilizer application on converted croplands will produce disproportionately large greenhouse gas impacts.[58]

The land conversion resulting from EISA's aggregate compliance approach has had a tremendous impact on the environment. For example, between 2008 and 2012, ***at least 1.6***

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[55] If the soil contains ample oxygen content, N_2O is generated as a byproduct when soil bacteria transform inorganic ammonium to nitrate (*nitrification*). If oxygen levels in the soil are too low, soil bacteria convert nitrate to dinitrogen (N_2), releasing N_2O gas in the process (*denitrification*).
[56] Soy does not require as much nitrogen fertilizer as corn because soy is a legume that is able to biologically fix most of its needed nitrogen.
[57] Iurri Shcherbak, et al., *Global metaanalysis of the nonlinear response of soil nitrous oxide (N_2O) emissions to fertilizer nitrogen*, 111 Proc. Nat'l Acad. Sci. 9199, 9202 (2014), http://www.pnas.org/content/pnas/111/25/9199.full.pdf.
[58] J.P. Hoben et al., *Nonlinear nitrous oxide (N_2O) response to nitrogen fertilizer in on-farm corn crops of the US Midwest*, 17 Global Change Biology 1140, 1140 (2011), https://pdfs.semanticscholar.org/22c0/ce0fa1d21a5ddb6dac284d78bfe2a550a062.pdf?_ga=2.132502793.661887377.1539277952-2076078948.1537993308; Dong-Gill Kim, et al., *Linear and nonlinear dependency of direct nitrous oxide emissions on fertilizer nitrogen input: A meta-analysis*, 168 Agric., Ecosystems & Env't 53 (2013); Iurii Shcherbak, et al., *supra* note 55, at 9199.

million acres of grassland were converted to potential feedstock cropland.[59] If this new cropland were used only to produce corn for ethanol, the conversion would have released ***an estimated 87 million metric tons of CO_2 from soil carbon loss and 62,000 metric tons of N_2O (the equivalent of 18 million metric tons of CO_2) from nitrogen fertilizer use.*** In total, emissions from land conversion and subsequent fertilizer use would be equivalent to the annual emissions from 27 coal-fired power plants or 22.5 million cars.

Table 2. Estimate of N_2O emissions from land conversion.[60]

Acres converted to cropland	**N_2O Emission Rate[1] (Mg CO_2-eq per acre)**	**Total Emissions (Mg CO_2-eq)**	**Equivalent to: Number of Vehicles' Emissions**	**Equivalent to: Number of Coal-Fired Powerplants**
1,600,000[2]	11.48	18,378,018	3.9 million	5
5,700,000[3]	11.48	65,471,688	14 million	16
7,340,000[4]	11.48	84,309,156	18 million	21

[1] Calculated using an average fertilizer application rate of 140 lbs nitrogen per acre, a N_2O-N emission rate of 1.5 kg N_2O-N per hectare at that application rate (Scherback et al., *supra* note 55), and a global warming potential of 298 (Intergovernmental Panel Climate Change).
[2] Amount of grasslands that was uncultivated for more than twenty years prior to the passage of EISA that was converted to crop production between 2008-2012.
[3] Amount of any type of grassland converted to crop production between 2008-2012.
[4] Amount of any land uncultivated since 2001 that was converted to crop production between 2008-2012.

The purported benefits gained from the ethanol and biodiesel substitution for petroleum[61] were effectively meaningless, as this conversion (not including fertilizer use) led to total

[59] Lark et al., *supra* note 8.
[60] Table 2 uses estimates from Lark et al., *supra* note 8, and assumes that corn was grown on all converted land.
[61] EPA estimates that annual GHG reduction benefits from replacing petroleum fuels with biofuels is on the scale of 150 million metric tons CO_2-eq (CO_2 equivalent) per year (p.469). Very optimistically, EPA predicts that the RFS2 projected level of biofuel production will reduce global mean surface temperatures and mean sea level rise (p.499). *See* EPA Regulatory Impact Analysis; *see also* Haixiao Huang et al., *Stacking low carbon policies on the renewable fuels standard: Economic and greenhouse gas implications*, 56 Energy Policy 5, 5-15(2013),

greenhouse gas emissions equivalent to yearly emissions from ***over 18 million cars.***[62] And as recent studies indicate, these increased emissions affect more than just climate; they may also impact the quality of the food we eat and the nutrients we receive through our food.[63]

The concept of "carbon debt" is a useful tool to quantify the climate harm from ethanol-driven land conversion. It measures total greenhouse gases released from the first 50 years after a plot of land is converted. To repay or reduce the carbon debt, total biofuel emissions – including those incurred from land conversion – must be less than fossil fuel emissions.[64] Yet for the first 30 years, greenhouse gas emissions from biofuels sourced from converted lands will be twice the amount released by gasoline.[65] Thus, ***corn ethanol grown on converted central grasslands in the U.S. incurs at least a 93-year carbon debt***.[66] In other words, it will take at least 93 years for the total cumulative ethanol emissions to be less than the emissions from the replaced petroleum if the corn is grown on converted grassland.[67]

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https://bepress-attached-resources.s3.amazonaws.com/uploads/4d/d3/77/4dd377e9-a8c4-4436-8518-de938ecd8380/fulltext_stamped.pdf.

[62] *Greenhouse Gas Equivalencies Calculator*, Envtl. Protection Agency, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator (last updated Sept. 2017).

[63] Samuel S. Myers et al., *Increasing CO2 threatens human nutrition*, 510 Nature 139, 139 (2014), http://www.environment.harvard.edu/sites/default/files/myers_2014_increasing_co2_threatens_human_nutrition_aop_version.pdf.

[64] Fargione et al., *supra* note 39, at 1236.

[65] Searchinger et al., *supra* note 36.

[66] Fargione et al., *supra* note 39, at 1237.

[67] This calculation approves corn ethanol use as having a positive impact on the environment, an assumption with which many disagree. *See supra* notes 34 and 35.

2. **Land Conversion for Corn Ethanol and Soy Biodiesel Has Increased Water Pollution.**

   i. **Increased Land Conversion Results in Greater Nitrogen Run-off that Harms Water Quality.**

Another consequence of land conversion is increased release of nitrogen into waters. Assuming that corn was grown on the converted 1.6 million acres of grassland – which is the most conservative estimate of land converted since EISA – this expansion could introduce at least 224 million pounds of new fertilizer onto the U.S. landscape of which much would flow into waterways.[68] If, instead, corn were grown on 5.7 million or 7.34 million acres of converted land, the amount of new fertilizer used could 789 or 1,027 million pounds:

Table 3. Estimate of increased fertilizer usage if corn were grown on land converted for crop production.

Acres converted to cropland	Average fertilizer application rate for corn (lbs N per acre)	Total fertilizer applied (lbs N)
1,600,000[1]	140	224,000,000
5,700,000[2]	140	798,000,000
7,340,000[3]	140	1,027,600,000

[1] Amount of grasslands that was uncultivated for more than twenty years prior to the passage of EISA that has been converted to crop production between 2008-2012.
[2] Amount of any type of grassland converted to crop production between 2008-2012.
[3] Amount of any land uncultivated since 2001 that was converted to crop production between 2008-2012.

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[68] This figure is calculated using a U.S. average nitrogen fertilizer application rate of 140 lbs per acre for corn. *See* USDA Nat'l Agric. Stats. Serv., *Agricultural Chemical Usage*, http://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Chemical_Use/ (last updated Sept. 28, 2018); USDA Econ. Res. Serv., *Fertilizer Use and Price*, https://www.ers.usda.gov/data-products/fertilizer-use-and-price/fertilizer-use-and-price (last updated Feb. 21, 2018). EPA performed a similar calculation in its 2018 Triennial Report using a value of "1.28 million acres extensification . . . due to corn." *See* EPA Triennial Report 2018 at 70.

According to EPA's FY2016-17 *National Water Program Guidance*, "nitrogen and phosphorus pollution is one of the most serious and pervasive water quality problems."[69] Between 25-35% of the nitrogen fertilizer applied to crops inevitably leaches into surface water due to runoff, poor tile drainage, and sediment transport.[70] The severe water quality injury caused by nitrogen enrichment in freshwater bodies has been widely studied and documented. The surplus nitrogen, often in reactive nitrate form (NO_3^-), stimulates excessive algae and microbe growth, which exhausts oxygen in the water column and breeds toxic algal blooms.[71] This results in eutrophication, which can lead to mass aquatic life mortality. Even in terrestrial systems, up to 25% of Great Plains plant species could be lost from receiving excess agricultural nitrogen enrichment.[72]

The many socioeconomic costs of eutrophication are huge. EPA analyzed the issue in the Hypoxia Task Force's 2017 Report to Congress and the 2015 *Cost of Nutrient Pollution*

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[69] EPA Office of Water, *FY2016-2017 National Water Program Guidance* 15 (2015), https://nepis.epa.gov/Exe/ZyPDF.cgi/P100MDWZ.PDF?Dockey=P100MDWZ.PDF.

[70] Susan E. Powers, *Nutrient loads to surface water from row crop production*, 12 Int'l J. Life Cycle Assessment 399, 399-407 (2007), https://link.springer.com/content/pdf/10.1065/lca2007.02.307.pdf; R. Dominguez-Faus et al., *The Water Footprint of Biofuels: A Drink or Drive Issue?*, 43 Envtl. Sci. & Tech. 3005, 3008 (2009), https://pubs.acs.org/doi/pdf/10.1021/es802162x.

[71] EPA Office of Water, *Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria* (2015), https://www.epa.gov/sites/production/files/documents/nandpfactsheet.pdf; V.H. Smith et al., *Eutrophication: impacts of excess nutrient inputs on freshwater, marine, and terrestrial ecosystems*, 100 Envtl. Pollution 179, 187 (1999), https://pdfs.semanticscholar.org/80cd/d0a042482b590b01620192193d8c13107beb.pdf?_ga=2.65952937.661887377.1539277952-2076078948.1537993308.

[72] More specifically, species loss ranges from approximately 18% from shortgrass steppe in the Central Plains to approximately 25% from tallgrass prairie. Chris M. Clark et al., *Environmental and plant community determinants of species loss following nitrogen enrichment*, 10 Ecology Letters 596, 600 (2007), http://collins.lternet.edu/sites/temperate.lternet.edu.collins/files/publications/Clark_etal_2007_EL_2.pdf.

Report.[73] It concluded that nationally, the damages can range from $1.3 to $4.2 billion,[74] and include: commercial and recreational fishing losses ($189-$589 million), boating expenditures ($182-$567 million), depreciated property value ($0.3-$2.8 billion), additional species conservation spending ($44 million), and bottled water costs due to undrinkable public water supply ($813 million).[75] Affected areas additionally need to implement expensive water treatment techniques, such as aeration systems, aluminum sulfate, or dredging, costing on the magnitude of tens or hundreds of millions of dollars.[76]

Moreover, continued land conversion for corn and soy production for use as fuel will likely cause an increase in contaminated local drinking water through groundwater leaching, which in turn will result in higher levels of nitrogen and other toxic exposure and associated harms for agricultural communities. For example, in infants, direct nitrate consumption from water or food causes methemoglobinemia (or "blue baby syndrome").[77] For older children and adults, high intake of nitrates could affect thyroid function.[78]

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[73] EPA, *Mississippi River/Gulf of Mexico Watershed Nutrient Task Force: 2017 Report to Congress* 7 (2017), https://www.epa.gov/sites/production/files/2017- 11/documents/hypoxia_task_force_report_to_congress_2017_final.pdf; EPA Office of Water, *A Compilation of Cost Data Associated with the Impacts and Control of Nutrient Pollution* (2015), https://www.epa.gov/sites/production/files/2015-04/documents/nutrient-economics-report-2015.pdf.

[74] *See* Walter K. Dodds et al., *Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages*, 43 Envtl. Sci. & Tech. 12 (2009), https://pubs.acs.org/doi/10.1021/es801217q.

[75] *Id.*

[76] EPA Office of Water, *supra* note 71, at 34-35.

[77] World Health Organization ("WHO"), *Nitrate and nitrite in drinking-water: background document for development of WHO Guidelines for Drinking-water Quality*, 11 (2016), http://www.who.int/water_sanitation_health/dwq/chemicals/nitrate-nitrite-background-jan17.pdf.

[78] *Id.*

Land conversion likewise harms surface waters. The harmful algae blooms caused by eutrophication may also release a host of biological toxins into the water that harm public health. For example, in Toledo, Ohio, fertilizer run-off caused a devastating bloom in Lake Erie in 2014, compromising the drinking water supply of over 500,000 people.[79] EPA determined that drinking water contaminated with the bacterial toxins in Toledo waters could lead to "[a]bdominal pain, [h]eadache, [s]ore throat, [v]omiting and nausea, [d]ry cough, [d]iarrhea, [b]listering around the mouth, and [p]neumonia."[80] Lake Erie algae bloom continues to this day.

At the same time it increases nitrogen run-off into the water supply, conversion of and agricultural production on previously untilled lands increases soil erosion, which exacerbates the harms stemming from nitrogen loading.[81] Sedimentation increases nitrogen loss rates, as nitrogen compounds bound to soil particles are transported by wind or water along with the eroded soil. And little to nothing is being done to prevent this soil loss. Native prairie conversion shaves off crucial buffers between croplands and native ecosystems, facilitating nutrient transport into surrounding environments.[82] Grassland buffers intercept sediment flows and uptake excess nutrients from runoff crop fertilizer, reducing surface nitrogen loads by 10 to

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[79] Emma G. Fitzsimmons, *Tap water ban for Toledo residents*, N.Y. Times (Aug. 3, 2014), https://www.nytimes.com/2014/08/04/us/toledo-faces-second-day-of-water-ban.html?mtrref=undefined.

[80] *Health and Ecological Effects*, EPA, https://www.epa.gov/nutrient-policy-data/health-and-ecological-effects#what1 (last updated June 22, 2017).

[81] *See* USDA Nat. Res. Conservation Serv., *Model Simulation of Soil Loss, Nutrient Loss, and Change in Soil Organic Carbon Associated with Crop Production* 118 (June 2006), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_012757.pdf.

[82] USDA Nat. Res. Conservation Serv., *Conservation Programs and Pesticides in Great Plains Depressional Wetlands—Texas to North Dakota* (2017), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1329455.pdf.

95%.[83] Yet recent land assessments show that ***over 80% of the converted grassland area in North and South Dakota was within 500 meters of adjacent wetlands***.[84] And USDA reported that from 2003 to 2006, only a small minority (less than 40%) of "highly erodible land" acreage in the Midwest utilized erosion prevention practices to control fertilizer runoff.[85] Thus, land conversion packs a double punch: it increases the release of nitrogen by increasing soil loss, at the same time it erodes critical barriers to nitrogen runoff.

The most evident water quality impact of biofuel-driven land conversion is linked to bottom water hypoxia in the Gulf of Mexico. *See infra* Figure 5. Hypoxia occurs when eutrophication and bacterial decomposition deplete dissolved oxygen levels in the lower water column, such that life cannot be sustained.[86] Every spring, the northern Gulf of Mexico dead zone swells to the size of Massachusetts, causing mass marine life mortality in the region.[87] In the summer of 2017, EPA recorded the largest ever dead zone at 22,720 km^2.[88] The EPA Hypoxia Task Force has set a goal to reduce nitrogen inputs in the Gulf by 45% in order to

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[83] EPA Office of Res. & Dev't, *Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations* 4, 6 (2005), http://ccrm.vims.edu/education/seminarpresentations/fall2006/Workshop CD/Other References/Riparian Buffers & Nitrogen Removal.pdf.

[84] This reflects conversion between 2007 and 2011. Wright & Wimberly, *supra* note 8, at 4137; Sahajpal et al., *supra* note 29, at 179.

[85] USDA Nat. Res. Conservation Serv., *Effects of Conservation Practices on Nitrogen Loss from Farm Fields: A National Assessment Based on the 2003-2006 CEAP Survey and APEX Modeling Databases* 21 (2017), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1365657.pdf.

[86] Hypoxic conditions are defined as dissolved oxygen levels below 2 parts per million ("ppm"). *Hypoxia Research Program*, Nat'l Center for Coastal Ocean Sci., https://coastalscience.noaa.gov/research/stressor-impacts-mitigation/habhrca/hypoxia-program/ (last visited Oct. 12, 2018).

[87] The five-year average size of the zone is 14,024 km^2; the actual size of hypoxic zone varies temporally. *See supra* note 71.

[88] *Northern Gulf of Mexico Hypoxic Zone*, EPA, https://www.epa.gov/ms-htf/northern-gulf-mexico-hypoxic-zone (last visited Oct. 12, 2018).

shrink the dead zone to 5000 km^2, with an interim target of 20% reduction by 2025.[89] However, nitrogen runoff from projected corn ethanol production in the Mississippi-Atchafalaya River Basin ("MARB") alone will completely jeopardize EPA's reduction goals.[90] Currently, agriculture contributes 60% of total nitrogen loads to the MARB, polluting the Gulf with approximately ***840,000 tons of nitrogen each year***.[91] Field measurements confirm that fertilizer leached from corn crops is responsible for the large majority of agricultural nitrogen exports.[92] *See infra* Figure 6. Studies indicate that corn expansion and intensification to meet EISA targets contribute an increase of 10 to 18% in annual dissolved inorganic nitrogen flux in the MARB.[93]

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89 *See supra* note 71.

90 The Mississippi-Atchafalaya River Basin encompasses all Midwest Corn Belt states, where overall corn production and grassland conversion are concentrated. Simon D. Donner & Christopher J. Kucharik, *Corn-based ethanol production compromises goal of reducing nitrogen export by the Mississippi River*, 105 Proc. Nat'l Acad. Sci. 4513 (2008), http://www.pnas.org/content/pnas/105/11/4513.full.pdf. The cited study looks at the impact of increased corn production from intensification and extensification combined. Given that corn grown on newly converted land requires a greater amount of fertilizer, increasing land conversion would likely result in increased nitrogen runoff.

91 This figure is calculated from 60% of the 5-year average annual nitrogen load (1.4 million tons) for 2010 to 2015. *See supra* note 71. Given that newly converted land requires greater amounts of nitrogen fertilizer, greater extensification would likely lead to greater increases in dissolved inorganic nitrogen flux.

92 Sixty to 98% of excess leached nitrogen in MARB can be allocated to corn fertilizer, as opposed to soybean. Powers, *supra* note 68.

93 Values based on 2008 model projections. *See* Donner & Kucharik, *supra* note 88. Similar results from price commodity model comparison to 1997 baseline. *See* Silvia Secchi et al., *Potential water quality changes due to corn expansion in the Upper Mississippi River Basin*, 21 Ecological Applications 1068, 1068-1084 (2011), https://opensiuc.lib.siu.edu/cgi/viewcontent.cgi?article=1002&context=agecon_articles. The studies looked at the conversion of Conservation Reserve Program grassland and soy crops to corn.

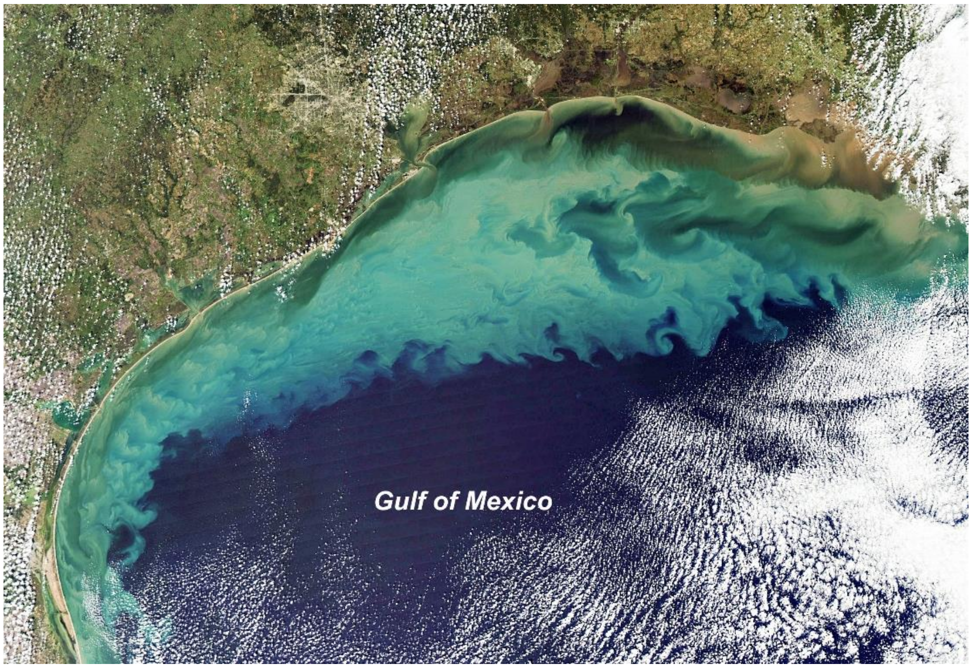

Figure 5. Satellite image of Gulf of Mexico dead zone, with visible algal blooms and agricultural run-off. Image credit: Jeff Schmaltz (NASA Earth Observatory)

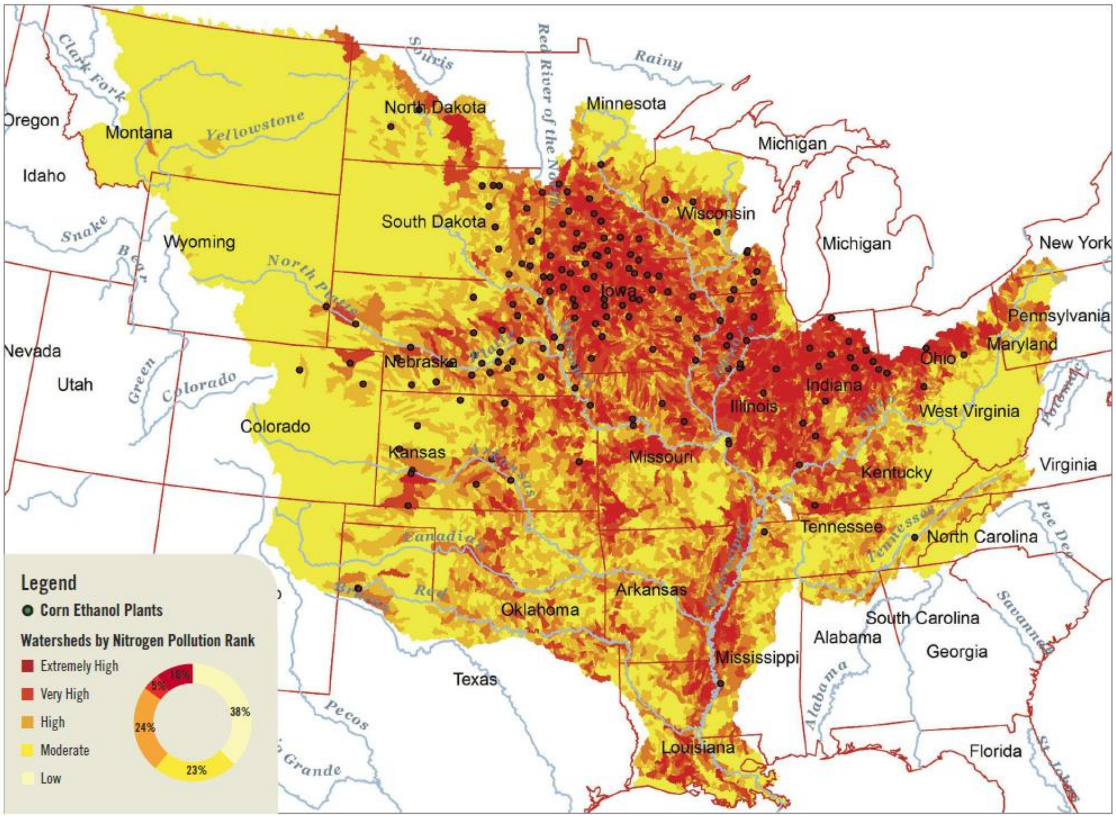

Figure 6. Corn ethanol refineries locations overlaid against watersheds in the Mississippi-Atchafalaya River Basin ranked by their relative contribution of agriculture-related nitrogen pollution to local waterways. Ethanol plants are likely sourcing corn feedstock from regions where agriculture-related nitrogen is a major contributor to water quality impairment. *See* Brooke Barton & Sarah Elizabeth Clark, *Water and Climate Risks Facing U.S. Corn Production*, Ceres 11 ex. ES6 (2014), http://www.indiaenvironmentportal.org.in/files/file/Water%20&%20Climate%20Risks%20Facing%20U.S.%20Corn%20Production.pdf.

ii. Increased Land Conversion Depletes Water Supplies.

In addition to impairing water quality, new cropland expansion will deplete freshwater resources by increasing demands for irrigation, and thus could lead to increased water scarcity in intensive agricultural areas. On average, each gallon of corn ethanol requires between 500 to 1,400 gallons of water for crop production alone.[94] On a per mile of travel basis, corn ethanol

[94] Data is based on irrigation rates in regions that require irrigation, at a weighted average of 566 gallons of water per gallon of ethanol. The water footprint depends on the irrigation rate where the corn is produced. For instance, water requirements range from: 367 gallons of water per gallon of ethanol for Iowa, to 742 gallons of water per gallon of ethanol in South Dakota, to 1,090 gallons of water per gallon of ethanol in Texas. Supplementary information from

requires nearly seven times as much surface water consumption than other transportation fuel sources.[95] Agriculture irrigation is the second largest consumer of freshwater in the U.S. after thermoelectric power, and corn comprises nearly a quarter of all irrigated acreage.[96] Though only 15% of total planted corn acreage is irrigated, annual water usage in Midwestern corn-dominated states ranges from 285,000 to 427,000 gallons of freshwater per acre of corn.[97] In fact, over 80% of irrigated corn is grown in regions predicted to experience high heat and water stress.[98] When this average irrigation rate is applied to 1.6 million acres of new potential feedstock crops, irrigation needs increase by ***85 billion gallons of water***.[99] This is equal to the

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Dominguez-Faus et al., *supra* note 68; *see also* Dominiguez-Faus et al., *Supporting Information for the Water Footprint of Biofuels: A Drink or Drive Issue?*, A- S6, https://pubs.acs.org/doi/suppl/10.1021/es802162x/suppl_file/es802162x_si_001.pdf.

[95] Corinne D. Scown, Arpad Horvath & Thomas E. McKone, *Water Footprint of U.S. Transportation Fuels*, Envtl. Sci. Tech. 2541, 3550 (2011), https://pubs.acs.org/doi/pdfplus/10.1021/es102633h.

[96] Molly A. Maupin et al., *Estimated Use of Water in the United States in 2010*, U.S. Dep't of the Interior, U.S. Geological Surv. Circular 1405 (2014), https://pubs.usgs.gov/circ/1405/pdf/circ1405.pdf. Value based on 2012 survey of irrigation acreage. *Background: Crops Produced with Irrigation*, USDA Econ. Res. Serv., https://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use/background.aspx (last visited on Jan. 11, 2017). One gallon of soy biodiesel, on the other hand, requires an average of 1,300 gallons of water from irrigation – however, only 8% of soy is irrigated, and the majority of soybean acreage expansion is non-irrigated. *See* Scott Irwin, Todd Hubbs & D. Good, *U.S. Soybean Yield Trends for Irrigated and Non-Irrigated Production*, farmdoc daily, Dep't Agric. Consumer Econ., U. Ill. (2017), https://farmdocdaily.illinois.edu/wp-content/uploads/2017/05/fdd030517.pdf.

[97] Calculated with 2003 values for Plains States: [2000 to 3000 gallons freshwater per bushel] x [142.2 bushels of corn per acre according to USDA ERS data] = 284,400 to 426,600 gallons per acre. *See* Scott Malcolm, Marcel Aillery & Marca Weinberg, *Ethanol and a Changing Agricultural Landscape* 33 USDA Econ. Res. Serv., ERR-86 2010, https://www.ers.usda.gov/webdocs/publications/46301/9205_err86.pdf?v=42262.

[98] Brooke Barton & Sarah Elizabeth Clark, *Water and Climate Risks Facing U.S. Corn Production*, Ceres 11 ex. ES6 (2014), http://www.indiaenvironmentportal.org.in/files/file/Water%20&%20Climate%20Risks%20Facing%20U.S.%20Corn%20Production.pdf.

[99] [356,000 gallons per acre] x [15% of 1.6 million acres] = 85 billion gallons. This calculation assumes 15% of corn acreage is irrigated, where in 2013 approximately 13.3 million acres out of 87.4 million total harvested acres of corn were irrigated. USDA, *Table 36. Specified Crops Harvested – Yield per Acre Irrigated and Nonirrigated*, US Census of Agriculture-Vol.1, Ch.1:

water supply sufficient to support the annual water consumption of 2.3 million Americans.[100] Yet the irrigated corn from converted grasslands would only produce 81 million gallons of ethanol, merely a 5% dent in the country's total ethanol production capacity.[101]

3. Land Conversion Has Caused Destruction and Degradation of Wildlife Habitat and Diversity, Including for Endangered and Threatened Species.

In addition to the deleterious impacts land conversion has on air and water, it also harms wildlife habitat. Some of the species most affected by conversion of grassland to crops include birds and waterfowl, monarch butterflies, and pollinator insects.[102] Expanding biofuel croplands destroys shelter and breeding sites, and it reduces food availability for grassland-dependent wildlife species.[103] Any remaining grassland habitat in an area of agricultural expansion may not be large enough to support the number of remaining faunal individuals.[104] For example, migratory duck reproductive success in the PPR wetlands relies on the dense grassland cover for

U.S. National Level Data (2012), https://www.nass.usda.gov/Publications/AgCensus/2012/Full_Report/Volume_1,_Chapter_1_US/st99_1_034_036.pdf. The 1.6 million acres of converted long-term grassland value is taken from Lark et al., *supra* note 8.

[100] *Water Questions & Answers: How much water does the average person use at home per day?*, U.S. Geological Surv., Water Sci. School, https://water.usgs.gov/edu/qa-home-percapita.html (last updated Dec. 2, 2016).

[101] Calculated based on conversion factors of 142.2 bushels per acre, and 2.8 gallons of ethanol produced per bushel. Total ethanol plant capacity is approximately 15.5 billion gallons per year. EIA, U.S. Energy Info. Admin., *US fuel ethanol production continues to grow in 2017* (July 21, 2017), https://www.eia.gov/todayinenergy/detail.php?id=32152

[102] David DeGennaro, *Fueling Destruction: The Unintended Consequences of the Renewable Fuel Standard on Land, Water and Wildlife*, Nat'l Wildlife Fed'n (2016), https://www.nwf.org/~/media/PDFs/Education-Advocacy/Fueling-Destruction_Final.ashx.

[103] Joseph E. Fargione et al., *Bioenergy and Wildlife: Threats and Opportunities for Grassland Conservation*, 59 BioScience 767, 770-772 (2009).

[104] James R. Herkert, *The Effects of Habitat Fragmentation on Midwestern Grassland Bird Communities*, 4 Ecological Applications 461, 464- 468 (1994), https://www.fws.gov/southwest/es/documents/R2ES/LitCited/LPC_2012/Herkert_1994.pdf.

nest protection.[105] Conversion of grassland[106] to cropland in North and South Dakota destroys that protection and could thus displace over 1.8 million individual birds of just five species studied.[107] Diminishing landscape complexity by converting land to agricultural use also threatens plant biodiversity, which in turn threatens animal diversity.[108] Land used for biofuel

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[105] Scott E. Stephens et al., *Duck Nest Survival in the Missouri Coteau of North Dakota: Landscape Effects at Multiple Spatial Scales*, 15 Ecological Applications 2137, 2137-2149 (2005).

[106] Much of the grassland converted in this area is land exiting the Conservation Reserve Program ("CRP"), a program through which, in exchange for a yearly rental payment, farmers enroll environmentally sensitive, marginal land in 10-15 year contracts under which they remove the land from agricultural production and instead allow for the growth of plants that improve soil health and water quality and create wildlife habitat. Some believe that EPA should not allow land exiting the CRP to qualify as land available for the production of renewable biomass because of the climate and environmental impacts associated with the conversion of this land. *See, e.g.*, Christopher M. Clark et al, *Growing a sustainable biofuels industry: economics, environmental considerations, and the role of the Conservation Reserve Program*, 8 Envtl. Res. Letters 025016 (2013), http://iopscience.iop.org/article/10.1088/1748-9326/8/2/025016/pdf (concluding that "the combination of the environmental assessment and the simulations suggests that large-scale conversion of CRP to row crops would likely incur a significant environmental cost, without a large benefit in terms of biofuel production. Therefore, the current environmental benefits provided by CRP lands should be fully weighed in any full-cost accounting of their potential use."). In its recent Triennial Report, EPA acknowledges the environmental harms attributable to converting land exiting the CRP, noting that its 2011 report found that, "[i]n general, biofuel feedstock production was found to negatively impact biodiversity through loss of habitat, often in sensitive areas, and especially if idled lands in the Conservation Reserve Program (CRP) (with established conservation covers) were to be returned to crop production," a nd that "a decrease in CRP lands could lead to decreases in biodiversity and terrestrial ecosystem health," which "affects habitat availability as well as species diversity and abundance." EPA Triennial Report 2018 at 84, 91.

[107] Studied species include the sedge wren, grasshopper sparrow, dickcissel, bobolink, and Western meadowlark. Neal D. Niemuth et al., *Benefits of the Conservation Reserve Program to Grassland Bird Populations in the Prairie Pothole Region of North Dakota and South Dakota*, USDA Farm Serv. Agency 37 (2007), https://www.fsa.usda.gov/Internet/FSA_File/grassland_birds_fws.pdf.

[108] Non-agricultural prairie ecosystems in the northern Great Plains are home to up to a hundred grass, shrub, and flowering plant species. Tim G. Benton, Juliet A. Vickery & Jeremy D. Wilson, *Farmland biodiversity: is habitat heterogeneity the key?*, 18 Trends in Ecology & Evolution 182, 182-188 (2003); Fargione et al., *supra* note 101; Igl, L.D. et al., *The influence of local- and landscape-level factors on wetland breeding birds in the Prairie Pothole Region of North and South Dakota*, 2017–1096 U.S. Geological Survey Open-File Report, 65,

row crops supports 60% fewer animal species compared to an equal area of grassland.[109] The continual shift from diverse vegetative cover to corn and soy monoculture under EISA could endanger up to 65% of bird species across areas in the PPR.[110]

Also problematic, newly converted agricultural fields create physical barriers to the movement and dispersal of wildlife animals, causing habitat fragmentation. For example, some Midwest butterfly species have been observed to avoid crossing from their native prairie habitat into crop fields.[111] Threatened populations are especially sensitive to the habitat fragmentation and degradation caused by land conversion.[112] Indeed, one-third of all grassland-breeding bird species have been identified as species of conservation concern.[113] By converting suitable breeding or foraging habitat to cropland that is inhospitable to wildlife, already small populations become increasingly isolated. Further, wildlife communities that do survive on remaining

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https://pubs.usgs.gov/of/2017/1096/ofr20171096.pdf; Roy Robison, Donald White & Mary H. Meyers, *Plants in Prairie Communities*, Minn. Extension Ser., Univ. Minn. (1995), https://conservancy.umn.edu/bitstream/handle/11299/93930/3238.pdf?sequence=1&isAllowed=y; Fred B. Samson, Fritz L. Knopf & Wayne Ostlie, *Great Plains ecosystems: past, present, and future*, 32 Wildlife Society Bulletin 6, 6-15 (2004), https://pdfs.semanticscholar.org/d79c/19addc8ff79af6f5da54dc8026f89ddc346b.pdf.

[109] Diversity response ratio of biofuel to reference site is 0.4, translating to a 60% loss. Robert J. Fletcher et al., *Biodiversity conservation in the era of biofuels: risks and opportunities*, 9 Frontiers Ecology & Env't 161, 163, https://vtechworks.lib.vt.edu/bitstream/handle/10919/24366/090091.pdf;sequence=1.

[110] At least 20% of the PPR will experience between 7 to 65% decrease in bird species richness. Timothy D. Meehan, Allen H. Hurlbert & Claudio Gratton, *Bird communities in future bioenergy landscapes of the Upper Midwest*, 107 Proc. Nat'l Acad. Sci. 18533, 18536 (2010), http://www.pnas.org/content/pnas/107/43/18533.full.pdf.

[111] Leslie Ries & Diane M. Debinski, *Butterfly responses to habitat edges in the highly fragmented prairies of Central Iowa*, 70 J. Animal Ecology 840, 840-852 (2001), https://eurekamag.com/pdf/003/003374023.pdf.

[112] Fletcher et al., *supra* note 107; Meehan et al., *supra* note 108.

[113] State of the Birds, *State of North America's Birds 2016: Main Results*, http://www.stateofthebirds.org/2016/overview/results-summary/ (last visited Oct. 15, 2018).

grassland habitat may experience the downstream harms of fertilizer run-off or sedimentation from neighboring agricultural activity.

Grassland conversion also has serious implications for federally endangered and threatened species. The U.S. Fish and Wildlife Service has explicitly cited habitat loss due to agricultural expansion as a key risk for several listed species.[114] For example, in Minnesota, North Dakota, and South Dakota, grassland within close proximity to the designated critical habitat[115] for the endangered Poweshiek skipperling butterfly (*Oarisma poweshiek*) has been converted to corn or soybean cropland,[116] leading to habitat fragmentation. Replacing tallgrass prairie habitat with crop fields isolates already dwindling populations, as the Poweshiek skipperling is unable to fly over wide distances to seek suitable habitat,[117] and thus cannot recolonize areas where populations were previously extirpated. Another example of an endangered species further threatened by habitat loss due to biofuel-driven land conversion is the iconic whooping crane (*Grus Americana*). Whooping cranes are large, long-lived birds that rely

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[114] U.S. Fish & Wildlife Serv., *Recovery plan for the black- footed ferret (*Mustela nigripes*)*, 24-25 (2013), https://ecos.fws.gov/docs/recovery_plan/20131108%20BFF%202nd%20Rev.%20Final%20Recovery%20Plan.pdf.

[115] The Endangered Species Act ("ESA") defines "critical habitat" under section 3(5)(A) as (i) as the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species. *See* 16 U.S.C. 1532(5)(A).

[116] Lark et al., *supra* note 8; *see also* Declaration of Dr. Tyler Lark, Addendum to [Corrected] Environmental Petitioners' [Initial] Opening Brief, *Sierra Club and Gulf Restoration Network v. EPA*, No. 17-1258 (D.C. Cir. Aug. 2, 2018), at Exhibit A, attached as Exhibit 2 ("Tyler Lark Declaration").

[117] Clint D. Pogue et al., *Habitat suitability modeling of the federally endangered Poweshiek skipperling in Michigan*, 7 J. Fish & Wildlife Mgmt. 359, 359-368 (2016), http://fwspubs.org/doi/pdf/10.3996/052015-JFWM-049.

on prairie and wetland habitat in the Great Plains region. However, significant conversion of land to corn or soy has occurred near the species' designated critical habitat in Kansas and on the Texas coast.[118] Trends of wetland drainage for agricultural expansion may further restrict the species' habitable range.[119]

Not only does conversion of grassland to cropland cause direct habitat destruction, but it also leads to nutrient pollution, eutrophication, and hypoxia, thereby impairing the habitats of endangered aquatic organisms. As of 2007, there were 139 fish, 70 mussels, 23 amphibians and 4 crayfish species listed as endangered or threatened in the U.S. At least 60 – a quarter – of these species were predicted to be imperiled by eutrophication.[120] Today, those numbers have risen to 165 fish, 91 mussels, 36 amphibians and 6 crayfish.[121] The Topeka Shiner (*Notropis topeka*), an endangered minnow that inhabits prairie streams and ponds in the Corn Belt states, provides an example of a locally impacted aquatic species.[122] Significant areas of land in Minnesota and Iowa have been converted to corn and soy cropland near its designated critical habitat,[123] and this expanding agriculture induces hydrological changes such as increased sedimentation, nitrogen loading and reduced stream flow, threatening the recovery of Topeka Shiner populations.[124] Fertilizer and pesticide run-off may lead to further declines of threatened filter-feeding shellfish

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[118] Lark et al., *supra* note 8; *see also* Tyler Lark Declaration, *supra* note 114.
[119] Lark et al., *supra* note 8; Wright & Wimberly, *supra* note 8.
[120] Walter K. Dodds et al., *Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages*, 43 Envtl. Sci. & Tech. 12, 12-19 (2009), https://pubs.acs.org/doi/pdfplus/10.1021/es801217q.
[121] U.S. Fish & Wildlife Serv. ("USFWS") 2018 Environmental Conservation Online System, https://ecos.fws.gov/ecp0/reports/box-score-report.
[122] USFWS, *Topeka Shiner (Notropis topeka) 5-year Review: Summary and Evaluation*, USFWS, Kansas Ecological Servs. Field Office (2009), https://www.fws.gov/mountain-prairie/es/species/fish/shiner/TopekaShiner5YearReview01222010Final.pdf
[123] Lark et al., *supra* note 8; *see also* Tyler Lark Declaration, *supra* note 114.
[124] *See supra* note 120.

species, either by direct toxicity or by promoting overgrowth of harmful algae.[125] For example, the Gulf of Mexico "dead zone" stems in part from biofuel-driven land conversion, which leads to increased nitrogen fertilizer runoff.[126] The effects of hypoxia in the Gulf, including low dissolved oxygen levels and harmful algae growth,[127] may harm critically endangered marine fauna like the Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) and the loggerhead sea turtle (*Caretta caretta*).

4. Land Conversion Leads to a Loss of Agricultural Bioservices and Harms the Agricultural Economy.

Expansion of land conversion for corn ethanol and soy biodiesel production also compromises ecological services that benefit the agricultural economy. For example, intense grassland conversion rates in the PPR of the Dakotas have undermined habitat availability for commercial honey bees.[128] Globally, over a third of all agricultural produce relies on managed bee pollination, and U.S. commercial insect pollination services were valued at $27 billion in 2009.[129] Corn cropland expansion, however, increases lethal pesticide exposure for pollinators

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125 S.B. Bricker et al., *Effects of nutrient enrichment in the nation's estuaries: a decade of change*, 8 Harmful Algae 21, 21-32 (2008), http://www.chesapeake.org/stac/downloads/habitat%20STAC/Bricker%20et%20al%20NEEA%20Key%20Findings%20&%20Summary.pdf.

126 *See supra* Section I.B.2.i.

127 Robert J. Diaz & Rutger Rosenberg, *Spreading Dead Zones and Consequences for Marine Ecosystems*, 321 Sci. 926, 926-929 (2008), https://pdfs.semanticscholar.org/fd24/459b08b635d12db8e1894228f728e5fda89e.pdf?_ga=2.124080458.1116472517.1539987208-2076078948.1537993308.

128 Clint R.V. Otto et al., *Land-use change reduces habitat suitability for supporting managed honey bee colonies in the Northern Great Plains*, 113 Proc. Nat'l Acad. Sci. 10430, 10430-10435 (2016), http://www.pnas.org/content/pnas/113/37/10430.full.pdf.

129 Alexandra-Maria Klein et al., *Importance of pollinators in changing landscapes for world crops*, 274 Proc. Royal Soc'y B 303 (2007). The $27 billion value is calculated as the sum of the value of directly dependent crops ($15.12 billion) and indirectly dependent crops ($11.80 billion). Nicholas W. Calderone, *Insect Pollinated Crops, Insect Pollinators and US Agriculture: Trend Analysis of Aggregate Data for the Period 1992-2009*, 7 PLoS ONE 1, 13 (2012), https://pdfs.semanticscholar.org/23dd/37b1d0a8a654e48b963e1c15e51bba503c27.pdf?_ga=2.89619035.1116472517.1539987208-2076078948.1537993308.

and replaces native vegetation food sources, driving beekeepers out from former apiary sites.[130] Similarly, insect pest control services, worth over $4.5 billion for U.S. agriculture, decreased significantly with biofuel-driven land-use change in the Corn Belt.[131] For instance, new corn ethanol feedstock fields expel natural predators that suppress invasive soybean aphids, costing soybean farmers an estimated $60 million per year in reduced yield and additional pesticide application.[132] Combined biological services for other crops and pests will further increase these economic costs – not to mention an increase in the harms associated with pesticide use.

5. Expanding Land Conversion Harms Marginal and Sensitive Land.

Over the past decade, massive areas of marginal and sensitive land have been cleared for corn and soy cultivation. As biofuel demand continues to drive economic incentives to convert uncultivated land to cropland for corn and soy production, experts predict that farmers may choose to cultivate more "high-risk" lands.[133] Marginal lands are generally characterized by low productivity and serious limitations for agricultural use.[134] For example, the USDA National

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[130] Otto et al., *supra* note 126.

[131] Insects are responsible for 33% of natural pest suppression; other controls include natural pathogens or climatic conditions. John E. Losey & Mace Vaughan, *The Economic Value of Ecological Services Provided by Insects*, 56 BioScience 311, 319 (2006); Douglas A. Landis et al., *Increasing corn for biofuel production reduces biocontrol services in agricultural landscapes*, 105 Proc. Nat'l Acad. Sci. 20552 (2008), http://www.pnas.org/content/pnas/105/51/20552.full.pdf.

[132] $58 million refers to the value of biocontrol lost for integrated pest management sites, under projected corn expansion in Iowa, Michigan, Minnesota, and Wisconsin. Farms using biocontrol alone may lose up to $671 million. *Id.* at 20555.

[133] Roger Claassen et al., *Grassland to Cropland Conversion in the Northern Plains: The Role of Crop Insurance, Commodity, and Disaster Programs*, USDA Econ. Res. Serv. (June 2011), https://www.ers.usda.gov/webdocs/publications/44876/7105_err120_reportsummary.pdf?v=41056; Tong Wang et al., *Determinants of Motives for Land Use Decisions at the Margins of the Corn Belt*, 134 Ecological Econ. 227, 227-237 (2017), https://pdfs.semanticscholar.org/0005/af6b4a958293e85178b758016ca4da36afbc.pdf.

[134] *See* Shujiang Kang et al., *Marginal lands: concept, assessment and management*, 5 J. Agric. Sci. 129, 129-139 (2013), for detailed discussion on the concept and definitions of "marginal land." http://www.ccsenet.org/journal/index.php/jas/article/download/24515/16222.

Resources Conservation Service classifies "prime" versus "marginal" land based on its capability to produce cultivated crops without deteriorating over the long term.[135] These criteria derive from soil characteristics: soils on marginal lands are "economically prohibitive" due to the steepness of slope, depth to bedrock, and other risks of damage if they are used for crops.[136] ***Half of all new cropland between 2008 and 2012 expanded onto land with these "severe cultivation limitations***."[137] Studies show evidence of recent westward agricultural expansion in the Corn Belt, where new corn crops are exposed to inhospitable conditions with high risk of drought.[138] Within the same timeframe, over 136,000 acres of wetlands habitat were drained for expansion of potential feedstock croplands in the Western Corn Belt.[139] Forty-two percent of these losses were concentrated in PPR wetlands, which are highly productive ecosystems that both sequester carbon and serve as critical migratory wildlife refuges.[140] Beyond the Corn Belt,

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[135] USDA's "land capability classes" ("LCC") range from "slight limitations that restrict [the lands'] use" to "very severe limitations that make [the lands] unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat." *National soil survey handbook*, U.S. Dep't of Agric., Nat. Res. Conservation Serv. 6222- A.2, https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=41985.wba.

[136] USDA, Nat. Res. Conservation Serv., *Land Use/Land Cover*, https://www.nrcs.usda.gov/wps/portal/nrcs/ar/technical/landuse/.

[137] Lark et al., *supra* note 8, at 7.

[138] Wright & Wimberly, *supra* note 8, at 4136.

[139] The figure includes acreage from Iowa, Minnesota, Nebraska, North Dakota, and South Dakota. *See* Lark et al., *supra* note 8.

[140] EPA defines the Prairie Pothole Region as depressional wetlands found primarily in North Dakota, South Dakota, Wisconsin, and Minnesota. *Prairie Potholes*, EPA, https://www.epa.gov/wetlands/prairie-potholes (last updated July 26, 2018). Forty-two percent is calculated as the proportion of wetland acres converted in Minnesota, North Dakota and South Dakota (56,684 acres) to total converted wetlands acreage in the Western Corn Belt states (136,453 acres). *See* Lark et al., *supra* note 8; *see also* Carol A. Johnston, *Wetland Losses Due to Row Crop Expansion in the Dakota Prairie Pothole Region*, 33 Wetlands 175, 175-182 (2013), https://smarterfuelfuture.org/assets/content/Johnston_Wetlands_20131.pdf; William J. Mitsch & James G. Gosselink, *The Value of Wetlands: Importance of Scale and Landscape Setting*, 35 Ecological Econ. 25, 25-33 (2000), http://cescos.fau.edu/gawliklab/papers/MitschWJandJGGosselink2000.pdf.

new marginal cropland areas surrounding the Appalachians, Ozarks, and the rapidly-depleting Ogallala aquifer nearly doubled in four years.[141] The trend of converting this marginal and sensitive land to crop land signals a step backward for environmental conservation, and it frustrates the environmental safeguards built into EISA.

One particularly harmful impact of tilling marginal lands is the risk of increased soil erosion.[142] The U.S. Midwest has already suffered a land degradation catastrophe – the 1930's Dust Bowl.[143] History may repeat itself if EPA does not actively monitor land-use changes under the RFS. Not surprisingly, soil loss rates increase dramatically when more erodible land is forced into production. Expansion of continuous corn systems will pose more severe sedimentation and erosion risks than other biofuel crops due to the greater fertilizer and tillage requirements.[144] Case studies in Iowa, for instance, show that nearly 60% of observed crop-rotation changes between 2007 and 2012 were driven by continuous corn plantings, and 40% of the changes shifted to continuous soybean production.[145]

6. Expanding Land Conversion Increases Soil Deterioration.

Physical conversion of native landscapes not only generates soil organic carbon emissions, but also causes soil conditions to deteriorate. Grasslands serve a valuable ecosystem

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[141] Lark et al., *supra* note 8, at 4.
[142] Silvia Secchi et al., *Corn-based ethanol production and environmental quality: a case of Iowa and the Conservation Reserve Program*, 44 Envtl. Mgmt. 732, 733 (2009).
[143] Benjamin I. Cook, Ron L. Miller & Richard Seager, *Amplification of the North American "Dust Bowl" drought through human-induced land degradation*, 106 Proc. Nat'l Acad. Sci. 4997, 4997-5001 (2009), http://www.pnas.org/content/pnas/106/13/4997.full.pdf.
[144] *Id.*
[145] Jie Ren, James B. Campbell & Yang Shao, *Spatial and temporal dimensions of agricultural land use changes, 2001-2012, East-Central Iowa*, Agric. Sys. 148, 149-158 (2016), https://vtechworks.lib.vt.edu/bitstream/handle/10919/81559/Ren_J_D_2016.pdf?sequence=1&isAllowed=y#page=13.

function of maintaining soil structure and integrity.[146] Long-term plant biomass physically anchors and shields the soil from wind and water stress while retaining soil nutrients such as nitrogen and phosphorus.[147] Plowing grassland reduces soil organic matter by up to 17% in the first year of cultivation, stunting soil fertility.[148] Even conversion from perennial grassland to no-tillage systems destroys 57% of original root biomass.[149] Biofuel-related agricultural development on grasslands negates these natural benefits and undoubtedly exacerbates soil degradation from erosion.

Compounding these harms, increased erosion leads to higher rates of nutrient loss. The soil that is lost as a result of the land conversion contains up to three times more nutrients than what is left in the remaining soil.[150] An acre of land converted from grassland to corn or soy monoculture can lose up to ***27 pounds*** of soil nitrogen annually.[151] And decades of scientific literature has also linked erosion to lower plant/crop productivity, waterway and dam damage

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[146] William R. Gascoigne et al., *Valuing ecosystem and economic services across land-use scenarios in the Prairie Pothole Region of the Dakotas, USA*, 70 Ecological Econ. 1715, 1715-1725 (2011), https://esanalysis.colmex.mx/Sorted%20Papers/2011/2011%20USA%20-CS%20USA%20ND%20SD,%20BiodivCO2%20Econ.pdf.

[147] David Pimentel & Michael Burgess, *Soil Erosion Threatens Food Production*, 3 Agric. 443, 443-463 (2013), https://www.bmbf.de/files/agriculture-03-00443.pdf.

[148] H. Tiessen, J.W.B. Stewart & J.R. Bettany, *Cultivation Effects on the Amounts and Concentrations of Carbon, Nitrogen, and Phosphorus in Grassland Soils*, 74 Agronomy J. 831 (1982).

[149] S. Tianna DuPont et al., *No-tillage conversion of harvested perennial grassland to annual cropland reduces root biomass, decreases active carbon stocks, and impacts soil biota*, 137 Agric., Ecosystems & Env't 25, 25-32 (2010).

[150] David Pimentel & Nadia Kounang, *Ecology of Soil Erosion in Ecosystems*, 1 Ecosystems 416, 416-426 (1998), http://www.doc-developpement-durable.org/file/eau/lutte-contre-erosion_protection-sols/Ecology%20of%20Soil%20Erosion.pdf.

[151] According to USDA ERS data, the average price of corn from 2007 to 2012 is $196.70 per ton; this study models effects of crop expansion at $196.84 per ton of corn in Iowa. Secchi et al., *supra* note 140, at 741.

from sediment clogging, and a higher risk of flooding.[152] In North and South Dakota, for instance, converting one million acres of native prairie to cropland will cost $6.4 million annually in soil loss related damages.[153]

II. CONGRESS ENACTED EISA TO CURB CLIMATE CHANGE AND ADVANCE OTHER ENVIRONMENTAL GOALS.

A. EISA's Primary Objective Is to Reduce Greenhouse Gas Emissions.

In 2007, in an effort to increase the production of renewable fuels and thereby reduce greenhouse gas emissions, as well as to move the United States toward greater energy independence, Congress passed the Energy Independence and Security Act ("EISA"). EISA adopted and amended measures Congress put in place under the 2005 Energy Policy Act.

Under the Energy Policy Act, gasoline sold in the United States had to contain a certain percentage of renewable fuel, defined as fuel produced from biomass, or natural gas produced from a biogas source, that is "used to replace or reduce the quantity of fossil fuel present in a mixture used to operate a motor vehicle."[154] It includes "cellulosic biomass ethanol and 'waste derived ethanol'; and biodiesel . . . and any blending components derived from renewable fuel (provided that only the renewable fuel portion of any such blending component shall be considered part of the applicable volume under the renewable fuel program)."[155] Under the Energy Policy Act, Congress established "applicable volume[s] of renewable fuel" through

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[152] Pimentel & Burgess, *supra* note 133; R. Lal, *Soil Erosion Impact on Agronomic Productivity and Environment Quality*, 17 Critical Rev. Plant Sci. 319, 319-348 (1998); Luise Kohl et al., *Agricultural practices indirectly influence plant productivity and ecosystem services through effects on soil biota*, 24 Ecological Applications 1842 (2014), https://dspace.library.uu.nl/bitstream/handle/1874/308320/1.pdf?sequence=1.

[153] Gascoigne et al., *supra* note 144 at 1722.

[154] Energy Policy Act, 119 Stat. 1068, § 1501(a).

[155] *Id.*

2012.[156] For 2013 and beyond, the EPA Administrator, in coordination with the Secretaries of USDA and Energy Department, had to set applicable renewable fuel volumes based on a review of "the impact of the use of renewable fuels on the environment, air quality, energy security, job creation, and rural economic development," as well as "the expected annual rate of future production of renewable fuels, including cellulosic ethanol."[157]

To ameliorate the growing harms stemming from global climate change, EISA builds upon the renewable fuel foundation established by the Energy Policy Act. Toward that end, Congress included within EISA a new Renewable Fuel Standard ("RFS"), which, among other things, increases the volume and greenhouse gas performance of biofuel required to be used to qualify as renewable fuel and imposes restrictions on how land may be used to satisfy the standard.[158]

In adopting EISA, Congress tasked EPA with promulgating regulations to ensure "that transportation fuel sold on or introduced into commerce in the United States… on an annual average basis, contains at least the applicable volume" of one of four distinct biofuel categories.[159] EISA divides biofuels into four separate categories based in large part on each fuel's ability to achieve a certain percentage of greenhouse gas emissions reduction relative to traditional fuel: renewable fuel, advanced biofuel, cellulosic fuel, and biomass-based diesel.[160]

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156 *Id*.
157 *Id*.
158 EISA Pub. L. No. 110-140, § 202(a)(1), 121 Stat. 1529 (2007); *see also* 42 U.S.C. §§7545(o)(1)(A), 7545(o)(1)(I)(i).
159 EISA § 202(a)(2); *see also* 42 U.S.C. §7545(o)(2)(B).
160 EISA § 202(a)(2). The categories are "nested" because the definition of "advanced biofuel" includes both "cellulosic biofuel" (which has a higher percentage of reduction in greenhouse gas emissions than the base definition of "advanced biofuel") and "biomass-based diesel" (which has the same or greater percentage reduction than "advanced biofuel"), *id*. § 7545(o)(1)(B), meaning that fuel can include a higher volume of either cellulosic biofuel or biomass-based diesel in order

Specifically, EISA's RFS mandates that such fuel contain a minimum volume of "additional renewable fuel" as a percentage of the total fuel volume sold by each fuel producer.[161] It defines "additional renewable fuel" as "fuel that is produced from ***renewable biomass*** and that is used to replace or reduce the quantity of fossil fuel present in a transportation fuel."[162]

Under the statute, "renewable biomass" includes crop-based biomass,[163] which is defined as "[p]lanted crops and crop residue harvested from agricultural land ***cleared or cultivated at any time prior to the enactment of this sentence that is either actively managed or fallow, and nonforested***."[164] Thus, for crops to count towards the renewable fuels volume mandate, the land on which they are grown must meet three criteria: it must have been (1) cleared or cultivated at any time prior to 2007, (2) actively managed or fallow in 2007, and (3) nonforested in 2007. These requirements prevent land that was not cultivated before 2007 or in cultivation as of the date of EISA's passage from being used to increase biofuel production, thereby reducing the release into the atmosphere of significant amounts of greenhouse gas emissions from the initial turning of the soil for cultivation as cropland, while avoiding the negative environmental impacts associated with this land conversion.

In addition to the land conversion limitations, EISA also drastically increases the biofuel requirements from levels set by prior legislation. Under the Energy Policy Act, the amount of renewable fuel in gasoline was required to increase in volume annually, from 4 billion gallons in

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to meet the required volume of advanced biofuel, thus theoretically increasing the overall reduction in greenhouse gas emissions relative to traditional fuel.

[161] EISA §202(a)(1). This RFS replaced a prior RFS framework set forth in the Energy Policy Act of 2005. *See* 42 U.S.C. §13201 et seq. (2005).

[162] EISA §201(1)(A) (emphasis added).

[163] In addition to crop-based biomass, the definition also includes biomass from trees, animal waste, slash, algae, and yard waste. EISA §201(1)(I).

[164] EISA §201(1)(I)(i) (emphasis added).

2006 to 7.5 billion gallons in 2012.[165] EISA increases the annual volume mandate for renewable fuels and extends the timeline for implementation, requiring that the renewable fuel volume increase from 9 billion gallons in 2008 to 36 billion gallons by 2022.[166] It further requires that the renewable fuels comprising the EISA volume mandate achieve a minimum level reduction in greenhouse gas emissions as compared to traditional fuels.[167] By increasing the required volume of renewable fuel, EISA aims to further reduce greenhouse gas emissions.

The climate change goals and intended impact of EISA played a pivotal role during the legislative process. During floor debates, Representative Barbara Lee of California remarked that EISA "eliminates greenhouse gases equivalent to 28 million cars from our roads[,] . . . includes a renewable fuels standard that contains safeguards to reduce carbon emissions and protect our environment[, and] . . . takes the right steps forward to . . . fight global warming."[168] Representative Jim Moran of Virginia touted the bill as "a substantial commitment toward lower greenhouse gas emissions," and projected that the policies implemented under EISA – including but not limited to the RFS – would, by 2030, "achieve[ ] about 40 percent of the greenhouse gas emissions reductions most scientists have concluded are needed to avoid catastrophic global climate change."[169] Representative Rush Holt of New Jersey, who at that time was a member of the Committee on Natural Resources, said that the bill would "take the long-overdue first steps toward addressing global climate change," and that it would "drastically reduce our greenhouse

[165] 42 U.S.C. §7545(o)(2)(B)(i) (2006), *amended by* 42 U.S.C. §7545(o)(2)(B)(i) (2007).
[166] EISA § 202(a)(2).
[167] *Id.* § 202(a)(1).
[168] 153 Cong. Rec. H14451-02, 2007 WL 4270020.
[169] 153 Cong. Rec. H14434-02, H14442, 2007 WL 4269999.

gas emissions."[170] And Representative Betty McCollum of Minnesota stated that the bill would "address the impending climate crisis."[171]

Signing the bill into law, President George W. Bush called the legislation "a major step" toward "confronting global climate change."[172] Estimating that "these initiatives could reduce projected CO_2 emissions by billions of metric tons," the President concluded that "[t]he legislation I'm signing today will lead to some of the largest CO_2 emission cuts in our nation's history."[173]

Thus, as evidenced by the text of EISA and its legislative history, the climate change objectives of the statute are part of the foundation upon which EISA was built. And these climate objectives are even more pressing today than at the time of EISA's passage. Since EISA was enacted in 2007, average global CO_2 concentration has risen from 383 parts per million ("ppm") to 408 ppm,[174] and average global temperature has risen by 0.26°C (0.47°F).[175] In 2016, there were 15 climate change-related extreme weather events in the United States that each had over $1 billion in losses, and in total resulted in $46 billion in direct costs.[176] It is crucial that EPA ensures that the RFS program does not further exacerbate the climate crisis.

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170 153 Cong. Rec. H14453-02 (Dec. 6, 2007).
171 153 Cong. Rec. E2661.
172 *President Bush Statement at Signing, President Bush Signs H.R. 6, The Energy Independence and Security Act of 2007*, 2007 WL 4429070, at *1-2.
173 *Id*.
174 Reported carbon dioxide concentrations measured in January of 2007 and 2018 at the Mauna Loa Observatory, Hawaii. *See* NASA, *Carbon Dioxide*, https://climate.nasa.gov/vital-signs/carbon-dioxide/.
175 Average global temperature change is calculated from the difference of anomalies (relative to 1951-1980 average temperatures) from 2007 to 2017. *See* NASA, *Global Temperature*, https://climate.nasa.gov/vital-signs/global-temperature/.
176 Adam Smith, *2016: A historic year for billion-dollar weather and climate disasters*, NOAA 2017, https://www.climate.gov/news-features/blogs/beyond-data/2016-historic-year-billion-dollar-weather-and-climate-disasters-us.

B. EISA Has Several Additional Environmental Objectives.

In addition to its focus on reducing greenhouse gas emissions, EISA also aims to address a number of other key environmental issues. Toward that end, the statute contains a requirement that every three years, EPA prepares and produces a report that examines the past and future impacts of the RFS program:[177]

> [T]he Administrator of the Environmental Protection Agency, in consultation with the Secretary of Agriculture and the Secretary of Energy, shall assess and report to Congress on the impacts to date and likely future impacts of the requirements of section 211(o) of the Clean Air Act on the following:
>
> (1) Environmental issues, including air quality, effects on hypoxia, pesticides, sediment, nutrient and pathogen levels in waters, acreage and function of waters, and soil environmental quality.
> (2) Resource conservation issues, including soil conservation, water availability, and ecosystem health and biodiversity, including impacts on forests, grasslands, and wetlands.
> (3) The growth and use of cultivated invasive or noxious plants and their impacts on the environment and agriculture.[178]

Similarly, EPA must consult with the Secretary of Agriculture and the Secretary of Energy to set future volumes of renewable fuels, taking into consideration the impact of renewable fuel use on, among other things, "the environment, including on air quality, climate change, conversion of wetlands, ecosystems, wildlife habitat, water quality, and water supply."[179] EISA amends Section 977 of the Energy Policy Act of 2005, 42 U.S.C. § 16317, to include the following language: "develop cellulosic and other feedstocks that are ***less resource and land intensive and that promote sustainable use of resources, including soil, water, energy, forests, and land, and***

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[177] EISA § 204(a).
[178] *Id*.
[179] *Id*. at §202(a)(2)(B).

ensure protection of air, water, and soil quality."[180] And it amends Section 307(d) of the Biomass Research and Development Act of 2000, 7 U.S.C. § 8606(d), to add language focused on "the systematic evaluation of the impact of expanded biofuel production on the environment, including forest lands, and on the food supply for humans and animals."[181] These provisions demonstrate a commitment to environmental protections and resource conservation objectives that go beyond EISA's climate goals.

EISA's legislative history further reflects the statutory focus on environmental protection. During the floor debate, several members of Congress noted that they understood that EISA provided crucial environmental protections beyond the reduction in greenhouse gas emissions. Representative John Dingell of Michigan, who at the time was a senior member of the Committee on Energy and Commerce, stated in extended remarks to the House that the section of EISA defining renewable biomass "adds some important environmental safeguards to the RFS program, including ones that will help protect certain wildlife habitats and special eco-systems."[182] Representatives Steve Kagen of Wisconsin, Betty Sutton of Ohio, and Tom Udall of New Mexico each separately noted the critical environmental protections provided by EISA.[183] In signing EISA into law, President Bush stated that the "measures" in EISA would "help us improve our environment."[184]

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[180] *Id*. at §232(a)(2)(D) (emphasis added).
[181] *Id*. at §232(b)(3).
[182] 153 Cong. Rec. E2665-01, 2007 WL 4556844, at *E2666 (Dec. 18, 2007).
[183] 153 Cong. Rec. H14255-04, 2007 WL 4269986 (Dec. 6, 2007) (Kagen: EISA will "protect our environment"); 153 Cong. Rec. H14258 (Dec. 6, 2007) (Sutton: EISA will "implement necessary environmental protections"); 153 Cong. Rec. H14262 (Dec. 6, 2007) (Udall: EISA is "good for the environment").
[184] *President Bush Statement at Signing, President Bush Signs H.R. 6, The Energy Independence and Security Act of 2007*, 2007 WL 4429070, at *2.

Thus, as the text and legislative history make clear, EISA offers a number of critical environmental safeguards. Not only does it aim to significantly reduce greenhouse gas emissions, but it also provides important environmental protections that extend far beyond climate change.

C. EPA Established a Regulatory Framework for Enacting EISA's Requirements.

To effectuate the purposes of EISA, in March, 2010, EPA issued a Final Rule for the new RFS under EISA.[185] The EISA rule reflected the higher renewable fuel volumes set in the new statute. It also largely incorporated the regulatory approach to renewable fuel tracking that EPA had previously established under the Energy Policy Act of 2005.[186] Under this regulatory framework, EPA must convert the mandated renewable fuel volumes into a percentage standard based on the estimated total amount of gasoline produced in or imported into the United States each year. Entities that "produce[] or import[] gasoline for consumption in the United States, including refiners, importers, and blenders" ("obligated parties") then determine their Renewable Volume Obligation ("RVO") – the volume of renewable fuel that party must use in the U.S. that year – by multiplying the percentage standard by the annual volume of gasoline the party individually produces or imports.[187] Renewable Identification Numbers ("RINs") are distributed for each gallon and each batch of renewable fuel used by a party.[188] To demonstrate compliance with its RVO at the end of each year, an obligated party must show that it has obtained a sufficient number of RINs to meet its RVO.[189]

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[185] 75 Fed. Reg. at 14,670 (March 26, 2010).
[186] 42 U.S.C. §13201 et seq. (2005).
[187] Regulation of Fuels and Additives: Renewable Fuel Standard, 72 Fed. Reg. 23,900, 23,908 (May 1, 2007); *Id.* at 23,908.
[188] *Id.*
[189] *Id.*

Though the final rule left the RFS regulatory approach largely intact,[190] it implemented one important change. It introduced a new approach – aggregate compliance – for determining whether land was in cultivation prior to 2007 and thus for discerning whether the crops grown on the land can count toward the renewable fuel volume mandates.[191] In adopting this new approach, EPA disregarded its initial proposal that, in order to receive a RIN, each obligated party must prove that the land used to produce feedstock for its renewable fuel was in cultivation – actively managed or fallow – at the time of EISA's passage in 2007.[192]

Specifically, EPA initially proposed "restrict[ing] planted crops and crop residue" used for renewable biomass "to that harvested from existing agricultural land," and proposed to define "agricultural land" as "land that was cleared or cultivated prior to December 19, 2007, and that, since December 19, 2007, it has been continuously actively managed (as agricultural land) or fallow, and nonforested."[193] It detailed ***seven distinct methods to independently verify or certify compliance with EISA's land use restrictions to ensure that newly converted land was not used to produce renewable biomass***, for example, requiring producers to provide documentation of the origin of the feedstock.[194] Numerous commenters supported this approach, noting that

[190] 75 Fed. Reg. at 14,721.
[191] *Id*. at 14,701.
[192] Regulation of Fuels and Fuel Additives: Changes to renewable Fuel Standard Program, 74 Fed. Reg. 24,904, 24,911 (proposed May 26, 2009) (to be codified at 40 C.F.R. pt. 80) ("[P]lanted crops and crop residue must be harvested from agricultural land cleared or cultivated at any time prior to December 19, 2007, that is actively managed or fallow and non-forested. Therefore, planted crops and crop residue derived from land that does not meet this definition cannot be used to produce renewable fuel for credit under" the RFS.).
[193] *Id*. at 24,931. By defining agricultural land in this way, EPA proposed to set the upper bound on acreage that qualifies for planted crop and crop residue production under" the RFS as "existing agricultural land – cropland, pastureland, or CRP land – as of December 19, 2007." *Id*. at 24,932.
[194] *Id*. at 24,938.

individual compliance and recordkeeping were both necessary for program integrity and not unduly burdensome. These commenters emphasized the importance of avoiding the disruption of natural ecosystems and wildlife habitats due to land-use conversion.[195]

EPA's Final Rule differed fundamentally from its proposal. It disregarded its own suggested approaches and those of the commenters, and instead adopted the aggregate compliance approach, which is the focus of this Petition.

D. EPA Devised an Aggregate Compliance Approach to Measure Land Conversion.

Under EPA's new aggregate compliance scheme, EPA starts with a baseline determination of the total amount of "existing agricultural land" in the U.S. at the time of EISA's enactment, which it calculated to be 402 million acres.[196] EPA then monitors agricultural acreage and compares it to this 402 million acre figure.[197] If the number does not exceed this level, EPA will assume – without any kind of verification – that feedstocks derived from planted crops and crop residue were grown on agricultural land cultivated prior to EISA's enactment.[198] If the total agricultural land in use ever approaches or exceeds the 402 million acre baseline, EPA will consider requiring each grower to prove that its land was in cultivation prior to 2007.[199]

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[195] *See, e.g.*, Comments of the Environmental Working Group, EPA-HQ-OAR-2005-0161-2508 (September 25, 2009), at 2 ("EWG is very concerned about the potential for slippage under the land conversion prohibitions. . . . Some coordination between USDA base acreage accounting and EPA biofuel feedstock accounting needs to be developed to avoid this problem."); *see also* Comments from the Environmental Community, submitted by Friends of the Earth, EPA-HQ-OAR-2005-0161-2129 (September 25, 2009), at 2-3 ("The way in which 'Renewable Biomass' is defined could have an enormous impact on natural ecosystems and wildlife habitat globally," and thus "to prevent expansion of crop land in to grassland and the conversion of naturalized ecosystems," "land use and cropping history data will be needed to verify land eligibility," and noting that USDA can provide this data).

[196] 75 Fed. Reg. at 14,701.

[197] Aggregate compliance only applies to domestic crop producers. It does not apply to imported fuels or to fuels made from other things such as woody biomass. *Id.*

[198] *Id.* at 14,703.

[199] *Id.*

The aggregate compliance approach essentially removes individual accountability from the equation. And it likewise largely removes EPA oversight from the process, relieving EPA of any responsibility to ensure that new land is not improperly converted in contravention of EISA's mandates.[200]

However, in its effort to cut corners for itself and for producers, EPA created a regulatory scheme that undermines what EISA set out to accomplish. While the total aggregate amount of cropland may have remained at or below 2007 levels, this has not prevented the conversion of land that was not in cultivation in December 2007. Indeed, during this time, millions of acres of agricultural land were taken out of production for urban or suburban development, thereby allowing for the cultivation of an equal amount of native grassland or wetlands without going over the regulatory cap. The result has been ***an astounding increase in the amount of uncultivated land in 2007 that has been converted to cropland***. This, in turn, has caused severe environmental damage, including increased greenhouse gas emissions, water pollution, destruction of wildlife habitat, loss of agricultural bioservices, and soil and land erosion. The aggregate compliance approach is thus antithetical to the purposes of EISA.

[200] As part of the new aggregate compliance approach to calculating land use conversion, the new RFS rule also introduced several new terms and definitions relevant to determining compliance with EISA's land use restriction. For example, the rule defines "fallow" land as "agricultural land that is intentionally left idle to regenerate for future agricultural purposes, with no seeding or planting, harvesting, mowing, or treatment during the fallow period." *Id.* at 14,865. It defines "nonforested" land as all land that is not "forestland," and defines "forestland" as "generally undeveloped land covering a minimum area of one acre upon which the predominant vegetative cover is trees, including land that formerly had such tree cover and that will be regenerated." *Id*. And it explains that "the term 'actively managed' is best interpreted by reference to the type of material and practices that this provision addresses – namely crops and residue associated with growing crops." *Id.* at 14,692.

III. AGGREGATE COMPLIANCE IS CONTRARY TO THE TEXT AND ANTITHETICAL TO THE PURPOSES OF EISA.

Congress enacted EISA with a clear environmental vision in mind. Both the text of the statute and the legislative history leave no doubt that EISA intended to reduce greenhouse gas emissions by increasing the use of renewable fuels. To harness the environmental benefits afforded by increased renewable fuel use, EISA put in place explicit provisions to limit the conversion of undeveloped land to cropland for purposes of growing crops to be used in renewable fuels. EPA's aggregate compliance scheme undermines these land use restrictions and in so doing, unravels the many crucial environmental protections upon which EISA is predicated.

A. Aggregate Compliance Fails to Meet EISA's Land Conversion Restrictions.

The aggregate compliance rule does not meet EISA's clear textual requirements and does not serve EISA's environmental purposes. Indeed, it undermines the unambiguous mandates of the statute, while causing far-reaching environmental harms that are antithetical to EISA's purposes. Given this fundamental incompatibility, EPA should implement a new compliance mechanism, one that serves – rather than undermines – the clear climate and other environmental objectives of EISA.

1. The Aggregate Compliance Rule Does Not Meet EISA's Explicit Land Conversion Requirements.

The aggregate compliance rule fails to ensure that the particular crops used for renewable fuels are grown on agricultural land that complies with EISA's statutory requirements. EISA unambiguously requires that the crops and crop residues used for renewable fuels be grown on land that was (1) cleared or cultivated at any time prior to the enactment of EISA, (2) actively managed or fallow on December 19, 2007 (when EISA went into effect), and (3) nonforested on

December 19, 2007.[201] Despite this explicit requirement – which necessarily depends on individualized determinations about the land used to grow renewable fuel sources – the aggregate compliance rule turns a blind eye to reality, ignoring data that would demonstrate whether particular land qualifies under EISA's standard so long as the amount of land in use as cropland across the country remains below a threshold level. Though convenient and easy to administer, this method contravenes EISA's clear mandate, violating both the spirit and letter of the law.

Under the aggregate compliance scheme, land not in cultivation as of December 2007 may be used to produce crops for renewable fuel sources, the consequence of which is the harmful release of vast quantities of greenhouse gases into the atmosphere. Indeed, as noted above, the scenario is not only possible, but has, in fact, come to pass. ***Millions of acres of ineligible land have been converted for ethanol and biodiesel feedstock***. By allowing this outcome, EPA is unquestionably violating the law and undermining the statutory objectives. The text of the statute could not be more clear: it unambiguously identifies the land that can be used for renewable biomass production, limiting it to land cleared or cultivated prior to 2007, that is actively managed or fallow in 2007, and that is nonforested in 2007.[202] Aggregate compliance, in contrast, ignores these limitations and instead permits cultivation of land not in production in December 2007 provided the total land in cultivation remains constant.

Under this scheme, by EPA's own admission, ***there has been an increase of between 4-7.8 million acres of actively managed land*** since EISA's passage, in direct contravention of the

[201] EISA §201(1)(I)(i).
[202] *Id*.

statute.[203] EPA's approach – allowing for unfettered land conversion as long as the total amount of agricultural land in use remains below a certain amount – is fundamentally at odds with the statutory requirements. Here, the language of the statute and the intent of Congress are clear and unambiguous,[204] and thus EPA's interpretation deserves no deference.[205] EPA's use of the aggregate compliance approach is therefore unlawful.

2. The Aggregate Compliance Rule Undermines EISA's Environmental Purposes.

The legislative history of EISA makes clear that EISA and its accompanying RFS aim to reduce greenhouse gas emissions and protect the environment from degradation to the water, air, wildlife habitat, and natural landscape. The aggregate compliance scheme undermines these environmental goals by allowing millions of acres of previously undeveloped land to be converted to agricultural use since EISA's enactment, resulting in increased greenhouse gas emissions and numerous harms to the water, air, wildlife habitat, and natural landscape.

As indicated above, converting native ecosystems, such as grassland and wetland habitat or other previously uncultivated land, to cropland releases large quantities of greenhouse gases and leads to water and air pollution, wildlife habitat destruction, and other environmental harms. For example, conversion of 1.6 million acres of native grassland– the most conservative calculation of the ineligible land converted to grow ethanol feedstock since EISA's enactment – releases ***87 million metric tons of CO_2***. *See* Table 1. Studies show that the conversion of land

[203] EPA Triennial Report 2018 at 111. This figure includes some quantity of land that was previously cultivated at some point prior to December 2007, but that was not in cultivation as of that date. At least 1.6 million acres of this quantity consists of prairieland that had remained uncultivated since 1970. *See* Lark et al. *supra* note 8, at 5.
[204] *W. Virginia Univ. Hosps., Inc. v. Casey*, 499 U.S. 83, 84 (1991).
[205] *Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 842–43 (1984) ("[i]f the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress").

from its natural state to cropland used to grow crops for renewable fuels results in a net increase in greenhouse gas emissions which takes an average of ***93 years*** to offset.[206] Thus, EISA's purpose of reducing greenhouse gas emissions is undermined when the renewable fuels that EISA promotes come from land that has been converted from non-agricultural land.

Not only does it release vast volumes of greenhouse gases, but, as discussed *supra*, converting land to cropland also has deleterious impacts on air and water quality, wildlife habitat and diversity, and natural landscape. These environmental harms run counter to EISA's goal of protecting the environment. EISA's implementing regulations, therefore, should aim to limit land conversion. EPA's aggregate compliance scheme does no such thing. By failing to restrict land conversion, the aggregate compliance approach contributes to these harms, undermining the protections EISA sought to implement. This is contrary to the statute, and is illegal.

B. EPA's Use of Aggregate Compliance is Unjustified.

Despite aggregate compliance's clear contravention of EISA and the failure of the rule to conform to EISA's textual mandate, EPA has defended this approach as consistent with the statute, stating in 2010 that it has "high confidence that the aggregate compliance approach for grown crops and crop residues meets the statutory obligation."[207] While EPA's stated rationales for the rule were unfounded and illogical in 2010, it is now clear after eight years in effect that those arguments are demonstrably wrong. They are directly contradicted by the facts. Even in its Second Triennial report, EPA never responds to the fact of conversion and the clear failure of the aggregate compliance approach to protect land that was uncultivated in December 2007.[208]

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[206] Fargione et al., *supra* note 39.
[207] 75 Fed. Reg. 14,670, 14,701.
[208] The closest it comes to this is its acknowledgment in the Second Triennial Report that there has been "an increase in actively managed cropland in the U.S. since the passage of EISA by roughly 4-7.8 million acres." EPA Triennial Report 2018 at 44.

In its 2010 rulemaking, EPA set forth five factors as purported justification for the aggregate compliance approach. However, none of them justifies its approach to land conversion. Absent a method that in theory should and in practice does ensure ***particularized*** compliance with EISA's land conversion mandates – as EISA requires – EPA's confidence that aggregate compliance meets its statutory obligations is severely misplaced.

1. A "Representative Estimate" of Total Agricultural Lands is Irrelevant to what EISA Requires.

In defense of its aggregate compliance approach, EPA first claimed that it had access to data that allowed an "appropriately representative estimate" of agricultural lands available under EISA for the production of crops as feedstock for renewable fuel production.[209] Yet it did not identify to what data it is referring. And even if this were true, and even if EPA could have somehow perfectly and accurately calculated the amount of land that complied with EISA's terms – which it cannot[210] – a total national calculation of available land is simply irrelevant to the question of whether the particular crops used for renewable fuels are grown on land that complies with EISA's requirements. This justification is therefore meaningless.

2. A Decline in Total Agricultural Land Does Not Prove Compliance with EISA's Land Use Restrictions.

EPA next pointed to USDA data showing that overall agricultural land had contracted over time as support for its aggregate compliance approach.[211] Once again, EPA's justification is baseless. Even if it were true that the total quantity of agricultural land has declined over time,

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[209] 75 Fed. Reg. at 14,701.

[210] *See* EPA Triennial Report 2018 at 43 ("Biofuel feedstock production is responsible for some of the observed changes in land used for agriculture, but we cannot quantify with precision the amount of land with increased intensity of cultivation nor confidently estimate the portion of crop land expansion that is due to the market for biofuels.").

[211] 75 Fed. Reg. at 14,701.

this provides no information as to whether or not crops and crop residues used for renewable fuels were produced on land in cultivation as of EISA's passage. A net decrease in total cropland does not mean that all land used for biofuel production is compliant with EISA's terms.

Indeed, despite EPA's contentions, much of the decrease in total agricultural land in the United States is the result of further urban and suburban development.[212] Between 1992 and 2012, roughly 21 million acres of agricultural land were converted for urban or other residential development.[213] Given that farmland is being taken out of production for other forms of development, it is more likely that new farmland will come from uncultivated land. The data upon which EPA relied undercuts its position, as it demonstrates growing land conversion to satisfy agricultural needs.

More importantly, the trend of contracting agricultural cropland no longer holds true. Research on land use since the passage of EISA reveals a dramatic increase in actively managed cropland. ***In its recent Second Triennial Report to Congress on EISA, EPA found that "[e]vidence from multiple sources demonstrates an increase in actively managed cropland in the U.S. since the passage of EISA by roughly 4 - 7.8 million acres, depending upon the source."***[214] ***And it further found that "[t]here is strong correlational evidence that biofuels are responsible for some of this observed land use change."***[215] Thus, the fact that there had been a decline in agricultural land at the time EPA developed its aggregate compliance approach in 2010 provided no justification then and provides even less now for an aggregate compliance approach that has contributed to a reversal of this trend over the past decade.

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[212] A. Ann Sorensen et. al., *Farms Under Threat: The State of America's Farmland*, 21 (May 9, 2018).
[213] *Id.*
[214] EPA Triennial Report 2018 at 44 (emphasis added).
[215] *Id*. (emphasis added).

3. More Efficient Utilization of Existing Agricultural Land Has Not Prevented the Conversion of New Land for Agricultural Production.

EPA next asserted that existing economic factors for feedstock producers favor more efficient utilization of existing agricultural land to grow crops for renewable fuel sources over converting non-agricultural lands for crop production.[216] While utilization of existing agricultural land has gotten more efficient over time, this has not prevented the conversion of non-agricultural lands to cropland, as EPA's own report reveals.[217] Indeed, evidence reveals that millions of acres of land have been converted from non-agricultural lands to cropland despite these gains in efficiency. And "efficient" use in many circumstances has included using land like buffers and other protective strips of land, which is very ecologically harmful. Even if overall trends indicate increased productivity of cultivated land, it does not provide sufficient grounds to defy EISA's mandate that all crops and crop residue used for renewable fuels come from land that meets EISA's land use restrictions.

4. Having a Fall-back Plan Does Not Undo the Fundamental Failure of Aggregate Compliance to Enforce EISA's Clear Terms.

EPA included on its list of justifications two related factors. *First*, EPA stated that "[i]f, at any point, EPA finds that the total amount of land in use for the production of crops including for grazing and forage is equal or greater than 397 million acres (i.e., within 5 million acres of EPA's established 402 million acre baseline), EPA will conduct further investigations to evaluate whether the presumption built into the aggregate compliance approach remains valid."[218] *Second*, EPA stated that "in the event there are more than the baseline amount of acres of cropland, pastureland and CRP land in production, renewable fuel producers will be required to

[216] 75 Fed. Reg. 14,670, 14,701.
[217] EPA Triennial Report 2018 at 44, 111.
[218] 75 Fed. Reg. 14,670, 14,701.

meet the same individual or consortium-based recordkeeping and reporting requirements applicable to RIN-generating renewable fuel producers using other feedstocks."[219] Neither of these assurances could then have justified EPA's failure to comply with EISA's unambiguous land conversion restrictions in the first instance. Instead, EPA was simply providing a mechanism to retreat from its unlawful approach to land conversion in the event its predictions about total crop acreage prove inaccurate. Proposing a plan to clean up its mess after the fact in no way justifies its making the mess in the first instance. The fact that significant conversion for ethanol and biodiesel feedstock production has occurred and that EPA has failed to change course in light of this conversion confirms that these after-the-fact proposed corrective measures are worthless.

Indeed, EPA itself acknowledged that its check on total land conversion under aggregate compliance

> [w]ould be difficult to enforce because data that could indicate that baseline production levels were exceeded in a given year would likely be delayed by many months, such that the recordkeeping requirements for renewable fuel producers would also be delayed. During the interim period, renewable fuel producers would have generated RINs for fuel that did not qualify for credit under the program, and any remedial steps to invalidate such RINs after the fact could be costly and burdensome to all parties in the supply chain.[220]

Yet despite this recognition, the final rule did nothing to ameliorate this fundamental problem.

5. EPA's Five Factors Do Not Cumulatively Justify EPA's Conclusion that Aggregate Compliance is Consistent with EISA's Terms.

The five listed factors neither individually nor cumulatively support EPA's "high confidence" that aggregate compliance will meet EISA's statutory requirements. They did not

[219] *Id.*
[220] Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, 74 Fed. Reg. 24,904, 24,940 (May 26, 2009).

do so in 2010 and they even more clearly do not do so now. EPA's aggregate compliance approach has in no way shown that the particular crops and crop residues used for renewable fuels were grown on lands that comply with EISA's terms. Indeed, EPA's own report directly and expressly undermines these justifications, concluding that millions of acres of uncultivated land have been converted to cropland since EISA's enactment.[221]

Pursuant to EISA's mandate, EPA can assess whether a crop qualifies as renewable fuel by examining where the crops used for renewable fuels are grown and determining whether that land was cleared or cultivated or actively managed or fallow or nonforested prior to the passage of EISA. Documentation, tracking, and other sources of historical information can provide information necessary to make this determination, as evidenced by EPA's required documentation of imported fuels. Thus, there is no need, nor any authority or discretion, for EPA to rely instead on the abstract and inaccurate aggregate compliance scheme for determining compliance with EISA's land use restrictions.

IV. CONVERSION OF LAND TO PRODUCE CROPS DISPLACED BY RENEWABLE BIOMASS CULTIVATION UNDERMINES EISA'S CLIMATE AND ENVIRONMENTAL BENEFITS.

Not only has EPA's aggregate compliance approach caused a tremendous increase in ***direct*** land conversion for the production of renewable biomass, but it also has led to a rise in ***indirect*** land conversion. Indirect land conversion occurs when cultivation of renewable biomass displaces other crops, which are then grown on land that was not in cultivation in December 2007.[222] Though this indirect land conversion does not run counter to an explicit provision of EISA, it is also antithetical to EISA's underlying objectives to curb climate change and improve the environment.

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[221] EPA Triennial Report 2018 at 44, 111.
[222] EPA Triennial Report 2018 at 21.

As discussed *supra*, land conversion of uncultivated land releases tremendous amounts of greenhouses gases and harms the environment. This is true whether the newly converted land is used to produce renewable biomass or crops displaced by renewable biomass. Thus, even if ***all*** production of renewable biomass occurred on EISA-compliant land – which right now it unquestionably does not – this production could nevertheless undermine EISA's purposes if it leads to the use of land not in cultivation or production in 2007 to grow displaced crops. EPA's pathway approval process has systematically underrepresented this indirect land use change and associated carbon emissions, which has become particularly clear in hindsight.

Accordingly, to comply with the fundamental goals of EISA, the RFS program must ensure that measures are in place to protect against ***any*** kind of land conversion resulting from the production of renewable biomass. This includes not just use for the direct production of renewable biomass, but also use that indirectly results from such production. Congress made clear its intent to protect a specific category of land from cultivation for purposes of renewable biomass production. EPA should close what is now a gaping loophole that would allow use of such land to grow displaced crops.

REQUESTED AGENCY ACTION

EPA's aggregate compliance approach to the RFS under EISA violates EISA's unambiguous land use restrictions. It fails to ensure that land not in cultivation or production in 2007 will not be converted for biofuel production, and as a result, millions of acres of uncultivated land have been converted to cropland since the adoption of this approach, with far-reaching deleterious environmental impacts. It also fails to prevent parallel indirect conversion. We therefore submit this petition asking EPA to modify its renewable fuel standards regulations to comply with EISA's expressed requirements and purposes.

1. EPA Should Require Biofuel Producers to Demonstrate that Each Source of Crop-Based Renewable Biomass Used to Meet the Renewable Fuel Standard was Grown on EISA-Compliant Lands to Qualify for a RIN

a. EPA Should Require Documentation Demonstrating that Biomass Was Grown on EISA-Compliant Land

Under the express terms of the statute, EISA requires that all crops used for RIN qualifying biofuels be grown on land that complies with its land use restrictions. To ensure compliance with this statutory mandate, EPA must revise its RFS regulations to require biofuel producers to demonstrate that the crops they use as renewable biomass sources were produced on land that complies with EISA's land use terms prior to being assigned a RIN. Requiring biofuel producers to submit valid documentation demonstrating that the biomass used was grown on EISA compliant lands – i.e., land that was cleared or cultivated prior to 2007, and that was actively managed or fallow and nonforested in 2007 – provides assurance that EISA's terms have been met and a RIN can properly be issued for that batch of biofuel. In fact, this is the only means by which EPA can faithfully ensure conformance with EISA's plain language.

b. Demonstrating Compliance for Each Source of Crop-Based Renewable Biomass is Feasible and Reasonable

A rule requiring biofuel producers to demonstrate compliance with EISA's land use restrictions for each source of crop-based renewable biomass is a reasonable and feasible method of accurately determining EISA compliance. Indeed, it is the only effective means of doing so.

EPA's RFS regulations provide available mechanisms for renewable fuel producers to verify that their feedstocks comply with EISA. For example, it describes "renewable biomass recordkeeping and reporting requirements by renewable fuel producers for their individual facilities."[223] Thus, EPA itself contemplated individual reporting as a reasonable method for verifying compliance with the law.[224]

Proof of compliance poses no undue burden, as there are a variety of readily accessible documentation methods available to producers, including receipts for agricultural products, purchasing records, and lease information. For example, in the May 26, 2009, notice of proposed rulemaking, EPA contemplated using satellite and aerial imagery along with mapping tools to develop a Web site that would assist feedstock producers to identify where their crops were produced so that they could demonstrate EISA compliance.[225] This idea was dropped in favor of aggregate compliance in the final EPA regulation. Nevertheless, the RFS rule outlines the recordkeeping necessary to establish EISA compliance, including:

> [s]ales records for planted crops, crop residue, or livestock; purchasing records for land treatments such as fertilizer, weed control, or reseeding; a written management plan for agricultural purposes; documentation of participation in an agricultural program sponsored by a Federal, state or local government agency; or documentation of land management in accordance with an agricultural certification program.[226]

EPA thus believed it was feasible and reasonable to prove individual compliance with EISA's land use mandates. However, to date, EPA has not required submission of such documentation, but instead has relied upon its unlawful aggregate compliance approach.

2. EPA Should Require Documentation Showing that Production of Renewable Biomass Does Not Cause Land Conversion for Production of Displaced Crops

To protect against the climate and environmental harms resulting from land conversion – harms that are antithetical to the text and intent of EISA – EPA should require documentation

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[223] 75 Fed. Reg. at 14,681.
[224] The RFS creates the further options of consortium-based quality-assurance surveys and aggregate compliance for crops and crop residue grown in the U.S. *See Id*.
[225] 74 Fed. Reg. 24,904, 24,940.
[226] *Id.* at 24,933, 24,938.

showing that production of renewable biomass does not result in land conversion to produce displaced crops. Such a requirement is necessary to ensure that producers of corn for ethanol use or soy for biodiesel use do not undermine EISA's objectives by displacing crops on land in cultivation in December 2007 with renewable biomass production while converting land not in cultivation in 2007 to produce the displaced crops. Such tactics clearly violate the law's ***structure and intent*** and therefore should not be permitted. Accordingly, this added documentation is necessary to demonstrate overall compliance with EISA's land use restrictions.

3. EPA Should Adjust Renewable Volume Obligations for Total Renewable Fuel to Reflect the Amount that Can Be Produced From EISA-Compliant Land.

To assist in the enforcement of EISA's land-use restrictions and to ensure that renewable biomass is not grown on land that was not in cultivation prior to EISA's passage and that this same previously uncultivated land is not used to produce displaced crops, EPA should reassess the annual volume obligation for total renewable biofuel for a given year. Specifically, EPA should determine the amount of biofuel produced from feedstock grown on recently converted land or land not in production in 2007 – i.e., renewable biomass that does not comply with EISA's land-use requirements – and then adjust the annual volume obligation down to subtract out that volume of biofuel, capping the requirement at that level going forward.[227] By doing so, EPA could ensure that the total RFS volumetric mandate matches the supply of renewable fuel that can be produced without violating or otherwise undermining EISA's land-use restrictions. This would help to re-set demand for biofuels at a volume that corresponds to the supply of EISA-compliant renewable biomass, as Congress intended.

[227] The adjustment should be applied after EPA projects cellulosic biofuel production and makes corresponding changes to the volume obligations for cellulosic biofuels, advanced biofuel, and total renewable fuel, pursuant to the Clean Air Act §211(o)(7)(D)(i).

Respectfully submitted,

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