



SUBSIDIES WITH RESPONSIBILITIES:

Placing Stewardship and Disclosure Conditions on Government Payments to Large-Scale Commodity Crop Operations



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*Sweet Corn
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**SUBSIDIES WITH RESPONSIBILITIES:
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Executive Summary

The last century marked a sea change in the way agricultural operations are conducted. Increased specialization, greater use of chemical inputs (such as fertilizers), and innovations in information technology and capital equipment resulted in what the U.S. Department of Agriculture (USDA) characterizes as the “industrialization” of agriculture. **The size of individual farms grew as the overall number of farms plummeted, with agricultural production today concentrated among the largest operations.** This industrialization and consolidation significantly increases efficiency and yields, but it also generates—as an unintended byproduct—pollution. These general trends in the agriculture sector as a whole are evident in commodity crop production.

This report focuses on *large-scale commodity crop operations*—farms that produce commodity crops such as corn, soybeans, and wheat, and that gross \$500,000 or more in annual sales. A practical approach to better addressing agricultural pollution dictates looking for solutions that begin with the largest players: those that, as a class, represent a large percentage of production and, therefore, have the potential to generate substantial pollution; receive the most support from federal farm subsidies; and have the potential to afford necessary conservation measures.

Based on data ELI generated through tailored searches in USDA’s Agricultural Resources Management Survey, Farm Structure and Finance Tailored Reports database, it is evident that large-scale commodity crop operations are prominent both in the marketplace and on the physical landscape. **In 2009, for example, almost 60% of all farm sales of corn, soybeans, and wheat were attributable to farms operating at this scale. And, large-scale corn, soybean, and wheat operations represent a major percentage of the total acres of commodity crops nationwide: half of all corn acres, 40% of soybean acres, and 30% of wheat acres.** The average farm of this size operates on well over 2,000 acres.

The pollution resulting from commodity crop operations can have harmful effects both locally, near the production area, and far downstream, where the cumulative impacts of the pollution can be severe—especially when combined with

pollution from other rural, suburban, and urban sources. Specifically, the fertilizers used by commodity crop operations to promote plant growth and health generate nutrient pollution, the impacts of which have risen to the level of national concern. **The harms caused by nutrient pollution are wide-ranging and costly—from dead zones in the Gulf of Mexico and other water bodies, to polluted streams, rivers and lakes, to contaminated drinking water sources.** Commodity crop operations can also have other adverse impacts, such as pesticide pollution and farmland erosion that results in downstream sediment and turbidity pollution.

These impacts and the related harms are a byproduct of a commercial activity. Some forms of agricultural production, like many other industrial production processes, generate pollution as a byproduct. **There is no reason to believe that environmental harm is intended, or that agricultural producers are uninterested in conservation.** Indeed, many agricultural operations implement stewardship practices that can and do mitigate environmental damage. **Yet pollution resulting from commodity crop production—in particular, nutrient pollution—remains a significant, national problem that must be more effectively addressed.**

Typically, when the production of a good or service pollutes or generates other adverse environmental impacts, the individual or company that is responsible and that profits from the activity is required under the law to avoid or minimize the impacts. This is rarely the case in the agriculture sector, which is afforded favorable treatment under environmental laws. As a result, the costs associated with the environmental impacts are not accounted for by either the seller of commodity crops (the farmer) or the purchaser (such as grain-trading companies, meatpackers and feedlots). Instead, **the externalized pollution costs are borne by the public.**

Today, agriculture is the only major industrial sector that is routinely exempted from baseline environmental safeguards, regardless of the scale of any particular operation. This is not to say that there are *no* requirements in environmental laws that apply to the agriculture industry, but environmental laws are more noteworthy for their exemptions for agriculture than for their coverage of it. The result is that, to date, **the key federal environmental laws designed to ensure protection of the Nation's waters and to notify the public about chemical releases have proven ineffective** for holding in check pollution from commodity crop operations, or for informing communities about agricultural pollutants entering their air and water.

Federal agricultural policy, which is established principally through periodic *Farm Bill* legislation, is a major driver of commodity crop production, including large-scale production. The federal taxpayer supports the agricultural sector through myriad

subsidy programs. Under the federal subsidy framework as it is currently designed, large-scale farms (those with annual farm sales of \$500,000 or more) receive substantial subsidies. **These operations represented 6% of all U.S. farms in 2009 and received more than half of all government commodity payments.** The vast majority of large-scale corn (98%), soybean (96%), and wheat (99%) farms opted to receive farm subsidies in 2009. To take one example, more than 7,000 large-scale soybean operations received government payments that year—with farms grossing \$500,000 or more (but less than \$1 million) receiving an average of \$32,182, and farms grossing \$1 million or more receiving an average of \$105,133. These figures understate the total extent of federal support to large-scale commodity crop operations, as they do not include federal crop insurance subsidies.

This report is intended to evaluate neither the merit nor the funding level of any particular agricultural subsidy. Rather, the report highlights that in providing these subsidies, the government requires only limited conservation stewardship commitments from recipients. Outside of conservation subsidies, **farm subsidy recipients typically are not required as a condition of receiving payments to implement measures that will protect water from nutrient pollution or any other form of pollution generated by on-farm activities.** An important exception is the 1985 conservation compliance requirements that apply to subsidy recipients that farm highly erodible lands. Their goal is to reduce soil erosion by requiring producers to implement and maintain soil “conservation systems” on highly erodible cropland or risk losing certain federal subsidies. According to USDA data, these conservation compliance requirements have had success, contributing to substantial reductions in soil erosion. Highly erodible land conservation compliance requirements apply to a range of government payments, including commodity and disaster programs—and these requirements initially covered, but do not currently apply to, crop insurance premium payments.

Recognizing the continuing problem of nutrient pollution, and building on existing conservation approaches under the Farm Bill, ELI presents two recommendations for reform—neither of which would require additional federal subsidy payments. First, **ELI proposes that large-scale commodity crop operations that opt to receive any form of federal farm subsidy, including federally subsidized crop insurance, assume responsibility for implementing a set of baseline stewardship measures to reduce pollution.**

Specifically, as a start, ELI recommends that recipients certify that baseline stewardship measures for nutrient pollution have been implemented. ELI uses “baseline stewardship measures” to mean a set of management practices appropriate to

the crop, geography, climate, and other circumstances of the particular operation. The determination of what constitutes baseline stewardship measures and how they are to be applied is best left to the expert agency to address with stakeholder input, although numerous resources exist that could be used as a starting point. The aim should not be to establish a significant new administrative program—which would likely be impractical, in any event, given the current difficult economic climate. Rather, the objective should be a workable, streamlined process for adoption of stewardship measures that can be readily integrated into existing subsidy program administration.

To ensure that this condition is implemented in a fair and equitable manner, exemptions should be made available in cases of undue economic hardship and for good faith efforts to implement stewardship measures that may nevertheless fail. Additionally, technical assistance should be provided when requested.

In asking large-scale commodity crop operations to assume responsibility for adopting baseline stewardship measures as a condition of receiving federal assistance, **ELI does not suggest that funding for existing conservation programs should be reduced or otherwise affected.** To the contrary, this condition on subsidy payments would be entirely independent of existing conservation programs. The proposal made here is intended to complement conservation subsidy efforts—not to replace them or to compete with them for scarce federal funding.

Because many large-scale commodity crop operations *are* already implementing on-farm stewardship measures that can mitigate the negative environmental and public health consequences of agricultural pollution, **conditioning receipt of federal farm subsidies will help level the playing field** to the benefit of operations that have already taken action.

ELI's second recommendation is that large-scale commodity crop operations that opt to receive any form of federal farm subsidy, including federally subsidized crop insurance, assume responsibility for publicly disclosing information about their application of fertilizers. Specifically, large-scale commodity crop operations that accept federal subsidy payments should disclose the quantity, type, and timing of fertilizers they apply each year. This will increase public access to information on the sources and quantities of nutrient pollution potentially entering surface waters and groundwater, while at the same time helping to discourage practices that result in the overuse of fertilizers. Eventually, applications of pesticides and other inputs could also be made subject to this disclosure condition. Although release reporting (that is, reporting on the quantity of nutrients leaving the property in runoff) would provide more relevant information than reporting only on the application of fertilizers, release

data is likely more burdensome to develop and produce. USDA, with stakeholder input, should decide on the precise contours of the information to be disclosed, with an emphasis on generating a clear, easy-to-understand dataset—while minimizing the burden on operators.

Environmental disclosure programs in other contexts have a track record of reducing the amounts of chemicals released into the environment. These programs work in part because they cause the disclosing entity to focus on its use and management of chemicals. This can lead to identifying new opportunities for reductions in releases—as a result of self-analysis or in response to perceived public or market pressure. This can also result in financial benefits to those who perform the disclosures, as reductions in chemical use can lower operating costs.

The process for reporting on fertilizer applications should be as simple as possible, resulting in only a minimal additional administrative burden. Farm subsidy payment recipients already are required to undertake certain reporting requirements. **Asking recipients to assume responsibility for disclosure of fertilizer applications is also consistent with food marketing system trends**, as the top food industry companies in the main sectors of the U.S. food system—food manufacturers, foodservice companies, and grocery retailers—are voluntarily reporting to varying extents on their environmental and other socially beneficial activities.

The Farm Bill offers a vehicle for implementing these recommendations and achieving almost immediate reductions in pollution generated by large-scale commodity crop operations. Not only is there ample precedent generally for attaching reasonable, practical conditions to federal payments to ensure that the dollars are used wisely and in manner that is not counter to other public policy priorities, but the conservation compliance requirements for soil erosion provide a track record of success under the Farm Bill. It should be feasible to build on this existing, common-sense approach.

In sum, to reduce the cumulative impacts of downstream pollution and for the benefit of those that use our waters for non-agricultural purposes—commercial as well as recreational—large-scale commodity crop operations that choose to accept federal subsidy payments should assume responsibility for implementing a baseline set of stewardship practices designed to minimize nutrient pollution. In addition, to increase public access to information on the sources and quantities of nutrient pollution potentially entering surface waters and groundwater, these large-scale commodity crop operations should also publicly report on the quantity, type, and timing of fertilizers they apply.

I. The Industry: Large-Scale Commodity Crop Production in the United States

A. General Trends

During the last century, the way in which agricultural operations are conducted in the United States underwent a sea change. As the U.S. Department of Agriculture (USDA) has explained:

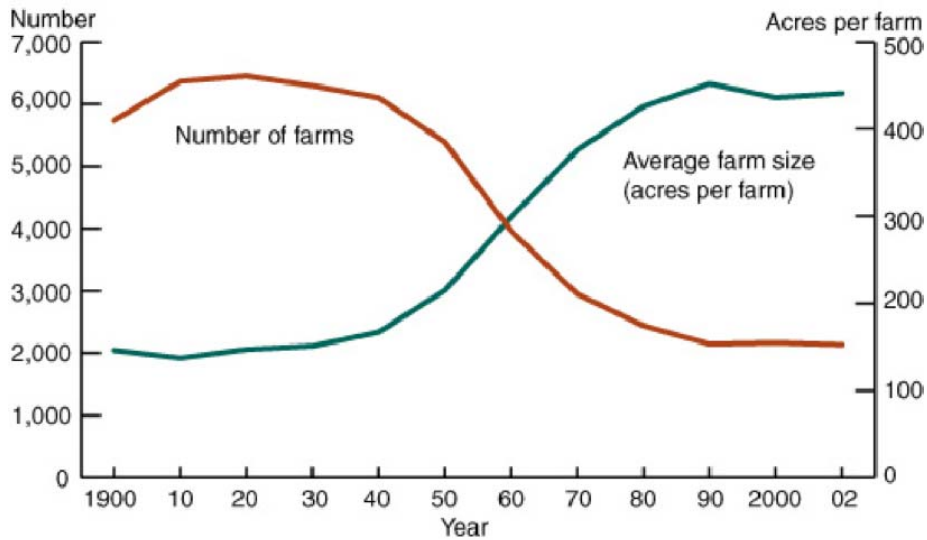
Early 20th century agriculture was labor intensive, and it took place on a large number of small, diversified farms The agricultural sector of the 21st century, on the other hand, is concentrated on a small number of large, specialized farms These highly productive and mechanized farms employ a tiny share of U.S. workers and use 5 million tractors in place of the horses and mules of earlier days.¹

This “industrialization of agriculture,” according to USDA, is reflected in trends such as the increased specialization of farm activities that results in greater use of purchased inputs, such as fertilizer, and a shift to larger farms due to innovations in information technology and capital equipment.²

Specifically, the size of individual farms has increased, as the overall number of farms has plummeted. The USDA estimates that since 1900, average farm size has risen by two thirds—while the number of farms has dropped by nearly the same percentage. And agricultural operations have become far more specialized: in the year 2000, farms produced an average of one commodity; in 1900, the average number of commodities produced was five.³

At the same time, agricultural productivity has consistently risen—increasing nearly 2% annually during the second half of the twentieth century. This is due in large part to economies of scale realized as a result of technological developments, such as advances in mechanization and the availability of relatively inexpensive fertilizers and pesticides.⁴

Figure 1: "As the number of farms declined, their average size increased," 1900-2002



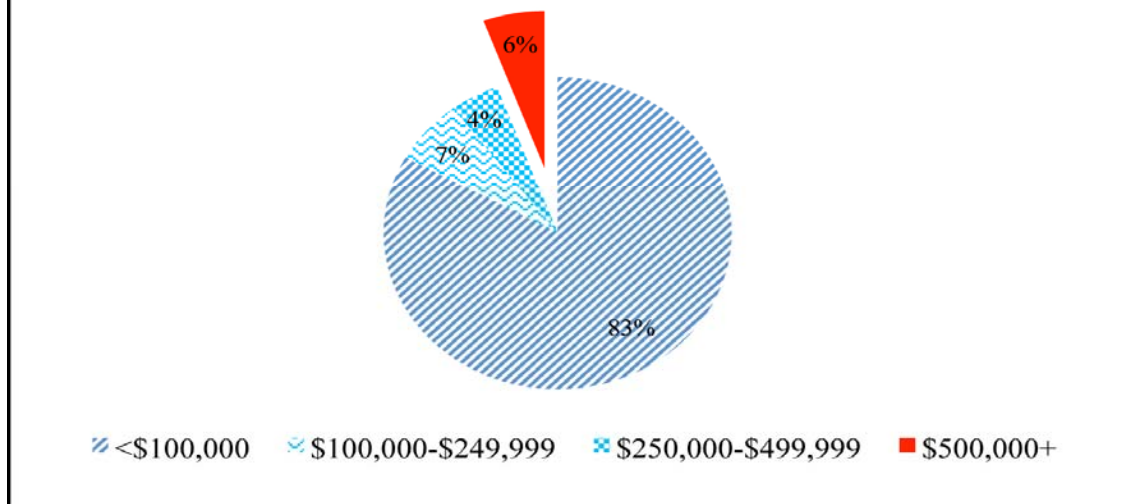
Note: Number of farms is in the 1000's.

Source: Compiled by USDA Econ. Research Serv., using data from Census of Agriculture, Census of Population, and Census of the United States. Carolyn Dimitri et al., U.S. Dep't of Agric., Econ. Info. Bull. No. 3, *The 20th Century Transformation of U.S. Agriculture and Farm Policy* 2 (June 2005), available at <http://www.ers.usda.gov/publications/eib3/eib3.pdf>.

This increased agricultural production is now concentrated among the largest farms. According to USDA, “[t]he nation relies on larger farms for most of its food and fiber despite the high number of small farms.” Together, the largest farms—classified by USDA as “large family,” “very large family,” and “nonfamily” farms—account for roughly 60% of all production.⁵

Large-scale farms represent a substantial share of the total farm acres in the United States. For example, farms of all types with total annual farm sales of \$500,000 or more constitute less than 6% of the total number of farms in the United States, yet they operate on nearly one third of all U.S. farmland—over 270 million acres.⁶

Figure 2: Distribution of All Farms by Farm Economic Class (Total Farm Sales), 2009



Source: Econ. Research Serv., U.S. Dep't of Agric., *ARMS Financial and Crop Production Practices: Farm Structure and Finance, Tailored Reports* (data compiled by Env'tl. L. Inst., 2012) (2009), available at http://www.ers.usda.gov/Data/ARMS/app/default.aspx?survey_abb=FINANCE.

B. Large-Scale Commodity Crop Operations

This report focuses on what we term *large-scale commodity crop operations*: farms that produce commodity crops and gross \$500,000 or more in annual sales. Corn, soybean, and wheat operations serve as our primary examples, but the discussion and recommendations can be applied more broadly to other types of commodity crops. We emphasize large-scale commodity crop operations for several reasons.

First, although the environmental impacts of commodity crop production can be substantial, they have received far less attention and analysis than the polluting effects of concentrated animal feeding operations (CAFOs), where animals are confined in large numbers. Pollution from commodity crop production tends to be less visible and more diffuse than pollution from CAFOs, even while the cumulative effects are significant.

Second, the production of commodity crops in the United States is intimately connected to the system of federal farm subsidies enshrined in the U.S. Farm Bill. The current Farm Bill is scheduled for re-authorization by September 2012.

Third, although every farming operation almost certainly generates some form of pollution, practical considerations dictate looking for solutions that begin with the largest players: those that, as a class, represent a large percentage of production; have the potential to generate substantial pollution; receive the most support from federal farm subsidies; and have the potential to afford necessary conservation measures.

Most of the agricultural data underlying the analysis in this report are derived from the 2009 USDA “ARMS.” ARMS is an annual survey of farm and ranch operations administered by USDA’s Economic Research Service and the National Agricultural Statistics Service. ELI generated data for this report by using the ARMS Farm Structure and Finance Tailored Reports (tailored reports database). ELI’s methodology is described in the Appendix to this report.

The general trends outlined above are reflected in current production of commodity crops. No longer characterized by small family farms, field commodity crop production is an industry driven by large operations that rivals other major industries in scale. In 2009, 80% of all corn, soybean, and wheat farm sales (approximately \$48 billion) were attributable to farms with at least \$250,000 in annual sales—and almost 60% were attributable to farms with at least \$500,000 in annual sales.⁷ The products, similar to other industrial commodities, can be used in a wide variety of ways. For example, according to the Corn Farmers Coalition, “only about 1 percent of the corn we grow is eaten as corn[.] The rest works its way into our food supply in other ways, such as animal feed or sweetener, or is used for industrial purposes like making fuel for cars.”⁸

Large-scale commodity crop operations are prominent not only in the agricultural marketplace, but also on the physical landscape. Large-scale operations cover roughly 48 million corn acres, 16 million soybean acres, and 16 million wheat acres.⁹ Together they account for about eighty million acres—roughly the size of New Mexico, the fifth-largest state.¹⁰ These operations represent a large percentage of the total acres of commodity crops nationwide, accounting for half of all corn acres, 40% of soybean acres, and 30% of wheat acres (see *Table 1*). Not surprisingly, each individual farm covers a substantial number of acres. For example, the average corn, soybean, and

wheat farm with gross sales of \$500,000 or more operates on approximately 2,000 acres, 2,100 acres, and 4,900 acres, respectively (see *Table 1*).

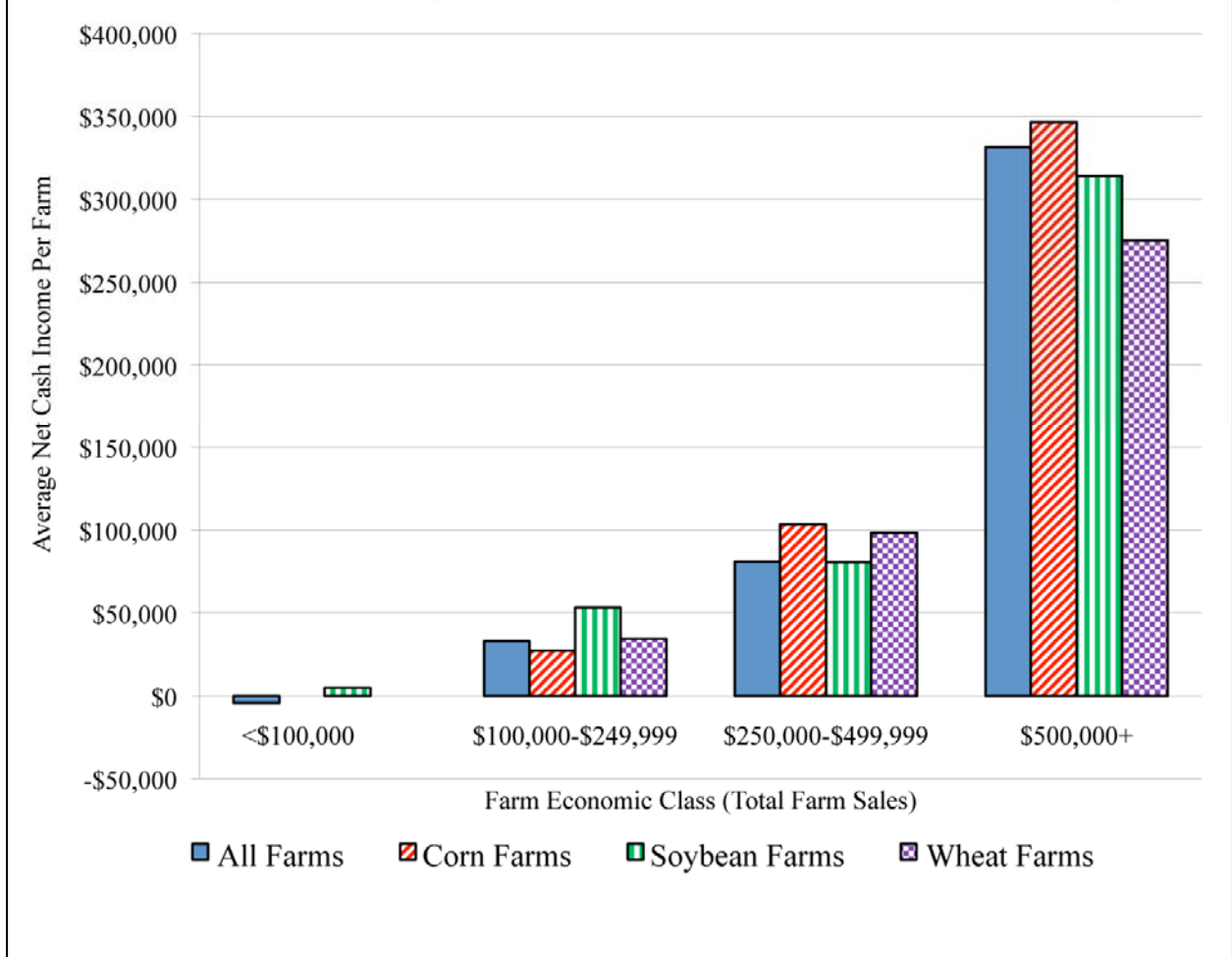
Table 1: Size of Large-Scale Commodity Crop Operations
Total Farm Sales of \$500,000 or more (2009)

	<i>Corn</i>	<i>Soybean</i>	<i>Wheat</i>
Average Acres Operated per Farm	2,000	2,100	4,900
Percent of Total U.S. Acreage of Crop	50%	40%	30%

Acres values in this table are rounded to the nearest hundred acres and percentages are rounded to the nearest 5%.¹¹

Many different variables affect the profitability (or lack thereof) of any farming operation. Nevertheless, publicly available data allows for some very basic characterizations about farm income. According to data collected by USDA, for example, large-scale corn, soybean, and wheat farms have higher average net cash income per farm than farms in other economic classes (see *Figure 3*, below).¹² Average net cash income per farm is defined by USDA as “the amount of net cash earnings from all business sources that a farm generates during the year.”¹³ Overall, the average large-scale corn, soybean, or wheat operation had net cash income per farm in 2009 of roughly between four and five times the median total farm household income.¹⁴

**Figure 3: Average Net Cash Income Per Farm
by Farm Economic Class (Total Farm Sales) and Production Speciality, 2009**



Source: Econ. Research Serv., U.S. Dep't of Agric., *ARMS Financial and Crop Production Practices: Farm Structure and Finance, Tailored Reports* (data compiled by Env'tl. L. Inst., 2012) (2009), available at http://www.ers.usda.gov/Data/ARMS/app/default.aspx?survey_abb=FINANCE.¹⁵

With this introduction to large-scale commodity crop production, we turn now to a discussion of how the production of commodity crops across so much of the American landscape, driven by these large-scale operations, generates unintended pollution that can adversely affect the natural environment and public health.

II. The Environmental Impact: Pollution Generated by Commodity Crop Operations

"[A]gricultural production practices can degrade the environment. Transformation of undisturbed land to crop production can diminish habitat for wildlife. Soil erosion, nutrient and pesticide runoff, and irrigation can pollute the air and water, degrade soil quality, and diminish water supplies. The extent and degree of the environmental problems associated with agriculture vary widely across the country."

—USDA Economic Research Service¹⁶

A byproduct of the production of commodity crops is pollution. According to the U.S. Environmental Protection Agency (EPA), the types of agricultural activities that cause nonpoint source pollution include "plowing too often or at the wrong time" and "improper, excessive or poorly timed application of pesticides, irrigation water and fertilizer."¹⁷ This pollution can have harmful effects both locally, near the production area, and far downstream, where the cumulative impacts of the pollution can be severe.

Specifically, commodity crop operations, including large-scale operations, generate nutrient pollution. The impacts of nutrient pollution, a topic of major national concern, are our focus for much of this report. Additionally, these operations typically have other polluting effects, including pesticide pollution and farmland erosion that result in downstream sediment and turbidity pollution. In addition, as a source of grain to be used as feed for intensive animal confinement operations, commodity crop operations contribute indirectly to the range of environmental and human health harms associated with those facilities. We now briefly survey each of these impacts linked to commodity crop production, with an emphasis on nutrient pollution.

A. Pollution of Waterways and Groundwater by Fertilizers: Nutrient Pollution

Perhaps the most widespread harm caused by the large-scale production of commodity crops results from *nutrient pollution* entering surface water and groundwater.¹⁸ This form of water pollution creates massive "dead zones;" contributes to blooms of harmful algae; degrades rivers, streams, lakes, and groundwater; and contaminates drinking water.¹⁹ Nutrients such as nitrogen and phosphorus are found in

the synthetic and natural fertilizers that are applied to crops.²⁰ Corn, in particular, requires significant fertilization, typically from synthetic chemical fertilizers.²¹

The root of the nutrient pollution problem is that crops do not take up all of the fertilizer applied to them. In fact, only a fraction of the nitrogen and phosphorus in fertilizers is used by plants.²² Eventually, the soil on cropland becomes saturated with water as a result of rainfall, snowmelt, irrigation, or flooding. The unused fertilizer can then migrate from the cropland through various means and find its way to downstream surface waters and into groundwater.²³

Nutrient management practices can significantly influence the extent to which nutrients contaminate surface and groundwater. For example, the Natural Resources Conservation Service (NRCS) emphasizes the importance of applying nutrients according to the “four Rs” —*i.e.*, in the right amount, from the right source, at the right place, and at the right time.²⁴ In a recent report, however, USDA’s Economic Research Service (ERS) concludes after discussing the variables that affect crop yields and nitrogen loss that “farmers overfertilize crops in most years.”²⁵

This is no small problem. A 2009 report of the State-EPA Nutrient Innovations Task Group sounded an “Urgent Call to Action” on the issue of nutrient pollution, nationwide. Among its findings were that “the nutrient pollution problem is nationally significant, expanding, and likely to substantially accelerate.” The report concluded that “[c]urrent regulations disproportionately address certain sources (*e.g.*, municipal sewage treatment) at the exclusion of others (*e.g.*, row crop agriculture).”²⁶ More recently, EPA explained that nitrogen and phosphorus pollution—resulting from row-crop runoff, among other sources—is degrading the Nation’s water quality and drinking water and has “the potential to become one of the costliest and the most challenging environmental problems we face.”²⁷

In recognition of the seriousness of the problem, USDA continues to take significant steps to address nutrient problems. This year, NRCS released its updated nutrient management conservation standard (known as “conservation practice standard 590”), which establishes minimum requirements to be applied by the agency in administering certain of its conservation programs.²⁸ Also, new administrative initiatives are underway. A federal pilot program recently launched in Minnesota will provide farmers who adopt conservation measures to limit runoff with certainty that they are in compliance with state water quality requirements.²⁹ And under the auspices of the Environmental Quality Incentives Program (EQIP), NRCS in 2012 established the National Water Quality Initiative. This new effort commits \$33 million in financial and

technical assistance to improving water quality in select watersheds around the country. The program targets nutrient and manure runoff to streams.³⁰

Federal legislators from both sides of the aisle are also concerned. In October 2011, the Subcommittee on Water and Wildlife of the Senate Environment and Public Works Committee held a hearing on “Nutrient Pollution: An Overview of Nutrient Reduction Approaches.” In his opening statement, Senator James Inhofe (R-Oklahoma) noted that although nutrients are necessary for healthy water bodies, “when conditions such as sunlight, water flow, temperature, and background water chemistry are right, they can be problematic.”³¹ He further stated that “we will hear from a number of our witnesses about the adverse effects of excess nutrients on waterbodies including excess algae growth, dissolved oxygen depletion, and pH increases.”³² Similarly, Senator Benjamin Cardin (D-Maryland) noted that nutrient pollution is a “national problem” that causes “significant water quality problems” that in turn “harm the fishing, recreation, and service industries.”³³

The involvement of different categories of nutrient sources—rural, suburban, and urban—magnifies the complexity of the problem,³⁴ but it is nevertheless clear that corn, America’s dominant row crop, is central both to the problem and to any workable solution. In fact, an ERS report issued in 2011 calls corn the “[m]ost [i]mportant [c]rop for [a]ddressing [n]itrogen-[r]elated [e]nvironmental [i]ssues.”³⁵ The report explains that “[c]orn is the most widely planted crop in the United States and the most intensive user of nitrogen.”³⁶ According to the report, corn crops represented half of all nitrogen-treated crop acres in 2006 for which at least one management improvement could be made to increase nitrogen use efficiency.³⁷ Overall, improvements in rate, timing, and method of application “might be needed on 67 percent of corn acres.”³⁸

The need to address nutrient pollution from corn, and from the production of commodity crops more generally, is highlighted by the array of harms it causes, as we now explain. At the same time, data quantifying the harms from this pollution—either in the aggregate, or relative to individual agricultural operations—remain incomplete. Any uncertainty surrounding the costs associated with agricultural pollution in no way changes the fact that these costs are immense. In March 2012, for example, the Organisation for Economic Co-operation (OECD) released new research concluding that “[t]he overall economic, environmental and social costs of water pollution caused by agriculture across OECD countries [including the United States] are likely to exceed billions of dollars annually (italics omitted).”³⁹

The most important reason for quantifying the costs of environmental damage associated with pollution from large-scale commodity crop operations is that *these costs*

currently represent a cost of production that is born not by the seller or the buyer of the crop, but by society. Such costs are described by economists as “externalized,” and they often are not obvious—and in some cases may even go unnoticed. Yet they are very real and form an integral part of the “true cost” of producing such prodigious quantities of corn, soybeans, and wheat every year in the United States, as we discuss in more detail below. Accordingly, each of the following harms imposes a substantial cost on the public that has yet to be fully quantified.

Coastal Dead Zones. Nutrient pollution is largely responsible for the well-documented problem of “dead zones” in U.S. coastal waters, the term used to describe an area of water containing insufficient levels of life-sustaining oxygen. When waters become eutrophic, or nutrient-enriched, there is an explosive growth of primary life in the form of algal blooms that block sunlight from penetrating to lower depths. When the algae die off, they sink to the bottom and are consumed by bacteria through a decomposition process that uses up oxygen—leaving insufficient dissolved oxygen in the water.⁴⁰ The resulting oxygen deprivation, or hypoxia, is incompatible with life: fish and shrimp that are able to do so flee, while younger organisms and less mobile sea creatures (such as sea urchins, clams, oysters, and starfish) that are unable to escape the dead zone become stressed or die.⁴¹ Injuries are sustained not only to these aquatic organisms, of course, but also to the commercial and recreational fisheries that depend on them.⁴²

The Gulf of Mexico dead zone that forms annually along the bottom of the continental shelf is the second-largest in the world.⁴³ In summer 2011, this dead zone exceeded its average annual size, at over 6,700 square miles—an area significantly larger than Connecticut.⁴⁴ One of the major causes of eutrophication—the nutrient enrichment that gives birth to dead zones—is row crop agriculture.⁴⁵ According to the U.S. Geological Survey (USGS), crops contribute 66% of the nitrogen affecting the Gulf of Mexico and 43% of the phosphorus. In particular, corn and soybean cultivation contributes more than half (52%) of the nitrogen and a quarter (25%) of the phosphorus that reach the Gulf.⁴⁶

The problem of dead zones is not unique to the Gulf of Mexico. A 2010 report found hypoxia to be “a serious problem along all of the Nation’s coasts and in the Great Lakes.”⁴⁷ In fact, since 1960, the incidence of hypoxia has increased thirty-fold, to more than three hundred systems nationwide. In 2011, the Chesapeake Bay experienced a dead zone covering roughly a third of the Bay’s area, despite the findings of a recent study of long-term data that reports reduced nutrient loadings, due in part to improved agricultural stewardship practices.⁴⁸ Nearly one third (30.8%) of the nitrogen delivered to the Chesapeake Bay can be sourced to cultivated cropland; and over one quarter

(28.3%) of phosphorous is attributable to cultivated cropland. Yet cultivated cropland comprises only about a tenth of the land area in the vast Chesapeake Bay watershed. Corn and soybeans are among the predominant crops in the region.⁴⁹

Streams, Lakes, and Rivers. Nutrient pollution takes a toll on inland freshwater ecosystems, as well. A decade-long study of water quality nationwide, released by the USGS in 2010, found that:

[a]lthough the use of artificial fertilizer has supported increasing food production to meet the needs of a growing population, increases in nutrient loadings from agricultural and, to a lesser extent, urban sources have resulted in nutrient concentrations in many streams and parts of aquifers that exceed standards for protection of human health and (or) aquatic life, often by large margins.⁵⁰

Concentrations of nitrogen were found to be the highest in agricultural streams, rather than in streams located in other areas. In addition, nitrogen concentrations in agricultural streams generally were highest in areas that have some of the most intense applications of fertilizer and manure.⁵¹

Similarly, EPA's 2009 National Lakes Assessment found that a high nutrient rate is the second-largest problem facing lakes nationwide. One fifth (20%) of U.S. lakes have high levels of phosphorus or nitrogen, and lakes with excess nutrients are two-and-a-half times more likely to have poor biological health. The Lakes Assessment notes that poorly managed agriculture is among the causes of excessive nutrient concentrations reaching lakes.⁵²

EPA maintains a large, publicly accessible database of water quality conditions nationwide, as reported by the states pursuant to their legal obligations under the Clean Water Act. According to summary data based on the most recent reporting cycle, nutrients are the second- or third-most common cause of water impairment (nutrients rank second for lakes, reservoirs, and ponds, and third for rivers and streams). Over 100,000 miles of assessed rivers and streams—as well as over 3.5 million acres of assessed lakes, reservoirs, and ponds—are impaired by nutrients. This means that these assessed waters exceed state water quality criteria established for that pollutant.⁵³ These figures almost certainly understate the true extent of nutrient impairment nationwide, because currently only about a quarter (27.5%) of the Nation's river and stream miles and two fifths (45.5%) of its lake, reservoir, and pond acreage have been assessed.⁵⁴

"Agriculture" as defined in various ways by the reporting states as a *probable source of impairments* for assessed rivers and streams, is associated with more miles of

impairments than any other source.⁵⁵ For assessed lakes, rivers, and ponds, agriculture ranks third overall as a probable source of impairments.⁵⁶

Algal Blooms. Eutrophication also has been linked to the phenomenon of “harmful algal blooms (HABs),” also known as “red tides.” These algae can be toxic to humans or to wildlife—and, they can degrade ecosystems and damage coral and seagrasses.⁵⁷ One U.S. government estimate of the nationwide economic impacts of HABs—articulated mainly in terms of harms to human health and commercial fisheries—pegs the damage at \$82 million annually.⁵⁸ The Centers for Disease Control and Prevention investigates the impacts of HABs on humans and treats the issue as a public health problem.⁵⁹ Certain kinds of HABs are seeing increased frequency and geographic distribution in the United States and pose “a particular threat” when they occur in drinking water sources.⁶⁰ Many variables factor into the appearance of HABs; one of these is nutrient enrichment⁶¹—including from fertilizers.⁶²

Nitrates in Drinking Water. Nitrate (NO₃) is a form of nitrogen that is both naturally occurring and found in chemical fertilizers and manure. It is water-soluble and can readily move from fields to groundwater and streams.⁶³ Nitrate contamination in drinking water poses a special risk for users of shallow, domestic wells located near current or past agricultural settings.⁶⁴ A major source of nitrate contamination is runoff from fertilizer use.⁶⁵ “Blue baby syndrome,” or methemoglobinemia, is associated with high nitrate levels in well water. Research also suggests links between nitrates and cancer, and possibly with adverse reproductive outcomes—though the full range of human health risks from nitrate intake is not yet well understood.⁶⁶ In September 2011, officials with the Ground Water Protection Council urged the launch of a new work group that will examine how federal and state agencies can limit harm to groundwater from nutrient pollution from agricultural and other nonpoint sources.⁶⁷

Other Adverse Effects of Nutrients. Beyond these direct effects of elevated concentrations of nutrients in water, nutrient pollution is associated with: an increase in the production of carcinogenic disinfection byproducts during chlorination of drinking water; increased mosquito populations; objectionable taste and odor for drinking water (which may be harmless but can pose a cost problem for water managers); and aesthetic damage to recreational waters.⁶⁸

B. Pesticide Pollution

Pesticides (and other “crop protection products,” such as herbicides and fungicides) play a central role in most agricultural operations.⁶⁹ Although pesticides

help to maximize yields, residues found in runoff from large-scale commodity crop operations and other agricultural operations can injure both freshwater and marine species and cause damage to recreational and commercial fisheries. Pesticide contamination of drinking water poses a risk to human health.⁷⁰

A USGS study of untreated groundwater from public supply wells nationwide found one or more pesticide compounds in 41% of source-water samples.⁷¹ State reporting to EPA pursuant to the Clean Water Act identifies pesticides as an impairment in thousands of assessed river and stream miles, and in hundreds of thousands of acres of assessed lakes, rivers, and ponds nationwide.⁷²

Crop pesticide use in 2004 consisted of approximately 495 million pounds of active ingredient. Corn received the greatest application of pesticide of any crop—approximately 175 million pounds of active ingredient applied in 2004—and soybeans ranked second, at approximately 88 million pounds.⁷³

A 2006 USGS study, “The Quality of Our Nation’s Waters: Pesticides in the Nation’s Streams and Groundwater, 1992-2001,” found pesticide compounds in 97% of samples from streams in agricultural areas, with 9.6% of streams in agricultural areas having pesticide concentrations above the human-health benchmark for water (*i.e.*, the point at which pesticide concentrations may have an adverse effect on human health). Concentrations of pesticide compounds exceeded aquatic-life benchmarks in 57% of the agricultural streams tested (*i.e.*, the point at which pesticide concentrations may have an adverse effect on the health of aquatic life).⁷⁴

C. Soil Erosion and Sediment Pollution

The NRCS, in its National Resources Inventory, found that as of 2007, cultivated cropland in the United States was losing on average 3.0 tons of soil per acre per year to erosion from rainfall and runoff.⁷⁵ Wind erosion claimed another 2.5 tons of soil per acre per year from cultivated cropland.⁷⁶ Although substantial progress has been made in reducing erosion rates, existing erosion not only results in loss of a valuable resource, but also leads to downstream sediment pollution. According to state reporting under the Clean Water Act, sediment impairs over 100,000 assessed rivers and stream miles, as well as over 700,000 acres of assessed lakes, rivers, and ponds nationwide.⁷⁷ Sedimentation is closely associated with the problem of turbidity—water becoming murky due to suspended solids.⁷⁸ Sediment also serves to transport other pollutants—such as nutrients and pesticides⁷⁹—downstream.

D. CAFO Pollution

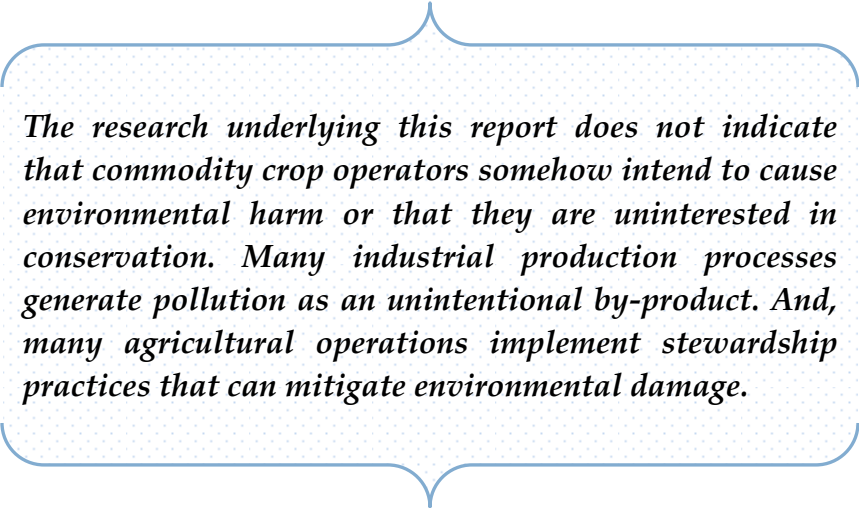
A detailed discussion of the pollution associated with CAFOs and the resulting adverse environmental and health impacts, is beyond the scope of this report. These harms are well documented elsewhere—notably through the work of the independent Pew Commission on Industrial Farm Animal Production, which in 2008 issued a consensus report and set of recommendations concerning the impacts of this industry, following a two-and-a-half year effort.⁸⁰ It is important to note that in 2007, grains fed to livestock represented half of all U.S. grain consumption.⁸¹ For this reason, the environmental harms associated with CAFOs is, to a significant degree, linked to the system of commodity crop agriculture that helps to support the CAFO business model.⁸²

E. Other Potential Impacts/Resource Concerns

In addition to these types of pollution resulting from large-scale commodity crop operations, the sector is associated with other potential adverse impacts on the environment and natural resources. These include significant greenhouse-gas pollution;⁸³ the loss of species habitat and biological diversity;⁸⁴ high rates of withdrawal and consumption of water;⁸⁵ and risks associated with genetically engineered crops—a subject of vigorous ongoing debate.⁸⁶ A detailed discussion of these issues is beyond the scope of this report.

* * *

It is clear from the growing body of research that commodity crop pollution contributes to quantifiable environmental harms. These harms have impacts in terms of resource damage and cost that are not being adequately addressed. It is important to note, however, that the issue here is not one of *intent*: the research underlying this report does not support a general conclusion that commodity crop operators somehow intend to cause environmental harm, or that they are uninterested in conservation. As we have noted, many industrial production processes generate pollution as an unintentional byproduct; this problem is not unique to agriculture. Furthermore, many agricultural operations do implement stewardship practices that mitigate environmental damages. Adoption rates among the largest commodity crop producers are either unknown or not publicly available.⁸⁷



The research underlying this report does not indicate that commodity crop operators somehow intend to cause environmental harm or that they are uninterested in conservation. Many industrial production processes generate pollution as an unintentional by-product. And, many agricultural operations implement stewardship practices that can mitigate environmental damage.

Nor do we mean to suggest that producers are acting illegally by undertaking activities that contribute to the pollution resulting in downstream harms. To the contrary: a fundamental feature of our agri-environmental legal and policy framework is that it tends to exempt agricultural operations from coverage. As a result, polluting practices associated with large-scale commodity crop production are left essentially unregulated. This is the subject to which we now turn.

III. Federal Law and Policy: Environmental Law Exemptions and Farm Bill Subsidies for Commodity Crop Operations

Typically, when the production of a good or service generates pollution or other adverse environmental impacts, the individual or company that is responsible—and that profits from the activity—is required by the law to avoid or minimize the impacts.⁸⁸ This is not the case in the agriculture sector. It is not currently U.S. policy to address the pollution related to commodity crop agriculture, outside of voluntary grant programs and cost-share programs designed to encourage conservation activities. As a result, the costs associated with the environmental impacts discussed above are typically not accounted for by either the seller of commodity crops (the farmer) or by the purchaser (such as grain-trading companies, meatpackers, and feedlots). This means that the producer receives a price for a commodity, such as a bushel of corn, without having to account for the full costs of its production. And the purchaser, often an agribusiness company, pays a lower price than it otherwise would for a crop that will serve as a “raw material” for its end product.⁸⁹

Instead, the *externalized* pollution costs are ultimately imposed on the public—*e.g.*, through the share of responsibility that this aspect of agricultural production bears for a dead zone, or for otherwise polluted waterways. Furthermore, the existing legal framework governing agricultural and environmental issues does not do much to address or discourage these pollution costs. To the contrary, the current system subsidizes large-scale commodity crop production without requiring subsidy recipients to adopt stewardship practices that could significantly reduce pollution. Ultimately, Americans can pay for the production of commodity crops as many as three times: as consumers of the end product at the grocery store cash register or gas pump; as taxpayers funding federal farm subsidies; and as citizens bearing the environmental and public health costs of harms traceable in part to pollution from commodity crop operations.

There are several possible explanations for why commodity crop producers have not been required—by law, policy, or public demand—to account for the pollution associated with their operations. First, most people probably do not associate large-scale commodity crop production with pollution. It can be difficult to accept that these operations result in significant pollution, particularly when the agriculture sector is seen by many policymakers and the public as consisting primarily of small family farms. Even to the extent the problem is recognized, policymakers may be hesitant to

impose regulatory requirements that could be perceived as limiting agricultural efficiency or productivity.

Second, the pollution generated by large-scale commodity crop operations tends to be cumulative and attributable to a variety of sources. For example, the Gulf of Mexico dead zone results from the combined nutrient runoff from thousands of fields—as well as from animal production facilities, municipalities, golf courses, and lawns. With the sources of the problem so diffuse, it can be difficult—factually, but also politically—to fairly and credibly assign responsibility.

Third, although the general nature and source of these harms is clear, the scientific and economic literature has yet to quantify them fully. Although it is not necessary to assign a dollar value to the costs of the pollution caused by large-scale commodity crop production, quantification could be critical in effectively communicating the harms to policymakers and to the public. For example, it is well understood that as long as nitrogen and phosphorus run off of farmland in large amounts, these nutrients will wash downstream and contribute to dead zones and harmful algal blooms. But the economic consequences of the dead zones in the Northern Gulf of Mexico and the Chesapeake Bay—in terms of lost catch, undersized or unhealthy commercial fish, foregone tourism dollars, and other costs—have yet to be fully documented and articulated.

Ultimately, the costs of pollution from large-scale commodity crop operations are externalized because of two types of preferential treatment under U.S. agri-environmental policy. We briefly explain each of these and then discuss opportunities for reform.

A. Exemptions for Large-Scale Commodity Crop Operations under Federal Environmental Law

Virtually all major federal environmental statutes and their implementing regulations grant favorable treatment to the agriculture sector. As the sector has transformed over the years from small family farms to large-scale operations that generate significant amounts of pollution, environmental laws have not been updated to keep pace. Agriculture is now the only major industrial sector that is routinely exempted from baseline environmental safeguards.

The preferential treatment afforded the agricultural industry is widely recognized. The Congressional Research Service recently noted that “[t]raditionally,

most farm and ranch operations have been exempt or excluded from many federal environmental regulations.”⁹⁰ A leading scholar on the intersection of environmental law and farm policy has explained that while some environmental laws do not specifically exempt agriculture, they are “structured in such a way that farms escape most if not all of the regulatory impact.”⁹¹ In other instances, the laws “expressly exempt farms from regulatory programs that would otherwise clearly apply to them.”⁹² “Passive” and “active” exemptions are found in virtually all of the major environmental laws that otherwise could be used to stem pollution resulting from large-scale commodity crop operations.⁹³

This is not to say that there are *no* requirements in environmental laws that apply to the agriculture industry—indeed, EPA has noted that most environmental laws touch on agricultural production in *some* way. But environmental laws are more noteworthy for their exemptions for agriculture than for their regulation of it.⁹⁴ As USDA has explained, environmental laws may place constraints on certain aspects of agricultural production—such as the use of “toxic agricultural inputs”—but “[f]ederal laws directed at reducing environmental pollution (*i.e.*, Clean Water Act, Clean Air Act, Coastal Zone Management Act) have generally not constrained agriculture directly, opting instead for voluntary approaches overseen primarily by the States.”⁹⁵

The reasons for these exemptions, some of which were adopted decades ago, may be rooted in part in the historical composition of the agriculture sector. As discussed earlier, the sector was long characterized by a multitude of small family farms that would have been difficult from a practical perspective to regulate under national environmental laws. Nor would there necessarily have been a need to do so, before the extensive use of chemical pesticides and fertilizer became commonplace. As the average size of farms has increased and the overall number of farms has decreased, however, the laws have not been amended.

The Clean Water Act is probably the most important environmental law with respect to pollution resulting from large-scale commodity crop operations. The Safe Drinking Water Act also plays a role in protecting sources of drinking water from contaminants generated by agricultural operations. In addition, given the dearth of publicly available information on sources of agricultural pollution, the right-to-know and reporting laws are also highly relevant. We turn now to these environmental laws.⁹⁶

The Clean Water Act. The primary U.S. law for controlling water pollution is the Clean Water Act.⁹⁷ Agricultural activities are largely exempt from the core programs responsible for the effectiveness of the law. At the same time, based on state reporting under the Clean Water Act, agricultural pollution is the leading probable source of

water quality impairments in surveyed rivers and streams; the third-largest probable source of impairments in lakes, reservoirs, and ponds; the fourth-largest probable source of impairments in wetlands; and a significant probable source of impairments in assessed bays and estuaries and coastal shoreline.⁹⁸

First, many agricultural activities are not covered by the National Pollutant Discharge Elimination System (NPDES) program established under Section 402 of the Clean Water Act, which is a permitting program for *point sources* of pollution, or facilities that discharge pollutants into waters of the United States.⁹⁹ Permits issued under the program may place limits and conditions on discharges and are based on available control technologies and on applicable water quality considerations.¹⁰⁰ The NPDES program, however, expressly exempts irrigation return flows from the definition of point sources subject to regulation. As a result, water containing pesticides, fertilizers, sediment, and other pollutants that flows from irrigated fields into surface waters is not regulated under the NPDES program.¹⁰¹

Second, the agriculture industry is exempt from regulation under another key component of the Clean Water Act—the industrial stormwater permit program. The Clean Water Act specifically excludes “agricultural stormwater discharges” from the definition of point sources that may be regulated. Therefore, large agricultural operations—including those that are thousands of acres in size—are not required to obtain stormwater permits.¹⁰² The result is that the substantial weather-related runoff containing pesticides, fertilizers, and other pollutants is not subject to Clean Water Act protections. In contrast, stormwater permit requirements apply to other types of industrial activity and even to construction projects over five acres in size.¹⁰³

Third, the Clean Water Act exempts most agricultural activities from the permitting program designed to protect wetlands and other waters subject to federal jurisdiction. Permits are typically required under Section 404 of the Clean Water Act for discharges of dredged and fill material into waters of the United States.¹⁰⁴ “Normal” farming activities, however, are exempt from these permitting requirements. Specifically, farming activities such as plowing, cultivating, minor drainage, and harvesting do not require a permit—even if they involve discharges of dredged or fill materials into wetlands and other waters of the United States.¹⁰⁵ To be exempt, however, the activity must be part of an ongoing operation and cannot involve converting a wetland into agricultural production or an agricultural wetland to a non-wetland area.¹⁰⁶

To the extent the Clean Water Act speaks to pollution from agriculture, agricultural sites are more often treated as a *nonpoint source* of pollution. Nonpoint

source pollution is addressed under several provisions of the Clean Water Act, but the authorities are limited and traditional regulatory tools are unavailable. For example, Section 319 of the Act establishes a Nonpoint Source Management Program, which requires states to establish programs to manage, in addition to other nonpoint source pollution, runoff and leaching of fertilizers and pesticides and irrigation return flows. The management programs must: identify best management practices to be used in reducing nonpoint source pollutant loadings; include programs for implementation of best management practices; and provide sources of funding for program management.¹⁰⁷ Despite the fact that states receive grants for their nonpoint source management programs, the programs have had limited success in addressing pollution from agricultural non-point sources, in part because the program is not federally enforceable.¹⁰⁸

Agricultural pollutants also can be addressed through the “total maximum daily load” (TMDL) program established under Section 303(d) of the Clean Water Act, which applies to water bodies in which state water quality standards still have not been met after technology-based point source pollution controls have been applied. Under the program, states list as “impaired” any waters that are failing to meet state water quality standards. The state is then required to prepare a pollutant-specific TMDL—essentially a “pollution diet”—for each impaired water. The TMDL identifies the amount by which a pollutant or group of pollutants must be reduced to attain water quality standards, and then allocates pollutant load reductions among sources in a watershed. These sources can include nonpoint sources, such as large-scale commodity crop operations. In fact, TMDLs under development in numerous states cover pollution from agricultural sources, but it is difficult to successfully address these and other non-point sources because they do not have permits in which pollutant load reductions can be included. Furthermore, the Act provides insufficient authorities to enforce TMDLs once they are issued. In addition, states tend not to place significant load reduction burdens on agricultural entities.¹⁰⁹

In sum, the Clean Water Act provides numerous exceptions for the agriculture sector that result in assigning little if any responsibility to large-scale commodity crop operations to protect surface and drinking water from the unintended pollution that is a byproduct of their activities.

Safe Drinking Water Act. The key objectives of the Safe Drinking Water Act are to set standards for public water systems’ drinking water quality and to prevent contamination of surface and ground sources of drinking water.¹¹⁰ Although EPA recognizes that runoff containing fertilizer and pesticides from agricultural operations “can have significant impacts on vulnerable aquifers,” the law does not provide for

federal regulation of this runoff, but instead relies on state assessments, voluntary programs, and best management practices.¹¹¹ The Act contains provisions that can be applied to agricultural operations, including requirements for farms that provide drinking water to a minimum number of workers or that inject liquid waste or wastewater into ground water, but the law does not impose requirements related to runoff that contaminates drinking water sources.¹¹²

In addition, the Safe Drinking Water Act requires states to develop source water assessments to identify threats to drinking water sources and states' drinking water program priorities. These assessments can be used by states and communities to address sources of drinking water contamination.¹¹³ The Act also authorizes states to establish Comprehensive State Ground Water Protection Programs. Under these programs, states can impose on agricultural entities requirements for best management practices to prevent groundwater contamination from pesticides, nitrates, phosphates, and other chemicals. Another voluntary program allows communities to implement effective watershed protection programs and take other steps instead of installing costly filtration treatment. A survey of these state programs and the extent to which they address agricultural entities is beyond the scope of this report.¹¹⁴

The Emergency Planning and Community Right-To-Know Act. The public receives little or no information about the quantity of fertilizers and pesticides that are contained in the runoff from large-scale commodity crop operations.¹¹⁵ The environmental laws that are intended to help communities plan for and respond to chemical spills and other emergencies, as well as provide information to citizens about releases of toxic chemicals, provide significant exemptions for agriculture.

Front and center is EPCRA, the Emergency Planning and Community Right-To-Know Act,¹¹⁶ which includes the Toxics Release Inventory (TRI).¹¹⁷ The TRI program requires certain types of facilities that manufacture, process, or use threshold amounts of toxic chemicals to submit an annual toxic chemical release report. The report covers releases and transfers of toxic chemicals to various facilities and environmental media.¹¹⁸ EPA maintains the data reported in a publicly accessible database.

The National Governors Association has called this law “a valuable and powerful incentive for environmental improvement” and noted that TRI “data empowers the government, public health officials, journalists, and citizens with critical information about the amount of toxic chemicals generated annually in a neighborhood, how such material was managed, and whether any of the chemicals were released into the environment.”¹¹⁹ Similarly, according to EPA, the goal of the TRI program is “to provide communities with information about toxic chemical releases and waste

management activities and to support informed decision-making at all levels by industry, government, non-governmental organizations and the public.”¹²⁰ Thus, TRI is used by a range of stakeholders, including the businesses that are required to report, to identify sources of releases, analyze hazards to public health and the environment, and encourage pollution prevention.

TRI does not apply to the agriculture sector. Large-scale commodity crop operations are not required to report releases of toxic chemicals, even though a wide range of businesses in numerous sectors, including manufacturing and mining, are required to report.¹²¹ TRI reporting requirements apply to facilities under Standard Industrial Classification Codes 20-39, which cover, for example, manufacturing. Agricultural entities are covered by SIC Codes 01-09.¹²² Furthermore, the application of pesticides is exempt from TRI reporting requirements.¹²³ Setting aside questions about whether specific fertilizers and pesticides, for example, should constitute “toxic chemicals” under the law and the extent to which such chemicals are released in amounts that trigger the statute,¹²⁴ the blanket TRI exemption for farms ensures that the public will receive no information about the extent to which these toxic chemicals are being released from large-scale commodity crop operations.¹²⁵

Fertilizer and pesticide *manufacturers*, however, are not exempt from TRI reporting requirements.¹²⁶ Those facilities report on more than two hundred toxic chemicals under EPCRA.¹²⁷ Not surprisingly, several of the chemicals that are listed under TRI¹²⁸ and reported by the manufacturing sector have been identified by EPA and others as the active, or sole, ingredient in certain fertilizers and pesticides used by agricultural operations.¹²⁹

* * *

To date, the key federal environmental laws designed to ensure protection of the Nation’s waters and to notify the public about chemical releases have proven ineffective for holding in check pollution from large-scale commodity crop operations, and informing communities about agricultural pollutants entering their water.¹³⁰ We turn now to a discussion of how large-scale commodity crop production fits into the federal framework for agricultural subsidies.

B. Subsidies for Large-Scale Commodity Crop Operations Under U.S. Agricultural Laws and Policy

1. Federal Subsidies to Commodity Crop Agriculture

Generally. Agricultural policy is established principally through the *Farm Bill*, federal agricultural legislation that is enacted at roughly five-year intervals. The latest Farm Bill became law in 2008 and is set to be reauthorized in September 2012.¹³¹ Work on the next Farm Bill is underway.¹³²

Central to the Farm Bill is its elaborate mechanism for providing agricultural subsidy payments. The federal taxpayer supports agricultural production through myriad subsidy programs. USDA characterizes the types of programs as follows:

- Direct or “fixed” payments based on historical cropping patterns on a fixed number of enrolled acres and not linked to the operator’s current decisions on what to produce and when to market farm output.
- Payments that depend on current market prices for enrolled commodities. These payments are comprised of countercyclical payments, loan deficiency payments, marketing loan gains, and certificate gains.
- Conservation program payments, principally from the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), and the Conservation Security Program (CSP) [now known as the Conservation Stewardship Program]—which together disbursed over 89 percent of all conservation payments made to farmers in 2009.
- Other payments include those made by emergency and disaster relief programs, milk support programs, the peanut and tobacco buyout programs, and small miscellaneous programs.¹³³

Additionally, federally subsidized *crop insurance* is an increasingly important component of the current system of federal support to the agriculture sector. The “multiple peril” crop insurance program, which covers most forms of loss, is subsidized by the federal government but sold and serviced by private insurers. The federal government subsidizes the full cost for basic protection of crops against catastrophe; if the policyholder acquires additional coverage under a “buy-up” program, the federal government subsidizes a portion of the premium.¹³⁴ The government pays, on average, 60% of the total premium. Most crop insurance policies are either “yield-based” or “revenue-based.” The federal government’s primary costs in maintaining the crop insurance program include: premium subsidies; reimbursement of “administrative and

operating expenses” to private insurance companies; and underwriting losses due to risk sharing between the government and private insurers (note that in some years, as was the case in 2010, this risk sharing can result in underwriting gains that inure to the benefit of the government). In 2010, crop insurance cost the government \$3.6 billion and covered 255 million acres—with corn, cotton, soybeans, and wheat accounting for 75% of total enrolled acres.¹³⁵ The federal crop insurance program is overseen by the Federal Crop Insurance Corporation, which is operated and managed by USDA’s Risk Management Agency.¹³⁶

Standing alone, each subsidy program is fiscally significant. When viewed in the aggregate, the total dollar figures are striking. For example, USDA reports that in 2010 approximately 772,000 farms received \$9.2 billion in government payments,¹³⁷ and from 2002 to 2010, farms received \$96 billion in government payments. Furthermore, this sum does not take into account federal crop insurance payments, which totaled \$37 billion from 2002 to 2010.¹³⁸

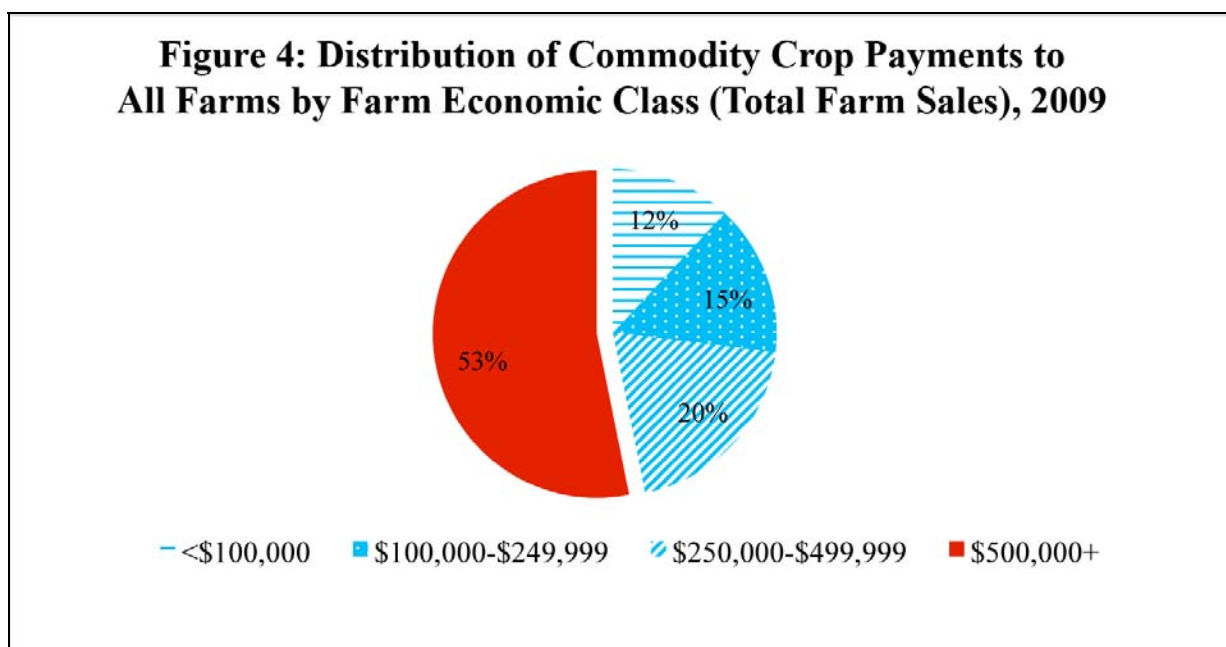
The level of subsidies has raised concerns from entities across the political and policy spectrum—from the Heritage Foundation to Environmental Working Group. The former asserts that Congress should abandon what it calls a “massive” corporate welfare system that is designed to “shift more money to the largest farms and agribusinesses at the expense of small farmers and taxpayers.”¹³⁹ The latter similarly contends that “the so-called farm ‘safety net’ benefits a narrow band of the wealthiest agribusinesses and absentee land owners and the lobbyists who ensure that the subsidies keep flowing.”¹⁴⁰

Viewed in a historical context, federal agricultural subsidies—even very large subsidies—arguably made sense. Subsidies were first adopted in the 1930s when plummeting crop prices following World War I and the Great Depression threatened the livelihoods of American farmers.¹⁴¹ The Agricultural Adjustment Act of 1933 sought to “relieve the existing national economic emergency by increasing agricultural purchasing power”¹⁴² and address a perceived disparity between farm and non-farm income.¹⁴³ To achieve this goal, the Act aimed to give agricultural commodities their pre-war purchasing power by setting a “parity” price based on the average price of a farm product between 1909 and 1914, adjusted by an index that accounted for increases in the cost of goods and in the cost of living. These parity prices were price floors that were backstopped by non-recourse loans.¹⁴⁴ Whenever the market price dropped below the parity price, a farmer could use his crop as collateral for a government loan and then store his grain until prices recovered, instead of selling the crop into a weak market and driving prices down even further. When the market recovered, the farmer could sell his crop and pay back the loan. If crop prices stayed low, he could elect to

keep the money he had borrowed and give the government his crop, which would then go into a grain reserve that could be used as buffer stocks during periods of shortfalls.¹⁴⁵

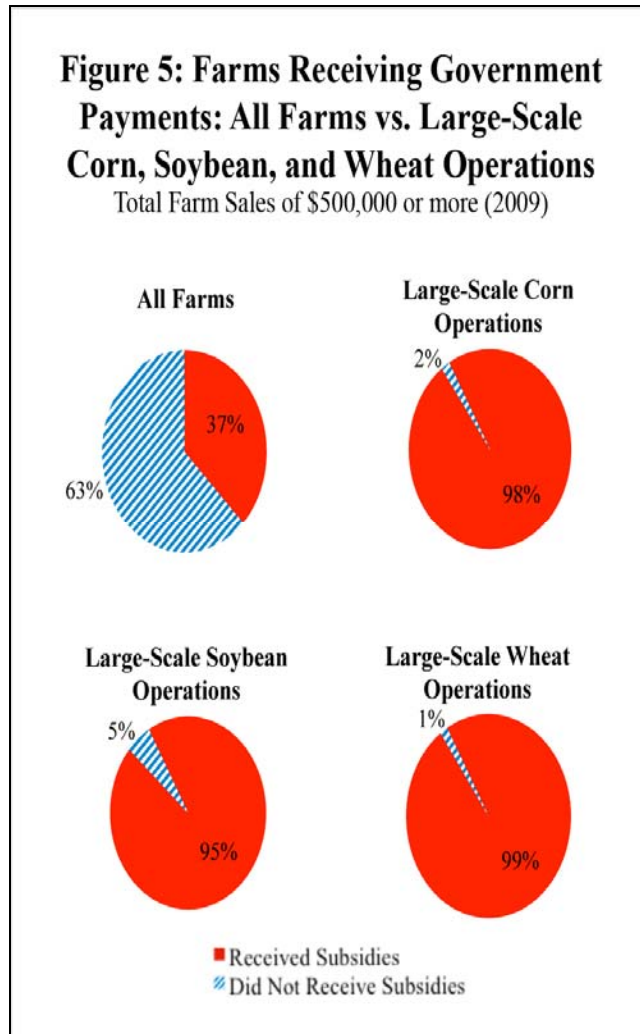
Not only is today's subsidy scheme a radical departure from the original loan concept, but the composition of the agriculture sector has also changed dramatically. In 1930, approximately 25% of the U.S. population lived on 6.3 million farms, each with an average size of 151 acres.¹⁴⁶ By 2002, less than 2% of the population¹⁴⁷ lived on one third (2.2 million) the number of farms, and the average size of each farm had almost tripled to 418 acres.¹⁴⁸

Subsidies to Large-Scale Operations. Large-scale farms with the highest total annual farm sales (\$500,000 or more) receive by far the most subsidy dollars under the system as it is currently structured. As production has shifted to larger farms over the past several decades, as discussed earlier, so too have government subsidies, which are tied to current and/or past production. This includes direct payments, countercyclical payments, federal crop insurance subsidies, and other types of payments.¹⁴⁹ For example, in 2009, government subsidies were paid to only three out of ten farms with less than \$100,000 in sales, but to seven out of ten large-scale farms with \$500,000 or more in sales. These large-scale farm operations (of all types), which represented 6% of all U.S. farms, received over half (53%) of all government *commodity* crop payments in 2009 (*Figure 4*).¹⁵⁰



Source: Econ. Research Serv., U.S. Dep't of Agric., *ARMS Financial and Crop Production Practices: Farm Structure and Finance, Tailored Reports* (data compiled by Env'tl. L. Inst., 2012) (2009), available at http://www.ers.usda.gov/Data/ARMS/app/default.aspx?survey_abb=FINANCE.¹⁵¹

While approximately one in three farms nationwide received government payments in 2009, nearly all large-scale corn, soybean, and wheat operations received them—with 98%, 95%, and 99% of these operations, respectively, doing so (*Figure 5*).¹⁵²



Source: Econ. Research Serv., U.S. Dep't of Agric., ARMS Financial and Crop Production Practices: Farm Structure and Finance, Tailored Reports (data compiled by Env'tl. L. Inst., 2012) (2009), available at http://www.ers.usda.gov/Data/ARMS/app/default.aspx?survey_abb=FINANCE.¹⁵³

Table 2 provides further detail about these payments. Specifically, over 20,000 large-scale *corn* operations in 2009 received \$770 million in government payments. Operations that grossed \$500,000 or more annually (but less than \$1 million) received an average of \$24,511 in 2009, and operations that grossed \$1 million or more received an average of \$51,152 in government payments. In addition, more than 7,000 large-scale *soybean* operations received over \$340 million in government payments. Farms grossing

\$500,000 or more (but less than \$1 million) received an average of \$32,182, and farms grossing \$1 million or more received an average of \$105,133. Similarly, more than 3,000 large-scale *wheat* operations received a total of \$210 million in government payments. Operations with gross sales of \$500,000 or more (but less than \$1 million) received an average of \$55,138 and those with gross sales of \$1 million or more received an average of \$124,841.¹⁵⁴ Note that these government payments do not include crop insurance subsidies.

Table 2: Government Payments to Large-Scale Corn, Soybean, and Wheat Operations

Total Farm Sales of \$500,000 or more and \$1,000,000 or more (2009)

	<i>Total Farm Sales</i>	<i>Corn</i>	<i>Soybean</i>	<i>Wheat</i>
Total Government Payments for Commodity	\$500,000+	\$770,373,000	\$340,945,000	\$212,968,000
	\$1,000,000+	\$350,361,000	\$155,351,000	\$59,746,000
Percentage of All Government Payments Received for Commodity	\$500,000+	50.78%	45.47%	37.36%
	\$1,000,000+	23.10%	20.72%	10.48%
Average Government Payment Per Farm	\$500,000+	\$32,120	\$47,059	\$65,549
	\$1,000,000+	\$51,152	\$105,133	\$124,841
Number of Farms Receiving Payments	\$500,000+	23,984	7,245	3,249
	\$1,000,000+	6,849	1,478	479

Source: Econ. Research Serv., U.S. Dep't of Agric., *ARMS Financial and Crop Production Practices: Farm Structure and Finance, Tailored Reports* (data compiled by Env'tl. L. Inst., 2012) (2009), available at http://www.ers.usda.gov/Data/ARMS/app/default.aspx?survey_abb=FINANCE.¹⁵⁵

A relatively small percentage of the subsidies received by large-scale commodity crop operations are conservation payments. From an environmental perspective, however, the Farm Bill's various conservation subsidy programs are enormously important. NRCS and the Farm Service Agency (FSA) collectively administer over

twenty programs and subprograms that provide technical and financial incentives to producers to implement conservation practices.¹⁵⁶ The programs are voluntary and support efforts by private landowners to address natural resource depletion and pollution caused by farming. Conservation programs cover a range of environmental issues, such as water quality and quantity, soil erosion, air quality, wetlands protection, and wildlife habitat.

According to 2009 ARMS data, large-scale commodity crop operations (corn, soybean, and wheat farms with total annual sales of \$500,000 or more) received 39.4% of all conservation subsidy dollars that went to those commodity crops. In total, large-scale commodity crop operations received \$168 million in conservation subsidies in 2009. The average conservation subsidy payment (per program recipient farm) in 2009 to a large-scale corn, soybean, and wheat operation was \$2,852, \$5,089, and \$19,300, respectively.¹⁵⁷

In total, according to a recent study, half of government farm subsidies in 2009 went to farm households with incomes that were “significantly higher” than the incomes of most U.S. households.¹⁵⁸ Eligibility restrictions for subsidy payments to individuals and companies do exist in the form of caps on adjusted gross income.¹⁵⁹

2. Minimal Stewardship Responsibilities Imposed on Large-Scale Commodity Crop Operators that Accept Subsidies

This report is not intended to evaluate the merit or the funding level of any particular agricultural subsidy. It is important to note, however, that the government requires only limited conservation stewardship measures from large-scale commodity crop operators that elect to receive subsidies. Outside of conservation subsidies, farm subsidy recipients typically are not required as a condition of receiving payments to implement conservation measures that will protect water from nutrient pollution or any other form of pollution generated by on-farm activities.

An important exception is for farming on certain lands that USDA specifically has designated as highly erodible land, referred to as “HEL.” In 1985, the Farm Bill contained for the first time conservation requirements that apply to subsidy recipients that farm highly erodible lands. These are known as the “conservation compliance” and “sodbuster” programs,¹⁶⁰ but we refer to these programs collectively as “conservation compliance requirements.” Their goal is to reduce soil erosion, which in turn helps to protect soil productivity and reduce sediment runoff. As discussed in more detail below, the programs require producers to implement and maintain soil “conservation systems” on highly erodible cropland, or risk losing certain federal subsidies, such as

price support loans and income support payments.¹⁶¹ The 1985 Farm Bill also established a wetlands conservation or “swampbuster” program,¹⁶² but it did not require measures to reduce nutrient or other types of pollution as a condition of receiving federal payments.¹⁶³

IV. Analysis and Recommendations: Large-Scale Commodity Crop Operations that Accept Federal Assistance Should Assume Responsibility for Adopting Baseline Stewardship and Disclosure Measures to Address Nutrient Pollution

More effectively controlling the pollution resulting from commodity crop production presents difficult policy issues. Agricultural pollution is diffuse in its sources, is associated with a politically powerful sector,¹⁶⁴ and imposes harms that tend to be invisible to the naked eye and difficult to quantify. Nevertheless, as is made abundantly clear by the literature cited in this report, we face clear environmental and human health impacts as a result of current agricultural practices and policy—and the answer should not be to maintain the status quo.

Not surprisingly, scholars as well as public interest groups have advocated for amendments to the Nation’s key environmental laws to minimize or eliminate the exemptions from coverage that are currently afforded to large-scale commodity crop agricultural operations.¹⁶⁵ Despite the advantages of such an approach, in the prevailing economic and political landscape, it seems unrealistic to expect new legislative action in this area, much less an amendment of the scale that would be necessary to meaningfully address non-point source pollution from field crops and other disparate sources.

Fortunately, the key instrument of modern farm policy—the federal Farm Bill—may provide a practical option for better responding to the environmental impacts discussed in this report.

A. Placing Responsibility on Large-Scale Commodity Crop Operations to Adopt Baseline Stewardship Measures Will Reduce Future Costs to the Public

The Farm Bill is a ready-made tool for achieving almost immediate reductions of pollution generated by large-scale commodity crop operations without requiring an increase in federal subsidy payments. There is ample precedent for attaching conditions to federal payments to ensure that the dollars are used wisely and in a manner that is not counter to other public policy priorities.¹⁶⁶ We already have experience with this approach under the Farm Bill—our recommendation would expand on existing practice and experience.

Conservation Compliance Requirements as a Template. As discussed above, conservation compliance requirements are aimed at reducing soil erosion and require farmers to develop conservation plans for highly erodible lands that achieve standards set by USDA.¹⁶⁷ As of 2007, the National Resources Inventory designated about 97.8 million acres¹⁶⁸ as highly erodible cropland—or 24% of the 406.4 million acres of all U.S. cropland.¹⁶⁹ The types of practices adopted under the plans vary according to many factors, including type of crop and climate. Over 1600 different types of systems have been approved for use. More than half of the acres with conservation systems in place, however, rely on one or more of three practices: conservation cropping, conservation tillage, and crop residue use.¹⁷⁰

According to USDA, farm program payments that were subject to conservation compliance requirements—including commodity, disaster, and conservation programs—ranged between \$11.7 billion and \$27.3 billion from 1997 to 2007. In addition, farmers may be ineligible for loan and loan guarantee programs if these requirements are not met.¹⁷¹ Federally subsidized crop insurance¹⁷² is the only major program that is not subject to conservation compliance requirements.¹⁷³ USDA researchers have noted, however, that if direct payments are reduced in the next Farm Bill as part of federal budget deficit reduction measures, many operations would no longer be subject to conservation compliance requirements. A possible way to bridge this gap, they explain, would be to extend conservation compliance requirements to crop insurance.¹⁷⁴

Conservation compliance requirements feature various exemptions and variances. These include an exemption for “good faith” efforts to apply conservation systems that fail to meet requirements, provided the farmer signs a plan to take appropriate measures within a designated time period. There is also an exemption for “undue economic hardship” if it is economically prohibitive for a farmer to install and maintain a system and exemptions for cases in which a needed technology is not available and alternatives do not exist. There are also variances associated with technical assistance to help farmers meet the conservation requirements.¹⁷⁵

USDA analysis indicates that the conservation compliance requirements have contributed to substantial reductions in soil erosion. According to USDA data, soil erosion declined by about 40% annually from 1982 through 1997, and approximately one quarter of those reductions occurred on highly erodible land subject to conservation requirements. Furthermore, greater reductions in percentage terms occurred on highly erodible land receiving government subsidies, as compared to on land owned by those who did not receive subsidies,¹⁷⁶ leading USDA to conclude that “compliance mechanisms encouraged greater conservation effort.”¹⁷⁷

In addition, potential loss of benefits may have kept some producers from expanding production onto highly erodible land—if the value of participating in commodity programs on cropland already in production was greater than the anticipated economic gains of expanding production. For example, USDA estimates that “[w]ithout compliance requirements, between 7 million and 14 million acres of highly erodible land . . . that are not currently being farmed could be profitably converted to crop production, under favorable market conditions.”¹⁷⁸

The USDA also recognized, however, that erosion was reduced on land that was not subject to compliance requirements. Therefore, other factors played a role in reducing soil erosion, including that adoption of conservation practices may increase net returns.¹⁷⁹ For example, conservation tillage “can preserve soil moisture where rainfall is limited and can also reduce machinery, fuel, and labor costs, making it profitable for some producers regardless of its effect on soil erosion.”¹⁸⁰ In addition, erosion may also be reduced because growers opt to use the same management practices on their non-highly erodible land as they use for acres subject to conservation compliance requirements.¹⁸¹

The conservation compliance requirements, despite their accomplishments, have faced numerous implementation challenges. Several years ago, the U.S. Government Accountability Office (GAO) reported that the conservation compliance requirements were not being implemented consistently by NRCS, which increased the possibility that farmers were receiving federal farm payments even in cases in which soil erosion rates were higher than permitted. According to GAO’s nationwide survey: “almost half of the Conservation Service’s field offices do not implement the conservation provisions as required because they lack staff, management does not emphasize these provisions, or they are uncomfortable with their enforcement role.”¹⁸² Furthermore, GAO found that the “field offices do not always find a farmer in violation for failing to implement an important practice, such as crop rotation, and do not always see whether a farmer has corrected the problem”¹⁸³ It also found that the USDA agency responsible for withholding benefits in cases in which there are violations often waived noncompliance determinations without adequate justification.¹⁸⁴ Similarly, the USDA Office of Inspector General (OIG) identified concerns about program administration, including “[w]eaknesses in handbook procedures,” status reviews that “were not always timely performed during critical erosion control periods,” and “[in]sufficient detail” in summaries of status review results, among other concerns.¹⁸⁵

In response to the GAO and OIG reports, NRCS implemented several changes intended to improve implementation and enforcement of the program, leading GAO to

designate most of its recommendations as “implemented,” including increased oversight and staff training.¹⁸⁶ Similarly, the OIG concluded that NCRS had made “considerable improvements to the status review sample selection and data collection processes; addressing major areas of concern included in prior OIG audit reports.”¹⁸⁷ Some recommendations were not deemed “implemented,” however, and calls continue for further improvements in implementation, including from the American Farmland Trust, which recently noted an opportunity to “modernize” the conservation compliance enforcement system “to serve both producers and the taxpayer better.”¹⁸⁸

Building on Existing Programs. Despite implementation challenges, these existing programs have succeeded in reducing sediment pollution and, therefore, establish a precedent for placing common-sense environmental conditions on the receipt of subsidies. It is not surprising that USDA researchers have suggested that these programs could serve as a model for reducing the costs to the public of the environmental impacts of farming activities that receive federal support.

Specifically, ERS researchers have examined whether a similar approach could be used to address other major pollutants from farms, including nutrient pollution. As discussed above, data suggest that fertilizers are often applied in excess of crop needs. According to a recent USDA report, for example, only 35% of the field crops planted in the United States in 2006 that were treated with commercial and/or manure nitrogen met all three best management practices included in the study for rate, timing, and method of application. Roughly 65% of cropland surveyed—109 million acres—was in need of improved nitrogen management. Furthermore, corn crops “met the criteria the least” and accounted for half of the acres treated for which at least one management improvement could be made to improve nitrogen use efficiency.¹⁸⁹

Rightly, ERS reasons that because USDA’s ARMS data indicate that farms receiving some type of government payment accounted for 86% of U.S. cropland, conservation conditions placed on subsidies would reach a large percentage of cropland.¹⁹⁰ Citing USGS estimates that commercial fertilizer applications are responsible for a substantial share of nutrient runoff, particularly nitrogen, ERS further explains that more than 80% of cropland acres with high or very high nitrogen runoff potential are found on farms that receive commodity program payments. Moreover, the highest payments appear to flow to producers in areas where nitrogen runoff potential is greatest. ERS also notes a similar connection between commodity program payments and the potential for phosphorus runoff to surface water and nitrogen leaching to groundwater.¹⁹¹

ERS has examined the costs associated with extending compliance provisions to include nutrient pollution, noting that a “drawback” of this approach is that “the strength of the incentive is dependent on the level of Government payments”—and because payments “can vary greatly,” the effectiveness of the approach can also vary.¹⁹² ERS researchers have concluded, however, that “[f]or many—but not all—crop farms with very high nutrient runoff potential, the cost of measures designed to reduce nutrient runoff would be modest compared with their commodity program payments.”¹⁹³ They further find that “the value of government payments will generally exceed the cost of addressing nutrient loss through either nutrient management or buffer practices, suggesting that a compliance mechanism could be effective in leveraging the adoption of practices designed to reduce nutrient runoff.”¹⁹⁴

For crop producers already subject to conservation compliance who also are located in areas where nutrient-related compliance requirements could be most significant, “farm program payments are also large and would likely provide ample incentive for the additional requirement.”¹⁹⁵ USDA has found that “[o]n the whole . . . a nutrient management requirement might prove as effective in reducing nutrient runoff from cropland as conservation compliance has been in reducing erosion”¹⁹⁶ and that “[e]xtending compliance to address nutrient runoff and leaching from land in crop production, whether through management of nutrient application or interception of nutrients with buffer practices (or both), could provide some additional environmental benefits.”¹⁹⁷

USDA researchers also have considered more generally the merits of “green” requirements similar to the conservation compliance requirements. They have observed that “[g]iven that major income support programs are centered on major fields crops, environmental problems associated with cropland are likely candidates for compliance.”¹⁹⁸ They have noted, however, that “unless payments tend to be high where conservation costs are high . . . equity issues could also arise,” because some operations could have large costs and receive small payments while others receive large payments but have only minimal conservation costs.¹⁹⁹

Recommendation No. 1. Drawing on these observations, **we recommend that large-scale commodity crop operations receiving any type of federal farm subsidy, including federally subsidized crop insurance,²⁰⁰ assume responsibility for implementing a set of baseline stewardship measures as a condition of receiving payment.**²⁰¹ This common-sense condition builds on the conservation compliance model that has long been present in Farm Bill programs and will reduce the downstream pollution costs that are now imposed on the taxpayer.

We offer an outline of the basic components of a new approach that places responsibility on large-scale commodity crop operators – we do not purport to provide a detailed implementation roadmap in this report.

First, we propose that receipt of Farm Bill payments associated with large-scale commodity crop operations be made contingent on the recipient's certification that baseline stewardship measures for nutrient pollution have been implemented. ELI uses "baseline stewardship measures" as shorthand for any set of management practices that is appropriate to the particular crop, geography, climate, and other local circumstances of the operation. We do not advocate a "one-size-fits-all" approach. Numerous resources exist that could be used as a starting point, such as the USDA-NRCS Conservation Standard 590–Nutrient Management and Field Office Technical Guides. The determination of what specifically constitutes appropriate baseline stewardship measures and how they are to be applied, however, is best left to the expert agency, USDA, to address with substantial stakeholder input.

Second, to ensure that the condition is implemented in a fair and equitable manner, it is essential to provide exemptions for undue economic hardship and good faith efforts to implement stewardship measures that fail. In addition, technical assistance should be provided as needed.

As discussed earlier, the average large-scale commodity crop operation has net cash income that is substantially larger than that of commodity crop farms in other USDA-designated economic classes. For example, large-scale corn, wheat, and soybean operations (*i.e.*, those with gross sales of \$500,000 or more) have average net cash incomes that exceed two times and in some cases three times the average net cash income of the same type of farms in the next-largest economic class (*i.e.*, farms that gross between \$250,000 and \$499,999 in sales), as indicated in *Figure 3*.

By limiting the recommendations in this report to large-scale commodity crop operations, it is intended that cases of undue economic hardship will not be widespread. However, conservation compliance requirements provide a model that can be built upon and possibly improved based on experience to address any economic hardship cases that arise. For example, in determining whether an exemption for undue economic hardship should apply, several factors are considered, including: the

installation cost of the conservation measures, the amount of program payments received, and the general economic situation of the recipient of federal assistance.²⁰² Furthermore, exemptions for undue economic hardship will ensure that even if there is an occasional inequity in the relative costs of implementing comparable stewardship practices, no large-scale commodity crop operation will experience financial duress. To the extent large-scale commodity crop operations require technical assistance to meet their responsibility to implement baseline conservation measures, NRCS should provide that assistance as it does for conservation compliance requirements and through other programs—and universities and extension services may have an important role to play.²⁰³

Third, conditioning federal payments on the implementation of baseline stewardship practices should not result in a significant new paperwork burden for recipients or government employees. The aim is not to establish a new program area, but rather to ask operators to take practical steps based on readily available tools and knowledge, and certify that they have done so. Farm subsidy recipients already complete paperwork that includes certification of compliance with adjusted gross income limits and conservation compliance requirements.²⁰⁴ This new condition could be incorporated into existing procedures.

The responsibility to adopt baseline stewardship measures for nutrients could be administered in a range of ways. On one end of the spectrum would be a simple annual requirement that the large-scale commodity crop operator certify in writing that baseline stewardship measures have been implemented. No further USDA review or inspection would occur. This approach would be similar to the American Recovery and Reinvestment Act requirement that a state, in exchange for receiving State Energy Program funds under the Act, certify that it will adopt energy efficiency codes for buildings.²⁰⁵ Such a streamlined approach would require minimal additional resources to administer, with USDA essentially taking the operator at his word that baseline stewardship measures have been successfully implemented.

On the other end of the spectrum is the conservation compliance model, under which USDA approves soil conservation plans and conducts follow-up inspections. If this more comprehensive approach is taken, every effort should be made to build upon USDA's extensive experience administering conservation compliance requirements and other stewardship programs, such as EQIP, in an effort to capitalize on lessons learned. For example, there are considerable analyses, such as those contained in the GAO and IG reports discussed above, that outline steps taken to improve implementation of conservation compliance requirements. Furthermore, the government in administering the program could borrow from ongoing efforts to make conservation programs more

client-focused and efficient, such as the NRCS Conservation Delivery Streamlining Initiative.²⁰⁶ Ultimately, however, an approach to administration that prioritizes verification will require a greater investment of time and resources by the recipient and agency personnel.

Striking the proper balance between ease of administration and verification must of necessity take into account current economic and political realities. A successful, practical approach to administering this “baseline stewardship measures” condition for the receipt of federal subsidies almost surely cannot be made to depend on implementing an expensive new administrative program within USDA. Further assessment of the various options for administering the requirement for baseline stewardship measures should be the subject of stakeholder discussion.

Fourth, in asking large-scale commodity crop operations to assume responsibility for adopting baseline stewardship measures as a condition of receiving federal assistance, there should be an effective interface with current USDA conservation subsidies programs to avoid overlap.²⁰⁷ This should be relatively straightforward, as the new condition would exist outside of and separate from current conservation subsidy programs. Although it will be important to provide operators with any required technical assistance, federal conservation subsidies should not be used to satisfy the condition of adopting baseline stewardship measures. Certainly federal conservation subsidies *could* appropriately be used to adopt measures above and beyond that baseline.²⁰⁸

Critically, this report does not suggest that conservation program funding be reduced or otherwise affected by placing responsibility on large-scale commodity crop operations to adopt baseline conservation measures. This proposal is intended to complement the accomplishments of existing conservation programs—not to replace any aspect of these essential programs, or to compete with them for scarce federal funding.

Responsibility for Baseline Stewardship Measures

Key Principles

- Apply to Large-Scale Commodity Crop Operations.
- Initially Include Only Baseline Stewardship Measures for *Nutrient Pollution*.
- Tailor to Local Circumstances Based on Farmer and Agency Expertise.
- Ensure Fairness Through –
 - Exceptions for undue economic hardship;
 - Exemptions for good faith efforts; and
 - Technical assistance.
- Minimize Administrative Burden on Federal Subsidy Recipients and USDA Staff.
- Complement – and Do Not Scale Back – Conservation Programs.

Conditioning federal payments on stewardship practices is not only a wise use of federal dollars that will reduce pollution, but it is also likely to be well received in the marketplace. The wholesalers and processors that purchase from large-scale commodity crop operations are already publicly touting their policies and initiatives that seek to foster the use of sustainable agricultural practices. For example, ConAgra Foods has a “sustainable agriculture initiative” founded on the premise that “promoting sustainable agricultural practices in our supply chain will be an integral part of our long term . . . success.”²⁰⁹ Its initiatives include a pledge to source 100% of its palm oil from sustainably certified sources.²¹⁰

PepsiCo posts its Global Sustainable Agriculture Policy online. The company advertises that it works with farmers, including corn and wheat producers, to promote sustainable agricultural practices, such as developing plans with producers to maximize agricultural outputs while minimizing the use of inputs that can have negative impacts.²¹¹ In addition, Archer Daniels Midland Company on its “Supply Chain Integrity” web site outlines its “Socially and Environmentally Responsible Agricultural Practices Program” for cocoa and its “Doing it Right” initiative for sustainably grown soybeans, in addition to other initiatives.²¹² Other food processors, such as Bunge, participate in initiatives including “Field to Market.”²¹³ This multi-stakeholder initiative provides resources to growers, including the “fieldprint calculator,” which helps farmers efficiently use natural resources in their operations.²¹⁴

Furthermore, many agricultural producers are themselves rightly concerned about pollution. For example, the 2009 Iowa Farm and Rural Life Poll, a respected survey of Iowa farmers that has been conducted annually since 1982, found that 78% of respondents agreed or strongly agreed with the following statement: “Iowa farmers should do more to reduce nutrient and sediment run-off into streams and lakes.”²¹⁵ Some farmers may even be willing to adopt conservation practices that reduce their profits if others will benefit from the environmental quality improvements.²¹⁶

In many cases, however, improved nutrient management practices can increase rather than decrease profits. Much as soil erosion prevention practices were found by USDA to increase net returns in some cases,²¹⁷ so, too, studies indicate that nutrient management practices can increase profitability. For example, nutrient management measures can reduce the amount of fertilizer applied to crops.²¹⁸ One study that analyzed economic and best management practice adoption data from 963 Kansas farms found that adoption of nitrogen best management practices had “a significant positive effect on net farm income” for corn and wheat acres.²¹⁹

In fact, there is evidence that many commodity crop operations are already implementing on-farm stewardship measures that can and do mitigate the negative environmental and public health consequences of nutrient pollution. For example, a 2009 report by the Keystone Alliance for Sustainable Agriculture noted that from 1992 to 2006, detection in surface water of certain nutrients and pesticides above human health benchmark levels remained relatively flat—despite an increase in crop production over the same period.²²⁰ Large scale commodity crop operations that are already implementing stewardship measures should be commended, and certainly no new measures would be required of farm subsidy recipients already implementing baseline stewardship conditions. Moreover, conditioning receipt of federal farm subsidies will help level the playing field and benefit the operations that are already

meeting minimal stewardship requirements by asking other large-scale operations to assume responsibility for adopting the same kinds of measures.

B. Placing Responsibility on Large-Scale Commodity Crop Operations to Publicly Disclose Fertilizer Use Will Increase Transparency and Potentially Reduce Pollution

The exceptions for the agriculture sector contained in the community right-to-know laws, discussed above, limit the information available to agricultural entities, policy-makers, and communities about pollutants released from large-scale commodity crop operations as a result of chemical inputs such as fertilizers and pesticides. This report does not assess whether the routine use of chemicals in agriculture operations should be exempt from the laws that require disclosure of storage, use, and releases of toxic chemicals. We do, however, examine other opportunities for increasing information disclosure, because of the potential benefits of doing so for public health and the environment—as well as the benefits to those entities disclosing the information.

It is useful to reference experience with TRI reporting, because it demonstrates the benefits of disclosure. As EPA explains: “The TRI data often spurs companies to focus on their chemical management practices since they are being measured and made public. In addition, the data serves as a rough indicator of environmental progress over time.”²²¹

This perspective generally is shared by the broader stakeholder community, as discussed earlier. For example, TRI has been characterized as the “most successful environmental regulation of the last ten years” due to consistent decreases in the releases of reportable chemicals and the use of reported data by a broad spectrum of stakeholders.²²²

The decreases in the amounts of releases are surprisingly high, given that TRI requires only reporting, without any performance requirements. The reasons for TRI’s success have been the topic of much debate and discussion. These include the assessment that stakeholders can use TRI information to affect future releases through an array of potential mechanisms, such as: self-analysis; industry-wide regulation/peer-review; governmental regulation as a response to newly-disclosed information; public pressure; and market pressure through capital markets, reputational harm, and other means.²²³

Furthermore, TRI and other environmental disclosure programs can result in financial benefits to those who perform the disclosure. For example, the information gathered in order to make the disclosure could inform behavior with respect to time and amount of fertilizer used. As discussed above, both soil erosion prevention and nutrient management practices have been found to increase net returns in some cases.²²⁴

TRI represents only one approach to reporting information about potential health and environmental impacts. Disclosure approaches also are used successfully in other contexts as a means of gathering environmental data or information and encouraging voluntary behavior changes that benefit the environment. For example, the Energy Star Program allows companies to affix the Energy Star label to their products, in exchange for disclosures with respect to energy efficiency and the assurance that the product meets certain EPA-established standards. Although there is not a retail market for commodity crops in the same way as there is for Energy Star products, implementation of stewardship measures may make purchasing from operations more appealing to those further up the supply chain in the food industry.

In addition, the act of disclosure itself can improve the value of a business entity. A recent study by researchers at the University of California, Davis, and the University of California, Berkeley, tracked stock values of 172 firms two days before and two days after the companies released carbon emissions information. On average, stock prices increased by about half a percentage point over the period of study and an even greater increase was found for smaller companies, whose stocks raised an average of 2.3% following disclosure. A co-author of the study concluded: “When a company makes a voluntary disclosure of this kind, it signals to the investment community that this is a firm that is environmentally responsible Investors are saying they would prefer to invest in an environmentally responsible firm.”²²⁵ Similar principles could apply here—particularly as markets for sustainably grown commodities expand. At the same time, there are real questions about whether such market signals can make it through the food chain in a largely undifferentiated market for commodity crops. Additionally, where there is only a single buyer, the seller’s choices may be severely constrained.

Others have recommended establishing a new system for agricultural entities to report releases of chemicals. For example, Professor J.B. Ruhl has proposed a Farm Release Inventory (FRI) modeled on TRI. The FRI would collect information that could be used to inform the development of other law and policy tools, such as tax incentives and permitting programs, and incentivize reductions in chemical releases.²²⁶

Rather than propose a new regulatory program or amendments to the right-to-know laws, however, this report recommends that certain recipients of federal

subsidies, in exchange, make available to taxpayers basic information that will increase understanding about the nature and extent of pollution associated with their operations, and the potential impact of these operations on public health and the environment.

Recommendation No. 2. Specifically, **we propose that large-scale commodity crop operations that accept any form of federal farm subsidy assume responsibility for disclosing the quantity, type, and timing of fertilizers they apply each year.** Eventually, applications of pesticides and other inputs could potentially be covered by this disclosure condition, as well. Although release reporting (that is, reporting on the quantity of nutrients leaving the property as runoff) would provide the most relevant information, this data would be more burdensome to develop and produce.²²⁷ NRCS, with stakeholder input, should decide on the details of the information to be disclosed, with an emphasis on generating a clear, easy-to-understand dataset—while minimizing the burden on operators. The information should be made available to the public in an accessible and user-friendly format. The disclosures would be purely informational and would not inform the distribution or allocation of federal subsidy program payments.

The approach to reporting information on fertilizer application should be as streamlined as possible, adding only a minimal administrative burden for large-scale commodity crop operators. Electronic reporting and certification should be considered, as well as other approaches based on stakeholder input. Farm subsidy payment recipients already are required to undertake certain reporting requirements. For example, to be eligible for either the Direct and Counter-Cyclical Program or the Average Crop Revenue Election Program, a producer must report annually on the use of the farm's cropland acreage.²²⁸ Reporting on fertilizer use would be consistent with existing requirements and could benefit from lessons learned about streamlining reporting of similar types of information.²²⁹

Finally, public disclosure of fertilizer applications is consistent with food marketing system trends. As ERS reports, the top companies in the main sectors of the U.S. food system—food manufacturers, foodservice companies, and grocery retailers—are to varying extents voluntarily reporting on their environmental and other socially beneficial activities on their web sites and in separate reports.²³⁰ For example, ConAgra and PepsiCo have web sites devoted to corporate social responsibility reporting. PepsiCo uses the Global Reporting Initiative index that includes standardized reporting guidelines for progress on environmental performance. And, the “Field to Market” initiative, in which Bunge participates, develops and tracks indicators for environmental and social impacts of corn, soybeans, wheat, and other crop production.

Disclosure Responsibility

Key Principles

- Apply to Large-Scale Commodity Crop Operations.
- Initially Include Only Disclosures Related to Fertilizer Applications.
- Ensure Fairness Through –
 - Exemptions for good faith efforts; and
 - Technical assistance.
- Minimize Administrative Burden on Federal Subsidy Recipients and USDA Staff.

* * *

A decade ago, Professor J.B. Ruhl observed that “we are well past the days when environmental policy triage leaves agriculture out of the operating room. The spotlight now is on agriculture.”²³¹ These remarks hold true today and may well be more urgent in light of the growing evidence of the impacts of agricultural pollution—and, in particular, nutrient pollution. We can take an important step in this direction by asking that when the largest commodity crop operators accept federal subsidy payments, they also assume responsibility for adopting baseline stewardship practices (which many will have already done) and publicly disclosing information on their application of fertilizers. These simple recommendations build on existing practice using mechanisms already familiar to stakeholders. This is a common sense, incremental approach that can help more effectively address agricultural pollution.

Summary of Recommendations

*Because Congress establishes U.S. agricultural policy through the Farm Bill, and the U.S. Department of Agriculture is the key federal agency implementing that policy, **Congress and USDA** should—*

- To reduce the cumulative impacts of downstream nutrient pollution, **ask large-scale commodity crop operations that accept any type of federal farm subsidy to assume responsibility for implementing baseline stewardship measures designed to minimize nutrient pollution.**
- To ensure that the public has access to information on the sources and quantities of nutrient pollution potentially entering surface waters and groundwater, **ask large-scale commodity crop operations that accept any of federal farm subsidy to assume responsibility for publicly disclosing the quantity, type, and timing of fertilizers they apply each year.**

*Because the best environmental stewardship comes from those who are closest to the land and have the greatest knowledge of local conditions, **large-scale commodity crop operations** should—*

- To reduce the cumulative impacts of downstream pollution, for the benefit of those who use our waters for recreation and non-agricultural commercial purposes, **increase the adoption of stewardship practices to the maximum extent practicable.**
- To ensure that the public has access to information related to the sources and quantities of pollution potentially entering surface waters and groundwater, **publicly disclose the quantity, type and timing of fertilizers they apply each year.**

Appendix: Methodology

ELI generated data for this report by using the Agricultural Resources Management Survey (ARMS) Farm Structure and Finance Tailored Reports database, available on the U.S. Department of Agriculture (USDA) web site at: <http://www.ers.usda.gov/Data/ARMS/FarmsOverview.htm>.

ARMS is an annual research survey of farmers and ranchers that is administered by USDA's Economic Research Service (ERS) and National Agricultural Statistics Service (NASS). ARMS is USDA's primary source of data for all research related to farm finances, production practices, resource use, and economic well-being.ⁱ The Tailored Reports database allows the user to manipulate data by changing variables within certain predetermined fields.

ELI conducted the underlying research for this report in reliance on 2009 ARMS data, which at the time of the research was the most current data. 2010 data is now available. Also, it is important to remember that key farm sector indicators like sales and income can fluctuate from year to year, as they are subject to a range of factors (*e.g.*, weather, market supply and demand, government policy (such as biofuels policy), and broader economic pressures). This means that while the data from any one year can provide a useful snapshot, it will not necessarily reveal all relevant trends.

For ELI's calculations based on the Economic Classes of All Farms, ELI used the following variables:

Survey: Farm Finances
Report: Government Payments
Filter by US/State: All States
From Year: 2009
Subject: All Farms
Row Group: Economic Class
Sub Group: All Farms

ⁱ Econ. Research Serv., U.S. Dep't of Agric., *What is ARMS?* (updated Sept. 2006), available at <http://www.ers.usda.gov/Briefing/ARMS/WhatIsArms.htm>. See also Econ. Research Serv., U.S. Dep't of Agric., *How Are ARMS Data Used?* (updated Sept. 2006), available at <http://www.ers.usda.gov/Briefing/ARMS/Howisitused.htm>.

ARMS divides farms into *Economic Classes* based on total farm sales,ⁱⁱ and uses the following six categories: *All farms, less than \$100,000, \$100,000-\$249,999, \$250,000-\$499,999, \$500,000-\$999,999, and greater than \$1,000,000*. For purposes of our analyses, ELI combined the *\$500,000-\$999,999* and *\$1,000,000 or more* categories into a single *\$500,000 or more in total sales* category. ELI refers to this group of farms as “*large-scale commodity crop operations*.” ELI primarily looked at data for corn, soybean, and wheat operations.

For ELI’s calculations on the Economic Class of All Farms sorted by Production Specialty, ELI selected the following variables:

Survey: Farm Finances

Report: Government Payments

Filter by US/State: All States

From Year: 2009

Subject: All Farms

Row Group: Production Specialty

Sub Group: Economic Class

In the ARMS dataset, USDA assigns a production specialty (*e.g.*, corn, soybean, wheat) to a farm when a commodity reaches 50% or more of that farm’s total production value. Throughout this report, when we refer to ARMS data and make statements about corn, soybean, and wheat farms, we are using the ARMS data definition of a farm production specialty.ⁱⁱⁱ If sales of corn, soybeans, or wheat do not individually constitute 50% of a farm’s total production value, ERS tests whether the sum of all three commodities is greater than 50% of the total value of farm production. If so, then they are classified as “general cash grain” farms; if not, they are classified as “other field crop” farms.

Accordingly, statements made in this report using ARMS data pertaining to corn, soybean, and wheat farms’ harvested acres, total sales, and net cash income may be over- or under-estimates. For example, since ARMS classifies a farm as a corn farm

ⁱⁱ Within ARMS, USDA defines “total farm sales” (also referred to as gross cash income) as “the total amount of cash received by the farm operations from the sale of agricultural products, services rendered, or government payments received during a given calendar year. Gross cash income of farm operations excludes the value of products provided to landlords under share rental arrangements and any government payments received by landlords. Commodities produced or marketed through contractual arrangements are treated separately so as to properly account for income and expenses associated with the farm operation.” Econ. Research Serv., U.S. Dep’t of Agric., *ARMS Financial and Crop Production Practices: Farm Structure and Finance, Tailored Reports Data Dictionary* (updated Nov. 30, 2011), available at http://www.ers.usda.gov/Data/ARMS/app/default.aspx?survey_abb=FINANCE.

ⁱⁱⁱ The definition of a “production specialty” as used in the ARMS data was provided in an email from the Deputy Director for Data & Staff Analysis, Res. & Rural Econ. Div. (RRED), Econ. Research Serv., U.S. Dep’t of Agric. (November 1, 2011).

when 50% or more of its production value is constituted by corn sales, it was not possible to determine: a) how many of the farm's total harvested acres are dedicated to corn production; b) the exact percentage of a corn farm's sales that come from selling corn (only that the percentage of the farm's production value is 50-100% corn sales); or c) the exact percentage of a corn farm's net income that derives from corn sales. Similarly, because ARMS classifies a farm as a cash grain farm when the combined sales of corn, soybean, and wheat constitute 50% or more of the farm's production value (without the sales of any individual commodity equaling 50% or more of the production value), it was not possible to determine: a) how many of the cash grain farm's total acres are dedicated to corn, soybean, or wheat production; b) the exact percentage of a cash grain farm's sales that comes from corn, soybean, or wheat sales (only that the farm's production value is less than 50% corn, soybean, or wheat sales, individually); or c) the exact percentage of a cash grain farm's net income that derives from selling corn, soybeans, or wheat.

ENDNOTES

¹ Carolyn Dimitri et al., U.S. Dep't of Agric., Econ. Info. Bull. No. 3, *The 20th Century Transformation of U.S. Agriculture and Farm Policy 2* (June 2005), available at <http://www.ers.usda.gov/publications/eib3/eib3.pdf>.

² Econ. Research Serv., U.S. Dep't of Agric., *Farm Structure: Glossary* (updated Mar. 29, 2011), available at <http://www.ers.usda.gov/briefing/farmstructure/glossary.htm#industri> (defining "Industrialization").

³ Dimitri et al., *supra* note 1, at 2.

⁴ *Id.* at 6.

⁵ Econ. Research Serv., U.S. Dep't of Agric., Agric. Info. Bull. No. 759, *ERS Farm Typology for a Diverse Agricultural Sector 3*, 8 (Sept. 2000), available at <http://www.ers.usda.gov/publications/aib759/aib759.pdf>.

⁶ Econ. Research Serv., U.S. Dep't of Agric., *ARMS Financial and Crop Production Practices: Farm Structure and Finance, Tailored Reports* (data compiled by Env'tl. L. Inst., 2012) (2009), available at http://www.ers.usda.gov/Data/ARMS/app/default.aspx?survey_abb=FINANCE [hereinafter *ARMS Farm Structure and Finance Data, Compiled by ELI*]. See also Methodology Appendix.

⁷ See *ARMS Farm Structure and Finance Data, Compiled by ELI, supra* note 6.

⁸ Corn Farmers Coalition, *Fact Book*, available at <http://www.cornfarmerscoalition.org/fact-book/>. The Corn Farmers Coalition is an alliance of the National Corn Growers Association and 14 state corn associations. Corn's prominent role as a feedstock for biofuel production makes it a special case among commodity crops. Certainly, federal policies supporting corn-based ethanol production have been a major driver of the expansion of corn acreage in recent years. See Steven Wallander et al., U.S. Dep't of Agric., Econ. Info. Bull. No. 79, *The Ethanol Decade: An Expansion of U.S. Corn Production, 2000-09*, at 1 (Aug. 2011), available at <http://www.ers.usda.gov/Publications/EIB79/>. However, a detailed discussion of biofuels policy with respect to ethanol production is beyond the scope of this report.

⁹ See *ARMS Farm Structure and Finance Data, Compiled by ELI, supra* note 6.

¹⁰ U.S. Census Bureau, *2010 Census State Area Measurements and Internal Point Coordinates* (Feb. 11, 2011), available at http://www.census.gov/geo/www/2010census/statearea_intpt.html.

¹¹ Exact values for the percentage of total U.S. acreage for each crop constituted by large-scale commodity crop operations with gross annual sales of \$500,000 or more (2009) are: 50.91% (corn); 40.68% (soybean); 31.73% (wheat). Exact values for average acres operated per farm of large-scale commodity crop operations with gross annual sales of \$500,000 and above (2009) are: 1,972 acres (corn); 2,132 acres (soybean); 4,862 acres (wheat). *ARMS Farm Structure and Finance Data, Compiled by ELI, supra* note 6.

¹² Specifically, the average net cash income of farms with sales between \$500,000 and \$999,999 is \$178,321; the average net cash income of farms with sales of \$1,000,000 or more is \$559,198. *ARMS Farm Structure and Finance Data, Compiled by ELI, supra* note 6.

¹³ The full definition from the ARMS Data Dictionary is: "This measure indicates the amount of net cash earnings from all business sources that a farm generates during the year. These funds can be used to repay principal on indebtedness, purchase new machinery or equipment, expand the farm business, or pay for family consumption or other obligations." *Id.*

¹⁴ The ERS indicates that 2009 median farm household total income was \$52,235. Mary Clare Ahearn, U.S. Dep't of Agric., *Financial Position of Farm Operator Households 23* (presented at USDA Agricultural Outlook Forum, Feb. 23, 2012), available at http://www.usda.gov/oce/forum/2012_Speeches/Ahearn.pdf. In contrast, large-scale corn operations that grossed \$500,000 or more (but less than \$1 million) each year have an average net cash income of \$219,000. For operations with gross sales of \$1 million or more per year, the average net cash income is \$665,000. For soybeans, the comparable average net cash income figures are \$251,000 (gross sales between \$500,000 and \$1 million annually) and \$568,000 (\$1 million or more in annual gross sales).

And for wheat, the average net cash income figures are \$225,000 (gross sales between \$500,000 and \$1 million annually) and \$566,500 (gross sales annually of \$1 million or more). *ARMS Farm Structure and Finance Data, Compiled by ELI, supra* note 6.

¹⁵ These figures could be under- or over-inclusive (see Methodology Appendix for explanation).

¹⁶ Econ. Research Serv., U.S. Dep't of Agric., *Environmental Interaction with Agricultural Production: Background* (updated Mar. 31, 2009), available at <http://www.ers.usda.gov/Briefing/AgAndEnvironment/background.htm>. Over a decade ago, ERS noted that “the number of widely recognized agri-environmental problems is expanding.” Roger Claassen et al., U.S. Dep't of Agric., Agric. Econ. Rep. No. 794, *Agri-Environmental Policy at the Crossroads: Guideposts on a Changing Landscape 1* (Jan. 2001), available at <http://www.ers.usda.gov/Publications/aer794/aer794.pdf>.

¹⁷ Nonpoint Source Control Branch, U.S. Env'tl. Prot. Agency, Doc. No. EPA 841-F-05-001, *Protecting Water Quality from Agricultural Runoff 1* (revised Mar. 2005), available at http://water.epa.gov/polwaste/nps/upload/2005_4_29_nps_Ag_Runoff_Fact_Sheet.pdf. Other contributors to non-point source pollution from farms include poorly located or managed animal feeding operations and overgrazing, according to EPA. *Id.*

¹⁸ See Marc Ribaud & Robert Johansson, “Water Quality: Impacts of Agriculture,” in Econ. Research Serv., U.S. Dep't of Agric., Econ. Info. Bull. No. 16, *Agricultural Resources and Environmental Indicators, 2006 Edition* 33, 35 (Keith Wiebe & Noel Gollehon eds., July 2006), available at http://www.ers.usda.gov/publications/arei/eib16/eib16_2-2.pdf.

¹⁹ See *id.* at 35. “Dead zone” is a common term for a large area of water affected by hypoxia, or low oxygen levels. In 2004, Congress recognized the risks posed by hypoxic events and harmful algal blooms and reauthorized the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998. See Harmful Algal Bloom and Hypoxia Amendments Act of 2004, Pub. L. No. 108-456, 118 Stat. 3630 (Dec. 2004). In July 2011, the Harmful Algal Blooms and Hypoxia Research and Control Amendments Act of 2011—a bill to reauthorize the 1998 and 2004 Acts—was introduced in the House. See Library of Cong., *Bill Summary & Status—112th Congress (2011-2012)—H.R.2484* (2012), available at <http://thomas.loc.gov/cgi-bin/bdquery/z?d112:h.r.2484>.

²⁰ Both organic and inorganic (synthetic) fertilizers contain nutrients (e.g., nitrogen and phosphorus) necessary for feeding plants. Inorganic fertilizers, however, contain these nutrients in higher concentrations and release them at a faster rate, making the soil more prone to leaching. E.g., Coll. of Agric., Univ. of Ariz., “Soils and Fertilizers: Fertilizers,” in *Arizona Master Gardener Manual* (1998), available at <http://ag.arizona.edu/pubs/garden/mg/soils/organic.html>.

²¹ Econ. Research Serv., U.S. Dep't of Agric., *Agricultural Chemicals and Production Technology: Nutrient Management* (updated Oct. 4, 2005), available at <http://www.ers.usda.gov/briefing/AgChemicals/nutrientmangement.htm>.

²² Michael Baker, Jon Capasaca, Ellen Gilinsky & Ephraim King et al., *An Urgent Call to Action: Report of the State-EPA Nutrient Innovations Task Group 17* (Aug. 2009), available at http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/upload/2009_08_27_criteria_nutrient_nitgreport.pdf. See also Mark. B. David et al., “Sources of Nitrate Yields in the Mississippi River Basin,” 39 *J. Env'tl. Quality* 1657, 1665 (July 2010) (“Our results and many other recent studies demonstrate that corn and soybean fields with tile drainage are quite leaky with respect to nitrate N, even when current best management practices are followed.”) (citation omitted).

²³ Nutrient-laden water can leave the land by way of runoff, soil erosion, leaching to groundwater, evaporation, and the drains that are used to keep the crops from becoming oversaturated. See, e.g., David et al., *supra* note 23, at 1657; Baker et al., *supra* note 22, at 17, B-6. See generally Lori A. Sprague et al., “Nitrate in the Mississippi River and Its Tributaries, 1980 to 2008: Are We Making Progress?,” 45 *Env'tl. Sci. & Tech.* 7209, 7215 (Aug. 2011) (“[L]ittle consistent progress has been made. . . . The increase in [nitrate] concentrations at low streamflows during all seasons is a strong indication that increasing nitrate concentrations in groundwater are having a substantial effect on river concentrations in the basin. As a result, conservation practices designed to reduce infiltration to groundwater may help with managing nitrate in these rivers.”).

²⁴ See Natural Res. Conservation Serv., U.S. Dep't of Agric., *Nutrient & Pest Management* (modified Feb. 23, 2012), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/crops/npm> (defining “Nutrient Management”).

²⁵ Marc Ribaud et al., U.S. Dep't of Agric., Econ. Research Rep. No. 127, *Nitrogen in Agricultural Systems: Implications for Conservation Policy 4* (Sept. 2011), available at <http://www.ers.usda.gov/Publications/ERR127/ERR127.pdf>.

²⁶ See Baker et al., *supra* note 23, at 31.

²⁷ Nancy Stoner, Acting Assistant Adm'r, U.S. Env'tl. Prot. Agency, Memorandum to Regional Administrators, *Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions* 1 (Mar. 16, 2011) available at http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/upload/memo_nitrogen_framework.pdf. In 2012, EPA introduced a new web site to provide information on EPA actions to reduce nutrient pollution, state efforts to develop numeric water quality criteria for nutrients, and other relevant EPA tools, data, research, and reports. See U.S. Env'tl. Prot. Agency, *Nutrient Pollution Policy and Data* (Mar. 16, 2012), available at <http://epa.gov/nandppolicy/>.

²⁸ See Natural Res. Conservation Serv., U. S. Dep't of Agric., *Conservation Practice Standard 590: Nutrient Management* (Jan. 2012), available at <ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/590.pdf>.

²⁹ See Office of Communications, U.S. Dep't of Agric., News Release No. 0010.12, *Secretary Vilsack Signs Historic Agreement with EPA and State of Minnesota Encouraging Farmers to Protect Rivers, Streams and Lakes* (Jan. 17, 2012), available at <http://www.usda.gov/wps/portal/usda/usdahome?contentid=2012/01/0010.xml&contentidonly=true> (describing Memorandum of Understanding among USDA, EPA, and Minnesota under which farmers who adopt voluntary conservation practices receive assurance that their farms satisfy water quality standards and goals during the duration of the agreement); Natural Res. Conservation Serv., U.S. Dep't. of Agric., *Certainty Framework* (July 2011) (setting forth parameters of the new program), available at http://www.mn.nrcs.usda.gov/partnerships/mstc/2011_Oct25/Certainty%20Framework%20FINAL%20july%2019%202011.pdf.

³⁰ Natural Res. Conservation Serv., U.S. Dep't of Agric., *Environmental Quality Incentives Program—National Water Quality Initiative* (updated June 6, 2012), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/eqip/?&cid=STELPRDB1047761>; Office of Communications, U.S. Dep't of Agric., *USDA Advances Water Quality Conservation Across the U.S.* (May 8, 2012), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/?cid=STELPRDB1047782>.

³¹ Details on witnesses and testimony from the Oct. 4, 2011 hearing, as well as the archived webcast, are available online at http://epw.senate.gov/public/index.cfm?FuseAction=Hearings.Hearing&Hearing_Id=ac6c2c31-802a-23ad-4a5a-9dce7b8eb51f.

³² *Id.*

³³ *Id.*

³⁴ See, e.g., Gregory McIsaac, "Surface Water Pollution by Nitrogen Fertilizers," in *Encyclopedia of Water Science* 950 (Bobby Altman Stewart & Terry A. Howell eds., 2003) ("Fertilizer . . . is not the only source of nitrogen that can cause contamination of surface waters. Biological nitrogen fixation, mineralization of soil organic nitrogen, and animal wastes can also contribute to nitrogen enrichment of water bodies. Additionally, under some conditions, nitrogen applied to the soil may be converted to gaseous or immobile forms of nitrogen that do not contribute to surface water contamination. Because of these various sources and transformations of nitrogen, the severity of surface water contamination by nitrogen fertilizer has been difficult to precisely quantify.").

³⁵ Ribaldo et al., *supra* note 26, at 47.

³⁶ *Id.*

³⁷ *Id.* at 47-48.

³⁸ *Id.* at 22.

³⁹ Org. for Econ. Co-operation & Dev., *Water Quality and Agriculture: Meeting the Policy Challenge—Key Messages and Executive Summary* 9 (2012), available at http://www.oecd.org/document/31/0,3746,en_2649_33793_49834719_1_1_1_1,00.html.

⁴⁰ Econ. Research Serv., *supra* note 21; U.S. Geological Survey, *The Gulf of Mexico Hypoxic Zone* (last modified Sept. 27, 2010), available at http://toxics.usgs.gov/hypoxia/hypoxic_zone.html.

⁴¹ See *id.*; Ecological Soc'y of Am., *Hypoxia* (n.d.), available at http://www.esa.org/education_diversity/pdfDocs/hypoxia.pdf; La. Univ. Marine Consortium, *What is Hypoxia?* (n.d.), available at <http://www.gulfhypoxia.net/Overview/>; Office of Wetlands, Oceans & Watersheds, U.S. Env'tl. Prot. Agency, *Hypoxia 101* (n.d.), available at

<http://water.epa.gov/type/watersheds/named/msbasin/hypoxia101.cfm>; World Res. Inst., *Eutrophication & Hypoxia: Impacts* (n.d.), available at <http://www.wri.org/project/eutrophication/about/impacts>.

⁴² Hypoxia causes a range of complex ecological problems within the affected ecosystem that ultimately injure the food web and render exploited fish populations less productive and resilient, and thus more vulnerable to overfishing. See Interagency Working Grp. on Harmful Algal Blooms, Hypoxia & Human Health, White House Council on Env'tl Quality, *Scientific Assessment of Hypoxia in U.S. Coastal Waters* 18-21 (Sept. 2010), available at <http://www.whitehouse.gov/sites/default/files/microsites/ostp/hypoxia-report.pdf>. The economic effects of dead zones have proven difficult to quantify, given the many variables and stressors that affect fishing operations. It is clear, however, that hypoxia results in fish kills and in damage to fish growth (resulting in, e.g., smaller shrimp) and reproduction. Fishing operations also incur costs in seeking different fishing grounds. See *id.* at 21.

⁴³ E.g., Nat'l Ocean Serv., Nat'l Oceanic & Atmospheric Admin., *Ocean Facts: What is a dead zone?* (Nov. 17, 2011), available at <http://oceanservice.noaa.gov/facts/deadzone.html>.

⁴⁴ Marc Schleifstein, "Gulf of Mexico 'dead zone' larger than average, but no record," *The Times-Picayune* (Aug. 1, 2011), available at http://www.nola.com/environment/index.ssf/2011/08/dead_zone_larger_than_average.html; La. Univ. Marine Consortium, *Dead Zone Large But Not Record Size* (July 31, 2011), available at <http://www.lumcon.edu/UserFiles/File/DeadZonePressRelease.pdf>.

⁴⁵ Interagency Working Grp., *supra* note 43. Other major causes include animal operations, industrial and municipal wastewater discharges, urban and suburban runoff, and atmospheric deposition. *Id.*

⁴⁶ Nat'l Water-Quality Assessment Program, U.S. Geological Survey, *Sources of Nutrients Delivered to the Gulf of Mexico* (Jan. 28, 2008), available at http://water.usgs.gov/nawqa/sparrow/gulf_findings/primary_sources.html. See also, e.g., Comm. on Clean Water Act Implementation Across the Miss. River Basin, Nat'l Research Council of the Nat'l Acad., *Improving Water Quality in the Mississippi River Basin and the Northern Gulf of Mexico* 1 (2010) ("Nutrients emanate from both point and nonpoint sources across the [Mississippi] river basin, but the large majority of nutrient yields across the [basin] are nonpoint in nature and are associated with agricultural activities, especially applications of nitrogen-based fertilizers and runoff from concentrated animal feeding operations."). However, a 2009 white paper prepared for the National Corn Growers Association points to the complexity of the Gulf hypoxia problem, notes the range of potential sources (in addition to agriculture) that contribute to nitrogen loading to the Gulf, and concludes that the net balance for nitrogen applied and nitrogen removed in corn is such that there is little or no excess nitrogen available due to fertilizer use. StrathKirn Inc., Nat'l Corn Growers Ass'n, *Hypoxia in the Gulf: An Analytical White Paper* 17, 21, 23 (Apr. 2009), available at <http://ncga.eweb3.socket.net/files/pdf/2009HypoxiaJune16.pdf>. For a response to this industry position, see Rebecca Sutton & Andrew Hug, Env'tl. Working Grp., *Corn Cop Out* (Aug. 2011), available at www.ewg.org/node/29134.

⁴⁷ Interagency Working Grp., *supra* note 43, at 11.

⁴⁸ See Rebecca R. Murphy et al., "Long-Term Trends in Chesapeake Bay Seasonal Hypoxia, Stratification, and Nutrient Loading," 34 *Estuaries & Coasts* 1293, 1307 (May 2011); Env't News Serv., *Chesapeake Bay Healing, Dead Zone Shrinking* (Nov. 3, 2011), available at <http://www.ens-newswire.com/ens/nov2011/2011-11-03-093.html>. See also Darryl Fears, "Alarming 'dead zone' grows in the Chesapeake," *Wash. Post* (July 24, 2011), available at http://www.washingtonpost.com/national/health-science/alarming-dead-zone-grows-in-the-chesapeake/2011/07/20/gIQABRmKXI_story.html.

⁴⁹ Natural Res. Conservation Serv., U.S. Dep't of Agric., *Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Region* 13, 117, 121 (Feb. 2011), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=stelprdb1041684>. In 2006, approximately 6,000 farms (roughly 7% of the total farms in the Bay region) had total farm sales over \$500,000. *Id.* at 13, 15. Also, see generally Office of Wetlands, Oceans & Watersheds, U.S. Env'tl. Prot. Agency, "Chapter 2: Agriculture," in Doc. No. EPA841-R-10-002, *Guidance for Federal Land Management in the Chesapeake Bay Watershed* 2-3 (May 12, 2010) (presenting "an overview of the practices and information resources available for federal land managers and others to achieve water quality goals in the most cost-effective and potentially successful manner, with the overall objective of improving water quality, habitat, and the environmental and economic resources of the Chesapeake Bay and its tributaries"), available at http://www.epa.gov/owow_keep/NPS/chesbay502/pdf/chesbay_chap02.pdf.

⁵⁰ Neil Dubrovsky et al., U.S. Geologic Survey Nat'l Water-Quality Assessment Program, Circular 1350, *The Quality of Our Nation's Waters—Nutrients in the Nation's Streams and Groundwater, 1992–2004* at 1 (2010), available at <http://pubs.usgs.gov/circ/1350/pdf/circ1350.pdf>.

⁵¹ *Id.* at 54, 58.

⁵² Office of Water & Office of Research & Dev., U.S. Env'tl. Prot. Agency, Doc. No. EPA 841-R-09-001, *National Lakes Assessment: A Collaborative Survey of the Nation's Lakes* at x, 44 (2009), available at http://water.epa.gov/type/lakes/upload/nla_newlowres_fullrpt.pdf.

⁵³ U.S. Env'tl. Prot. Agency, *Watershed Assessment, Tracking & Env'tl. Results: National Summary of State Information* (updated June 1, 2012), available at http://iaspub.epa.gov/waters10/attains_nation_cy.control.

⁵⁴ *Id.* at "Assessed Waters of the United States" table.

⁵⁵ *Id.* at "Probable Sources of Impairments in Assessed Rivers and Streams" table.

⁵⁶ *Id.* at "Probable Sources of Impairments in Assessed Lakes, Reservoirs, and Ponds" table.

⁵⁷ See, e.g., Woods Hole Oceanographic Inst., *Harmful Algae: What are Harmful Algal Blooms (HABs)?* (updated May 31, 2011) ("Impacts include human illness and mortality following consumption of or indirect exposure to HAB toxins, substantial economic losses to coastal communities and commercial fisheries, and HAB-associated fish, bird and mammal mortalities."), available at <http://www.whoi.edu/redtide/>.

⁵⁸ Nat'l Ctr. for Coastal Ocean Sci., Nat'l Oceanic & Atmospheric Admin., *Economic Impacts of Harmful Algal Blooms* 1 (2008), available at http://www.cop.noaa.gov/stressors/extremeevents/hab/current/econimpact_08.pdf.

⁵⁹ See, e.g., Ctr. for Disease Control & Prevention Health Studies Branch, U.S. Dep't of Health & Human Serv., *Promoting Clean Water for Health: Harmful Algal Blooms (HABs)* (updated January 13, 2012) (discussing cyanobacteria, harmful marine algae, red tide, and ciguatera), available at <http://www.cdc.gov/nceh/hsb/hab/default.htm>.

⁶⁰ Cary B. Lopez et al., Interagency Working Grp. on Harmful Algal Blooms, Hypoxia & Human Health, White House Council on Env'tl. Quality, *Scientific Assessment of Freshwater Harmful Algal Blooms* 1 (July 2008), available at <http://www.whitehouse.gov/sites/default/files/microsites/ostp/frshh2o0708.pdf>.

⁶¹ See, e.g., K.L. Bushaw-Newton & K.G. Sellner, Nat'l Oceanic & Atmospheric Admin., *State of the Coastal Environment: Harmful Algal Blooms* 8 (1999) ("Strong relationships appear to exist between several algal groups and nutrient enrichment in certain localities."), available at http://oceanservice.noaa.gov/websites/retiredsites/sotc_pdf/hab.pdf.

⁶² See Harmful Algal Bloom Research, Dev., Demonstration & Tech. Transfer, *National Workshop Report: A Plan for Reducing HABs and HAB Impacts* 14 (Q. Dortch et al., eds) (2008), available at www.whoi.edu/fileserver.do?id=43464&pt=10&p=19132.

⁶³ E.g., Olga V. Naidenko et al., Env'tl. Working Grp., *Troubled Waters: Farm Pollution Threatens Drinking Water* 10 (Apr. 2012), available at http://static.ewg.org/reports/2012/troubled_waters/troubled_waters.pdf; J.R. Self & R.M. Waskom, Co. State Univ. Extension, Fact Sheet No. 0.517, *Nitrates in Drinking Water* (Oct. 2008), available at <http://www.ext.colostate.edu/pubs/crops/00517.html>.

⁶⁴ Dubrovsky et al., *supra* note 51, at 11.

⁶⁵ See U.S. Env'tl. Prot. Agency, *Basic Information about Nitrate in Drinking Water* (updated May 21, 2012), available at <http://water.epa.gov/drink/contaminants/basicinformation/nitrate.cfm>.

⁶⁶ Mary H. Ward & Jean D. Brender, "Nitrate in Drinking Water: Potential Health Effects" (2005) in Dubrovsky et al., *supra* note 51, at 102-03. For more on the human health risks posed by ingestion of nitrates, see, e.g., Naidenko et al., *supra* note 64, at 11-12.

⁶⁷ Ground Water Protection Council, *Resolution No. 11-2 Regarding USEPA Partnership with States to Address Nutrients* (Sept. 25, 2011), available at <http://www.gwpc.org/advocacy/documents/resolutions/Resolution%2011-2.pdf>.

⁶⁸ Dubrovsky et al., *supra* note 51, at 22 (sidebar: "Concerns about Elevated Nutrients in Water").

⁶⁹ A recent industry report highlights the role these products play in maximizing crop yields and identifies further benefits from their use for the broader economy. See Mark Goodwin Consulting Ltd., CropLife America, *The Contribution of Crop Protection Products to the United States Economy* (Nov. 2011), available at http://www.croplifeamerica.org/sites/default/files/node_documents/CLA_Socio_Econ120.pdf.

⁷⁰ See Ribaldo & Johansson, *supra* note 18, at 37.

⁷¹ Patricia L. Toccalino & Jessica A. Hopple, U.S. Geologic Survey Nat'l Water-Quality Assessment Program, Circular 1346, *The Quality of Our Nation's Waters—Quality of Water from Public-Supply Wells in the United States, 1993-2007, Overview of Major Findings* 31 (2010), available at <http://pubs.usgs.gov/circ/1346/pdf/circ1346.pdf>.

⁷² See U.S. Env'tl. Prot. Agency, *supra* note 54 (various tables). These figures likely understate the true degree of pesticide pollution, given the great extent of the Nation's waters that have yet to be assessed.

⁷³ Craig Osteen & Michael Livingston, "Pest Management Practices," in Econ. Research Serv., U.S. Dep't of Agric., Econ. Info. Bull. No. 16, *Agricultural Resources and Environmental Indicators, 2006 Edition* 107, 108 (Keith Wiebe & Noel Gollehon, eds., July 2006), available at http://www.ers.usda.gov/publications/arei/eib16/eib16_4-3.pdf. Pesticides include insecticides, herbicides, and fungicides. Crop pesticide use peaked in 1997 at approximately 579 million pounds of active ingredient. *Id.* at 107.

⁷⁴ See Robert J. Gilliom et al., U.S. Geologic Survey Nat'l Water-Quality Assessment Program, Circular 1291, *The Quality of Our Nation's Water—Pesticides in the Nation's Streams and Groundwater, 1992–2001*, at 4, 6, 8 (revised Feb. 15, 2007), available at <http://pubs.usgs.gov/circ/2005/1291/pdf/circ1291.pdf>.

⁷⁵ Natural Res. Conservation Serv., U.S. Dep't of Agric. & Iowa State Univ. Ctr. for Survey Statistics & Methodology, *Summary Report: 2007 National Resources Inventory 97* (Dec. 2009), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/nri>. Despite these losses, the overall trend from 1982-2007 has been a decrease in erosion of cropland. *Id.* at 7.

⁷⁶ *Id.* at 110. National Resources Inventory erosion data may understate the extent of the problem—and current rates of soil loss may not be sustainable. See generally Craig Cox et al., Env'tl. Working Grp., *Losing Ground* (2010) (discussing soil erosion across the Corn Belt in general and in Iowa in particular), available at http://static.ewg.org/reports/2010/losingground/pdf/losingground_report.pdf. Furthermore, recent high market prices for corn and soy have created an incentive to plant more of those crops, which can, in turn, result in clearing marginal land and planting on land that is steeper and thus more erodible. See, e.g., William Neuman, "High Prices Sow Seeds of Erosion," *N.Y. Times*, Apr. 13, 2011, at B1, available at <http://www.nytimes.com/2011/04/13/business/13erosion.html>.

⁷⁷ U.S. Env'tl. Prot. Agency, *supra* note 54, at "Causes of Impairment in Assessed Rivers and Streams" table, "Causes of Impairment in Assessed Lakes, Reservoirs, and Ponds" table.

⁷⁸ Nat'l Estuarine Research Reserve Sys., Nat'l Oceanic & Atmospheric Admin., *Turbidity and Sedimentation* (n.d.), available at <http://www.nerrs.noaa.gov/doc/siteprofile/acebasin/html/modules/watqual/wmtursed.htm>.

⁷⁹ Office of Water, U.S. Env'tl. Prot. Agency, Doc. No. EPA 841-B-03-004, *National Management Measures to Control Nonpoint Source Pollution from Agriculture* at 4-39, 4-75 (July 2003), available at http://water.epa.gov/polwaste/nps/agriculture/agmm_index.cfm.

⁸⁰ See Pew Comm'n on Indus. Farm Animal Production, *Putting Meat on the Table: Industrial Farm Animal Production in America* (Apr. 2008) (discussing impacts of intensive animal confinement on public health, the environment, animal welfare, and rural America), available at <http://www.ncifap.org/reports/>. Prior to releasing its final report, the Commission issued a series of detailed technical reports addressing the public health and environmental consequences of CAFOs. See *id.* For more on the geographic distribution of CAFOs and related facts, see "Factory Farm Map," an interactive project of Food & Water Watch, available at <http://www.factoryfarmmap.org/>.

⁸¹ World Res. Inst., *EarthTrends Environmental Information Portal* (2007) (database temporarily down for maintenance at time of report release), available at http://earthtrends.wri.org/searchable_db/index.php?action=select_countries&theme=8&variable_ID=348. WRI indicates that in 2007, 50.1% of total U.S. grain consumption was fed to livestock. "Grains" include: "wheat (including durum wheat), rice (milled), corn, barley, sorghum, millet, rye, oats, and mixed grains." To compile this data, WRI relied on data from Foreign

Agric. Serv., U.S. Dep't of Agric., *Production, Supply & Distribution Online Database* (2007), available at <http://www.fas.usda.gov/psdonline/>.

⁸² For a recent critique of CAFO pollution in the context of poultry production, see Pew Campaign to Reform Indus. Animal Agric., Pew Env't Grp., *Big Chicken: Pollution and Industrial Poultry Production in America* (July 2011), available at http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/PEG_BigChicken_July2011.pdf. The industry responds that it is a responsible business and that Pew seems "unaware of the scope of environmental progress underway in the poultry community." See U.S. Poultry & Egg Ass'n, "Poultry Industry Statement on Pew's 'Report'," *U.S. Poultry News & Views* (Fall 2011), available at <http://www.uspoultry.org/communications/NewsandViews/News%20and%20Views%20Fall%202011/files/newaandviewsfall2011.pdf>. For a discussion of how subsidizing row crops creates a cost benefit to CAFOs, see Elanor Starmer & Timothy A. Wise, Global Dev. & Env't Inst., Tufts Univ., Policy Brief No. 07-03, *Feeding at the Trough: Industrial Livestock Firms Saved \$35 billion From Low Feed Prices* (Dec. 2007) (arguing that U.S. agricultural policy encourages overproduction and drives down the cost of crops such as corn and soybeans, resulting in a substantial savings to CAFO operators), available at <http://www.ase.tufts.edu/gdae/Pubs/rp/PB07-03FeedingAtTroughDec07.pdf>.

⁸³ EPA's annual inventory of U.S. greenhouse gas emissions and sinks found that the agriculture sector was the fourth-largest sectoral emitter of greenhouse gases. See U.S. Env'tl. Prot. Agency, Doc. No. EPA 430-R-12-001, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010*, at 2-17 (Apr. 2012), available at <http://epa.gov/climatechange/emissions/downloads12/US-GHG-Inventory-2012-Main-Text.pdf>. Allocating emissions to specific source categories is complex, particularly when, as is the case with agriculture, the sector features aspects of both a greenhouse-gas emitter and a "sink." Nevertheless, agricultural soil management activities, such as fertilizer application and other cropping practices, were the largest source of nitrous oxide (N₂O) emissions in 2010 (accounting for over two thirds of the total N₂O emissions). *Id.* at ES-12 to ES-13, 6-18.

⁸⁴ The conversion of existing grassland and prairie to cropland eliminates wildlife habitat. Small wetland features, such as "prairie potholes," can also be lost as land is brought into production. See, e.g., Ducks Unlimited, 'Sodsaver': *Saving America's Prairie* (n.d.), available at <http://www.ducks.org/conservation/farm-bill/sodsaver-saving-americas-prairies>. Although many agricultural lands have long been enrolled in the Conservation Reserve Program (CRP), high grain prices have created a pressure to move these lands back into production. See, e.g., David Streitfeld, "As Prices Rise, Farmers Spurn Conservation Program," *N.Y. Times* (April 9, 2008) ("Thousands of farmers are taking their fields out of the government's biggest conservation program, which pays them not to cultivate. They are spurning guaranteed annual payments for a chance to cash in on the boom in wheat, soybeans, corn and other crops. Last fall, they took back as many acres as are in Rhode Island and Delaware combined."), available at <http://www.nytimes.com/2008/04/09/business/09conserve.html?pagewanted=all>; Dow AgroSciences LLC, *Give Crops a Clean Start* (2012) ("As demand for grain remains strong, it may make economic sense to convert Conservation Reserve Program acres to crop production."), available at <http://www.dowagro.com/range/crp/convert/crop.htm>.

⁸⁵ In 2005, nationwide withdrawals of water for irrigation totaled 128 billion gallons a day. This amount represented nearly one third (31%) of all daily withdrawals of water across all categories in the United States, and it was second only to water withdrawals for thermoelectric power generation. Joan F. Kenny et al., U.S. Geological Survey, Circular 1344, *Estimated Use of Water in the United States in 2005*, at 4-5, 23 (Oct. 2009), available at <http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf>. And although power generation requires more water *withdrawal* than irrigation, irrigation results in vastly more *consumptive* use of water—that is, power generation processes typically return significant amounts of water. See, e.g., Paul Torcellini et al., U.S. Dep't of Energy, Doc. No. NREL/TP-550-33905, *Consumptive Water Use for U.S. Power Production* 8 (Dec. 2003) (comparing total water consumption and returns, across U.S. industrial sectors), available at <http://www.nrel.gov/docs/fy04osti/33905.pdf>. In 2008, nearly 55 million acres of American farms were irrigated. That same year, corn for grain or seed was harvested from nearly 12 million acres of irrigated farmland; another 1.6 million irrigated acres of corn were used for animal feed; and nearly 295,000 acres of irrigated cropland were used for sweet corn. Soybeans were harvested from over seven million acres of irrigated farmland. Irrigated land produces significantly higher per-bushel yields of both corn and soybeans. Nat'l Agric. Statistics Serv., U.S. Dep't of Agric., Doc. No. AC-07-SS-1, *2007 Census of Agriculture: Farm and Ranch Irrigation Survey (2008)* at 3, 70-71, 75, 85 (updated July 2010), available at http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Farm_and_Ranch_Irrigation_Survey/fris08.pdf. See generally David H. Getches, "The Metamorphosis of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role?," *20 Stan. Env'tl. L.J.* 3, 61 (Jan. 2001) ("The failure to respond to problems of aquifer depletion and contamination can curtail production from present sources and create problems that cannot be solved within the planning horizon of most water managers. In some aquifers, recharge occurs slowly, or only over geologic time making it critical to manage the pace of depletion."), available at <http://lawweb.colorado.edu/profiles/pubpdfs/getches/GetchesSELJ.pdf>.

⁸⁶ Genetically engineered (GE) crops have come to dominate modern commodity crop operations. For example, as of 2011, the vast majority of corn (88%) and soybeans (94%) planted in the United States were GE varieties. Econ. Research Serv., U.S.

Dep't of Agric., *Adoption of Genetically Engineered Crops in the U.S.* (July 1, 2011), available at <http://www.ers.usda.gov/Data/BiotechCrops/>. GE crops feature such beneficial traits as resistance to pests, herbicides, and viruses. At the same time, serious concerns have been raised about potential effects—known and unknown—on human health and the environment. See, e.g., World Health Org., *20 Questions on Genetically Modified Foods* (2012), available at <http://www.who.int/foodsafety/publications/biotech/20questions/en/>. For a detailed discussion of the concerns associated with GE crops, see, e.g., Union of Concerned Scientists, *Risks of Genetic Engineering* (revised Oct. 30, 2002), available at http://www.ucsusa.org/food_and_agriculture/science_and_impacts/impacts_genetic_engineering/risks-of-genetic-engineering.html.

⁸⁷ ARMS provides data on crop production practices (e.g., Nutrient Use and Management, Herbicide Use by Method), but these data cannot be broken down by Farm Economic Class (total annual farm sales). For ARMS crop production practice data, see *ARMS Farm Structure and Finance Data, Compiled by ELL*, *supra* note 6.

⁸⁸ U.S. environmental law contains many examples of this principle. See, e.g., Clean Air Act § 112(r)(1), 42 U.S.C. § 7412(r)(1) (requiring stationary sources to take necessary steps to prevent or avoid polluting releases of hazardous substances); Endangered Species Act § 10(a)(2)(A), 16 U.S.C. § 1539(a)(2)(A) (preventing a permitted “take” unless the applicant has specified steps taken to minimize or mitigate the impacts of the take); regulations implementing the National Environmental Policy Act (NEPA), 40 C.F.R. §§ 1500.2, 1502.1 (identifying as one of the principal aims of NEPA the requirement to avoid or minimize harms to the environment); Resource Conservation and Recovery Act § 3002(b), 42 U.S.C. § 6922(b) (mandating certification that a hazardous waste generator has used methods of treatment, storage, and disposal of wastes that minimize present and future harm). The responsibility to avoid or minimize pollution impacts is complemented by the “polluter pays” principle, which requires the polluter to absorb the costs of any harm that cannot be avoided or minimized. See, e.g., Phyllis P. Harris, *Combining Legal Mandates with Economics in the Application of Environmental Law* (presented at the OECD Global Forum for Sustainable Development, Dec. 1-2, 2004) (outlining EPA’s use and understanding of the polluter pays principle), available at http://www.inece.org/conference/7/vol1/07_Harris.pdf; Ved P. Nanda, “Agriculture and the Polluter Pays Principle,” 54 *Am. J. Comp. L.* 317, 318 (2006) (describing the use of the polluter pays principle in American environmental law and noting its relative absence in agricultural regulation), available at http://www.nationalaglawcenter.org/assets/bibarticles/nanda_agriculture.pdf.

⁸⁹ See, e.g., Food & Water Watch, *Farm Subsidies 101* (Feb. 2011) (arguing that agribusiness buyers are the real beneficiaries of federal agricultural subsidies, as they are able to pay farmers less for crops than the crops cost to produce), available at <http://documents.foodandwaterwatch.org/doc/FB-subsidies101.pdf>.

⁹⁰ Megan Stubbs, Cong. Research Serv., CRS Rep. No. R41622, *Environmental Regulation and Agriculture 1* (February 7, 2011), available at <http://www.farmpolicy.com/wp-content/uploads/2011/02/CRSEnvandAg11Feb.pdf>.

⁹¹ J.B. Ruhl, “Farms, Their Environmental Harms, and Environmental Law,” 27 *Ecology L.Q.* 263, 293 (2000).

⁹² *Id.*

⁹³ *Id.* at 312.

⁹⁴ Agric. Counselor, U.S. Env'tl. Prot. Agency, *Major Existing EPA Laws and Programs That Could Affect Agricultural Producers* (June 2007), available at <http://www.epa.gov/agriculture/agmatrix.pdf>.

⁹⁵ See Econ. Research Serv., U.S. Env'tl. Prot. Agency, *Environmental Interactions with Agricultural Production: Federal Laws Protecting Environmental Quality* (Sept. 30, 2008), available at <http://www.ers.usda.gov/Briefing/AgAndEnvironment/federallaws.htm>.

⁹⁶ Although in some cases states may regulate pollution from agricultural sources, a survey of state laws and regulations is beyond the scope of this report.

⁹⁷ The Clean Water Act is formally known as the Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1387.

⁹⁸ See U.S. Env'tl. Prot. Agency, *supra* note 54. According to EPA’s database, pollutants sourced to agriculture threaten or impair 123,669 miles of rivers, 1.82 million acres of lakes, reservoirs, and ponds, more than 3,000 square miles of bays and estuaries, and nearly 370,000 acres of wetlands. *Id.* at “National Probable Sources Contributing to Impairments” table. These statistics do not cover water quality impacts from “atmospheric deposition,” which includes pesticide application and is considered separately. In addition, as noted previously, these figures likely understate the true degree of pollution, given the great extent of the Nation’s waters that have yet to be assessed.

⁹⁹ 33 U.S.C. § 1362(14) (“The term ‘point source’ means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.”).

¹⁰⁰ See, e.g., Ruhl, *supra* note 92, at 295-96.

¹⁰¹ See 33 U.S.C. § 1362(14); 40 C.F.R. § 122.3(f); Ruhl, *supra* note 92, at 295-96. Animal feeding operations of sufficient size to be deemed “concentrated animal feeding operations” under federal law are considered point sources under the Act. 40 C.F.R. § 412. However, EPA’s framework for requiring these facilities to obtain permits has since 2005 twice been struck down by federal appeals courts. See *Nat’l Pork Producers Council v. U.S. EPA*, 635 F.3d 738 (5th Cir. 2011); *Waterkeeper Alliance, Inc. v. U.S. EPA*, 399 F.3d 486 (2d Cir. 2005). EPA recently issued a new general permit under the CWA covering certain pesticide applications made directly over or in close proximity to water. See *Final Nat’l Pollutant Discharge Elimination System (NPDES) Pesticide General Permit for Point Source Discharges From the Application of Pesticides*, 76 Fed. Reg. 68,750 (Nov. 7, 2011). It does not appear that this new permit will affect most commodity crop or other row-crop pesticide applications. See Region Seven, U.S. Evtl. Prot. Agency, *Fact Sheet, November 2011: Pesticide General Permit* (updated May 22, 2012) (“Permit coverage is not required for pesticide applications that do not result in point source discharge to waters of the U.S., such as land applications for the purpose of controlling pests on agricultural crops, forest floors, or range lands. Agricultural runoff, irrigation return flows, and spray drift continue to be exempt from permitting under the Clean Water Act. The pesticide label remains the law in these situations.”), available at http://www.epa.gov/region07/factsheets/2011/pesticide_general_permit.htm.

¹⁰² 33 U.S.C. § 1362(14); 40 C.F.R. § 122.3.

¹⁰³ 40 C.F.R. § 122.26(b)(14); Ruhl, *supra* note 92, at 295-96.

¹⁰⁴ 33 U.S.C. § 1344(f)(A); 33 C.F.R. § 323.3.

¹⁰⁵ 33 C.F.R. § 323.4.

¹⁰⁶ *Id.*; Ruhl, *supra* note 92, at 295-96.

¹⁰⁷ 33 U.S.C. § 1329.

¹⁰⁸ Robert W. Adler, “Integrated Approaches to Water Pollution: Lessons from the Clean Air Act,” 23 *Harv. Evtl. L. Rev.* 203, 227 (1999); Ruhl, *supra* note 92, at 298-99; See also Evtl. Law Inst., *Putting the Pieces Together: State Nonpoint Source Enforceable Mechanisms in Context* (2000), available at http://www.elistore.org/reports_detail.asp?ID=547. EPA is expected to announce changes to the Section 319 program based on a self-evaluation completed in 2011. See Nonpoint Source Control Branch, U.S. Evtl. Prot. Agency, *A National Evaluation of the Clean Water Act Section 319 Program* (Nov. 2011), available at <http://www.epa.gov/owow/NPS/pdf/319evaluation.pdf>. An independent audit of the program initiated by the GAO at the request of Congress has yet to be publicly released as of May 1, 2012. The EPA assessment notes that “the vast majority of our nation’s impaired waters have no possibility of being restored unless the nonpoint sources affecting those waters are effectively remediated. Moreover, unless nonpoint sources are more effectively addressed, we will continue to see the number of impaired waters grow over time.” *Id.* at 4. The national nonpoint source program has “no federal regulatory authority and only relatively modest federal funding.” *Id.* at 14-15. The assessment further notes that “[a]griculture is by far the leading source of impairment” of assessed rivers and streams nationwide. *Id.* at 5.

¹⁰⁹ See Ruhl, *supra* note 92, at 302-05; see generally Evtl. L. Inst., *Non-Point Source Pollution Research* (collecting ELI resources), available at http://www.eli.org/Program_Areas/water_nonpoint_source_research.cfm.

¹¹⁰ 42 U.S.C. §§ 300f–300j–9; see Office of Water, U.S. Evtl. Prot. Agency, Doc. No. EPA 816-F-04-030, *Understanding the Safe Drinking Water Act* (June 2004), available at http://water.epa.gov/lawsregs/guidance/sdwa/upload/2009_08_28_sdwa_fs_30ann_sdwa_web.pdf.

¹¹¹ See Office of Water, U.S. Evtl. Prot. Agency, Doc. No. EPA 816-F-04-032, *Protecting Drinking Water Sources* (June 2004), available at http://water.epa.gov/lawsregs/guidance/sdwa/upload/2009_08_28_sdwa_fs_30ann_swp_web.pdf; U.S. Evtl. Prot. Agency, *Water: Source Water Protection, Local Protection* (updated May 9, 2012), available at <http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/localprotection.cfm>.

¹¹² Nat'l Agric. Ctr., U.S. Env'tl. Prot. Agency, *Drinking Water and Wells* (updated May 24, 2012), available at <http://www.epa.gov/agriculture/tdri.html>. Drinking water provided by agricultural entities may be regulated (e.g., if it has its own source of drinking water, such as a well, or provides drinking water to workers). Under the Wellhead Protection Program, if an agricultural entity has an on-site water source that qualifies as a public non-community drinking water system, it must comply with state requirements that are designed to protect the wellhead from contaminants. *Id.* The Sole Source Aquifer program could also apply to some large-scale commodity crop operations. The program prohibits federal financial assistance for any project that could cause contamination to a sole source aquifer (i.e., one that supplies at least 50% of the drinking water consumed in the area overlying the aquifer) on any property, including agricultural lands. *Id.*

¹¹³ Office of Water, *supra* note 112.

¹¹⁴ Region Two, U.S. Env'tl. Prot. Agency, *Filtration Avoidance* (updated Oct. 15, 2010), available at <http://www.epa.gov/region2/water/nycshed/filtad.htm>; U.S. Env'tl. Prot. Agency, *Water: Source Water Protection, EPA, State and Tribal Programs* (updated Mar. 6, 2012), available at <http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/epastateandtribalprograms.cfm#csqwpp>.

¹¹⁵ To the contrary, USDA's general confidentiality rules (under 7 U.S.C. § 2276(a)) and the confidentiality rules associated with its Agricultural Commodity Support Programs (under 7 U.S.C. § 8791(b)(2)(A)) require non-disclosure of any information on agricultural operations where the party responsible is identifiable. These prohibitions apply to the Secretary of Agriculture, any employee or officer of the Department, and to any contractors or "cooperators" of the Department. The general confidentiality rules of Section 2276 extend the reach of the prohibition to "any other person." Under Section 2276, this information is immune from disclosure laws, and cannot be requested or obtained for a court proceeding. Revealing such information carries penalties of up to \$10,000 in fines and a year in prison. Section 8791's confidentiality provision allows the Secretary to disclose information on specific agricultural operations in the event that a pest or disease threatens agricultural operations, but no parallel provision allows the Secretary to disclose the information in the event of threats to human health or welfare.

¹¹⁶ 42 U.S.C. §§ 11001-11050.

¹¹⁷ 42 U.S.C. § 11023.

¹¹⁸ Toxic chemicals are defined under 42 U.S.C. § 11023(d)(2). The statute specifies numerous chemicals and provides that EPA may by rule add certain types and numbers of chemicals to the list. The standard that governs EPA's decision to add a chemical to the list is whether there is "sufficient evidence" to establish that the chemical is "known to cause or can reasonably be anticipated to cause significant adverse" acute or chronic human health or a "significant adverse effect on the environment of sufficient seriousness."

¹¹⁹ Nat'l Governors Ass'n, *NR-06. State and Federal Partnerships, Environmental Priorities, and Unfunded Mandates* (2011), formerly available at http://www.nga.org/cms/home/federal-relations/nga-policy-positions/page-nr-policies/col2-content/main-content-list/title_state-and-federal-partnerships-environmental-priorities-and-unfunded-mandates.html. The 2011 Policy Positions of the Natural Resources Committee have been removed from the NGA web site.

¹²⁰ U.S. Env'tl. Prot. Agency, *TRI Program Factsheet* (Jan. 2012), available at http://www.epa.gov/tri/triprogram/TRI_Factsheet_Jan_2012.pdf.

¹²¹ 42 U.S.C. § 11023(b)(1)(A); 40 C.F.R. § 372.23; U.S. Env'tl. Prot. Agency, *Is My Facility's Six-Digit NAICS Code a TRI-Covered Industry?* (updated May 10, 2012), <http://www.epa.gov/tri/lawsandregs/naic/ncodes.htm>. (Note that, since the passage of EPCRA, the federal government has switched from using SIC codes to using the more detailed NAICS codes. Information on how the two sets of codes match up is available at the link above.)

¹²² 42 U.S.C. § 11023; Occupational Safety & Health Admin., U.S. Dep't of Labor, *Standard Industrial Classification* (n.d.), available at http://www.osha.gov/pls/imis/sic_manual.html. Note, SIC Codes 20-39 cover pesticide and fertilizer manufacturers and mixers, but the Conference Report that accompanied the passage of EPCRA suggested that Congress thought that not all of these facilities should be covered. The Conference Report noted that the power given to the Secretary to exempt certain facilities from the "Toxic chemical release forms" requirement was intended to be used, "[f]or example," for facilities that "mix or blend for sale at the retail level various fertilizer products in response to specific customer needs. They may fall within SIC codes 20 through 39 . . . [y]et, given the retail context and the nature of the blending and mixing done by these specific facilities, reporting by such facilities may not be appropriate." H.R. Conf. Rep. No. 99-962, at 292-93 (1986).

¹²³ The TRI regulations, 40 C.F.R. 355.31(c), provide that reporting is not required for releases of pesticides registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In addition, release reporting requirements under another statute, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), exempt the “normal application of fertilizer” by carving the activity out from the definition of “release.” 42 U.S.C. § 9601(22)(D); Ruhl, *supra* note 92, at 312-14.

¹²⁴ The statute and regulations provide that reporting is required only if a threshold amount of a toxic chemical is “manufactured,” “processed,” or “otherwise used” at a facility. The definition of these terms is broad and inclusive; however, the statute also authorizes EPA to lower the reporting threshold under certain circumstances for classes of chemicals or categories of facilities. 42 U.S.C. § 11023(a).

¹²⁵ Agricultural operations are also exempt from EPCRA reporting requirements for “material safety data sheets” (42 U.S.C. § 11021) and “emergency and hazardous chemical inventory forms” (42 U.S.C. § 11022). Material safety data sheets and emergency and hazardous chemical inventory forms are used to inform state and local emergency responders about hazardous chemicals present at a facility. Both forms may be requested by the public. Specifically, the definition of a “hazardous chemical” excludes “any substance to the extent it is used in routine agricultural operations or is a fertilizer held for sale by a retailer to the ultimate customer.” 42 U.S.C. § 11021(e)(5). However, agricultural operations are not exempt from reporting requirements under CERCLA § 103(a) (42 U.S.C. § 9603(a)) or EPCRA § 304 (42 U.S.C. § 11004). These sections cover releases of “extremely hazardous substance[s]” (a narrower category of substances than the “toxic chemicals” subject to TRI reporting or the “hazardous substances” covered by material safety data sheets and hazardous chemical inventory forms). CERCLA § 103(a) requires notification of the National Response Center whenever there is a known release of a hazardous substance “equal to or greater than the reportable quantity (RQ) established by EPA for that substance.” 42 U.S.C. § 9603(a); 72 Fed. Reg. 73,700, 73,701. EPCRA § 304 requires that notification of such releases under CERCLA § 103(a) (as well as some additional categories of extremely hazardous releases) be reported to state and local authorities as well. 42 U.S.C. § 11004. Unlike TRI reporting under EPCRA § 313, agricultural operations are subject to these hazardous release reporting requirements. However, in 2008, the Bush Administration added regulatory exemptions for some animal-based discharges from farms. 73 Fed. Reg. 76,948. Specifically, air emissions from animal waste at farms are fully exempt from CERCLA § 103(a) reporting, though releases to other media and releases from other sources (including sources like ammonia storage tanks on farms) are not exempt. 40 C.F.R. § 302.6(e)(3). Under EPCRA § 304, air emissions from animal waste at farms are exempt provided the farm is below the federal threshold for a “large CAFO,” as defined in the federal NPDES regulations. 40 C.F.R. § 355.31(g)-(h). As with CERCLA § 103(a), releases into other media, and from other sources, remain subject to reporting requirements. These Bush-era exemptions are under review at EPA; if repealed, they would expand reporting obligations at livestock operations but only with respect to extremely hazardous substances; agricultural releases would remain exempt from TRI reporting.

¹²⁶ Fertilizer and pesticide manufacturers are covered by SIC Code Group 28 (Chemicals and Allied Products), which is one of the SIC Codes subject to TRI. Occupational Safety & Health Admin., *supra* note 123. Under the new NAICS classification system, fertilizer and pesticide manufacturers are covered by NAICS Code Group 325 (Chemicals) and remain subject to TRI. *See* U.S. Env'tl. Prot. Agency, *supra* note 122.

¹²⁷ *See* Office of Compliance, U.S. Env'tl. Prot. Agency, *Profile of the Agricultural Chemical, Pesticide, and Fertilizer Industry* 78-88, tables 14-17 (Sept. 2000), available at <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/agchem.pdf>.

¹²⁸ Office of Solid Waste & Emergency Response, U.S. Env'tl. Prot. Agency, Doc. No. EPA 550-B-01-003, *Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA) and Section 112(r) of the Clean Air Act* (Oct. 2006), available at http://www.epa.gov/oem/docs/chem/title3_Oct_2006.pdf

¹²⁹ Office of Compliance, *supra* note 128, at 7-16, 57-70; Beyond Pesticides/NCAMP, *Health Effects of 30 Commonly Used Lawn Pesticides* (Apr. 2005), available at <http://www.beyondpesticides.org/lawn/factsheets/30health.pdf>.

¹³⁰ Another law that bears mention with respect to large-scale commodity crop production is the Resource Conservation and Recovery Act (RCRA), which governs the management of hazardous and solid waste. Pursuant to RCRA, EPA has established standards and regulations for the treatment, storage, and disposal of wastes. 40 C.F.R. §§ 124, 260-279. In theory, agricultural entities that generate waste must determine whether the waste is a solid or a hazardous waste. A waste is considered hazardous if it is specifically listed by EPA or has the characteristics of hazardous waste (*i.e.*, toxicity, ignitability, corrosivity, or reactivity). As EPA explains: “Most agriculture-related activities do not generate significant amounts of hazardous waste. Generally, the activities potentially subject to RCRA involve the use of pesticides and fertilizers, and the use and maintenance of different types of machinery.” Office of Compliance, U.S. Env'tl. Prot. Agency, *Profile of the Agricultural Crop Production Industry* 122 (Sept. 2000), available at <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/agcrop.pdf>. According to EPA, based on the quantity of hazardous waste generated per month, most agricultural establishments qualify as conditionally exempt small quantity generators of waste. *See* 40 C.F.R. § 261.5. In addition to potential exemptions based on the amount of

waste generated, similar to other environmental laws, RCRA provides numerous exemptions for certain types of agricultural wastes. These include: certain solid wastes used as fertilizers, including wastes from growing and harvesting agricultural crops, and commercial fertilizers for public use that contain recyclable materials. In addition, irrigation return flow is not considered a solid waste, although it may contain waste. Ruhl, *supra* note, at 313-14.

¹³¹ Food Conservation and Energy Act of 2008, Pub. L. No. 110-246, 122 Stat. 1651 (June 2008), available at http://otexa.ita.doc.gov/pdfs/Food_Conservation_and_Energy_Act_of_2008.pdf.

¹³² *E.g.*, U.S. Comm. on Agric., Nutrition & Forestry, *Agriculture Reform, Food and Jobs Act of 2012* (2012), available at <http://www.ag.senate.gov/issues/farm-bill>.

¹³³ Econ. Research Serv., U.S. Dep't of Agric., *Farm Income and Costs: Farms Receiving Government Payments* (updated Feb. 14, 2011), available at <http://www.ers.usda.gov/briefing/farmincome/govtpaybyfarmtype.htm>.

¹³⁴ *See, e.g.*, Insurance Info. Inst., *Crop Insurance* (Mar. 2012) (providing an overview of how crop insurance is provided, what it covers, and how it is funded), available at <http://www.iii.org/media/hottopics/insurance/crop/>.

¹³⁵ Dennis A. Shields, Cong. Research Serv., CRS Rep. No. R40532, *Federal Crop Insurance: Background and Issues* 11, 2-3 (Dec. 13, 2010), available at www.nationalaglawcenter.org/assets/crs/R40532.pdf.

¹³⁶ Risk Mgmt. Agency, U.S. Dep't of Agric., *Fact Sheet: About the Risk Management Agency* (Nov. 2010), available at <http://www.rma.usda.gov/pubs/rme/aboutrma.pdf>.

¹³⁷ \$9.2 billion is rounded from \$9,204,614,000 and \$96 billion is rounded from \$95,955,700,000. *ARMS Farm Structure and Finance Data, Compiled by ELL, supra* note 6. "Government payments" are defined in the ARMS Data Dictionary as follows: "Gross value of direct government payments received by farm operations during the calendar year. Programs for which payments are received include: direct payments, counter-cyclical payments, loan deficiency payments (LDPs), marketing loan gains, peanut quota buyout program, milk income loss contract payments, disaster payments, conservation reserve program (CRP), wetlands reserve program (WRP), environmental quality incentive program (EQIP), and all other federal and state programs." *Id.* In addition, \$9.2 billion may be a significant underestimate of government payments, as other USDA data, commonly referred to as "administrative" data, indicate that federal program payments to the agriculture sector in 2010 were \$12.4 billion. *See* Timothy Park et al., U.S. Dep't of Agric., Doc. No. AIS-91, *Agricultural Income and Finance Outlook* 5 (Dec. 2011), available at <http://usda01.library.cornell.edu/usda/current/AIS/AIS-12-14-2011.pdf>. Environmental Working Group estimates that federal program payments to the agriculture sector in 2010 were \$15.2 billion, presumably because they rely on USDA administrative data and include crop insurance premiums. Envtl. Working Grp., *2011 Farm Subsidy Database: USDA subsidies for farms in United States totaled \$261,927,000,000 from 1995 through 2010* (2010), available at <http://farm.ewg.org/regionsummary.php?fips=00000&statername=theUnitedStates>.

¹³⁸ \$37 billion is rounded from \$36,835,000,000. Risk Mgmt. Agency, U.S. Dep't of Agric., *FY Government Cost for Federal Crop Insurance, 2002-11* (Nov. 23, 2011), available at <http://www.rma.usda.gov/aboutrma/budget/fycost2002-11.pdf>. *See also* Don Carr, Envtl. Working Grp., *Government's Continuing Bailout of Corporate Agriculture* (May 5, 2010) (stating that the federal government paid out \$250 billion in farm subsidies from 1995-2009), available at <http://www.ewg.org/agmag/2010/05/governments-continued-bailout-of-corporate-agriculture/>.

¹³⁹ Brian Riedl, Heritage Found., Backgrounder No. 1520, *How Farm Subsidies Became America's Largest Corporate Welfare Program* (Feb. 25, 2002), available at <http://www.heritage.org/Research/Reports/2002/02/Farm-Subsidies-are-Americas-Largest-Corporate-Welfare-Program>.

¹⁴⁰ Sara Sciammacco, Envtl. Working Grp., *City Slickers Continue to Rake In Farm Payments* (June 23, 2011), available at <http://www.ewg.org/agmag/2011/06/city-slickers-continue-to-rake-in-farm-payments>.

¹⁴¹ Geoffrey S. Becker, Cong. Research Serv., CRS Rep. No. 96-900 ENR, *Farm Commodity Legislation: Chronology, 1933-2002*, at 1 (updated May 31, 2002), available at <http://www.nationalaglawcenter.org/assets/crs/96-900.pdf>.

¹⁴² H.R. Rep. No. 73-6 (1933) at 1, available at <http://www.nationalaglawcenter.org/assets/farmbills/1933-house6.pdf>.

¹⁴³ Ashley Wood Renck, *The Agrarian Myth: How Has it Affected Agricultural Policy?* at 7 (presented at Western Agricultural Economics Association Annual Meeting, July 2002), available at <http://ageconsearch.umn.edu/bitstream/36568/1/sp02re01.pdf>.

¹⁴⁴ See Harwood Schaffer, Douglas B. Hunt & Darryl E. Ray, Univ. of Tenn. Agric. Policy Analysis Ctr., *U.S. Agricultural Commodity Policy and its Relationship to Obesity* 6 (Mar. 2007), available at http://209.197.87.28/images/stories/her_wingspread/9schafferbackgroundpaper.pdf.

¹⁴⁵ Michael Pollan, *The Omnivore's Dilemma: A Natural History of Four Meals* 49 (2006).

¹⁴⁶ Carolyn Dimitri & Anne Effland, U.S. Dep't of Agric., "Milestones in U.S. Farming and Farm Policy," in *Amber Waves* Vol. 3, at 10-11 (June 2005), available at <http://www.ers.usda.gov/AmberWaves/June05/pdf/FullIssueJune2005.pdf>.

¹⁴⁷ Becker, *supra* note 142, at 1.

¹⁴⁸ Nat'l Agric. Statistics Serv., *supra* note 86, at 7.

¹⁴⁹ T. Kirk White & Robert A. Hoppe, U.S. Dep't of Agric., Econ. Info. Bull. No. 91, *Changing Farm Structure and the Distribution of Farm Payments and Federal Crop Insurance* at i, 15 (Feb. 2012) (government payments covered in study included commodity direct payments, payments depending on market prices, disaster and emergency payments, as well as crop insurance premium subsidies and indemnity payments), available at <http://www.ers.usda.gov/Publications/EIB91/EIB91.pdf>; T. Kirk White & Robert A. Hoppe, U.S. Dep't of Agric., "Government Commodity Payments Continue to Shift to Larger Farms, Higher Income Households," in *Amber Waves* Vol. 10, at 1 (Mar. 2012), available at <http://162.79.45.209/amber-waves/2012-march/government-commodity-payments.aspx>.

¹⁵⁰ *ARMS Farm Structure and Finance Data, Compiled by ELI, supra* note 6. In 2009, 30.1% of farms with less than \$100,000 in sales received government payments, while 71.4% of farms with \$500,000 or more in sales received government payments. The ARMS Data Dictionary defines "commodity crop payments" as the sum of direct payments, countercyclical payments, and marketing loan benefits. *Id.* As noted earlier, "government payments" are defined in the ARMS Data Dictionary as follows: "Gross value of direct government payments received by farm operations during the calendar year. Programs for which payments are received include: direct payments, counter-cyclical payments, loan deficiency payments (LDPs), marketing loan gains, peanut quota buyout program, milk income loss contract payments, disaster payments, conservation reserve program (CRP), wetlands reserve program (WRP), environmental quality incentive program (EQIP), and all other federal and state programs." *Id.* sure, many of the smallest farms are not in commodity markets and thus lack access to subsidy programs.

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ *Id.* These figures could be under- or over-inclusive (*see* Methodology Appendix).

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ These include: Agricultural Management Assistance Program (AMA); Chesapeake Bay Watershed Program; Cooperative Conservation Partnership Initiative (CCPI); Conservation Operations (CO); Conservation Technical Assistance (CTA); Conservation Reserve Program (CRP); CRP—Conservation Reserve Enhancement Program (CREP); CRP—Farmable Wetlands Program; Conservation Security Program; Conservation Stewardship Program (CSP); Emergency Conservation Program (ECP); Emergency Watershed Program (EWP); Environmental Quality Incentives Program (EQIP); EQIP—Agricultural Water Enhancement Program (AWEP); EQIP—Conservation Innovation Grants (CIG); Farmland Protection Program (FPP); Grassland Reserve Program (GRP); Healthy Forest Reserve Program (HFRP); Resource Conservation and Development Program (RC&D); Voluntary Public Access and Habitat Incentive Program; Watershed and Flood Prevention Operations; Watershed Rehabilitation Program; Wetland Reserve Program (WRP); and Wildlife Habitat Incentive Program (WHIP). The Congressional Research Service recently grouped these conservation programs into several categories and concluded that the two largest program categories in terms of 2011 funding dollars were the "working lands programs" and "land retirement and easement programs." Working lands programs foster conservation measures on land in production and include EQIP, CSP, and WHIP. Land retirement and easement programs provide incentives for temporary and permanent changes, respectively, in land use and management practices and include CRP and CREP. Specifically, CRS found that almost half (46%) of 2011 conservation dollars were allocated to land retirement and easement programs, and more than a third (39%) to working lands programs. The rest of the conservation dollars were divided among several other types of programs. Megan Stubbs, Cong. Research Serv., CRS Rep. No. R40763, *Agricultural Conservation: A Guide to Programs* 2, 4 (June 7, 2011), available at <http://www.nationalaglawcenter.org/assets/crs/R40110.pdf>.

¹⁵⁷ Conservation payments in 2009 totaled \$2.4 billion. Conservation payments in 2009 to corn, soybean and wheat operations totaled \$426.5 million. Of that amount, \$168 million in payments went to large-scale (\$500,000 or more in total farm sales) corn, soybean, and wheat operations. *ARMS Farm Structure and Finance Data, Compiled by ELL, supra* note 6.

¹⁵⁸ White & Hoppe, *Changing Farm Structure, supra* note 150, at 28.

¹⁵⁹ See 7 U.S.C. § 1308-3a (adjusted gross income limitation). Under the Farm Bill, in order to receive certain types of farm subsidy payments, including direct payments, a recipient cannot have an adjusted gross income (AGI) of more than \$500,000 for non-farm income or \$750,000 for farm income. To receive conservation program payments, a recipient cannot have an AGI of more than \$1,000,000 for nonfarm income—unless two thirds or more of the recipient’s AGI is farm income. *Id.* at §§ 1308-3a(b)(1)-(2). However, the appropriations bill for fiscal year 2012 provides that no funds may be used to make direct payments to any person or company with an AGI in excess of \$1,000,000. See Consolidated and Further Continuing Appropriations Act of 2012, Pub. L. No. 112-55, 125 Stat. 552 § 745 (Nov. 2011) (prohibiting Secretary of Agriculture from using funds to make the direct subsidy payments authorized by 7 U.S.C. §§ 8713, 8753 to any entity with an AGI in excess of \$1,000,000).

¹⁶⁰ 16 U.S.C. §§ 3821,3822 (conservation compliance applies to land cropped before the enactment of the 1985 law (between 1981 and 1985); whereas, sodbuster program applies to highly erodible land cropped after the 1985 law); see also Ctr. for Regulatory Effectiveness, *Food Security Act of 1985* (n.d.), available at http://www.thecre.com/fedlaw/legal14coast/food_security_act_of_1985_legal_matters.htm; Roger Claassen et al., U.S. Dep’t of Agric., Agric. Econ. Rep. No. 832, *Environmental Compliance in U.S. Agricultural Policy: Past Performance and Future Potential* at 1 (June 2004), available at <http://www.ers.usda.gov/publications/aer832/aer832.pdf>.

¹⁶¹ *Id.* at i, 1.

¹⁶² Although the requirements do not directly apply to nutrient pollution measures, as explained by researchers: “Erosion control practices are particularly critical to reduce losses of particulate P and sediment-bound forms of N. Efficient water management can reduce leaching of soluble N from irrigated cropland. Many erosion and sediment control, grazing management, and irrigation management measures will therefore contribute to the effectiveness of nutrient management. . . .” Office of Enforcement & Compliance Assurance, U.S. Dep’t of Agric., *Overview of BMPs for Nutrient Management, A Farmer’s Guide To Agriculture and Water Issues* (updated Dec. 19, 2003), available at <http://www.cals.ncsu.edu/wq/wqp/wqpollutants/nutrients/bestman.html#overview>.

¹⁶³ Natural Res. Conservation Serv., U.S. Dep’t of Agric., *Wetland Conservation Provisions (Swampbuster)* (Mar. 14, 2012), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/alphabetical/camr/?&cid=stelprdb1043554>.

¹⁶⁴ For example, the research organization MapLight concluded that agribusiness interests involved with corn, soybeans, wheat, and cash grains contributed over \$650,000 to members of the House and Senate Agriculture Committees of the 112th Congress from January 1, 2001 to June 30, 2011. See Jeffrey ErnstFriedman, MapLight, *Agribusiness Contributions to Members of the House and Senate Agriculture Committees* (Nov. 14, 2011), available at <http://maplight.org/content/72865>. Total contributions to these committee members from agriculture related businesses over the same time frame were estimated at over \$26 million.

¹⁶⁵ See, e.g., J.B. Ruhl, “Three Questions for Agriculture About the Environment,” 17 *J. Land Use & Envtl. L.* 395; Max Schnepf, Envtl. Working Grp., *Conservation Compliance: A Retrospective...And Look Ahead* (Feb. 2012), available at http://static.ewg.org/pdf/conservation_comp_maxs.pdf. An advantage of utilizing federal environmental laws to address pollution associated with large-scale commodity crop operations is that these laws provide a well-established mechanism through which Congress can balance the legitimate needs of an economic sector against the priority of safeguarding human health and the environment. In addition, federal law (as opposed to individual state laws) affords the ability to set a federal conservation floor—with states then free to enact more stringent protections where they see fit, based on their individual circumstances. For example, massive, chronic, interstate problems like the coastal dead zones that plague the Northern Gulf of Mexico and the Chesapeake Bay are quintessential examples of problems that call for legal responses on a national scale.

¹⁶⁶ For example, federal contracts place obligations on recipients with respect to nondiscrimination, drug-free workplace requirements, and labor standards. Carl L. Vacketta, DLA Piper LLP, *Federal Government Contract Overview* (1999), available at <http://library.findlaw.com/1999/Jan/1/241470.html>. In addition, “Buy America” requirements may also be imposed. 23 C.F.R. § 635.410; Fed. Highway Admin., U.S. Dep’t of Transp., *Quick facts about “Buy America” requirements for Federal-aid highway construction* (updated Apr. 7, 2011), available at <http://www.fhwa.dot.gov/programadmin/contracts/b-amquck.cfm>. In the context of farm subsidies, recipients are subject to the compliance requirements, discussed *supra*, among other requirements. For example, recipients of direct and counter-cyclical payments are subject to certain restrictions on the planting of wild rice,

fruits, and vegetables crops. Farm Serv. Agency, U.S. Dep't of Agric., *Direct and Counter-Cyclical Payment Program (DCP)—2012*, at 3 (Jan. 2012), available at http://www.fsa.usda.gov/Internet/FSA_File/dcp_0112.pdf.

¹⁶⁷ The sodbuster program for new cropland requires that conservation systems must “prevent a substantial increase in erosion,” which is defined as “any soil erosion level that is greater than the sustainable level.” For highly erodible cropland farmed between 1981 and 1985, conservation systems must “substantially reduce soil erosion,” which is a lower standard defined by USDA to mean a 75% reduction of the potential erodibility or not more than two times the soil loss tolerance level or rate at which soil can maintain continued productivity, whichever is less. Natural Res. Conservation Serv., U.S. Dep't of Agric., *National Food Security Act Manual* § 512.0(E) (5th ed. 2010), available at <http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=29340>; Claassen et al., *supra* note 161. As explained by USDA: “As originally envisioned, conservation systems would be designed to reduce soil erosion to the soil loss tolerance (“T”) level—the level that a soil can sustain without long-term productivity damage. Before conservation compliance was implemented, however, USDA determined that reducing erosion to T would be very costly on some land—so costly that a considerable amount of HEL cropland would be unprofitable to farm. In the meantime, doubts about the scientific validity of T were being voiced and research showed, increasingly, that water quality damage from sedimentation (which is unrelated to T) exceeded the value of productivity loss.” Roger Claassen, “Compliance Provisions for Soil and Wetland Conservation,” in Econ. Research Serv., U.S. Dep't of Agric., Econ. Info. Bull. No. 16, *Agricultural Resources and Environmental Indicators, 2006 Edition* 186-87 (Keith Wiebe & Noel Gollehon eds., July 2006) (internal citations omitted), available at http://www.ers.usda.gov/publications/arei/eib16/eib16_5-3.pdf.

¹⁶⁸ Natural Res. Conservation Serv., U.S. Dep't of Agric., *National Soil Erosions Results Tables: 2007 National Resources Inventory* at Table 20, available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/nri/?&cid=stelprdb1041678>.

¹⁶⁹ Nat'l Agric. Statistics Serv., U.S. Dep't of Agric., Doc. No. AC-07-A-51, *2007 Census of Agriculture: United States Summary and State Data* 16 (updated Dec. 2009), available at http://www.agcensus.usda.gov/Publications/2007/Full_Report/usv1.pdf.

¹⁷⁰ Claassen et al., *supra* note 161, at 7.

¹⁷¹ Econ. Research Serv., U.S. Dep't of Agric., *Conservation Policy: Compliance Provisions for Soil and Wetland Conservation* (updated Feb. 9, 2012), available at <http://www.ers.usda.gov/Briefing/ConservationPolicy/compliance.htm>.

¹⁷² Federally subsidized crop insurance was initially subject to conservation compliance in 1985 but was removed from the list of programs subject to conservation compliance in 1996. Claassen et al., *supra* note 161, at 8,10.

¹⁷³ Econ. Research Serv., *supra* note 172.

¹⁷⁴ For example, USDA reasoned that if direct payments are eliminated, extending conservation compliance to crop insurance could affect the 181,000 farms (9%) that received direct payments in 2010 and also purchased crop insurance, but did not receive conservation payments—assuming they continued to purchase crop insurance. It would also affect farms that did not receive direct payments but did purchase crop insurance (roughly 53,000 or 2.4% of farms) in 2010 by making some of them subject to conservation compliance for the first time. *Id.*; Roger Claassen, U.S. Dep't of Agric., Econ. Info. Bull. No. 94, *The Future of Environmental Compliance Incentives in U.S. Agriculture: The Role of Commodity, Conservation, and Crop Insurance Programs* 11 (Mar. 2012), available at <http://www.ers.usda.gov/Publications/EIB94/EIB94.pdf>.

¹⁷⁵ 16 U.S.C. § 3812a(a)(4); 7 C.F.R. § 12.23(j) (“*Undue economic hardship*. After a technical determination has been made, the FSA county committee shall, if a person asserts that the application of the person’s conservation system would impose an undue economic hardship on the person, make a recommendation to the State FSA Committee as to whether or not the application of the conservation system would impose an undue economic hardship. The State FSA Committee may provide the person with a variance on the basis of the hardship. Under this variance, and any conditions that may be required in the variance, the person will be considered to be in compliance with the applicable provisions of this part. The State FSA Committee will consider relevant factors, such as the cost of installation of required conservation practices and benefits earned through programs subject to compliance with this part, and the person’s general economic situation.”); U.S. Gov’t Accountability Office, Doc. No. GAO-03-418, *Agricultural Conservation: USDA Needs to Better Ensure Protection of Highly Erodible Cropland and Wetlands* 8-9 (Apr. 2003), available at <http://gao.gov/assets/240/237878.pdf>.

¹⁷⁶ Claassen et al., *supra* note 161, at v; Claassen, “Compliance Provisions,” *supra* note 168, at 189. (“Reductions in excess erosion (*i.e.*, erosion in excess of T) were larger on farms that received farm program payments than on farms that did not. Excess wind erosion declined by 31 percent on farms receiving payments, but only 14 percent on farms not receiving payments (fig.

5.3.4). Excess water erosion dropped by 47 percent on farms receiving payments and by 41 percent on farms not receiving payments.”).

¹⁷⁷ Roger Claassen et al., U.S. Dep’t of Agric., Research Brief, *Environmental Compliance in U.S. Agricultural Policy: Past Performance and Future Potential* (June 2004), available at http://www.ers.usda.gov/Publications/aer832/aer832_researchbrief.pdf; see also Schnepf, *supra* note 166.

¹⁷⁸ Claassen et al., *supra* note 161, at vi.

¹⁷⁹ Claassen et al., *supra* note 178.

¹⁸⁰ Claassen, “Compliance Provisions,” *supra* note 168, at 188.

¹⁸¹ Schnepf, *supra* note 166, at 8.

¹⁸² U.S. Gov’t Accountability Office, *supra* note 175, at “What GAO Found.”

¹⁸³ *Id.*

¹⁸⁴ *Id.* Similarly, in a report arguing that soil erosion and runoff rates are far higher than estimated by USDA, Environmental Working Group recently called for stepped-up enforcement of the conservation compliance program through intensifying annual inspections of farmers’ soil conservation practices and fully using penalty authority in cases of failure to comply with conservation requirements. EWG points out that “[i]t has been 20 years since farmers were first asked to write and implement conservation plans” and that “[i]t is only reasonable that they now be asked to meet today’s challenges in return for a continuing flow of income, production and insurance subsidies.” Cox et al., *supra* note 77, at 31. Environmental Working Group calls on Congress to take several specific steps: “Reopen and revise all legacy conservation compliance soil conservation plans (those approved and implemented before July 3, 1996). Practices prescribed in the revised plans must reduce soil erosion to the land’s T value and prevent ephemeral gully erosion on highly erodible cropland.”; “Require treatment and/or prevention of ephemeral gully erosion on all agricultural land — not just highly erodible land — owned by producers or landlords receiving income, production, insurance and conservation subsidies.”; “Require a vegetative buffer at least 35 feet wide between row crops and all lakes, rivers and smaller streams.”; “Require producers participating in existing and new crop and revenue insurance programs to meet conservation compliance provisions.”; “Bar producers who convert native prairie or rangeland to row crops from receiving income, production, insurance or conservation subsidies on those acres.”; “Use a portion of the funding provided for income, production, insurance and conservation programs to pay for the technical staff needed to plan and implement the required conservation practices and to complete annual inspections to certify that those practices are in place.” *Id.* at 31-32.

¹⁸⁵ Office of Inspector Gen., U.S. Dep’t of Agric., Audit Rep. No. 10099-8-KC, *Natural Resources Conservation Service Compliance with Highly Erodible Land Provisions* at i (Sept. 10, 2002), available at http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_007537.pdf.

¹⁸⁶ U.S. Gov’t Accountability Office, *supra* note 176, at 43.

¹⁸⁷ Office of Inspector Gen., U.S. Dep’t of Agric., Audit Rep. No. 50601-13-KC, *Natural Resources Conservation Service Status Review Process 2* (June 11, 2008), available at www.usda.gov/oig/webdocs/50601-13-KC.pdf.

¹⁸⁸ Jon Scholl, *Conservation Compliance is Critical* (Oct. 7, 2011), available at <http://blog.farmland.org/2011/10/conservation-compliance-is-critical/>. In addition, Environmental Working Group has developed detailed recommendations for improving the Conservation Compliance Program. See Michelle Perez, Env’tl. Working Grp., *Trouble Downstream: Upgrading Conservation Compliance* 37-39 (Sept. 2007), available at http://www.ewg.org/files/EWG_Compliance_wholereport.pdf. And a large coalition of stakeholders representing municipal water and wastewater utilities, state regulators, and components of the agricultural and conservation sectors recently issued a set of Farm Bill recommendations that included the following:

Conservation compliance requirements should apply to all commodity and crop and revenue insurance programs. In addition, federal payments and premium subsidies should be linked in some manner to the goal of avoiding adverse water quality impacts from agricultural operations. Options to consider include expanding conservation compliance requirements to include nutrient reduction activities, particularly in watersheds impaired by nutrients, or providing increased assistance to producers in such watersheds to adopt an adaptive management approach to maximizing nutrient use efficiency and/or other effective and documentable practices and approaches to reduce nutrient losses. In

addition, Congress should examine commodity and crop and revenue insurance programs to identify where these programs may create disincentives for effective nutrient management and remove those disincentives.

Healthy Waters Coalition, *Healthy Waters Coalition Urges Action on Nutrient Run-Off 2* (Sept. 2011), available at <http://sustainableagriculture.net/wp-content/uploads/2011/09/HWC-FINAL-Policy-Recommendations.pdf>.

¹⁸⁹ Ribaldo et al., *supra* note 25, at 22, 25; *see also* Claassen et al., *supra* note 161, at 27 (citing Stan Daberkow et al., “Nutrient Use and Management” (2000), in Econ. Research Serv., U.S. Dep’t of Agric., Econ. Info. Bull. No. 16, *Agricultural Resources and Environmental Indicators, 2006 Edition* (Keith Wiebe & Noel Gollehon eds., July 2006), available at <http://www.ers.usda.gov/publications/arei/eib16>) (“Roughly 70 percent of corn acres and 60 percent of winter wheat and cotton acres had high excess nitrogen balances in 1995, while high excess phosphorus balances were estimated to exist on roughly 40 percent of corn, cotton, and wheat acres.”).

¹⁹⁰ Claassen et al., *supra* note 161, at 5 (“[T]he effectiveness of compliance mechanisms—relative to other agri-environmental policy tools—depends largely on the size and spatial distribution of government payments relative to the spatial distribution of targeted agri-environmental problems and the costs involved in mitigating those problems. Given the configuration of current farm programs, compliance mechanisms have the potential to address many cropland-based conservation and environmental problems.”).

¹⁹¹ *Id.* at 27-30 (“In areas where USGS researchers estimate that phosphorus surface-water concentrations exceed the [EPA] suggested water quality goal of 0.1 mg/L, fertilizer is estimated to account, on average, for 21 percent of phosphorus loading while livestock waste and nonagricultural land are estimated to account for 38 percent and 33 percent, respectively (Smith et al., 1997). As noted above, however, many cropland acres carry excess phosphorus balances. Thus, non-waste phosphorus management on cropland may still be important to reducing phosphorus damage to surface water, particularly in areas where livestock production is less prevalent and commercial phosphorus fertilizer is applied.”).

¹⁹² Ribaldo et al., *supra* note 26, at 44 (noting that reductions in direct payments could mean the cost of more expensive nitrogen management practices such as waste utilization would be greater than the program benefits, thereby making compliance requirements an ineffective approach).

¹⁹³ Roger Claassen, U.S. Dept. of Agric., “Can Commodity Program Payments Encourage Better Nutrition Management?,” in *Amber Waves* Vol. 5, at 6 (June 2007), available at http://www.ers.usda.gov/AmberWaves/June07/PDF/AW_June07.pdf.

¹⁹⁴ Roger Claassen et al., *supra* note 161, at 38.

¹⁹⁵ *Id.*

¹⁹⁶ Claassen, *supra* note 194, at 6. Specifically, USDA found that “[w]here nitrogen runoff potential is highest, annual commodity program payments ranged from about \$42 to more than \$100 per cropland acre. Environmental Quality Incentive Program (EQIP) payments are the best available estimates of producers’ costs for implementing a nutrient management plan. Half of all annual non-livestock EQIP payments (paid for up to 3 years) are \$5 per acre or less, while 95 percent are \$15 per acre or less. Buffer practices, such as filter strips, may be cost-effective for reducing surface runoff because they occupy only about 2.5 percent of a field. A grass filter strip costs an estimated \$2.70 per cropland acre, on average, although costs vary considerably.” *Id.* Compare Claassen et al., *supra* note 161, U.S. Gov’t Accountability Office, *supra* note 176, and Claassen, “Compliance Provisions,” *supra* note 168, with Roger Claassen & Mitch Morehart, U.S. Dep’t of Agric., Econ. Brief No. 1, *Conservation Program Design: Greening Income Support and Supporting Green* 5 (Mar. 2006) (noting that expanding compliance could “undercut income support if conservation requirements were expensive to fulfill”), available at <http://www.ers.usda.gov/publications/EB1/EB1.pdf>.

¹⁹⁷ Claassen et al., *supra* note 161, at 38.

¹⁹⁸ Claassen & Morehart, *supra* note 197, at 5.

¹⁹⁹ *Id.* Another potential approach identified would be to combine commodity program payments and conservation payments into a single program. *See, e.g.*, Roger Claassen et al., U.S. Dep’t of Agric., Econ. Research Rep. No. 44, *Integrating Commodity and Conservation Programs: Design Options and Outcomes* (Oct. 2007) (examining how income support features of commodity programs and conservation payments might be combined in a single program, and noting that policymakers would face “significant tradeoffs” between the objectives of each of the existing regimes), available at <http://www.ers.usda.gov/publications/err44/err44.pdf>.

²⁰⁰ Claassen, *supra* note 175 (analyzing the incentive effects of attaching conservation compliance requirements to crop insurance premium subsidies).

²⁰¹ Various recommendations for the 2012 Farm Bill cycle also contain suggestions for expanding the reach of conservation through the federal farm subsidy program. For example, a national coalition of policy and advocacy organizations has proposed, among other things, that conservation compliance be expanded to crop insurance. See Alliance for the Great Lakes et al., *Principles for Strengthening the Conservation Title* (Sept. 28, 2011), available at <http://www.farmland.org/documents/092811JointConservationTitlePrinciples.pdf>.

²⁰² 16 U.S.C. § 3812a(a)(4); 7 C.F.R. § 12.23(j). Additionally, it is important to note that a significant percentage of U.S. farm land is rented. See, e.g., Timothy A. Wise, “Understanding the Farm Problem: Six Common Errors in Presenting Farm Statistics” 10, Working Paper No. 05-02, Global Development and Environment Institute, Tufts University (2005) (“With nearly half of U.S. farm land leased and not owned by the farmers, it is misleading to assume that farmers are the ultimate beneficiaries of farm programs.”) (citations omitted). This creates a potential disconnect in a situation where the agricultural landlord accepts the benefits of federal subsidy payments, but the farmer-lessee must satisfy the baseline stewardship condition. Ultimately, however, it is the federal subsidy *recipient*—and not a lessee of the land—who should be legally responsible for satisfying the condition.

²⁰³ E.g., 16 U.S.C. § 3812a(e). On the need to reinvigorate public investment in agricultural research, and ensure that farmers receive independent advice, see generally Food & Water Watch, *Public Research, Private Gain: Corporate Influence Over University Agricultural Research* (Apr. 2012), available at <http://documents.foodandwaterwatch.org/doc/PublicResearchPrivateGain.pdf>.

²⁰⁴ Commodity Credit Corp., U.S. Dep’t of Agric., *Appendix to Form CCC-509, Direct and Counter-Cyclical Program (DCP) Contract or Average Crop Revenue Election (ACRE) Program Contract 6* (Apr. 24, 2009), available at [http://forms.sc.egov.usda.gov/efcommon/eFileServices/eForms/CCC509_APPENDIX_\(04-24-09\).PDF](http://forms.sc.egov.usda.gov/efcommon/eFileServices/eForms/CCC509_APPENDIX_(04-24-09).PDF). “Producers will timely file in the manner prescribed by CCC with the FSA County Committee the following, if required, and agree to meet any other certification or filing requirements, as may be required by CCC, if not already on file: (1) A certification of the acreage of all cropland on the farm in accordance with 7 CFR Part 718; and (2) A farm operating plan in accordance with 7 CFR Part 1400; and (3) A certification of compliance with the highly erodible land and wetland conservation provisions set forth in 7 CFR Part 12; and (4) A certification of compliance with the average adjusted gross income provisions in accordance with 7 CFR Part 1400 (together with any waivers as may be deemed needed by CCC to verify income with the Internal Revenue Service or to otherwise facilitate the administration of the DCP and ACRE programs); and (5) A report of production on the farm according to 7 CFR §1412.76.”

²⁰⁵ Weatherization & Intergovernmental Program, U.S. Dep’t of Energy, Doc. No. DOE/GO-102010-3063, *The State Energy Program and the American Recovery and Reinvestment Act* (June 2010) (To receive SEP Recovery Act funds, state governors must provide signed certifications that they have obtained necessary assurances that the “state or applicable units of local government that have the authority to adopt building codes will . . . [a]dopt a residential building energy code that meets or exceeds the most recent International Energy Conservation Code[,] . . . [a]dopt a commercial building energy code that meets or exceeds the ASHRAE Standard 90.1-2007 [and] . . . [i]mplement a plan to achieve 90% code compliance within eight years.”), available at http://www1.eere.energy.gov/library/pdfs/48101_weather_arra_fsr2.pdf.

²⁰⁶ See Natural Res. Conservation Serv., U.S. Dep’t of Agric., *Conservation Delivery Streamlining Initiative (CDSI) Areas* (modified May 30, 2012), available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/home/?&cid=stelprdb1042169>.

²⁰⁷ E.g., 7 C.F.R. § 12.5(a)(ii) (exempting from conservation compliance requirement land set aside under USDA programs aimed at reducing production).

²⁰⁸ It seems self-evident that neither federal cost-share dollars nor any other source of federal support is an appropriate source of funding to implement the “baseline stewardship measures” condition proposed in this report, given the underlying intent to ask operators to assume responsibility. Additionally, an operator that is financially unable to comply with the condition may seek an economic hardship exception.

²⁰⁹ ConAgra Foods, *Sourcing and Supplier Engagement* (n.d.), available at http://company.conagrafoods.com/phoenix.zhtml?c=202310&p=Policies_Environment#SustainableAgriculture.

²¹⁰ *Id.*

²¹¹ PepsiCo, *Our Commitment to Sustainable Agricultural Practices* (n.d.), available at http://www.pepsico.com/Download/PepsiCo_agri_0531_final.pdf.

²¹² Archer Daniels Midland Co., *2011 Corporate Responsibility Report: Supply Chain Integrity* (2012), available at http://www.adm.com/en-US/responsibility/2011CR/Pages/supply_chain_integrity.aspx.

²¹³ Bunge Ltd., *Bunge Citizenship: Sustainable Agriculture* (2012), <http://www.bunge.com/citizenship/sustainable.html>.

²¹⁴ Field to Market, *Field to Market: The Keystone Alliance for Sustainable Agriculture* (2012), available at <http://www.fieldtomarket.org/>.

²¹⁵ J. Gordon Arbuckle, Jr. et al., Iowa State Univ. Extension, *Iowa Farm and Rural Life Poll: 2009 Summary Report* 15 (Dec. 2009), available at <http://www.extension.iastate.edu/Publications/PM2093.pdf>. See also, e.g., Schnepf, *supra* note 166, at 19 (summarizing history of conservation compliance, recommending improvements, and arguing based on various sources of polling data that “[f]armers consistently support conservation compliance as a compact between taxpayers and themselves”).

²¹⁶ Ribaud et al., *supra* note 25, at 28-29 (citing Bishop et al., 2010; Chouinard et al., 2008) (“For example, based on survey responses from the State of Washington . . . farmers would be willing to forgo up to \$4.52 (median value estimate) in per acre annual profits to implement soil conserving stewardship practices.”).

²¹⁷ Claassen et al., *supra* note 161, at 38; Jodi DeJong-Hughes & Jeffrey Vetsch, Univ. of Minn. Extension, Doc. No. BU-08483, *On Farm Comparison of Conservation Tillage Systems for Corn Following Soybeans* 10 (2007), available at <http://www.extension.umn.edu/distribution/cropsystems/components/08483.pdf>.

²¹⁸ U.S. Env'tl. Prot. Agency, Pointer No. 6, Doc. No. EPA841-F-96-004F, *Managing Nonpoint Source Pollution from Agriculture* (1996), available at <http://water.epa.gov/polwaste/nps/outreach/point6.cfm>.

²¹⁹ Luc Valentin et al., “Testing the Empirical Relationship between Best Management Practice Adoption and Farm Profitability,” 26 *R. Agric. Econ.* 489, 489 (2004), available at <http://www.jstor.org/stable/3700793>. See also B. Koch et al., “Site-Specific Management: Economic Feasibility of Variable-Rate Nitrogen Application Utilizing Site-Specific Management Zones,” 96 *Agron. J.* 1572 (2004) (when compared to conventional uniform nitrogen application, a strategy that utilized management zones with differentiated yield goals to determine variable nitrogen application rates used between six and 46% less nitrogen, resulted in equal or higher grain yields, and produced additional net returns per hectare); J.O. Paz et al., “Model-based technique to determine variable rate nitrogen for corn, 61 *Agric. Systems* 69 (1999) (approach that applied model-determined optimum nitrogen fertilizer rate for 224 grid cells in 16-hectare Iowa cornfield reduced average fertilizer rate, increased expected yield, and increased profits per hectare as compared to applying uniform nitrogen rate to entire field).

²²⁰ Keystone Ctr., *Environmental Resource Indicators for Measuring Outcomes of On-Farm Agricultural Production in the United States, First Report* 15, 17 (Jan. 2009), available at http://www.keystone.org/images/keystone-center/spp-documents/2011/Regional_Transmission_Projects/Field-to-Market_Environmental-Indicator_First_Report_With_Appendices_01122009.pdf. This suggests a “significant[] increase[]” in the efficiency of nitrogen and pesticide utilization. *Id.* at 15. See also, e.g., Cathy Mathers, Fertilizer Inst., *The Fertilizer Institute Responds to Environmental Working Group's "Troubled Waters" Report* (Apr. 13, 2012), available at <http://www.tfi.org/media-center/news-releases/fertilizer-institute-responds-environmental-working-groups-troubled-water?colorbox=1§ion=news-releases> (“U.S. farmers are growing corn with record efficiency. In 2010, U.S. farmers grew 87 percent more corn using 4 percent fewer nutrients than they did in 1980.”).

²²¹ Office of Env'tl. Info., U.S. Env'tl. Prot. Agency, *2007 TRI-MEweb Delivers Results for the TRI Program* 1 (2008), available at http://www.whitehouse.gov/sites/default/files/omb/assets/fea_docs/EPA_TRI-MEweb_success_2008.pdf.

²²² Archong Fung & Dara O'Rourke, “Reinventing Environmental Regulation from the Grassroots Up: Explaining and Expanding the Success of the Toxics Release Inventory,” 25 *J. Env'tl. Mgmt.* 115, 115 (Feb. 2000) (on file with ELI); see also Bradley C. Karkkainen, “Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?,” 89 *Geo. L.J.* 257 (Jan. 2001), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=224157.

²²³ See, e.g., Fung & O'Rourke, *supra* note 223; Karkkainen, *supra* note 223; see also Mark A. Cohen, “Information as a Policy Instrument in Protecting the Environment: What Have We Learned?,” 31 *Env'tl. L. Rep.* 10425 (Apr. 2001) (noting the need for empirical research on the causes of TRI-related environmental benefits). Not all commentators agree that TRI has been a success. Critics assert, for example, that TRI data is incomplete and inaccurate and that the reporting methodologies and chemicals

reported obscure the relative risks, leading to consumer confusion and misallocation of resources. See, e.g., Fung & O'Rourke, *supra* note 223 (explaining critics' argument that TRI measures environmental performance poorly and thus may direct resources toward the "wrong targets").

²²⁴ Claassen et al., *supra* note 161, at 19, 38; DeJong-Hughes & Vetsch, *supra* note 218, at 10) ("Conservation tillage can greatly reduce soil erosion, with minimal effect on crop yields and often at lower production costs than conventional tillage. With appropriate adjustments to crop management, conservation tillage offers a low-risk means of achieving substantial reductions in sediment and phosphorus losses from cropland to streams, rivers, and lakes."); U.S. Env'tl. Prot. Agency, *supra* note 219.

²²⁵ Susanne Rust, California Watch, *Disclosing Greenhouse Gas Emissions Boosts Business, Study Finds* (Feb. 6, 2012), available at <http://californiawatch.org/dailyreport/disclosing-greenhouse-gas-emissions-boosts-business-study-finds-14765>; see Paul A. Griffin & Yuan Sun, *Going Green: Market Reaction to CSR Newswire Releases* (Jan. 29, 2012), available at <http://ssrn.com/abstract=1995132>.

²²⁶ Ruhl, *supra* note 92, at 337-38.

²²⁷ E.g., Jeff Arnold et al., *SWAT: Soil & Water Assessment Tool Fact Sheet* (1998), available at <http://swatmodel.tamu.edu/fact-sheet/>; Env'tl. Prot. Agency, *Exposure Assessment Models: HSPF (Hydrological Simulation Program-Fortran)* (Apr. 1997), available at <http://www.epa.gov/ceampubl/swater/hspf/>; Univ. of Ga., *GLEAMS (Groundwater Loading Effects of Agricultural Management Systems) Y2K Update* (modified May 16, 2007) (providing an update of the popular 1980 CREAMS model, Leonard et al. 1987), available at http://www.tifton.uga.edu/sewrl/Gleams/gleams_y2k_update.htm#GeneralOverviewofGLEAMS; Robert A. Young, USDA-ARS N. Cent. Soil Conservation Research Lab., *Agricultural Non-Point Source Pollution Model* (updated Mar. 26 1998), available at http://www.wiz.uni-kassel.de/model_db/mdb/agnps.html. See generally Great Lakes Env'tl. Research Lab., Nat'l Oceanic & Atmospheric Admin., *Distributed Large Basin Runoff Model* (updated Sept. 8, 2006), available at <http://www.glerl.noaa.gov/res/Programs/pep/dlbrm/other.html>. A comprehensive survey of potential models is found in EPA's 2005 review of TMDL models, which includes a profile of each model. Leslie Shoemaker et al., U.S. Env'tl. Prot. Agency, Doc. No. EPA/600/R-05/149, *TMDL Model Evaluation and Research Needs* (Nov. 2005), available at <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/600r05149.pdf>.

²²⁸ See, e.g., Farm Serv. Agency, U. S. Dep't of Agric., *Average Crop Revenue Election (ACRE) Program Backgrounder 1* (updated Apr. 2009) (noting that the ACRE program also requires the submission of production reports), available at http://www.fsa.usda.gov/Internet/FSA_File/acrebkgrd.pdf; Farm Serv. Agency, U. S. Dep't of Agric., *Direct and Counter-cyclical Payment (DCP) Program Fact Sheet 1* (Dec. 2008), available at http://www.fsa.usda.gov/Internet/FSA_File/dcp2008.pdf.

²²⁹ See, e.g., Natural Res. Conservation Serv., *supra* note 207.

²³⁰ Steven W. Martinez, U.S. Dep't of Agric., Econ. Research Rep. No. 42, *The U.S. Food Marketing System: Recent Developments, 1997-2006*, at 30 (May 2007), available at <http://www.ers.usda.gov/publications/err42/err42.pdf>.

²³¹ Ruhl, *supra* note 166, at 401.