# Farms, Their Environmental Harms, and Environmental Law

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*Farms are one of the last uncharted frontiers of environmental regulation in the United States. Despite the substantial environmental harms they cause—habitat loss and degradation, soil erosion and sedimentation, water resources depletion, soil and water salinization, agrochemical releases, animal wastes, nonpoint source water pollution, and air pollution—environmental law has given them a virtual license to do so. When combined, the active and passive safe harbors farms enjoy in most environmental laws amount to an "anti-law" that finds no rational basis given the magnitude of harms farms cause. This Article comprehensively documents the environmental harms farms cause and the safe harbors they enjoy in environmental law, then argues for a core federal statute that blends regulation, information, tax, incentive, and trading instruments to address several of the major sources of harm. This Article shows that conventional prescriptive regulation simply will not effectively fit the geographic, economic and political demographics of farms, but that the proposed blend of instruments could achieve significant gains in farming's environmental performance without excessive administrative or compliance complexities and costs.*

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## INTRODUCTION

Farms and farming are intrinsically linked with human civilization, and have had a dramatic impact on our planet's landscape and environmental systems.[1] Environmental regulation in the United States, though young when compared to other fields of law, is a highly developed body of law. Unfortunately, a wide chasm exists between these two social endeavors— farms are virtually unregulated by the expansive body of environmental law that has developed in the United States in the past 30 years. Yet the absence of an environmental regulation program for farms presents us with the opportunity to create one from scratch. The time for taking advantage of that

1. *See* A.M. MANNION, AGRICULTURE AND ENVIRONMENTAL CHANGE 227 (1995) ("Agriculture, to state the obvious, has had a profound influence on the Earth's surface and the processes that operate thereon. There are few parts of the globe that remain unaffected by agriculture."); P.A. Matson et al., *Agricultural Intensification and Ecosystem Properties*, 277 SCI. 504, 504 (1997) ("Expansion of agricultural land is widely recognized as one of the most significant human alterations to the global environment."); Peter M. Vitousek et al., *Human Domination of Earth's Ecosystems*, 277 SCI. 494, 494 (1997) ("The use of land to produce goods and services represents the most substantial human alteration of the Earth system.").

opportunity is long overdue.

To acknowledge that farms pollute and degrade the environment should neither indict farming as a way of life nor denigrate the ideals farmers hold. Farming in America is a deeply-rooted cultural institution with many noble qualities and important economic and social benefits, but it is also an industry with much in common with other industries, their owners, and their workers. Acknowledging that industries cause environmental damage has not generally been regarded as an attack on the people or the institutions involved. Nor should it be so for farms. The plain truth is that farms pollute ground water, surface water, air, and soils; they destroy open space and wildlife habitat; they erode soils and contribute to sedimentation of lakes and rivers; they deplete water resources; and they often simply smell bad. These effects are and always have been consequences of farming in general.[2] What is amazing is that these consequences have escaped serious regulatory attention even through the recent decades of environmental awakening. The organic farming[3] and sustainable agriculture[4] movements that

2. Farming has caused widespread environmental degradation for centuries. For example, the January 1849 *Scientific American* included a report of the practice, common in England at the time, of steeping wheat in an arsenic solution before sowing it to prevent loss of the crop to worms and birds. Although successful in achieving its intended agricultural purpose, the magazine condemned the practice for the adverse effect it had on partridges and pheasants, concluding "we can afford to feed both men and birds." *See 50, 100, and 150 Years Ago–Biocides for Agriculture*, SCI. AM., Jan. 1999, at 14. Six thousand years ago, Sumerian irrigation practices salinized water and soils to the point of inhibiting food production, a factor many historians believe contributed to the decline of the Sumerian culture. *See* Mohamed T. El-Ashry et al., *Salinity Pollution From Irrigated Agriculture*, 40 J. SOIL & WATER CONSERVATION 48, 48 (1985). For comprehensive histories of agriculture from the perspectives of its effects on the environment and vice versa since the dawn of agriculture, see generally MANNION, *supra* note 1, at 31-226 and DANIEL E. VASEY, AN ECOLOGICAL HISTORY OF AGRICULTURE, 10,000 B.C.-A.D. 10,000 (1992).

3. In the midst of some uncertainty as to what organic farming is, Congress passed the Organic Foods Production Act as part of the 1990 Farm Bill to require the United States Department of Agriculture (USDA), with the assistance of a newly-created National Organic Standards Board, to promulgate national standards for marketed organic foods. *See* 7 U.S.C. §§ 6501-6522 (1994); *see also* Kenneth C. Amaditz, *The Organic Foods Production Act of 1990 and Its Impending Regulations: A Big Zero for Organic Foods?*, 52 FOOD & DRUG L.J. 537 (1997). USDA proposed standards in 1997, *see* Dep't of Agric., Proposed Rules, National Organic Program, 62 Fed. Reg. 65,850 (1997) (to be codified at 7 C.F.R. pt. 205), on which it has received over 300,000 comments claiming the standards were contrary to the Board's recommendations and at odds with the organic farming industry's goals. Information about organic farming and the standards, including USDA's proposed rule and all the comments, is available at Agric. Marketing Serv., USDA, *National Organic Program Home Page* (visited Apr. 6, 1999) <http://www.ams.usda.gov/nop>. Although USDA has announced it will make substantial revisions to the rules based on the comments, several organic farming and food protection advocacy groups have

are gaining momentum from within the farming community may be steps in the right direction, but they are not panaceas. At best these steps should be taken in addition to, rather than in lieu of, an effort to rein in the environmental impact of farms through a concerted, comprehensive regulatory framework.

To be more accurate, it is not entirely true to say that environmental law has never addressed farming or that farms have wreaked environmental damage unbeknownst to the political institutions that generate such laws. Rather, Congress has actively prevented their intersection through a nearly unbroken series of decisions to exclude farms and farming from the burdens of federal environmental law, with states mainly following suit.[5] Congress has erected what I will call a vast "anti-law" of farms and the environment. While federal, state, and

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organized continuing campaigns against USDA's proposals. *See* International Center for Technology Assessment, *Organic Watch* (visited Apr. 6, 1999) <http://www.icta.org/projects/cfs/orgwtch.htm>; Campaign for Food Safety, *Save Organic Standards* (visited Apr. 6, 1999) <http://www.purefood.org/organlink.html>. Whatever the outcome of USDA's rules, at present organic farming represents a small proportion of the total farm economy— total retail sales of what are marketed as organically grown foods rose to just over $3.5 billion in 1996. *See Is Organic Better?*, NEWSWEEK, June 1, 1998, at 55.

4. The sustainable agriculture movement focuses on ways to promote natural resource stewardship in agriculture while still maintaining the economic profitability of farms and the social vitality of farming communities. *See* James Stephen Carpenter, *Farm Chemicals, Soil Erosion, and Sustainable Agriculture*, 13 STAN. ENVTL. L.J. 190, 220-43 (1994); Neil D. Hamilton, *Sustainable Agriculture: The Role of the Attorney*, 20 Envtl. L. Rep. (Envtl. L. Inst.) 10,021 (1990); Robert Myers et al., *Developing an Enduring American Agriculture*, 12 NAT. RESOURCES & ENV'T 110 (1997); *see also* VERNON W. RUTTAN ED., AGRICULTURE, ENVIRONMENT, AND HEALTH: SUSTAINABLE DEVELOPMENT IN THE 21ST CENTURY (1994) (overview of sustainable agriculture movement). Some commentators have described the sustainable agriculture movement as part of a larger "New Agriculture" movement through which a "network of farmers, consumers, educators, community activists, food marketers, and chefs are combining to offer alternatives to [farm] industrialization," Neil D. Hamilton, *Greening Our Garden: Public Policies to Support the New Agriculture*, 2 DRAKE J. AGRIC. L. 357, 358 (1997), while others have expressed the concern that the sustainable agriculture movement may play into continued efforts by farming interests to project the "agroecological opium" that farms are environmentally benign, or even have the potential to be environmentally beneficial, thereby making the case to keep environmental regulation of farms an adjunct to overall farm support policies. *See* Jim Chen, *Get Green or Get Out: Decoupling Environmental from Economic Objectives in Agricultural Regulation*, 48 OKLA. L. REV. 333, 337 (1995).

5. *See* John Davidson, *Conservation Agriculture: An Old New Idea*, 9 NAT. RESOURCES & ENV'T 20, 20 (1995) (noting that "nearly every major federal environmental statute exempts production agriculture"). As pointed out in this Article, in recent years some states have begun to move ahead of the federal government in environmental regulation of agriculture on certain fronts. *See* William L. Oemichen, *State Government Service to the Agriculture of Tomorrow*, 2 DRAKE J. AGRIC. L. 247 (1997). Even taken together, however, these state efforts by no means reverse the basic theme of safe harbor for farming in environmental law.

local governments have been busy addressing most other forms and sources of environmental degradation, farms remain largely unburdened by environmental law,[6] yet move steadily up the ranks of the worst threats to the environment. Today, farms stand at or very near the top of that list in many categories of environmental degradation.[7]

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6. As one leading agriculture law scholar has put it, whereas many sectors of the economy are exploring "next generation" environmental policy, "agriculture is different. It never had coherent first-generation environmental protection programs." C. Ford Runge, *Environmental Protection from Farm to Market*, *in* THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY 200, 200 (Marian R. Chertow & Daniel C. Esty eds., 1997). Runge points out that even after 30 years of modern statutory environmental law, "[N]o significant environmental controls have been placed on farm practices even where agricultural activities are a primary cause of pollution problems." *Id.* at 201; *see also* Chen, *supra* note 4, at 350-51 ("Unlike agriculture, which enjoys environmental exemptions both explicit and implicit, virtually every other industry in the United States must face a comprehensive battery of environmental obligations."); Davidson, *supra* note 5, at 20 ("In contrast to the national response to other environmental problems . . . the response by lawmakers to agricultural pollution has been cautious and exploratory."); Margaret Rosso Grossman, *Agriculture and the Environment in the United States*, 42 AM. J. COMP. L. 291, 293 (1994) ("Despite the serious effects of agricultural pollution, little direct environmental regulation of farming practices has occurred, and some federal farm policies have encouraged environmentally harmful practices."); J.W. Looney, *The Changing Focus of Government Regulation of Agriculture in the United States*, 44 MERCER L. REV. 763, 771 (1993) ("The least pervasive area of agricultural regulation is at the farm level."). For background on the law of farms and the environment—what little there is of it—see K. Jack Haugrud, *Agriculture*, *in* SUSTAINABLE ENVIRONMENTAL LAW 451-574 (Celia Campbell-Mohn et al. eds., 1993) (environmental law treatise chapter covering agriculture); Symposium, *Agriculture and Forestry in a Changing World*, 9 NAT. RESOURCES & ENV'T 3 (1995). *See also* Sally J. Kelley et al., *Agricultural Law: A Selected Bibliography, October 1992-December 1995*, 61 MO. L. REV. 877, 909-33 (1996) (covering books and articles on agriculture and wetlands, land use, water rights, water quality, pesticides and herbicides, sustainable agriculture, and soil conservation). The U.S. Environmental Protection Agency (EPA) maintains the "Ag Center," an internet site devoted to assisting the agricultural community in understanding and complying with environmental laws. *See* National Agric. Compliance Assistance Ctr., Agric. and Ecosystems Div., Office of Compliance, U.S. EPA, *About the Ag Center* (visited Apr. 22, 1999) <http://es.epa.gov/oeca/ag/about.html>. By accessing the "Laws and Policies" portion of the site, visitors can obtain what EPA claims are plain-English descriptions of how environmental laws apply to farming and links to related sites.

7. For example, farms rank as the leading cause of water quality impairment in our nation's lakes and rivers. *See* OFFICE OF WATER, U.S. ENVTL. PROTECTION AGENCY, NATIONAL WATER QUALITY INVENTORY 1994 REPORT TO CONGRESS ES-12 to ES-19 (1994) [hereinafter NATIONAL WATER QUALITY INVENTORY]. This dubious distinction is not limited to farms in the United States. France's Ministry of the Environment recently presented an exhaustive analysis of the environmental consequences of French agriculture, finding that agriculture is that nation's top water consumer, top national emitter of nitrates, and second-highest emitter of phosphates. Environmental problems in France associated with these and other agricultural practices include levels of nitrates in drinking water and groundwater far beyond European Union norms as well as growing concentrations of toxic substances in soils. *See* Lawrence J.

It may be that farming has escaped attention because "[a]griculture's vintage— its sheer age as a human activity— obscures its long-term effects on the environment."[8] But the cumulative effects of more than 450 years of crop and livestock farming in America are no longer obscure; if we continue to leave farms unregulated, it is by choice, not by ignorance.

We ought not ignore the pressing need for environmental regulation of farms simply because farming and farmers are melded into American ideology.[9] Given how distant the lay conception of farms is from reality, ideology seems a poor reason to favor farming in this respect. Rather, "the simple expedient of treating agriculture like any other activity— no more virtuous or villainous— promises to restore some semblance of allocative efficiency and distributive justice to American farm policy."[10] With this expedient in mind, this Article outlines in detail how farms, with the sanction of law, have dramatically degraded the environment. One would be hard pressed to identify another industry with as poor an environmental record and as light a regulatory burden.

For those readers who may be unconvinced or unaware of the impact farms have had on the environment, Part I of this Article inventories the environmental harms that farms cause. Unfortunately, this exercise is a necessary step because many farm interests portray efforts to regulate farms as being premised on "bad science" and exaggerated descriptions of the environmental dangers that farms pose.[11] But the reality is that

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Speer, *Report Blames Agriculture for Damages to Environment, Recommends Eco-Taxes*, Daily Env't Rep. (BNA), Mar. 15, 1999, at A-7. For a thorough discussion of European policies regarding agriculture and the environment, see Margaret Rosso Grossman, *Agro-Environmental Measures in the Common Agricultural Policy*, 25 U. MEM. L. REV. 927 (1995).

8. Chen, *supra* note 4, at 337.

9. A leading scholar of American agricultural law sums it up best in observing that "[m]uch of the favorable regulation enacted for agriculture can be traced to the special status of farming in American society." Grossman, *supra* note 6, at 293. American ideology tends to romanticize farms, focusing on the Jeffersonian agro-society roots of democracy, the plight of dust bowl farmers, and the peacefully bucolic farm by the side of the road. In fact, American farms comprise one of the most massive, self-interested, economically anti-competitive, and politically powerful industries in our nation's history. *See generally* Jim Chen, *The American Ideology*, 48 VAND. L. REV. 809, 810-31 (1995). For a concise social and political history of farming in America, see Haugrud, *supra* note 6, at 460-74.

10. Chen, *supra* note 9, at 875-76.

11. *See, e.g.*, NATIONAL LEGAL CENTER FOR THE PUBLIC INTEREST, FARMERS, RANCHERS AND ENVIRONMENTAL LAW (1995). Many farm advocates remain in deep denial of the industry's environmental failure. For example, one leading farm advocate recently advocated that growth control laws should put farms "legally out of

farming, particularly in the modern American style, is an intensive land use involving a multitude of polluting and land transforming activities.[12] The magnitude of its environmental impacts is not readily apparent from studying individual farms; rather, serious environmental degradation results from the aggregation of harmful farming practices across large areas. When compiled on regional, national, and global levels, the numbers are quite alarming.[13] Environmental law can no longer ignore the fact that farming is integrally related to the future of our national and global environmental quality.

Part II of this Article provides an inventory of the many provisions of environmental laws that exempt, release, and excuse farms from regulation.[14] Some of these provisions can be understood, in isolation, as rational responses to the need for efficient administration of environmental law and the importance of farming to other social and economic goals. When the sheer mass of this anti-law is considered as a whole, however, it defies reasonable explanation. There is simply no rational relationship between the magnitude of the environmental harms farms cause and the response of environmental law.[15]

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the reach of development for the foreseeable future" because in addition to food, they "provide environmental amenities like scenic open space, wildlife habitat and unpaved watersheds; and [farms] demand few public services." Edward Thompson, Jr., *"Hybrid" Farmland Protection Programs: A New Paradigm for Growth Management?*, 23 WM. & MARY ENVTL. L. & POL'Y REV. 831, 831 (1999) (author is Senior Vice President for Public Policy, American Farmland Trust).

12. Its adverse impacts include not only environmental degradation, which is substantial in its own right, but also effects outside the scope of this Article, such as occupational safety risks, food quality impairment, animal mistreatment, the risks of biogenetic engineering, and the promotion of resistant bacteria harmful to humans.

13. A 1998 report prepared jointly by the World Resources Institute, the United Nations Environment Program, the United Nations Development Program, and the World Bank identified "intense agricultural development" as one of three "drivers of change" in the global environment. Alec Zacaroli, *Environmental Degradation Causes Millions of Premature Deaths Per Year, Report Says*, 29 Env't Rep. (BNA) 113 (1998). The other two were industrial development and increased energy use.

14. The favorable treatment of farms is by no means limited to environmental regulation. *See* Chen, *supra* note 9, at 875 n.353 (collecting farm safe harbor provisions in antitrust laws, labor laws, minimum wage laws, bankruptcy laws, tax laws, motor carrier laws, and animal welfare laws).

15. For additional legal commentary on some of the safe harbors farms enjoy from environmental regulation, see Haugrud, *supra* note 6 (discussing the general coverage of the environmental law of farms); Elaine Bueschen, *Pfiesteria Piscicida: A Regional Symptom of a National Problem*, 28 Envtl. L. Rep. (Envtl. L. Inst.) 10,317 (1998) (focusing on water pollution control laws); Larry C. Frarey & Staci J. Pratt, *Environmental Regulation of Livestock Production Operations*, 9 NAT. RESOURCES & ENV'T 8 (1995) (focusing on exemptions covering animal waste runoff); Drew L. Kershen, *Agricultural Water Pollution: From Point to Nonpoint and Beyond*, 9 NAT. RESOURCES & ENV'T 3 (1995) (focusing on water pollution control laws); Grossman,

The solution to this disconnection between effect and response is complex. It may be that "[t]raditional agriculture quakes at the idea that environmental law will come to the farm."[16] If so, perhaps the approach of *traditional* environmental law is the problem. Protecting the environment from farms is not merely a matter of applying traditional approaches that have worked with other industries. Rather, as Part III of this Article demonstrates, the geographic, economic, and political settings of the farming industry call for approaches that may be outside the box of conventional environmental law. The environmental regulation of farms must incorporate several key features if it is to succeed where traditional models of environmental law surely would not. First, it must relate to farms the way farms relate to the landscape— that is, as numerous, disperse, and diverse operations having cumulative effects over large geographic scales. Second, it must take full advantage of market incentives and adaptive management techniques as means of keeping farms and their regulatory burdens flexible and responsive to rapidly changing social and economic conditions— that is, it must avoid relying exclusively on command-and-control regimes that have dominated modern federal environmental law. Finally, it must relate to farms the way farms relate to the relevant decisionmaking bodies— that is, local and state governing bodies must be sufficiently empowered to form arms-length cooperative relationships with federal regulatory authorities.

Satisfying these criteria through a national environmental law system for farms probably will not require a completely new model of environmental law. Farms may present a special case requiring unconventional responses, but we are not completely inexperienced in dealing with these issues in similar contexts. Although environmental law has deliberately overlooked farms, it has tested a variety of regulatory models in other settings, from heavily centralized command-and-control schemes to relatively decentralized market-based trading systems. Many of these programs have successfully managed problems similar to those presented by farms. The ingredients for an appropriate approach to regulating farms thus are already developed and in use, albeit scattered throughout a multitude of other environmental regulation programs. My proposed framework for a farm-environment management law, outlined in Part IV of this Article,

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*supra* note 6, at 299-330 (discussing the general coverage of the environmental law of farms).

16. Chen, *supra* note 4, at 351.

cherry picks from existing successful environmental law programs to assemble a comprehensive legal framework that responds to the geographic, economic, and political setting of the farming industry. The anti-law of farms and the environment could thus be replaced with a body of positive law that responsibly addresses the problems of the future.

## I

## THE ENVIRONMENTAL HARMS OF FARMS

The United States Department of Agriculture's (USDA) 1997 Census of Agriculture (Census)[17] defines a farm as "a place which produced and sold, or normally would have produced and sold, $1,000 or more of agricultural products during 1997."[18] In 1997, over 1.9 million such operations fit that description in the United States.[19] Data from the Census and from other studies reveal the size and diversity of the industry we call farming and the massive aggregate impact it has on the environment.

### *A. Some Background on Farms and Farming*

Farms cover over 930 million acres of the United States, with roughly equal divisions of cropland and pastureland/rangeland accounting for the vast majority of that total.[20] The total market

17. The results of the 1997 Census of Agriculture are available at NATIONAL AGRIC. STAT. SERV., U.S. DEP'T OF AGRIC., 1997 CENSUS OF AGRICULTURE (visited Feb. 10, 1999) <http://www.nass.usda.gov/census/> [hereinafter CENSUS]. USDA's National Agricultural Statistics Service conducts the census in years ending in the numbers 2 and 7 by sending report forms to all known ranchers and farmers, who by law must return the completed forms even if they conducted no agricultural operations. *See* National Agric. Stat. Serv., U.S. Dep't of Agric., *Frequently Asked Questions About the Census of Agriculture* (visited Feb. 10, 1999) <http://www.nass.usda.gov/census/ census97/cenfaqs.htm>.

18. *Id.* This Article examines the environmental effects and regulation of *farms* only. Crop production farms are categorized into oilseed and grain farming, vegetable and melon farming, greenhouses and nurseries, tobacco, cotton, sugarcane, hay, and all other crops. *See* CENSUS, *supra* note 17, at United States Data 69, tbl.47. Livestock farming is categorized into beef cattle, cattle feedlots, dairy cattle and milk production, hogs and pigs, poultry and eggs, sheep and goats, animal aquaculture, and other animal production. *See id.* The environmental effects and regulation of "upstream" industries that supply farms, such as pesticide manufacturing and seed suppliers, and of "downstream" industries that are supplied by farms, such as meat packing and other food processing and distribution, are vast topics in their own right and outside the scope of this Article. For an excellent discussion of the regulation of the agriculture industry as broadly defined to include these related sectors, see Looney, *supra* note 6.

19. *See* CENSUS, *supra* note 17, United States Data at 19, tbl.7.

20. *See id.* at 8, fig.4. This is roughly 45% of the United States' 2.1 billion acres of total land mass. Adding forest land to crop and pasture land brings the figure to 75%. *See* RUTHERFORD H. PLATT, LAND USE AND SOCIETY 6-8 (1996).

value of agricultural products sold by American farms in 1997 was just under $200 billion,[21] and total expenses were over $150 billion.[22] Individual farms, meanwhile, are tremendously diverse. For example, roughly half of American farms generate annual product values under $10,000, accounting for less than 1.5% of total farm production value, whereas roughly 3.6% of farms generate over $500,000 in annual product value, accounting for over 56% of total farm production value.[23] Over half of farms are under 500 acres in size, whereas only 4% are over 2000 acres.[24] Over 85% of farms, mostly the so-called "small farms," are owned by individuals or families; corporate farms make up under 5% and partnerships just under 9%.[25] The four principal crops, in order of acres in production, are corn, soybeans, hay, and wheat.[26] The principal livestock, in order of production value, are cattle, poultry, and hogs.[27] As a point of reference, farms in the United States produced over 98 million head of cattle, 366 million egg layer chickens, 6.75 billion broilers and meat chickens, and 61 million hogs in 1997.[28]

Despite their diversity, one feature is common to all farms: they are part of an industry. Farms owned an estimated $110 billion in machinery and equipment in 1997.[29] They spent a total of over $6 billion on gasoline and other fuels,[30] over $18 billion on chemical fertilizers, crop control chemicals, and other agricultural chemicals combined,[31] and over $2.75 billion on electricity.[32] The payroll for farms in 1997 was over $14 billion for hired farm labor and over $2.9 billion for contract labor.[33] In short, farming is a vast industry in the United States which, in turn, supplies and is supplied by other industries.[34]

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21. *See* CENSUS, *supra* note 17, United States Data at 7, fig.3.
22. *See id.* at 98, tbl.49.
23. *See id.* at 6, fig.2.
24. *See id.*
25. *See id.*
26. *See id.* at 8, fig.5.
27. *See id.* at 9, fig.6.
28. *See id.* at 10, tbl.1.
29. *See id.*
30. *See id.* at 23, tbl.14.
31. *See id.*, tbl.15.
32. *See id.* at 100, tbl.49.
33. *See id.*
34. The American "food and fiber" industry as a whole accounts for $1 trillion in economic activity every year, or "over 15 percent of our gross domestic product," Allison Rees Armour-Garb, *Minimizing Human Impacts on the Global Nitrogen Cycle: Nitrogen Fertilizer and Policy in the United States*, 4 N.Y.U. ENVTL. L.J. 339, 346 (1995), one of every six jobs, and the largest export component in the economy— over $50 billion annually. *See* NATURAL RESOURCE CONSERVATION SERV., U.S. DEP'T OF

### B. The Inventory of Environmental Harms Farms Cause

Another attribute that farms share is that they degrade the environment. The magnitude of that effect, however, is something that is difficult for most nonfarmers to grasp.[35] Consider the typical farming process: first, remove all existing vegetation from the land and level it; second, deploy a single-species regime of crop or livestock; third, cultivate the crop or livestock with water and chemicals; finally, remove the crop or livestock and associated waste products from the land and start over. A number of environmental harms flow directly and necessarily from that basic reality of farming: (1) habitat loss and degradation; (2) soil erosion; (3) water resources depletion; (4) soil salinization; (5) chemical releases; (6) animal waste disposal; (7) water pollution; and (8) air pollution.[36] In each of these categories, farms are a significant source of environmental harm.

#### 1. Habitat Loss and Degradation

The consequences of modern agriculture on wildlife habitat are undeniable, from habitat elimination to more direct effects on water and wildlife species.[37] The "structure and diversity of the agroecosystem can also influence the movement of wildlife

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AGRIC., GEOGRAPHY OF HOPE 7, 27 (1996) [hereinafter GEOGRAPHY OF HOPE]; Looney, *supra* note 6, at 763.

35. For example, the 1998 comprehensive Roper Starch survey of adult Americans' environmental perceptions, the seventh in an annual series of such surveys, revealed that although most Americans claim they know a "fair amount" about environmental issues and problems and list clean water as a top priority, only one in five knows that run-off is the most common form of pollution of streams and rivers. Nearly half of people surveyed mistakenly believe the most common source of water pollution is industrial discharges, and 15% believe it is garbage dumping by cities. *See* THE NATIONAL ENVIRONMENTAL EDUCATION & TRAINING FOUNDATION, ROPER STARCH WORLDWIDE, THE NATIONAL REPORT CARD ON ENVIRONMENTAL KNOWLEDGE, ATTITUDES AND BEHAVIORS 5-6, 23 (1998). Americans simply do not perceive farms as the leading source of water pollution.

36. To some extent these eight categories interrelate and overlap. For example, farm irrigation practices lead to water resource depletion and soil salinization; the pollutants carried in nonpoint source water runoff from farms include chemicals, animal waste, and eroded soils; farms release nitrogen into the environment through chemical applications and animal waste. Nevertheless, the literature on the impacts of farming on the environment tends to break the problem down into these discrete topics, each of which is susceptible to measurement and study. Thus, I use them to organize both the factual overview of the environmental harms of farms, as well as some of the measures I propose to reform the law of farms and the environment.

37. *See* NATIONAL BIOLOGICAL SERV., U.S. DEP'T OF THE INTERIOR, OUR LIVING RESOURCES: A REPORT TO THE NATION ON THE DISTRIBUTION, ABUNDANCE, AND HEALTH OF U.S. PLANTS, ANIMALS, AND ECOSYSTEMS 424 (1995) [hereinafter OUR LIVING RESOURCES].

between natural and agricultural systems and affect their use of such systems."[38] Despite the ability of perennial, vegetationally diverse agro-ecosystems with complex structure to provide important habitats for many birds and other animals typically found in undisturbed habitats,[39] farms pose an enormous net negative to wildlife.

Farming no longer poses a significant direct threat of habitat loss. Most direct loss of habitat resulting from conversion of land areas to farming has already occurred.[40] In fact, the United States loses a small portion of its available farmland each year, mainly to urban and suburban land uses.[41] But the magnitude of the historical transformation of undisturbed habitat to farming was immense— after all, at one time virtually all of the 930 million acres currently in farming uses were undisturbed habitat. The fact that these habitat losses were experienced in the past does not obviate the seriousness of their continuing impacts to wildlife in the present.[42] Further, habitat losses to

38. Matson et al., *supra* note 1, at 507.

39. *See id.*

40. For example, "conversion of wetlands to agricultural land has declined steadily since the 1950s." GEOGRAPHY OF HOPE, *supra* note 34, at 52. Over 790,000 acres of wetland were lost on non-Federal lands between 1982 and 1992, for a yearly loss estimate of 70,000 to 90,000 acres. Agriculture was responsible for 87% of the loss of wetlands from the mid-1950s to the mid-1970s, but only 54% of the loss from the mid-1970s to the mid-1980s. *See* NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-28 to ES-29.

41. Between 1992 and 1997, farmland in the United States fell from 946 million acres to 932 million acres, a loss of about 1.5% in five years. In 1964, land in farming was about 1.1 billion acres, about 18% more than we have today. *See* CENSUS, *supra* note 17, United States Data at 10, tbl.1. Between 1982 and 1992, 3 million acres of cropland were converted to commercial or residential uses. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 30; Myers et al., *supra* note 4, at 111. The highly visible impact of urbanization on prime quality agricultural land lying at the urban fringe has led several states to implement narrowly focused farmland protection laws. *See* Haugrud, *supra* note 6, § 8.2(B)(1)(b), at 323-30; *see also* George E.H. Gay, *State Solutions to Growth Management: Vermont, Oregon, and a Synthesis*, 10 NAT. RESOURCES & ENV'T 13 (1996); Henry E. Rodegerdts, *Land Trusts and Agricultural Conservation Easements*, 13 NAT. RESOURCES & ENV'T 336 (1998); Jeanne S. White, *Beating Plowshares into Townhomes: The Loss of Farmland and Strategies for Slowing its Conversion to Nonagricultural Uses*, 28 ENVTL. L. 113 (1998). The federal government also has entered the arena. For example, the Farmland Protection Policy Act of 1981 directs federal agencies to take farmland preservation into account when administering their authorities, *see* 7 U.S.C. §§ 4201-4209 (1994), and the 1996 Farm Bill authorized USDA to initiate a Farmland Protection Program through which the federal government can join with state, tribal, and local governments to acquire conservation easements on land that farmers want to preserve in agriculture, *see* Pub. L. No. 104-127, § 388, 110 Stat. 888, 1020 (1996) (codified at 16 U.S.C. § 3830 (1994 & Supp. III 1997)); *see also* Grossman, *supra* note 6, at 330; Haugrud, *supra* note 6, § 8.2(B)(1)(a), at 483; Rodegerdts, *supra*, at 337.

42. For example, reduced habitat is the most common threat to endangered

farms have not been geographically uniform throughout the nation.[43]

The continuing loss of valuable habitat on farms themselves is often overlooked. The amount of undisturbed grass-dominated cover and non-cropped areas on farms has decreased, resulting in lower availability of habitat and higher losses to predators of many species of wildlife.[44] In many agricultural areas, crucial wildlife habitat components such as undisturbed grassland have been dissected into small, isolated patches.[45] Habitat diversity on farms has also declined drastically as a consequence of the elimination of hay and pasture once needed by draft animals and a shift to crop monocultures.[46] In addition, wetland drainage, consolidation of fields and farms, and elimination of fence-rows and idle areas have reduced habitat diversity even further, thereby diminishing the populations of wildlife that once co-existed with crops on farms.[47] Increased agrochemical use has also been implicated in the long-term decline of species that relied on farmland as part of their habitat base.[48]

Despite these losses, the truly pernicious effects of farming on habitat today occur off-site.[49] For example, gaseous and dissolved nitrogen oxide and ammonia emitted from agricultural ecosystems are transported to and deposited in downwind and

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species. *See* William Stolzenburg, *Habitat Loss Affects 88 Percent of Species*, NATURE CONSERVANCY, Nov.-Dec. 1997, at 6; David S. Wilcove et al., *Quantifying Threats to Imperiled Species in the United States*, 48 BIOSCI. 607 (1998). The effects of habitat loss on species viability may not be fully manifested for decades or centuries, *see* Michael L. Rosenzweig, *Heeding the Warning in Biodiversity's Basic Law*, 284 SCI. 276, 277 (1999), and for many endangered species, habitat restoration is a necessary ingredient for recovering the species from the path toward extinction, *see* Theodore C. Foin et al., *Improving Recovery Planning for Threatened and Endangered Species*, 48 BIOSCI. 177, 179-80 (1998).

43. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 23 (map of farmland distribution in the United States). For example, the Mississippi River ecosystem, which covers almost 40% of the contiguous United States, has lost over 75%, and in some places 95%, of its floodplain to farmland, urban development, and impoundments. *See 500,000 Acres Will Shield Waterways from Farm Runoff*, EDF NEWSLETTER, June 1998, at 1, 3 (discussing plans to restore some of the converted floodplain).

44. *See* OUR LIVING RESOURCES, *supra* note 37, at 424. Harvested cropland has increased by 20 million acres since 1987. *See* CENSUS, *supra* note 17, at United States Data 19, tbl.7.

45. *See* OUR LIVING RESOURCES, *supra* note 37, at 424.

46. *See id.*

47. *See id.*

48. *See id.*

49. *See* Matson et al., *supra* note 1, at 507 ("Although agroecosystems are typically managed in isolation from other ecosystems within a region, the physical, ecological, and biogeochemical changes that take place within them have numerous consequences for adjacent, and even distant, ecosystems.").

downstream terrestrial and aquatic ecosystems. This deposition causes inadvertent fertilization, which can lead to acidification, eutrophication, shifts in species diversity, and effects on predator and parasite systems.[50] Transport of pesticides beyond farm boundaries also causes severe damage to wildlife and habitat functions.[51] Similarly, because evaporation and concentration effects cause irrigation return-flows to carry greater concentrations of salt and minerals than found in irrigation water sources, fish and wildlife populations downstream often suffer.[52] Also, high erosion rates associated with cultivated agriculture can lead to sedimentation in reservoirs and lakes, which reduces the lifetime of these water systems as aquatic habitat.[53] Overall, therefore, farming has caused and continues to cause significant habitat degradation both on the farm and off.[54]

### 2. *Soil Erosion and Sedimentation*

Converting natural ecosystems to permanent agriculture results in a loss of soil organic matter, thus increasing the erosion potential of the soils.[55] As a result, farms are by far the leading national cause of soil erosion.[56] In 1997, for example, there were 375 million acres of cropland in the United States, of which 103.5 million acres were considered "highly erodible."[57] In 1982, forces of erosion moved almost 3.1 billion tons of soil from

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50. *See id.*

51. *See* Carpenter, *supra* note 4, at 213-18; *Report Links Wildlife Decline to Chemical Exposure*, 30 Env't Rep. (BNA) 718 (1999).

52. *See* Matson et al., *supra* note 1, at 508.

53. *See id.*; Carpenter, *supra* note 4, at 218-19.

54. When land conversion, farm practices, and the offsite effects of pesticides and fertilizers are combined, farming has significantly affected 38% of the listed endangered species. *See* Wilcove et al., *supra* note 42, at 610-12. For additional economic and legal analysis of the relation between farming and habitat, see Jan Lewandrowski & Kevin Ingram, *Policy Considerations for Increasing Compatibilities Between Agriculture and Wildlife*, 39 NAT. RESOURCES J. 229 (1999).

55. *See* Matson et al., *supra* note 1, at 506.

56. For example, 90% of all the soil erosion that happens in Illinois, about 158 million tons per year, occurs on farms. THE NATURE OF ILLINOIS FOUND. & ILL. DEP'T OF ENERGY AND NATURAL RESOURCES, THE CHANGING ILLINOIS ENVIRONMENT: CRITICAL TRENDS 59 (1994).

57. *See* Natural Resources Conservation Serv., U.S. Dep't of Agric., 1997 National Resources Inventory— Summary Report tbl.14, *available at* <http://www.nhq.nrcs.usda.gov/NRI/1997/> (visited Dec. 7, 1999) [hereinafter 1997 National Resources Inventory]. Highly erodible cropland is generally steeper and less fertile, requires more inputs to maintain production, and can be damaged by high erosion rates. *See* Carpenter, *supra* note 4, at 204-05 (explaining protocol for evaluating highly erodible land).

America's cropland, 1.4 billion by wind and 1.7 billion by water.[58] This loss of topsoil is replenished at a rate of less than one inch in 200 years.[59]

Depending on a variety of factors,[60] between 25 and 40% of soil that erodes from a field will reach a water body.[61] Erosion thus leads directly to sedimentation in reservoirs and lakes.[62] Yearly soil discharge from agriculture land to waterways in the United States is estimated at over 1 billion tons of sediments and 447 million tons of total dissolved solids.[63] The Mississippi River alone carries 331 million tons of topsoil to the Gulf of Mexico annually.[64]

Sediments not only reduce the lifetime and uses of water systems,[65] but also carry significant amounts of pollutants. Both "instream suspended sediment and bedload are, by volume, the largest category of pollutants in the United States."[66] "High levels of suspended sediments can also reduce net primary production in freshwater and marine systems, ultimately affecting" the feeding and reproduction of fish and aquatic invertebrates.[67] Farming also releases nutrients and other chemicals that are absorbed by the sediment soil particles entering streams and rivers as a result of soil erosion.[68] Bottom sediment contaminated with pesticides and other agricultural chemicals is an increasing problem in watersheds around the nation.[69]

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58. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 36.

59. *See* Charles M. Cooper & William M. Lipe, *Water Quality and Agriculture: Mississippi Experiences*, 47 J. SOIL & WATER CONSERVATION 220, 220 (1992).

60. "[T]he rate and amount of [soil organic matter] loss depends on a number of factors, including climate and soil type as well as numerous factors directly influenced by cropping systems, such as the amount of organic inputs, crop coverage of the soil, tillage practice, and length and type of fallow." Matson et al., *supra* note 1, at 506.

61. *See* David Zaring, *Federal Legislative Solutions to Agricultural Nonpoint Source Pollution*, 26 Envtl. L. Rep. (Envtl. L. Inst.) 10,128, 10,129 (1996).

62. *See* Matson et al., *supra* note 1, at 508. Wind erosion contributes to the aerosol content of the atmosphere, playing a large role in climate and air pollution. *See id.*

63. *See* Cooper & Lipe, *supra* note 59, at 220.

64. *See id.*

65. *See* Carpenter, *supra* note 4, at 210 ("[T]he hundreds of millions of tons of eroded soils deposited in waterways disrupts navigation, fills reservoirs, increases the costs of water treatment, and limits recreational uses.").

66. Cooper & Lipe, *supra* note 59, at 220; *see also* Carpenter, *supra* note 4, at 210-11.

67. Matson et al., *supra* note 1, at 508.

68. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 40.

69. For example, EPA recently delivered to Congress a report entitled *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States*, identifying 7% of watersheds sampled as containing areas of probable concern

Through improved soil management technology and practices, soil erosion is to some extent on the mend.[70] Average cropland erosion rates in tons per acre per year for 1997 were substantially lower than erosion rates for 1982.[71] Most of this improvement, however, occurred by 1992, with little additional performance improvement since that time.[72] Moreover, even these improved rates are 12 times higher than soil formation rates, meaning net losses of cropland soils each year at an annual cost to society in excess of $29 billion.[73] Indeed, some new "good farming" practices actually increase soil erosion rates.[74] Soil erosion associated with farming thus continues to reduce soil productivity and substantially affect water quality and atmospheric resources.[75]

### 3. *Water Resources Depletion*

Farms use vast quantities of water. In 1992, for example, farmers in the United States irrigated 49 million acres of agricultural land,[76] and by 1997, that number had soared to 55 million acres.[77] Over 40% of the energy used by agriculture is

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because of contaminated bottom sediment, and including agricultural runoff as one of the leading causes. *See* Notice of Availability of Report to Congress, 63 Fed. Reg. 2237, 2238 (1998).

70. Between 1982 and 1997, total erosion on all cropland decreased by 42%. In 1982, erosion totaled 3.07 billion tons, and by 1997 it had been reduced to 1.9 billion tons. *See* 1997 Natural Resources Inventory, *supra* note 57, fig.3. Some controversy has developed over whether the picture looks even better than that. Most of the erosion figures discussed in the text are derived from large scale models of erosion rates. A recent study based on a watershed-specific survey of historical "markers" of soil loss and sedimentation suggests that erosion rates have fallen dramatically from the 1970s to the 1990s, though the study is not without its critics. *See* James Glanz, *Sharp Drop Seen in Soil Erosion Rates*, 285 SCI. 1187 (1999); R. Monastersky, *Erosion: Dustup over Muddy Waters*, 156 SCI. NEWS 116 (1999).

71. *See* 1997 National Resources Inventory, *supra* note 57, at 7 (noting that combined water and wind erosion rates fell from 7.4 in 1982 to 5.0 in 1997).

72. *See id.* tbls.10 & 11 (showing rates of water and wind erosion for cropland in each state for years 1982, 1987, 1992, and 1997). The amount of highly erodible land in cropland production, which fell significantly from 1982 to 1992, has also leveled off through 1997. *See id.*

73. *See* David Pimentel & Edward L. Skidmore, *Rates of Soil Erosion*, 286 SCI. 1477 (1999).

74. For example, farmers who use impermeable plastic sheet mulch, which is better than vetch-covered rows at retaining soil moisture and temperature, experience higher soil erosion rates. *See Plastic Mulch's Dirty Secrets*, 156 SCI. NEWS 207 (1999).

75. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 34.

76. *See* CENSUS, *supra* note 17, United States Data at 10, tbl.1.

77. *See id.* On a global scale, 40% of crop production comes from the 16% of agricultural land that is irrigated. *See* Matson et al., *supra* note 1, at 506.

devoted to irrigation.[78] Although irrigation acreage in the western states declined from 1982-1992 as the use of groundwater for irrigation became increasingly uneconomical,[79] irrigation acreage in the eastern United States has expanded in that time period as farmers attempt to reduce the risk of drought.[80]

Overpumping of groundwater sources for irrigation is a serious concern in many regions,[81] leading to effects such as water table drawdown, land subsidence, desertification, destruction of natural springs and associated wildlife habitats, and saltwater intrusion.[82] Yet as old surface water reservoirs lose capacity due to siltation and new ones become increasingly difficult or impracticable to site,[83] increases in agricultural production will raise the demand for irrigated water from groundwater sources. Irrigation water for farms, from all sources, can be expected to become more scarce "as competition for withdrawals increases with human population growth and development."[84] Complicating this problem are massive federal subsidies for existing and expanded farm irrigation infrastructure and supply.[85] Agricultural demand for water thus

78. *See* Lindsey McWilliams, *Groundwater Pollution in Wisconsin: A Bumper Crop Yields Growing Problems*, ENV'T, May 1984, at 25, 27.

79. For a comprehensive history and future prognosis of irrigated farming in western states, see COUNCIL FOR AGRICULTURAL SCIENCE AND TECHNOLOGY, FUTURE OF IRRIGATED AGRICULTURE (1996).

80. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 31.

81. For example, intensive irrigation has drawn down the huge Ogallala aquifer that stretches across Kansas, Nebraska, and Colorado, posing the possibility of future shortages and reduced productivity. *See* Sandra Postel, *When the World's Wells Run Dry*, WORLD WATCH, Sept.-Oct. 1999, at 30, 32; Runge, *supra* note 6, at 204; Robert R.M. Verchick, *Dust Bowl Blues: Saving and Sharing the Ogallala Aquifer*, 14 J. ENVTL. L. & LITIG. 13 (1999); Erla Zwingle, *Ogallala Aquifer: Wellspring of the High Plains*, NAT. GEO., Mar. 1993, at 83.

82. *See* Barton H. Thompson, Jr., *Water Allocation and Protection: A United States Case Study*, *in* EARTH SYSTEMS: PROCESSES AND ISSUES 476 (W.G. Ernst ed., 2000).

83. *See* Matson et al., *supra* note 1, at 506.

84. *Id.* Irrigation also leads to significant alteration of surface water systems and habitat, as large surface storage reservoirs must be constructed to convert seasonal stream flows to permanent water supplies. The effects of such projects have been tremendous and irreversible in many areas of the nation, particularly in the West. *See* Harrison Dunning, *Confronting the Environmental Legacy of Irrigated Agriculture in the West: The Case of the Central Valley Project*, 23 ENVTL. L. 943, 944-54 (1993). The classic discussion of the issue is found in MARC REISNER, CADILLAC DESERT (1986).

85. The Bureau of Reclamation has spent billions of dollars developing sources of economically inefficient irrigation water for western farmers. *See* Thompson, *supra* note 82, at 483 (noting the irony that this subsidized water encourages western farmers to grow crops that other federal subsidy programs pay midwestern and southern farmers *not* to grow, even though the latter could grow them more economically).

appears to be headed upward on a collision course with competing uses.

*4. Soil and Water Salinization*

In addition to being a significant user of limited water supplies, irrigated farming continually degrades its surrounding environment in arid and semi-arid areas through the salinization of soils and water.[86] Irrigating arid and semi-arid soils leaches salts and other minerals from the soil, causing them to accumulate in the plant root zone and retard plant growth.[87] Highly salinized soil is useless for agriculture, and reclaiming it is economically difficult, if not impossible.[88] Over 570 million acres of the continental United States have a moderate to severe potential for soil and water salinity problems,[89] and an estimated 20 to 25% of all irrigated land in the United States suffers from saline-induced yield reductions.[90] At least 48 million acres of cropland and pastureland are categorized as saline, and recent surveys indicate that this number is growing at a rate of 10% a year.[91]

For farmers, the solution to salinized soil is to flush the salinized soils with more high quality water than is needed for the crops so that the excess water carries away the leached salts.[92] Often this flushing process is accomplished through installation of an underground drainage tile system, which captures the irrigation water as it percolates through the soils, collects it into an underground drainage pipe network, and then efficiently moves the saline-rich waters away from the farmland in a drainage ditch system.[93] The salts that have been flushed from the irrigated farmlands end up in irrigation return flows which typically carry substantially higher concentrations of salt and minerals than their original surface or groundwater

86. *See* Matson et al., *supra* note 1, at 506.

87. *See* El-Ashry et al., *supra* note 2, at 49 ("Repeated application of water to land for irrigation results in the accumulation of salts in the upper layers of soil."). Saline soils are those that contain sufficient salts to adversely affect plant growth. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 33.

88. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 33.

89. *See id.*

90. *See* El-Ashry et al., *supra* note 2, at 48.

91. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 33.

92. *See* El-Ashry et al., *supra* note 2, at 49 ("To maintain agricultural productivity, these salts must be leached out of the crop root zone.").

93. *See* Gary Bobker, *Agricultural Point Source Pollution in California's San Joaquin Valley*, 9 NAT. RESOURCES & ENV'T 13, 13 (1995) (noting that hundreds of thousands of farmland acres in the San Joaquin Valley employ such tile systems).

sources.[94] This salinized water has potentially devastating effects on downstream aquatic systems.[95] Indeed, "[i]rrigation-related salinity is the major water quality problem in the semiarid western states, where significant quantities of salts occur naturally in rocks and soils."[96]

### 5. *Agrochemical Releases*

Farms are massive users of chemicals, including insecticides, herbicides, and fungicides.[97] Every year, over "750 million pounds of pesticides are applied to agricultural crops yearly" in the United States.[98] Since 1979, agriculture has been responsible for about 80% of all pesticide use in the United States,[99] and pesticide use on farms has nearly tripled since 1964.[100] "Four of the most prevalent herbicides— atrazine, simazine, alachor, and metolachlor— are applied nationwide, and grain belt states receive large shares of the estimated 135

94. The "leaching fraction" of the irrigated water— the excess needed for leaching away the salts— will contain unnaturally high salt concentrations because of the intended "salt loading" effect and because the irrigation return water is further concentrated by evaporation. *See* El-Ashry et al., *supra* note 2, at 48-49.

95. One of the most tragic examples is the Kesterson National Wildlife Refuge, which was created when financial troubles caused a planned irrigation return flow "regulation" project to become a terminal reservoir for return flow waters in California's Central Valley. Seen as a potential waterfowl haven, selenium-laden return flow water collected in the vegetation and invertebrates, eventually causing tremendous damage to the waterfowl. *See* Dunning, *supra* note 84, at 953-54; Bobker, *supra* note 93, at 14-15.

96. El-Ashry et al., *supra* note 2, at 49.

97. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) defines pesticides to include nitrogen stabilizers and "substances intended for preventing, destroying, repelling, or mitigating any pest . . . [or] for use as a plant regulator, defoliant, or desiccant." 7 U.S.C. § 136(u) (1994). The pesticide industry involves about 30 major manufacturing companies, 100 smaller companies marketing the active ingredients of pesticides, 3,300 product formulators who take the raw pesticide ingredients and produce finished pesticide products, and over 29,000 pesticide distributors. About 600 distinctive groups of active ingredients are found in the 45,000 pesticide products that are marketed in the United States. About 1.2 billion pounds of pesticides, valued at over $6.5 billion, are sold each year in the United States, over 70% of which are used in farming. *See* P.S.C. Rao et al., Inst. of Food and Agricultural Sciences, Fact Sheet SL-53, Regulation of Pesticide Use 1-2 (rev. ed. 1997). For more on FIFRA and farming, see *infra* text accompanying notes 259-73.

98. Zaring, *supra* note 61, at 10,129.

99. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 45. About 25% of pesticide use in the United States is in California. *See* James Liebman et al., Pesticide Action Network and Californians for Pesticide Reform, Rising Toxic Tide-Pesticide Use in California, 1991-1995, *available at* <http://www.igc.org/panna/risingtide/textoftide.html>. Pesticide applications on farms in the United States have risen dramatically since the 1960s, while land in cultivation has remained about the same. *See* Carpenter, *supra* note 4, at 191.

100. *See* Zaring, *supra* note 61, at 10,129.

million pounds" of herbicides used annually.[101] Although pesticides have undoubtedly improved agricultural efficiency and human living conditions immensely,[102] their adverse environmental impacts are also undeniable.

A significant fraction of pesticides applied to agricultural systems fails to reach its target pests and moves into the soil where it poses immediate and long-term environmental threats.[103] For example, chlorinated hydrocarbons such as DDT can persist in the environment for decades after their use, while organophosphates and carbamates are short-lived but acutely toxic.[104] As urban areas increasingly encroach upon farmlands or even encompass them, the danger that residents will be exposed to harmful levels of pesticide increases.[105]

Pesticides from farm applications have also infiltrated adjacent ecosystems through a multitude of pathways, including discharges and runoff to surface waters,[106] leaching to ground water,[107] and aerial drift.[108] These unwanted pesticide migrations

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101. Penny Loeb, *Very Troubled Waters*, U.S. NEWS & WORLD REPORT, Sept. 28, 1998, at 43.

102. For an aggressive defense of the use of pesticides, arguing that this and other technology-intensive farming practices will allow the Earth easily to support the projected population of 10 billion, see DENNIS T. AVERY, SAVING THE PLANET WITH PESTICIDES AND PLASTIC (1995).

103. *See, e.g.*, *Plastic Mulch's Dirty Little Secrets*, *supra* note 74, at 207 (measuring and comparing chemical runoff from fields using different kinds of mulch). Even when pesticides reach their target, long-term environmental effects remain, for example, the problem of increasing pest resistance. *See* Matson et al., *supra* note 1, at 505. Once pests develop resistance to pesticides, farmers typically respond by increasing the quantity of the pesticide applied or shifting to other pesticides, fueling the pests' resistance buildup mechanisms. Today, nearly 1,000 major agricultural insect, disease, and weed pests are immune to common pesticides. *See* LESTER R. BROWN ET AL., VITAL SIGNS 1999, at 124 (1999).

104. *See* Matson et al., *supra* note 1, at 508.

105. For example, in 1999, the New Jersey Historic Pesticide Contamination Task Force estimated that 5% of the state's land is affected by agricultural pesticides and recommended that areas formerly used for agricultural purposes should be tested for pesticide residue before they are developed. Some local jurisdictions in New Jersey already impose such a requirement. *See Task Force Urges Sampling of Farm Areas for Pesticide Residues Before Development*, 29 Env't Rep. (BNA) 1896 (1999). Recent studies indicate that humans, and even fetuses, continue to be exposed to pesticides that have long been banned in the United States. *See Pesticide Exposure Begins Early*, 156 SCI. NEWS 47 (1999).

106. *See infra* text accompanying notes 48-51.

107. A soil's vulnerability to leaching of pesticides and other agricultural chemicals depends upon three principal factors: (1) the propensity of soils to leach pesticides and nitrates; (2) the amount and timing of rainfall; and (3) the extent of chemical use. The coastal plains stretching from Alabama, Florida, and Georgia, as well as the Corn Belt and the Mississippi River Valley all have the highest vulnerability to leaching agrochemicals. *See* Robert L. Kellogg et al., *The Potential for Leaching of Agrichemicals Used in Crop Production: A National Perspective*, 49 J. SOIL

can have significant adverse impacts on the diversity and abundance of nontarget species as well as complex effects on ecosystem processes and trophic interactions.[109] The threat also extends to human health; more than 14 million Americans drink public water obtained from river sources that contain herbicides,[110] and millions more ingest pesticides in drinking water obtained from groundwater sources.[111]

Fertilizers are another major agrochemical pollutant.[112] Farmers apply nitrogen, phosphorous, and potassium to promote crop growth; however, when applied inappropriately or in excessive amounts the excess nutrients are carried from farmlands into waterways. Fertilizer application rates have increased dramatically.[113] American agriculture now discharges

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& WATER CONSERVATION 294, 294-97 (1994). Not surprisingly, pesticides from every major chemical class have been detected in groundwater. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 48. The United States Geological Survey's 1999 National Water Quality Assessment report, which analyzes 5,000 water samples from 20 major river and groundwater areas of the country, found at least one pesticide at detectable levels in more than 90% of water and fish samples from all streams. *See* U.S. GEOLOGICAL SURVEY, U.S. DEP'T OF THE INTERIOR, USGS CIRC. 1225, THE QUALITY OF OUR NATION'S WATERS: NUTRIENTS AND PESTICIDES (1999); *see also Chemicals Widely Present in Stream, Potential Threats Uncertain, Study Finds*, Daily Env't Rep. (BNA), Mar. 22, 1999, at A-3. In 1992, the EPA reported that 132 pesticide-related compounds, 117 parent pesticides, and 16 pesticide degradates had been found in ground water in 42 states. *See* NATURAL RESOURCES DEFENSE COUNCIL, TROUBLE ON THE FARM, GROWING UP WITH PESTICIDES IN AGRICULTURAL COMMUNITIES 28 (1998) [hereinafter TROUBLE ON THE FARM].

108. *See infra* text accompanying notes 174-77.

109. *See* Matson et al., *supra* note 1, at 508. For example, evidence is mounting that the presence of certain pesticides in water bodies is linked to increasing rates of amphibian deformities. *See* J. Raloff, *Thyroid Linked to Some Frog Defects*, 156 SCI. NEWS 212 (1999). Ironically, the unintended effects of pesticide use have direct ramifications for farms. For example, farmers must compensate for reduced pollination resulting from declining honeybee populations lost to pesticides, and must apply excess pesticides when pesticides kill the pests' natural predators. *See generally* Carpenter, *supra* note 4, at 213.

110. *See* Loeb, *supra* note 101, at 43. Indeed, several water supply systems recently sued the manufacturer of the herbicide atrazine for the costs of removing the chemical from their water supplies. *See No Class Action for Herbicide Cleanup Costs: Water Systems Have No Standing, Court Says*, Daily Env't Rep. (BNA), Apr. 9, 1999, at A-2. For a detailed review of the impact of farm chemical releases on groundwater and some of the legal instruments that can be used to regulate those practices, see Debbie Sivas, *Groundwater Pollution from Agricultural Activities: Policies for Protection*, 7 STAN. ENVTL. L.J. 117 (1987-1988).

111. The State of California reported that 22 pesticides were detected in a total of 436 groundwater wells in 1996. *See* TROUBLE ON THE FARM, *supra* note 107, at 28. A 1997 survey of water contamination found that about 4.3 million Americans in 245 communities are exposed to levels of carcinogenic herbicides in drinking water that exceed the EPA's benchmark of "acceptable" cancer risk. *See id.*

112. *See* Carpenter, *supra* note 4, at 201-03.

113. In 1987, 1.38 million farms spent $6.7 billion applying fertilizer to 211

1.16 million tons of phosphorous and 4.65 million tons of nitrogen into waterways annually.[114] Land use models identify agriculture as the leading source of nitrogen and phosphorus in the environment, accounting for 76 and 56%, respectively.[115] These nutrients, so beneficial on the farm, threaten associated water resources by fostering excessive plant growth.[116] Nutrient runoff from farms thus influences the health of natural systems by stimulating eutrophication of estuaries and coastal marine environments, resulting in anoxic conditions that are toxic to aquatic animal populations.[117]

### 6. *Animal Waste*

Driven by economies of scale and new production and processing technologies, industrialization of the livestock production sector[118] has produced unprecedented livestock concentrations in the United States.[119] As a result, the United States produces 200 times more livestock waste than human waste.[120] "Livestock in the United States produce approximately 1.8 billion metric tons of wet manure per year, much of which reaches surface water after being applied to fields as fertilizer."[121]

Although many farming operations contain their animal waste in on-site structures, spills occur frequently and with drastic effects. For example, a 100,000 gallon spill in Minnesota killed almost 700,000 fish along 19 miles of a major stream. As a result, a downstream dairy operation had to dump 3,000 pounds of milk after cows drank infected water and half the pregnant

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million acres; ten years later 1.2 million farms spent $9.6 billion applying fertilizers to 233 million acres. *See* CENSUS, *supra* note 17, at United States Data 23, tbl.15; *see also* Zaring, *supra* note 61, at 10,129.

114. *See* Cooper & Lipe, *supra* note 59, at 221.

115. *See* Carpenter, *supra* note 4, at 201 (seven million tons per year in 1960; nineteen million tons per year in 1994).

116. *See generally* GEOGRAPHY OF HOPE, *supra* note 34, at 41.

117. *See* Matson et al., *supra* note 1, at 507; Zaring, *supra* note 61, at 10,129. Although most attention regarding the environmental impacts of fertilizer runoff has been devoted to its nutrient loading effect, recent studies have suggested that fertilizers may pose toxicity threats as well. *See* OFFICE OF SOLID WASTE, U.S. ENVTL. PROTECTION AGENCY, ESTIMATING RISK FROM CONTAMINANTS CONTAINED IN AGRICULTURAL FERTILIZERS 1-1 (1999) (draft report); J. Raloff, *Fertilizer: Hiding a Toxic Pollutant?*, 156 SCI. NEWS 245 (1999).

118. For further discussion of these industry trends, see *infra* text accompanying notes 386-90.

119. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 41.

120. *See* Ted Williams, *Assembly Line Swine*, AUDUBON, Mar.-Apr. 1998, at 26, 31.

121. Zaring, *supra* note 61, at 10,129.

animals aborted.[122] The Missouri Department of Natural Resources found that 63% of all large animal feeding operations had spills between 1990 and 1994.[123] In North Carolina, a 25 million gallon hog-waste spill is the biggest on record, and killed 10 million fish and closed 364,000 acres of coastal wetlands to shellfishing in 1995.[124] The Illinois Environmental Protection Agency reported that 15 out of 22 randomly inspected manure lagoons in western Illinois were illegally discharging wastewater into streams in 1998.[125] In Iowa, 60 spills have been recorded since 1992. One of those, a 1.5 million gallon spill in 1995, killed 8,861 fish, polluted thirty miles of river, and closed a primary recreation area.[126] Recently, several cases involving intentional bypasses of manure holding ponds have resulted in substantial criminal fines.[127]

Spills and illegal discharges are merely the tip of the iceberg, however. Even proper farm waste management releases immense amounts of waste and waste-related pollutants. For example, California's Central Valley is home to 1,600 of the state's 2,400 dairies, and its 891,000 cows create as much waste as 21 million people.[128] Creeks in that area often contain 200 times more ammonia than the level that is poisonous for fish.[129] Dairy manure pollution in California is a significant cause of fishery depletion.[130]

Cows are not the only source of waste management problems on farms. For example, chicken manure contains twice as much phosphorous as human waste.[131] The 625 million chickens raised annually in the Delmarva area, which includes portions of Delaware, Maryland, and Virginia, produce 3.2 billion pounds of waste annually, the constituents of which include 13.8 million

122. *See* Williams, *supra* note 120, at 28.

123. *See id.*

124. *See id.* at 27.

125. *See* NATURAL RESOURCE DEFENSE COUNCIL & CLEAN WATER NETWORK, AMERICA'S ANIMAL FACTORIES: HOW STATES FAIL TO PREVENT POLLUTION FROM LIVESTOCK WASTE 26 (1998) [hereinafter AMERICA'S ANIMAL FACTORIES].

126. *See id.* at 34.

127. *See* Carolyn Whetzel, *Dairy Farm Ordered to Pay $250,000 for Polluting California River in CWA Case*, 29 Env't Rep. (BNA) 2572 (1999); Pamela Najor, *Iowa Hog Farm Pleads Guilty to Discharge in First Criminal Manure Discharge Case*, Daily Env't Rep. (BNA), June 29, 1999, at A-4.

128. *See* AMERICA'S ANIMAL FACTORIES, *supra* note 125, at 15. A mature dairy cow produces as much waste as 34 people, or an average of 114 pounds of waste per day, or 22.5 tons of manure per year. *See id.*

129. *See id.* at 16.

130. *See id.* (noting that salmon and steelhead fisheries are down more than 90% from their historic levels).

131. *See id.* at 50.

pounds of phosphorous and 48.2 million pounds of nitrogen.[132]

Hogs are a major pollution source as well. In North Carolina, the significant progress made by municipal and industrial sources of pollution has been largely offset by agricultural pollution, primarily runoff from hog production facilities. North Carolina has been the fastest growing swine-producing state in the country, as the number of hogs has increased from 3.7 million in 1991 to more than 10 million in 1998.[133] In 1998, the North Carolina Department of Environment, Health and Natural Resources investigated 1,595 drinking water wells located on property adjacent to hog and poultry production facilities and found that 10.2% of the wells tested were contaminated with nitrate levels above current drinking water standards, and 34.2% of the wells tested exhibited detectable nitrate levels.[134] According to EPA estimates, in 1995 agriculture in eastern North Carolina was responsible for airborne emissions of 179 million pounds of ammonia nitrogen per year. Hog operations alone were responsible for 73% of these emissions.[135] Indeed, current scientific studies find that at least 67% and perhaps as much as 95% of the total nitrogen produced by swine is actually volatized to the atmosphere as ammonia nitrogen,[136] making land and water pollution control measures largely a moot point.

### 7. *Nonpoint Source Water Pollution*

In addition to pollutants released in irrigation return flows, farms release massive quantities of pollutants through runoff from fields and livestock operations. These releases are collectively known as nonpoint source water pollution.[137]

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132. *See New NPDES Permit Condition to Hold Chicken Producers Accountable for Waste*, Daily Env't Rep. (BNA), Mar. 22, 1998, at A-2.

133. *See* AMERICA'S ANIMAL FACTORIES, *supra* note 125, at 73. For current background on hog farms in North Carolina and elsewhere, see Environmental Defense Fund, *Hog Watch* (visited Feb. 2, 2000) <http://www.hogwatch.org>.

134. *See id.* at 76.

135. *See id.*

136. *See id.* at 77.

137. EPA defines nonpoint water pollution as "water pollution caused by rainfall or snowmelt moving over and through the ground and carrying natural and human-made pollutants into lakes, rivers, streams, wetlands, estuaries, coastal waters, and ground water." Section 319 Federal Consistency Guidance, 63 Fed. Reg. 45,504, 45,504 (1998). Agricultural nonpoint source pollution thus includes "runoff from manure disposal areas, and from land used for livestock and crop production." Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. § 1288(b)(2)(F) (1994). By legislative decree, if not physical reality, agricultural nonpoint source pollution also includes "return flows from irrigated agriculture." *Id.*; *see infra* text accompanying notes 185-93 (explaining the origins of this legislative fiction).

Nonpoint source pollution from all sources accounts for 65-75% of the pollution in the nation's most polluted waters.[138] In 33 states, nonpoint source pollution is the most significant form of pollution affecting streams and rivers.[139] In Iowa, Missouri, Montana, Nebraska, and Wisconsin, nonpoint source pollution accounts for over 90% of stream and river pollution.[140] In 42 states, nonpoint sources are the predominant source of pollution in lakes,[141] and in six states nonpoint source pollution accounts for 100% of lake pollution.[142]

Farms are the major source of nonpoint water pollution nationally,[143] with farm runoff acting as a primary transport mechanism for fertilizers, animal wastes, pesticides, sediments, and bacteria.[144] For example, commercial fertilizers in farm runoff have widespread and pernicious effects,[145] leading to eutrophication as the nutrient laden runoff promotes rapid algal and plant growth, and attendant consequent depletion of oxygen resources.[146] Overall, nitrate concentrations from fertilizer runoff have increased three- to tenfold in our nation's surface waters

138. *See* Zaring, *supra* note 61, at 10,128.

139. *See id.*

140. *See id.*

141. *See id.* at 10,128-29.

142. *See id.* at 10,129.

143. *See* Kershen, *supra* note 15, at 3 ("Near unanimous agreement exists that agricultural nonpoint source pollution is the largest contributor."). EPA's 1994 *National Water Inventory* ranks agriculture, defined as crop production, pastures, rangeland, feedlots, and other animal holding areas, as the leading source of water quality impairment in lakes and rivers, in both cases by wide margins, and the third leading cause of impairment in estuaries. NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-11 to ES-12, ES-15 to ES-18. Federal government efforts to control agricultural nonpoint source runoff have proven costly. For example, since fiscal year 1994, the federal government has spent $3 billion annually to address nonpoint source runoff. USDA spent a total of $11 billion in that period, primarily on farm soil conservation programs designed to reduce sedimentation loading of streams. EPA, which spent $225 million in fiscal year 1998 funding state and regional programs to control nonpoint source pollution, has estimated that it will cost $9.4 billion annually to control what it says are the three main sources of nonpoint pollution: agriculture, silviculture, and animal feeding operations. *See* U.S. General Accounting Office, GAO/RCED-99-45, Water Quality: Federal Role in Addressing— and Contributing to— Nonpoint Source Pollution 4-5 (1999); *Methodology Used to Calculate Costs of Nonpoint Pollution Inadequate, GAO Says*, Daily Env't Rep. (BNA), Mar. 16, 1999, at A-10.

144. *See* Cooper & Lipe, *supra* note 59, at 220-22.

145. For example, commercial fertilizers, animal manure, and atmospheric deposition, in that order, are the primary nonpoint sources of nitrate in surface water and groundwater. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 48.

146. *See* NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-9; GEOGRAPHY OF HOPE, *supra* note 34, at 41-45; Matson et al., *supra* note 1, at 507. The eutrophication effect is also discussed *supra* at the text accompanying note 50.

since the early 1900s.[147] Commercial fertilizers today are the dominant nonpoint source pollutant in the western, central, and southeastern United States,[148] and their effects can be felt far from the farm source. For example, hundreds of thousands of tons of agricultural fertilizers applied in the enormous Mississippi River watershed reach Louisiana's Gulf Coast estuaries, contributing to an offshore hypoxic "dead zone."[149] Eighty percent of the nitrogen delivered to the Gulf originates more than a thousand miles upstream above the confluence of the Ohio and Mississippi Rivers— almost all of it from cropland runoff.[150] Agriculture is also a major source of nutrient discharge into the watershed of the Chesapeake Bay, where inputs of nitrogen and phosphorous have led to excessive plankton production and the demise of submerged aquatic vegetation.[151] Other coastal regions have experienced similar hypoxia

147. *See* Matson et al., *supra* note 1, at 507.

148. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 48.

149. *See id.* at 44; Runge, *supra* note 6, at 205.

150. The Harmful Algal Bloom and Hypoxia Research and Control Act of 1998 directs a newly formed federal task force on the hypoxia issue to assess the ecological and economic impacts of hypoxia in the Gulf and develop a plan for controlling the effects by 2000. *See* Coast Guard Authorization Act of 1998, Pub. L. No. 105-383, § 604(a)-(b), 112 Stat. 3411, 3449 (1998). The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) recently released reports on a series of comprehensive studies it had funded on the Gulf hypoxia effect. *See* National Center for Coastal Ocean Science, NOAA, U.S. Dep't of Commerce, *Hypoxia in the Gulf of Mexico* (visited May 17, 1999) <http://www.noaa.gov/products/pubs_hypox.html>. One report concludes that "[t]he principal source areas for the nitrogen that discharges to the Gulf are watersheds draining intense agricultural regions in southern Minnesota, Iowa, Illinois, Indiana, and Ohio." "Nonpoint sources contribute about 90% of the nitrogen and phosphorous discharging to the Gulf. Agricultural activities are the largest contributors of both nitrogen and phosphorous." DONALD A. GOOLSBY ET AL., FLUX AND SOURCES OF NUTRIENTS IN THE MISSISSIPPI-ATCHAFALAYA RIVER BASIN 14 (1999); *see also Clean Water Act Should Be Strengthened to Address Nutrient Reduction, Group Says*, Daily Env't Rep. (BNA), Mar. 30, 1999, at A-10. The task force has finalized the assessment phase of its mission and has begun to develop an action plan proposal. *See* Notice of Fifth Meeting of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 64 Fed. Reg. 56,788 (1999) (notice of availability of the report and public comment period, and of task force decision to begin work on action plan).

151. *See Water Quality Policies Must Be Integrated Among Air, Water, Land, USGS Official Says*, Daily Env't Rep. (BNA), Mar. 8, 1999, at A-2. The United States Geological Survey's National Water Quality Assessment found that 85% of nitrogen contributed to the Chesapeake Bay is from groundwater and the atmosphere, suggesting that integrated management will be needed to address watershed degradation, nonpoint source pollution, total maximum daily loads, and wetlands protection. *Id.*; *see also* Thomas E. Jordan et al., *Effects of Agriculture on Discharges of Nutrients from Coastal Plain Watersheds of Chesapeake Bay*, 26 J. ENVTL. QUALITY 836, 836 (1997).

problems.[152]

Animal waste is another major component of farm runoff, accounting for one-third of all water impairments attributable to agriculture.[153] "Livestock in the United States produce approximately 1.8 billion metric tons of wet manure per year, much of which reaches surface water supplies after being applied to fields as natural fertilizer."[154] In 1996, the Maryland Department of Environment reported that approximately 93% of Maryland waters that fail to meet state water quality standards do so because of excessive nutrient pollution.[155] The Department also estimated that 326 million pounds of nitrogen and 19 million pounds of phosphorous enter the Chesapeake Bay every year.[156] The effect of these nutrient loads goes beyond eutrophication of aquatic habitat; entire ecological processes are affected. For example, *Pfiesteria piscicida*, a one-celled organism that lives in many estuaries and rivers and under certain conditions eats away at fish's scales, has been implicated in massive fish kills in rivers leading to the Chesapeake Bay and other Atlantic and Gulf Coast estuaries, forcing the closing of many rivers to commercial and recreational uses.[157] According to scientists, the *Pfiesteria piscicida* outbreaks are correlated with increased nitrate levels in rivers caused by chicken waste, which, when applied to crops as "natural" fertilizer, runs into the watershed.[158]

Overall, runoff of topsoil, silt, sediment, manure, nutrients, chemicals, and other pollutants from agricultural nonpoint sources is the leading source of impairment in the Nation's rivers,[159] affecting 60% of the impaired river miles.[160] Agriculture is the leading source of impairment in lakes as well, affecting

152. *See* Oliver A. Houck, *TMDLs IV: The Final Frontier*, 29 Envtl. L. Rep. (Envtl. L. Inst.) 10,469, 10,470 (1999).

153. *See* Frarey & Pratt, *supra* note 15, at 8. Farm animal waste management is discussed in more detail *supra* at the text accompanying notes 118-36.

154. Zaring, *supra* note 61, at 10,129.

155. *See* AMERICA'S ANIMAL FACTORIES, *supra* note 125, at 50.

156. *See id.*

157. *See generally* JoAnn M. Burkholder, *The Lurking Perils of Pfiesteria*, SCI. AM., Aug. 1999, at 42; Carol Jouzaitis, *Fish-Killing Microbe Found in Fourth River*, USA TODAY, Sept. 15, 1997, at 3A.

158. *See, e.g.*, John P. Almeida, *Nonpoint Source Pollution and Chesapeake Bay Pfiestera Blooms: The Chickens Come Home to Roost*, 32 GA. L. REV. 1195 (1998); Bueschen, *supra* note 15, at 10,317-19; Burkholder, *supra* note 157, at 46.

159. From 1984 through 1996, the percentage of rivers designated as "impaired," meaning that they cannot support aquatic life and are unsafe for fishing and swimming, grew from 26% to 36%. *See* Loeb, *supra* note 101, at 42.

160. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 40; NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-14; Zaring, *supra* note 61, at 10,129.

50% of impaired lake acres, or 2 million lake acres.[161] Agriculture also pollutes 34% of impaired estuarine waters.[162] Groundwater, on which half of the U.S. population and most rural communities depend,[163] is also substantially threatened from polluted farm runoff.[164]

### 8. *Air Pollution*

Although farms are often associated with unpleasant odors, many people overlook the fact that farms are significant sources of chemical air pollution. Fertilizer is a source of several greenhouse gases, including carbon dioxide, nitrous oxide, and methane,[165] and leads to increased emissions of gases that play critical roles in tropospheric and stratospheric chemistry and air pollution.[166] Worldwide, agricultural soils emit nitrogen oxides (commonly known as $NO_x$) at estimated rates of up to 25% of the emissions from global fossil fuel combustion.[167] Once in the

161. *See* NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-19; Zaring, *supra* note 61, at 10,129.

162. *See* NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-25.

163. More than 97% of the nation's rural drinking water comes from underground aquifers, and over 50% of the nation's population relies on groundwater as its source of drinking water. *See* Erik Lichtenberg & Lisa K. Shapiro, *Agriculture and Nitrate Concentrations in Maryland Community Water System Wells*, 26 J. ENVTL. QUALITY 145, 145 (1997).

164. Groundwater is especially susceptible to nitrate contamination from the nitrogen sources in commercial inorganic fertilizer and manure. *See id.* at 145-47; *see also* Carpenter, *supra* note 4, at 202-03; Runge, *supra* note 6, at 204. Nitrogen is present in water as nitrate-nitrogen (known as $NO_3$-N) and converts to nitrites, which have acute toxic effects at high concentrations. Nitrates and nitrites are also suspected to have carcinogenic effects either through secondary conversion to other compounds or in synergistic effects with pesticides also found in contaminated waters. *See generally* Lichtenberg & Shapiro, *supra* note 163, at 145; Carpenter, *supra* note 4, at 202. Rising use of commercial fertilizer has been suspected as a primary source for increasing $NO_3$ concentrations found in groundwater, which at some locations reaches levels deemed unhealthy for human consumption. *See* N.R. Kitchen et al., *Impact of Historical and Current Farming Systems on Groundwater Nitrate in Northern Missouri*, 52 J. SOIL & WATER CONSERVATION 272, 272 (1997) ("Nitrates attributable to fertilizers and manure have been found in the groundwater of every agricultural region of the nation."); Zaring, *supra* note 61, at 10,129. Water in one-fourth of the wells in many agricultural areas has become unsafe to drink because of high levels of nitrates. *See* Loeb, *supra* note 101, at 43.

165. *See* Matson et al., *supra* note 1, at 507-08. EPA estimates that agricultural activities were responsible for seven percent of total U.S. greenhouse gas emissions in 1997. *See* OFFICE OF POLICY, U.S. EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-1997, at 5-1 (1999), *available at* U.S. EPA, *U.S. Emissions Inventory— 1999* (visited Mar. 21, 2000) <http://www.epa.gov/oppeoee1/globalwarming/publications/emissions/us1999/index.htm>.

166. *See* Matson et al., *supra* note 1, at 507.

167. *See id.*

atmosphere, $NO_x$ is a critical regulator of tropospheric ozone, a key component of smog, and a threat to human health, agricultural crops, and natural ecosystems.[168] $NO_x$ is also "transported and deposited in gaseous or dissolved solution forms to downwind terrestrial and aquatic ecosystems," leading to acidification, eutrophication, shifts in species diversity, and changes in predator and parasite systems.[169] Wind erosion also contributes to the aerosol content of the atmosphere, which plays a critical role in climate change as well as air pollution.[170]

Animal waste is another major source of air pollution. In Minnesota, large-scale feedlots emit hydrogen sulfide at levels vastly exceeding state air quality standards for other industries.[171] According to EPA estimates, agriculture in eastern North Carolina was responsible for airborne emissions of 179 million pounds of ammonia nitrogen in 1995, with hog operations responsible for 73% of these emissions.[172]

Pesticide dispersal in the air is also often overlooked in comparison to more visible and documented pollution problems, but it is significant. Sources include fumigants, wind erosion of pesticide-laden soil particles, and aerial drift from spraying.[173] In California, two weeks of ambient air monitoring near sugar beet and potato fields for the carcinogen fumigant Telone II measured ambient air levels that exceeded the safe level for chronic inhalation exposures,[174] and 19 of 26 monitored pesticides have been detected in and around California communities between 1986 and 1998.[175] Fog samples gathered in suburban Maryland and in agricultural regions of California revealed up to 16 different agricultural pesticides.[176] Thus, farms pose a substantial threat to air quality.

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168. *See id.*

169. *Id.* For example, air pollution is the leading cause of water quality impairment in the Great Lakes, with pesticides and nutrients being significant components of that impairment. *See* NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-20 to ES-22.

170. *See* Matson et al., *supra* note 1, at 508.

171. *See* AMERICA'S ANIMAL FACTORIES, *supra* note 125, at 53. "[T]he Minnesota Pollution Control Agency . . . confirmed through a testing program that half of the CAFOs tested were exceeding state standards for hydrogen sulfide, some by up to 50 times," and "[v]iolations occurred on a frequent basis, with one operation exceeding the half-hour standard 32 times over 19 days." *Id.*

172. *See id.* at 76.

173. *See* TROUBLE ON THE FARM, *supra* note 107, at 29.

174. *See id.*

175. *See* Zev Ross & Jonathan Kaplan, Californians for Pesticide Reform, *Poisoning the Air* 1 (1998), *available at* (visited Apr. 8, 1999) <http://www.igc.org/cpr/poisoned_air/air_execsum.html> (compilation of state government testing data).

176. *See* TROUBLE ON THE FARM, *supra* note 107, at 30.

## II

## THE ENVIRONMENTAL LAW SAFE HARBORS THAT FARMS ENJOY

Getting a handle on the environmental law of farms is difficult. There is no unified code of environmental law for farms. Federal environmental law is scattered throughout many statutes, making it difficult to piece together the various provisions that could apply to farms. Although the general theme at the federal level is hands-off, no express or implied preemption prevents states from more aggressively regulating farms. To date, however, states have generally not chosen to regulate the environmental impacts of farming in any comprehensive manner.[177] We are left, therefore, with a collection of provisions, spread throughout many different laws, which combine to form what I call the "anti-law" of farms and the environment. There are few exceptions to this anti-law.

### *A. An Inventory of Safe Harbors for Farming*

The anti-law of farms and the environment comes in two forms. Some laws, while not expressly exempting or even mentioning farms, are structured in such a way that farms escape most if not all of the regulatory impact. Other laws expressly exempt farms from regulatory programs that would otherwise clearly apply to them. Together, these passive and active exemptions provide a large safe harbor for farms from the impact of environmental law.

#### *1. Clean Water Act*

The Clean Water Act (CWA)[178] prohibits the "discharge of any pollutant by any person"[179] into waters of the United States and establishes a series of permit programs designed to regulate the discharge of pollutants provided certain conditions are met. Though seemingly straightforward, this prohibition is riddled with important exemptions for farms. Although the CWA defines "pollutant" to include "agricultural waste discharged into water,"[180] other provisions of the statute put discharges of agricultural wastewater, stormwater, and fill material largely

177. The same political forces that operate on the federal level to impede regulation of farms no doubt operate with equal or greater force at the state and local level. *See infra* notes 391-401 and accompany text.

178. 33 U.S.C. §§ 1251-1387 (1994). For an overview of the CWA programs, see THE CLEAN WATER ACT HANDBOOK (Parthenia B. Evans ed., 1994).

179. 33 U.S.C. § 1311(a) (1994).

180. *Id.* § 1362(6).

beyond regulatory reach.

*a. Wastewater Permits*

Section 402 of the CWA establishes a permitting program, known as the National Pollutant Discharge Elimination System (NPDES), to regulate the discharge of pollutants.[181] NPDES permits may be issued only if, among other conditions, the permittee satisfies a set of technology-based[182] and water quality-based[183] limitations on the amount and quality of discharged effluent. For almost twenty years, the NPDES program focused on discharges of wastewater effluent from "industrial" processes— that is, water which had come into contact with process wastes or which was used as a waste disposal medium.

Many wastewater discharges from agriculture, such as the collected return flow from irrigated fields, appear to fit within the NPDES permit program as generally described. Indeed, EPA knew that this interpretation was inescapable under the CWA as it was originally enacted.[184] Awed by the prospect of issuing NPDES permits to two million farms, EPA thus promulgated an administrative exemption from the statute's unambiguous terms.[185] The courts struck down that exemption as contrary to the clear intent and meaning of the CWA,[186] but in 1977 Congress overruled the courts and codified EPA's farm exemption. The original version of the CWA defined discharge of a pollutant as "any addition of any pollutant to navigable waters *from any point source.*"[187] To exempt farm irrigation return flows

181. *See id.* § 1342.

182. *See id.* §§ 1311, 1316–1317.

183. *See id.* §§ 1312–1315.

184. *See* Kershen, *supra* note 15, at 3 (explaining that EPA took a broad view of its CWA jurisdiction, leading the agency to conclude that farm irrigation return flows channeled in ditches and other conveyances were covered).

185. *See* 38 Fed. Reg. 18,000, 18,003 (1973) (previously codified at 40 C.F.R. § 125.4). The regulation provided that "the following do not require an NPDES permit: . . . (j) Discharges of pollutants from agricultural and silvicultural activities, including irrigation return flow and runoff from orchards, cultivated crops, pastures, rangelands, and forest lands," with an exception for discharges from large confined animal feeding operations and large irrigation projects. *Id.*

186. *See* NRDC v. Costle, 568 F.2d 1369 (D.C. Cir. 1977). EPA argued that the regulatory exemption was necessary to allow the agency to avoid the "administrative infeasibility" of issuing and administering millions of farm NPDES permits. *See id.* at 1374. Although the court rejected EPA's position, it explained that EPA could accomplish most of its objectives by promulgating a general permit describing and authorizing the classes of discharges it had sought to exempt entirely. *See id.* at 1380-82. EPA later accepted the court's invitation. *See* 42 Fed. Reg. 6846 (1977).

187. 33 U.S.C. § 1362(12) (1994). The "point" in point source refers to the requirement that the discharge be from "any discernible, confined and discrete

from the reach of NPDES wastewater discharge permits, Congress adopted the fiction that "these sources were practically indistinguishable from any other agricultural runoff"[188] and simply redefined "point source" to exclude "return flows from irrigated agriculture."[189] Congress drove home the point in Section 402 as well, dictating that EPA may not "require a permit under this section for discharges composed entirely of return flows from irrigated agriculture,"[190] and, leaving nothing to doubt, elsewhere described irrigation return flows as "agriculturally . . . related *nonpoint* sources of pollution."[191] Through this exemption, therefore, farms that discharge soils, animal wastes, fertilizers, and pesticides via return flows into waters of the United States need no authorization for such discharges under the CWA.[192]

### *b. Stormwater Permits*

Although EPA's focus for the first twenty years of the NPDES program was on process wastewater, the CWA always provided

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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." *Id.* § 1362(14).

188. S. REP. NO. 95-370, at 35 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4326, 4360.

189. Clean Water Act of 1977, Pub. L. No. 95-217, § 33(b), 91 Stat. 1566, 1577 (1977) (codified at 33 U.S.C. § 1362(14) (1994)).

190. Pub. L. No. 95-217, § 33(c), 91 Stat. 1566, 1577 (1977) (codified at 33 U.S.C. § 1342(l)(1) (1994)).

191. *Id.* § 33(a) (codified at 33 U.S.C. § 1288(b)(2)(F) (1994)) (emphasis added).

192. It is through this exemption, for example, that hundreds of thousands of acres of California farm lands using subsurface drainage tile fields discharge polluted wastewater to the San Joaquin Valley watershed. *See* Bobker, *supra* note 93, at 14-16. The exemption does not apply to other wastewater discharges a farm might produce, such as animal waste collected from feed lots, or manure distributed from spreaders onto farm lands, when ultimately discharged through a point source. *See* Concerned Area Residents v. Southview Farm, 34 F.3d 114 (2d Cir. 1994); *see also* Kershen, *supra* note 15, at 4; Susan E. Schell, *The Uncertain Future of Clean Water Act Agricultural Pollution Exemptions After* Concerned Area Residents for the Environment v. Southview Farms, 31 LAND & WATER L. REV. 113 (1996). Recently, for example, state and local prosecutors in California joined in filing four lawsuits against dairy operators in San Joaquin County for allegedly allowing cattle manure runoff to pollute waterways. *See* Carolyn Whetzel, *Attorney General, County District Attorney File Civil Complaints Against Dairy Operators*, Daily Env't Rep. (BNA), May 6, 1999, at A-9. Also, a court recently held that wastes removed from NPDES-regulated manure holding ponds and spread on land as fertilizer remain subject to the continuing jurisdiction of the NPDES permit, meaning that unpermitted discharges of nonpoint runoff from the manure are illegal. *See* Community Ass'n for Restoration v. Henry Bosma Dairy, 65 F. Supp. 2d 1129 (E.D. Wash. 1999) (granting motion for summary judgment); Susan Bruninga, *Land Application of Manure Subject to CWA Requirements, Court Says*, 30 Env't Rep. (BNA) 173 (1999).

EPA the authority, under certain conditions, to require permits for stormwater discharged through point sources. In 1987, Congress renewed EPA's attention to polluted stormwater through a series of amendments outlining in detail a framework for NPDES permitting of municipal and industrial stormwater discharges.[193] In the course of doing so, however, Congress made it clear that the stormwater NPDES program would not extend to farm stormwater runoff. As it had in 1977 for irrigation return flows, Congress defined "point source" so as to exclude "agricultural stormwater discharges."[194] Hence, like irrigation return flows, stormwater from farms collected in ditches, canals, and other conveyances, and the pollutants carried in it, are beyond NPDES stormwater program coverage.[195]

*c. Dredge and Fill Permits*

The third major CWA water pollutant discharge permitting program, found in Section 404 of the statute, covers "the discharge of dredged or fill material into the navigable waters."[196] This so-called dredge-and-fill permit program has been the nation's principal vehicle for wetlands protection.[197] Prominently excluded from the program, however, are discharges "from normal farming . . . activities such as plowing, seeding, cultivating, minor drainage, harvesting for the production of food, . . . or upland soil and water conservation practices."[198] A

193. *See* Water Quality Act of 1987, Pub. L. No. 100-4, Title IV, §§ 401-405, 101 Stat. 65, 65-69 (1987) (codified at 33 U.S.C. § 1342 (1994)).

194. Pub. L. No. 100-4, Title V, § 503, 101 Stat. 75, 75 (1987) (codified at 33 U.S.C. § 1362(14) (1994)). Congress believed these activities "have no serious adverse impact on water quality," that regulating them under the dredge and fill permit program would produce "no countervailing environmental benefit," and that they would be "more properly controlled by State and local agencies." S. REP. NO. 95-370, at 76, 77 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4326, 4401; *see also* 123 CONG. REC. 26,707 (1977) (remarks of Sen. Anderson) ("The exemption of these activities from permit requirements will greatly simplify the administrative process and reduce the potential redtape burden.").

195. *But see supra* note 192 (discussing cases applying NPDES program to irrigation and stormwater runoff carrying pollutants from manure piled onto farmlands).

196. 33 U.S.C. § 1344 (1994).

197. For a history of how Section 404, which does not mention the word "wetlands," has become associated *primarily* with wetlands protection, see Jason Perdion, *Protecting Wetlands Through the Clean Water Act and the 1985 and 1990 Farm Bills: A Winning Trio*, 28 U. TOL. L. REV. 867, 869-73 (1997).

198. 33 U.S.C. § 1344(f)(A) (1994). Additional exemptions apply to "construction or maintenance of farm or stock ponds or irrigation ditches," *id.* § 1344(f)(1)(C), and "construction or maintenance of farm roads," *id.* § 1344(f)(1)(E). *See generally* Perdion, *supra* note 197, at 874-77.

significant limitation on this "normal farming" exemption is that it does not apply to activities intended to bring a wetlands area into a use to which it was not previously subject.[199] Hence, "normal farming" does not include the conversion of a natural wetlands area to a rice farm or the conversion of farmed wetlands into upland cultivated farmlands.[200] Nevertheless, continued farming in wetlands, or activities designed to reclaim historically farmed wetlands, has accounted for substantial loss and degradation of wetland ecosystems since the enactment of the CWA.[201]

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199. *See* 33 U.S.C. § 1344(f)(2) (1994). This so-called "recapture" provision has generally been construed broadly by courts and administrative agencies, making the normal farming exemption narrow and tricky for farmers. *See, e.g.*, U.S. ARMY CORPS OF ENGINEERS, SECTION 404 AND AGRICULTURE INFORMATION PAPER (1990) (addressing various scenarios under the normal farming exemption and recapture provision); *see also* Perdion, *supra* note 197, at 877-83.

200. The recapture provision addresses only those conversions of wetlands to farming accomplished through discharges subject to Section 404. Two important limitations on the scope of that jurisdiction apply to farms. First, farm wetland areas converted to cropland uses before December 25, 1985— so-called "prior converted croplands"— are not subject to Section 404. *See* 58 Fed. Reg. 45,008 (1993). Second, a recent court decision holding that the Section 404 program does not reach draining and clearing activities that do not involve more than incidental redischarge of small amounts of debris opens the door to relatively easy conversion of many wetlands to farming free of any Section 404 consequences. *See* National Mining Assoc. v. United States Army Corps of Engineers, 145 F.3d 1399 (D.C. Cir. 1997); *see also* Revisions to the Clean Water Act Regulatory Definition of "Discharge of Dredged Material", 64 Fed. Reg. 25,120 (1999) (codified at 33 C.F.R. pt. 323 and 40 C.F.R. pt. 232) (revising regulations to correspond to *National Mining* decision and explaining background thereof). Some farmers already have attempted to take advantage of this turn of events by draining wetlands for conversion to crop uses. *See, e.g., In re* Slinger Drainage, Inc., CWA App. No. 98-10, 1999 WL 778576 (EPA App. Bd. 1999) (finding that a farmer who drained wetlands after *National Mining* decision violated Section 404 because installation of drainage tiles involved more than incidental redischarge). Such conversions may nonetheless have undesirable consequences to farmers under farm subsidy programs and thus may not be widely implemented. *See infra* text accompanying notes 356-61.

201. *See* NATIONAL WATER QUALITY INVENTORY, *supra* note 7, at ES-27 to ES-29 (noting that agriculture was responsible for 54% of national wetland losses from the mid-1970s to the mid-1980s, and remains the leading source of wetland degradation). One of the murkiest issues involving wetlands and farming is the delineation of wetlands on farms and the determination of which such areas are prior converted croplands for purposes of Section 404 and farm subsidy programs. *See* Justin Lamunyon, *Wetlands and the Swampbuster Provisions: The Delineation Procedures, Options, and Alternatives for the American Farmer*, 73 NEB. L. REV. 163 (1994). Recently, environmental groups have alleged that USDA, the lead agency for delineation of wetlands on farms, has used poor delineation methodology and undercounted wetlands on farming land. *See* Susan Bruninga, *Group Says Oversight Inadequate in Delineations on Farmland Tracts*, 30 Env't Rep. (BNA) 313 (1999); Susan Bruninga, *Group Charges EPA Overlooks Failings in Farmland Delineations, Seeks Review*, Daily Env't Rep. (BNA), June 14, 1999, at A-6.

### 2. *Nonpoint Source Water Pollution*

In a classic example of passive nonregulation, the repeated references in the CWA to "*point* source" as an essential criterion for application of the NPDES program create one of the largest safe harbors in environmental law for farms— the failure to regulate *nonpoint* sources of water pollution. The size of this harbor and its effects have not gone unnoticed.[202] It has, however, remained largely open, particularly for farms.[203]

Efforts to address nonpoint source water pollution in the CWA and other statutes have been feeble, unfocused, and underfunded. For example, Section 208 of the CWA required states to develop area-wide waste treatment management plans that were to include a process for identifying nonpoint sources and establishing feasible control measures.[204] Upon EPA's approval of a state's plan, the state could receive federal assistance for the planning process.[205] With high expectations, Congress used the program as the rationale for moving irrigation return flows from the point source side of the CWA to the nonpoint source side[206] and for excluding normal farming from the Section 404 dredge-and-fill permit program.[207] Similarly, in the 1987 amendments, Congress added Section 319 to the statute, requiring states to prepare "state assessment reports" that identify waters which cannot reasonably be expected to meet water quality standards because of nonpoint source

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202. *See* Scott D. Anderson, *Watershed Management and Nonpoint Source Pollution: The Massachusetts Approach*, 26 B.C. ENVTL. AFF. L. REV. 339, 339-40 (1999) ("[T]he control of nonpoint source pollution continues to frustrate the [Clean Water Act's] stated goal to 'restore and maintain the chemical, physical, and biological integrity of the Nation's waters.'"); Kershen, *supra* note 15, at 3 (recounting descriptions of nonpoint source pollution as "'the neglected legacy and unfinished agenda' of federal water pollution laws").

203. For a comprehensive overview of federal regulation of nonpoint source water pollution from farms, see Zaring, *supra* note 61; George A. Gould, *Agriculture, Nonpoint Source Pollution, and Federal Law*, 23 U.C. DAVIS L. REV. 461 (1990).

204. *See* 33 U.S.C. § 1288(a) (1994); *see also* Haugrud, *supra* note 6, § 8.2(C)(3)(b)(i), at 540-41.

205. *See* 33 U.S.C. § 1329(f) (1994); *see also* Haugrud, *supra* note 6, § 8.2(C)(3)(b)(ii), at 541-42.

206. *See* S. REP. NO. 95-370, at 35 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4326, 4360 ("All such sources, regardless of the manner in which the flow was applied to the agricultural lands, and regardless of the discrete nature of the entry point, are more appropriately treated under the requirements of section 208(b)(2)(F)."); *see also supra* text accompanying notes 185-93.

207. *See* S. REP. NO. 95-370, at 76 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4326, 4401 (noting that Section 404 need not extend to normal farming activities because they will be "controlled by State and local agencies under section 208(b)(4)").

pollution.[208] States must prepare "state management programs" prescribing the "best management practices" to control sources of nonpoint pollution.[209] When EPA approves a state's assessment reports and management plans, the state is eligible for federal financial assistance to implement its programs.[210]

In the absence of any concrete, enforceable federal blueprint for addressing nonpoint source pollution, the success of Sections 208 and 319 depended largely on state initiative. It is little surprise, then, that neither Section 208 nor Section 319 produced meaningful results.[211] Congress thus took a more aggressive step in Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990,[212] amending the Coastal Zone Management Act[213] (CZMA) to add a requirement that any state with a federally approved coastal zone management plan[214] must develop a Coastal Nonpoint Pollution Program subject to federal review and approval.[215] States must identify land uses leading to nonpoint source pollution and develop measures to apply "best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives."[216] When EPA and the National Oceanic and Atmospheric Administration approve a state's Coastal Nonpoint

208. *See* 33 U.S.C. § 1329(a) (1994).

209. *See id.* § 1329(b).

210. *See id.* § 1329(h).

211. An EPA Advisory Committee recently summed up the weakness of the Section 208 and 319 programs by explaining that "EPA had no 'hammer' provision for States not adopting programs and no ability to establish a program if a State chose not to." EPA TMDL Federal Advisory Committee, Discussion Paper, Nonpoint Source-Only Waters 5 (1997) (on file with author). *See generally* Anderson, *supra* note 202, at 344 (noting that "the section 208 program failed to make any significant progress" and under Section 319 "EPA continues to lack the authority to require the states to take any affirmative action"); Kershen, *supra* note 15, at 4 (noting that "section 208 gave states great discretion . . . and carried no enforcement penalties" and under Section 319 "the states have been slow to act and EPA has limited enforcement authority to make states act."); Zaring, *supra* note 61, at 10,130, 10,132 (noting that Section 208 was "toothless" and Section 319 suffered from "not enough carrot, not enough stick"). EPA continues nonetheless to devote considerable resources to the Section 319 program, largely in the form of increased funding for states that EPA is proposing be tied to the requirement that states follow "key elements" EPA is in the process of developing. *See Chances for Clean Water Bill Dim; EPA to Use Existing Authorities on Nonpoint Sources*, Daily Env't Rep. (BNA), Jan. 20, 1999, at S-18.

212. Pub. L. No. 101-508, Title VI, § 6217 (1990), 104 Stat. 1388-314.

213. 16 U.S.C. §§ 1451-1464 (1994).

214. For a description of the CZMA coastal management plan provisions, see *infra* text accompanying note 431.

215. *See* 16 U.S.C. § 1455b (1994). *See generally* Clare Saperstein, *State Solutions to Nonpoint Source Pollution: Implementation and Enforcement of the 1990 Coastal Zone Amendments Reauthorization Act Section 6217*, 75 B.U. L. REV. 889 (1995).

216. 16 U.S.C. § 1455b(g)(5) (1994).

Pollution Program, the federal government agrees not to fund, authorize, or carry out projects inconsistent with the state's plan.[217] For coastal states, this requirement can serve as an impetus for more aggressive regulation of nonpoint source pollution, but federal funding assistance is woefully short of the expected cost of plan preparation and implementation.[218]

Another federally-based incentive for state regulation of nonpoint source pollution derives from the CWA's program for determining Total Maximum Daily Load (TMDL) waste load allocations under Section 303(d) of the CWA.[219] Where application of the technology-based NPDES permit discharge limits does not bring a water body within ambient water quality standards,[220] the TMDL program implements a procedure to

217. *See id.* § 1455b(k). EPA has recently outlined the guidelines for federal consistency determinations. *See* Section 319 Federal Consistency Guidance, 63 Fed. Reg. 45,504 (1998).

218. *See* ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION 973 (2d ed. 1996) (noting that EPA estimated the cost of implementing the measures contemplated in the program at $390 million to $590 million, whereas only $50 million in grant money was available).

219. *See* 33 U.S.C. § 1313(d) (1994).

220. Water quality standards are based on two components: (1) designated uses of the water body, such as recreation or water supply, and (2) water quality criteria, which set concentration levels for individual pollutants designed to attain particular designated uses. Water quality standards thus are designed to regulate ambient water pollution concentrations for identified pollutants in different classes of waters. *See* 33 U.S.C. § 1313(c) (1994); *see also* PERCIVAL ET AL., *supra* note 218, at 937. One of the difficulties facing efforts to apply the water quality standards program to water pollution from farming is that, at present, no federally-promulgated water quality criteria exist for nutrients from nitrogen and phosphorous discharges. EPA, however, is in the process of developing them. *See* Office of Water, U.S. Envtl. Protection Agency, Nutrient Criteria Technical Guidance Manual: Rivers and Streams (review draft of Sept. 1999); Office of Water, U.S. Envtl. Protection Agency, Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs (review draft of Apr. 1999); U.S. Envtl. Protection Agency, Notice of National Strategy for the Development of Regional Nutrient Criteria, 63 Fed. Reg. 34,648 (1998); *see also* Susan Bruninga, *Effort to Set Nutrient Criteria Premature, Too Burdensome on POTWs, Officials Say*, 30 Env't Rep. (BNA) 172 (1999); Susan Bruninga, *Regulating Nutrients, Implementing Controls Focus of EPA Meeting on Draft Criteria*, 30 Env't Rep. (BNA) 310 (1999); Karen L. Werner, *Project to Guide States in Development of Limits for Pesticides in Impaired Waters*, 30 Env't Rep. (BNA) 1284 (1999). In the meantime, some states have developed their own nutrient criteria in the absence of federal guidelines, though the process has often been contentious. *See* Pamela S. Clarke & Stacey M. Cronk, *The Pennsylvania Nutrient Management Act: Pennsylvania Helps to "Save the Bay" Through Nonpoint Source Pollution Management*, 6 VILL. ENVTL. L.J. 319 (1995); Alfred R. Light, *The Myth of Everglades Settlement*, 11 ST. THOMAS L. REV. 55, 62-65 (1998) (discussing litigation over Florida's water quality criteria for phosphorous); McElfish, *supra* note 232, at 10,197. The Ecological Sciences Division of the Department of Agriculture's Natural Resources Conservation Service is also developing policies for providing nutrient management technical assistance in connection with programs protecting highly erodible lands and wetlands. *See* 64 Fed. Reg. 19,122 (1999).

impose more restrictive discharge limits on the NPDES permittees.[221] Under the TMDL program, states must identify impaired water bodies, calculate the total maximum daily loading of pollutants that the water body can tolerate while still meeting water quality goals, and then allocate the necessary reduction in total discharges among NPDES dischargers and, theoretically, nonpoint source dischargers of that pollutant.[222]

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221. The TMDL program thus represents the intersection of the CWA's technology-based and water quality-based components of regulation. For comprehensive explanations of the TMDL program, see Robert W. Adler, *Integrated Approaches to Water Pollution: Lessons from the Clean Air Act*, 23 HARV. ENVTL. L. REV. 203, 215-30 (1999); Office of the Administrator, U.S. EPA, *Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program (1998)*, (visited Feb. 8, 2000) <http://www/epa.gov/OWOW/tmdl>, and in particular review the series consisting of Oliver A. Houck, *TMDLs: The Resurrection of Water Quality Standards-Based Regulation Under the Clean Water Act*, 27 Envtl. L. Rep. (Envtl. L. Inst.) 10,329 (1997); Oliver A. Houck, *TMDLs, Are We There Yet?: The Long Road Toward Water Quality-Based Regulation Under the Clean Water Act*, 27 Envtl. L. Rep. (Envtl. L. Inst.) 10,391 (1997); Oliver A. Houck, *TMDLs III: A New Framework for the Clean Water Act's Ambient Standards Program*, 28 Envtl. L. Rep. (Envtl. L. Inst.) 10,415 (1998); Oliver A. Houck, *TMDLs IV: The Final Frontier*, 29 Envtl. L. Rep. (Envtl. L. Inst.) 10,469 (1999). The TMDL program lay dormant for almost twenty years before a series of lawsuits against states and EPA in the early 1990s resulted in court-imposed deadlines for completing the TMDL process in many states. *See* Adler, *supra*, at 221; Houck, *TMDLs, Are We There Yet?*, *supra*. As the weight of litigation turned against them, EPA and the states worked to develop a plan to carry out the TMDL program nationally over a twelve year period beginning in 1998. For current information on this development and the status of the TMDL program, see Office of Water, U.S. Envtl. Protection Agency, *Total Daily Maximum Load (TMDL) Program* (visited June 10, 1999) <http:/www.epa.gov/OWOW/tmdl>.

222. *See* 33 U.S.C. § 1313(d) (1994). EPA recently distributed proposed TMDL regulations designed to include many nonpoint sources in the full scope of the TMDL program. *See* Proposed Revisions to the Water Quality Planning and Management, 64 Fed. Reg. 46,011 (1999) (to be codified at 40 C.F.R. § 130.33(b)(6)); Revisions to the National Pollutant Discharge Elimination System Program and Federal Antidegradation Policy in Support of Revisions to the Water Quality Planning and Management Regulation, 64 Fed. Reg. 46,057 (1999) (proposed rule amending various provisions of 40 C.F.R. pt. 122). *See generally* Lisa E. Roberts, *Is the Gun Loaded This Time? EPA's Proposed Revisions to the Total Maximum Daily Load Program*, 6 ENVTL. LAW. 635 (2000). Nevertheless, there is far from universal agreement as to whether the CWA allows allocation of a portion of the pollutant load to nonpoint sources. Indeed, farming groups have initiated litigation challenging EPA's authority to implement the TMDL program so as to assign allocations to nonpoint sources. *See* Susan Bruninga, *Suit Challenging EPA Authority to Set TMDLs for Nonpoint Sources Concerns Cities*, Daily Env't Rep. (BNA), May 27, 1999, at A-2; Houck, *TMDLs IV*, *supra* note 152, at 10,474. Some members of Congress have also questioned EPA's authority in this regard. *See* Susan Bruninga, *House Panel Members Question EPA Authority to Issue TMDL Proposal*, 30 Env't Rep. (BNA) 1241 (1999). EPA's Federal Advisory Committee on TMDL's declined to address these legal issues in its final report. *See* Office of the Administrator, U.S. Envtl. Protection Agency, *Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program* 42 (1998) (visited Feb. 8, 2000) <http://www/epa.gov/OWOW/tmdl>. In the first judicial opinion on the question, a California federal

States must include TMDL implementation as part of "continuing planning process" programs that EPA must approve in order for a state to retain delegation to administer the NPDES permit program within its boundaries.[223]

The TMDL program stops there, however, providing no independent source of authority for enforcing load reduction allocations.[224] Enforcing allocations for NPDES permit dischargers is a straightforward matter of tightening NPDES permits to reduce total discharges of the pollutants of concern.[225] For nonpoint sources, however, the most EPA can say is that TMDL load allocations are to be "enforced" through the Section 319 program,[226] which, as pointed out above, fails to secure real gains in control of nonpoint source discharges from farms.

EPA has recognized the obstacle this dichotomy poses to TMDL program implementation. In waters impaired primarily or exclusively by nonpoint sources, EPA has proposed a policy that allows states that promulgate demonstrable means of reducing nonpoint source pollution in a given water body to ease the burdens on NPDES permittees.[227] Where that approach does not

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district court held that agricultural nonpoint source pollution must be included in TMDL determinations, but that states have discretion as to the load reduction allocation between point and nonpoint sources. *See* Pronsolino v. Marcus, No. C99-01828WHA (N.D. Cal. Mar. 30, 2000). Given the complexities involved in the TMDL and waste load allocation calculations, it appears likely that the implementation process will continue to face litigation challenges at virtually every stage. *See* Dana A. Elfin, *Challenges to Total Maximum Daily Loads Possible Following Upcoming EPA Regulation*, 30 Env't Rep. (BNA) 311 (1999) (reporting that discharger groups are filing "pre-litigation type comments" on proposed TMDL allocations).

223. *See* 33 U.S.C. § 1313(e)(3)(C) (1994).

224. *See* Office of Water, U.S. Envtl. Protection Agency, *Total Maximum Daily Load (TMDL) Program, Memorandum from Robert Perciasepe, EPA Assistant Administrator, to Regional Administrators and Regional Water Division Directors Re: New Policies for Establishing and Implementing Total Maximum Daily Loads* (Aug. 8, 1997) (visited Feb. 1, 2000) <http://www.epa.gov/OWOW/tmdl/ratepace.html> [hereinafter Perciasepe Memorandum] ("A TMDL improves water quality when the pollutant allocations are implemented, not when a TMDL is established. . . . Section 303(d) does not establish any new implementation authorities beyond those that exist elsewhere in State, local, Tribal, or Federal law."). Because the TMDL program is limited in this respect, establishing TMDLs "trigger[s] no additional obligations on the part of any [nonpoint source]." Federal Advisory Committee, *supra* note 211, at 5.

225. *See* 33 U.S.C. § 1312(a) (1994); *see also* Perciasepe Memorandum, *supra* note 224 ("[P]oint sources implement the wasteload allocations within TMDLs through enforceable water quality-based discharge limits in NPDES permits authorized under section 402 of the CWA.").

226. *See* Perciasepe Memorandum, supra note 224 ("[P]rograms and efforts for control of nonpoint sources should be described in the State nonpoint source management program under section 319.").

227. For example, one of EPA's proposed policies is designed to prevent degradation of existing water quality levels by requiring that new significant point sources in a watershed offset their pollutant load with reductions in the existing

work, EPA suggests that states simply declare, presumably as a matter of state law, that offending nonpoint sources are actually point sources and require state-issued NPDES permits and full TMDL compliance.[228] Nonpoint source pollution, a significant contributor to water quality degradation, has been unregulated for decades. Substantial gains in water quality thus could be achieved through such an intense focus on nonpoint source pollution. In addition, the marginal costs of pollution reduction for nonpoint sources might be well below those that NPDES permittees would bear to achieve the same reductions in pollutant loads. Although it is questionable whether the EPA can use the TMDL program in such a manner or require states to do the same, the program may allow states to do so in order to balance the costs of water quality improvement between point and nonpoint sources.[229]

The problem with relying on the CZMA's program and CWA's TMDL program as the foundations for regulating *farm* nonpoint pollution is that neither program addresses farms specifically at

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baseline load by a ratio of less than one-to-one. Where the reductions are made to nonpoint source pollution sources, EPA has explained that "the discharger's NPDES permit would need to contain any conditions necessary to ensure that the load reductions from the nonpoint source will be realized." 64 Fed. Reg. 46,057, 46,071 (1999); *see also* Perciasepe Memorandum, *supra* note 224 (noting that under the TMDL program, "where any wasteload load allocation to a point source is increased based on an assumption that loads from nonpoint sources will be reduced, the State must provide 'reasonable assurances' that the nonpoint source load allocations will in fact be achieved"); Office of Water, U.S. EPA, *Ensuring That TMDLs Are Implemented—Reasonable Assurance* (visited Oct. 10, 1999) <http://www.epa.gov/OWOW/tmdl/ensure.html> ("In allocating reductions to nonpoint sources, States must provide reasonable assurance that those nonpoint sources will meet their allocated amount of reductions.").

228. *See* Office of Water, *supra* note 227 ("Reasonable assurance is satisfied by designating these [nonpoint] sources as point sources and issuing them an NPDES permit.").

229. EPA cannot mandate the methods by which states accomplish this balancing, but the agency has suggested that states may institute "regulatory, non-regulatory, or incentive-based [measures], depending on the program." Perciasepe Memorandum, *supra* note 224. The use of incentive-based measures could, for example, allow NPDES dischargers to pay for nonpoint source dischargers' reductions in discharge loads and thereby ease restrictions in their NPDES permits. The irony is that farms, the leading source of water pollution in America, would be paid to stop polluting. This prospect is likely to pit farms and other nonpoint sources against NPDES dischargers, which are more likely to support EPA's suggestion that reasonable assurance can also be demonstrated through the direct regulation of nonpoint sources. EPA has essentially left it to each state to decide how to resolve the debate, but it has made clear that a state's failure to resolve the debate will result in federal imposition of TMDLs and load allocations. *See* Office of Water, *supra* note 227 ("Because reasonable assurance is a required element of a TMDL, EPA may then disapprove that State's TMDL. If EPA disapproves a TMDL, EPA must establish the TMDL.").

the federal level. States, in other words, will have the discretion to achieve the general goal of nonpoint source pollution control in ways that do not place serious burdens on farms, or leave farms entirely unregulated.[230] Some states have done exactly that in their initial TMDL implementation policies.[231] Indeed, in a recent series of comprehensive studies of state law, the Environmental Law Institute identified few states with any meaningful program regulating farm nonpoint source pollution, much less an actively enforced one.[232] Most states have followed the federal lead and focused on point source pollution; of those that have ventured into addressing nonpoint source pollution, most leave farms out of the picture.[233] EPA remains fundamentally powerless to require otherwise.[234] Hence, while the impetus for state regulation of nonpoint pollution is growing under the CZMA and the CWA, farms appear poised to slip

230. Even if the CWA allows EPA to include nonpoint sources directly in the TMDL program, in the end "states have discretion in allocating pollution loads among sources as long as the allocations will meet TMDL targets." Report of the Federal Advisory Committee, *supra* note 211, at iii. States will be free to leave farms out of the picture even if other nonpoint sources such as urban runoff are covered. Indeed, although EPA's proposed TMDL rules aggressively invite states to cover more farm animal feeding operations as point sources, *see* 64 Fed. Reg. 46,057, 46,074 (1999), the proposed rules are otherwise silent with respect to farms. For further discussion of the animal feeding operations issue, see *infra* text accompanying notes 307-26.

231. For example, Florida recently enacted a TMDL implementation statute that subjects only *nonagricultural* nonpoint source pollution to load allocations by the Florida Department of Environmental Protection, leaving agricultural sources subject to voluntary best management practices developed by the Florida Department of Agriculture. *See* FLA. STAT. ANN. § 403.067(7)(c) (nonagricultural sources) & 403.067(7)(d) (agricultural sources).

232. *See* ENVIRONMENTAL LAW INSTITUTE, ENFORCEABLE STATE MECHANISMS FOR THE CONTROL OF NONPOINT SOURCE WATER POLLUTION (1997); ENVIRONMENTAL LAW INSTITUTE, RESEARCH REPORT: ALMANAC OF ENFORCEABLE STATE LAWS TO CONTROL NONPOINT SOURCE WATER POLLUTION (1998); James M. McElfish, *State Enforcement Authorities for Polluted Runoff*, 28 Envtl. L. Rep. (Envtl. L. Inst.) 10,181, 10,195-99 (1998).

233. *See* ENVIRONMENTAL LAW INSTITUTE, ENFORCEABLE STATE MECHANISMS, *supra* note 232, at iii ("Agriculture is the most problematic area for enforceable [nonpoint source water pollution] mechanisms. Many laws of general applicability . . . have exceptions for agriculture. Where state laws exist, they often defer to incentives, cost sharing, and voluntary programs."); McElfish, *supra* note 232, at 10,182. Although "no state is entirely without any enforceable authority relevant to nonpoint source discharges . . . some states have few such authorities [and] others have adopted a bewildering array of enforceable tools . . . paired with equally bewildering arrays of exemptions and exclusions." *Id.*

234. For example, EPA has explained that for water bodies impaired primarily or exclusively by nonpoint source pollution, the primary implementation mechanism for the TMDL program "will generally be the State section 319 nonpoint source management program coupled with State, local, and Federal land management programs and authorities. For example, voluntary, incentive-based approaches at the State and local level can be used. . . ." Perciasepe Memorandum, *supra* note 224.

through the process once again. Although states could reverse this continuation of past practice, farms appear likely to retain a safe harbor for their nonpoint source discharges.

### 3. *Clean Air Act*

The Clean Air Act (CAA) provides a complex and comprehensive regulatory framework covering stationary and mobile sources of air pollution.[235] Although farms do not enjoy the range of express exemptions under the CAA that they do under the CWA, they generally escape most CAA regulatory programs by virtue of de minimus discharge exceptions. By limiting their emphasis to "major sources" emitting more than threshold quantities of regulated pollutants, CAA regulatory programs essentially give farms yet another safe harbor, this one for air pollution.[236] By contrast, other sectors of the agriculture economy upstream and downstream of farms are heavily regulated by the CAA.[237]

A significant CAA regulatory program not tied to minimum emission quantity thresholds leaves the fate of farms open to the states and thus largely beyond direct federal control. Under Sections 108 and 109 of the CAA, EPA must designate "criteria" air pollutants that may reasonably be anticipated to endanger public health or welfare, and then establish nationally uniform

235. *See* 42 U.S.C. §§ 7401-7671q (1994). For an overview of the CAA programs, see THE CLEAN AIR ACT HANDBOOK (Robert J. Martineau, Jr. & David P. Novello eds., 1998).

236. *See, e.g.*, 42 U.S.C. § 7412(a)(1) (1994) (defining major source of hazardous air pollutants as a source emitting 10 tons per year of any such pollutant or 25 tons per year of any combination of such pollutants); *id.* § 7479(1) (defining major source for purposes of permits designed to prevent significant deterioration of air quality generally as any source emitting 250 tons per year of any air pollutant; farms are not included in the list of specifically identified sources requiring only 100 tons per year to qualify as major); *id.* § 7602(j) (defining major source generally for the CAA to mean any source emitting 100 tons per year of any pollutant, unless otherwise specified). One exception is the CAA program for standards of performance for new stationary sources, which establishes no "major source" threshold. *See id.* § 7411. However, the new source emission limits apply only to categories of sources EPA has designated and for which it has promulgated such standards. EPA has not done so for farms generally, though grain terminal elevators storing over 2.5 million bushels are subject to gas emission opacity and particulate matter emission limits. *See* 40 C.F.R. subpt. DD, § 60.300 (1999) (standards of performance for grain elevators).

237. *See, e.g.*, 64 Fed. Reg. 33,550 (1999) (to be codified at 40 C.F.R. pts. 9 & 63) (EPA final rule regulating emissions of hazardous air pollutants from pesticide manufacturers); 64 Fed. Reg. 31,358 (1999) (to be codified at 40 C.F.R. pts. 9 & 63) (EPA final rule regulating emissions of hazardous air pollutants from fertilizer manufacturers).

ambient air quality standards.[238] Section 110 of the CAA allows states, if they elect to do so, to develop State Implementation Plans (SIPs) prescribing the enforceable measures the state will implement to achieve the NAAQS.[239] Within the SIP framework, the details are left to state discretion. The criteria pollutants are federally designated, but the questions of whom and what to regulate in order to achieve the federal standards are left to the states.[240] Although states could regulate air pollutant emissions from farms within that scope of discretion,[241] most states do not do so rigorously, and EPA actively dissuades them from doing so.[242]

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238. *See* 42 U.S.C. §§ 7408-7409 (1994). For a thorough overview of the NAAQS program, comparing its operation to that of the CWA water quality protection programs, see Adler, *supra* note 221, at 230-34.

239. *See* 42 U.S.C. § 7410 (1994). *See generally* Adler, *supra* note 221, at 234-50. If a state elects not to prepare a SIP, or prepares one that does not meet EPA approval, EPA must prepare a Federal Implementation Plan for the area in question. *See* 42 U.S.C. § 7410(c) (1994).

240. *See* United Electric Co. v. EPA, 427 U.S. 246, 267, 269 (1976) ("[T]he State has virtually absolute power in allocating emissions limitations so long as the national standards are met. . . . Congress plainly left the States, so long as the national standards were met, the power to determine which sources would be burdened by regulation and to what extent.").

241. EPA has explained that "the degree to which ambient air emissions from farming practices— such as prescribed burning— are allowed are location-specific (specific to a geographic area) within each State Implementation Plan." National Agric. Compliance Assistance Ctr., U.S. Envtl. Protection Agency, *Laws & Policies— Clean Air Act* 3 (visited Apr. 22, 1999) <http://es.epa.gov/oeca/ag/lcaa.html>.

242. For example, faced with the prospect that its new regulations establishing NAAQS for fine particulate matter could extend to farm emissions of soil and particulates from tilling, prescribed burning, and other practices, EPA is currently devising policies to allow farms to escape regulation. EPA has contended that farms do not constitute major sources of the fine particulates, though data to support that claim appear to be nonexistent. Farm industry advocates are concerned that states could nonetheless attempt to regulate farm emissions through the state SIPs, so EPA is developing "guidance" for states that will reflect the purportedly small contribution farms make to fine particulate emissions. These and other issues are the subject of the Agricultural Air Quality Task Force EPA and USDA jointly established in 1997. *See* Alec Zacaroli, *Agencies Develop MOU Addressing Agricultural Impacts on Air Quality*; 28 Env't Rep. (BNA) 1282 (1997). The issue has been complicated by a recent court decision striking down EPA's new rule on the ground that it violates the nondelegation doctrine. *See* American Trucking Ass'n v. EPA, 195 F.3d 4 (D.C. Cir. 1999); *see also* Alec C. Zacaroli, *Court Rulings Imperil EPA's Efforts to Clamp Down on Ozone Pollution*, 30 Env't Rep. (BNA) 325 (1999). A related program designed to protect visibility in and near national parks and other vista areas may provide states with another opportunity to regulate farm emissions. Section 169A of the CAA establishes this so-called "regional haze" regulatory program, new regulations which EPA recently promulgated to require all states to develop regional haze SIPs to achieve clear visibility for protected areas by the year 2064. *See* Regional Haze Regulations, 64 Fed. Reg. 35713 (July 1, 1999) (to be codified at 40 C.F.R. pt. 51); *see also* Eric L. Hiser, *Regional Haze and Visibility: Potential Impacts for Industry*, 29 Env't Rep. (BNA) 2597 (1999). Although few protected areas lie close to heavily

Under the CAA's program for prevention of significant deterioration (PSD) of air quality, in areas where the NAAQS is met for a regulated pollutant, states must establish "increments" of maximum air quality degradation and administer permits for major sources of the covered pollutant.[243] States may exclude from the increment "concentrations of particulate matter attributable to the increase in emissions from . . . temporary emission-related activities."[244] This provision would probably cover prescribed seasonal agricultural burning. Hence, although farms would not normally be regulated under the PSD permitting program as they would not meet the "major source" threshold,[245] the exclusion of seasonal burning removes any incentive a state may have to restrict such farming practices in order to protect the area's increment for other economically valuable sources of emissions.

Beyond the general omission of farm regulation from the CAA framework, several specific exemptions for farms apply, or are proposed to apply, under programs that might otherwise capture some farming emissions. For example, Section 112 of the CAA requires sources of designated hazardous air pollutants to comply with specified prevention, control, and reporting conditions. Facilities that use the chemicals in quantities above specified thresholds must prepare and file a "risk management plan" with EPA prescribing measures for prevention of and response to accidental releases.[246] Farms do not enjoy a blanket exemption from these requirements; rather, the program allows EPA wide discretion to set threshold quantities and "exempt entirely" any substance that is used as a nutrient in agriculture.[247] EPA has done so for ammonia, exempting it "when held by farmers."[248] EPA also has raised the quantity threshold

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farmed areas, the farm industry has expressed concerns that states may implement regional haze SIPs so as to restrict emissions from tilling and prescribed burning, which could be transported in the atmosphere to distant protected areas. Farming groups have suggested that they would seek congressional intervention should states focus on farms with that objective. *See* James Kennedy, *Farmers Fear Haze Rule Implementation, Could Seek Congressional Help, Group Says*, 29 Env't Rep. (BNA) 2558 (1999). As of yet there is no evidence that states are moving toward regulation of farms under regional haze SIPs any more than they have under the NAAQS SIPs.

243. *See* 42 U.S.C. §§ 7470-7478 (1994).

244. *Id.* § 7473(c)(1)(C).

245. *See supra* note 237 (discussing the major source feature of the PSD and other CAA programs).

246. *See* 42 U.S.C. § 7412 (1994).

247. *See id.* § 7412(r)(5).

248. 40 C.F.R. § 68.125 (1999). EPA has explained that the ammonia exemption applies "as long as it is used on that [farm] establishment. It would not be exempt if

for propane, widely used on farms for heating, cooling, drying grain, and powering irrigation systems, to a level that effectively removes farms from the scope of the planning requirement.[249]

Regulation of emissions from mobile source fuels and engines under Subpart II of the CAA[250] also takes a hands-off approach to farms. For example, Section 209 of the CAA preempts states from controlling emissions from "new engines . . . used in farm equipment or vehicles and which are smaller than 175 horsepower."[251] Farms also are exempt from the requirement that centrally-fueled fleets of vehicles use lower-polluting fuels.[252]

A recent example of the clout the farm industry has in securing safe harbors in the air pollution realm comes at the international environmental policy level. The production and consumption of methyl bromide, a colorless gas used as a pesticide on more than 100 crops, has been banned both domestically and internationally because it depletes the stratospheric ozone layer.[253] International protocols will ban methyl bromide in 2010.[254] Originally, the CAA specified a domestic phase-out date of 2001;[255] however, under tremendous

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resold or used on another establishment." National Agric. Compliance Assistance Ctr., U.S. Envtl. Protection Agency, *Laws & Policies— Clean Air Act* 6 (visited Apr. 22, 1999) <http://es.epa.gov/oeca/ag/lcaa.html>. Congress added the nutrient exemption option because it believed "the imposition of costly and burdensome regulation on routine use of ammonia emissions associated with the production of crop nutrients would place an undue economic burden on an already beleaguered farm economy," and because "America's farmers have learned to live with and handle ammonia safely." *See* S. REP. NO. 228, 101st Cong., 1st Sess. (1989), *reprinted in* 1990 U.S.C.C.A.N. 3385.

249. *See Browner Signs Administrative Stay to Exempt Fuels from Risk Management Requirements*, Daily Env't Rep. (BNA), May 25, 1999, at A-4. In response to a court-ordered stay issued in connection with litigation challenging EPA's authority to extend the program to fuel-related uses of propane, *see* National Propane Gas Assoc. v. EPA, No. 96-1278 (D.C. Cir. Apr. 27, 1999), EPA simultaneously stayed the risk management program for propane, *see* 64 Fed. Reg. 29,168 (1999), and proposed a regulation raising the propane threshold quantity to a level that effectively will exclude farms even if the litigation challenging coverage of propane does not succeed, *see* 64 Fed. Reg. 29,171 (1999) (to be codified at 40 C.F.R. pt. 68).

250. *See* 42 U.S.C. §§ 7521-7590 (1994).

251. *Id.* § 7543(e)(1).

252. *See id.* §§ 7586 (application of clean fuels requirement to centrally fueled fleets) & 7581(5) (exemption of farm vehicles).

253. For background on methyl bromide and the phase-out bans, see U.S. General Accounting Office, GAO/RCED-96-16, The Phaseout of Methyl Bromide in the United States (1995); Sondra Goldshein, *Methyl Bromide: The Disparity Between the Pesticide's Phaseout Dates Under the Clean Air Act and the Montreal Protocol on Substances that Deplete the Ozone Layer*, 4 ENVTL. LAW. 577 (1998).

254. *See* Goldshein, *supra* note 253, at 587-92.

255. *See id.* at 585-86.

farm industry lobby pressure, Congress extended the implementation date.[256] Hence, where the CAA's "passive" safe harbors for farms do not suffice to protect farms, Congress often provides targeted "active" safe harbors. Although there have been efforts by a few states to regulate farm air pollutant emissions more aggressively, they are trivial by comparison to the overall negligence in this area.[257]

### 4. *Agrochemical Regulation Laws*

Farms purchase pesticides and fertilizers, apply them to crops and soils, and any excess is removed by water runoff and air dispersal. As demonstrated above, the CWA and CAA do not purport to reach this "disposal" of chemicals in any meaningful way. Consistent with that theme, the nation's core agrochemical regulation statute, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA),[258] does little to regulate farm applications of pesticides and leaves fertilizers untouched. FIFRA is primarily a product-licensing statute under which no one may sell, distribute, or use a pesticide unless it has been registered with EPA.[259] The registration process for new pesticides involves testing designed to detect the harmful effects a product may have on the environment.[260] Approved pesticides must be periodically

256. *See* Omnibus Consolidated Appropriations Act, Pub. L. No. 105-277, § 764(a), 112 Stat. 2681, 2681-36 (1998) (codified at 42 U.S.C. § 7671c(h) (1994)). EPA had indicated its receptiveness to the extension, and USDA lobbied outright in its favor. *See* Goldshein, *supra* note 253, at 599-601.

257. *See* Kip Betz, *Agricultural Coalition Asks Court to Void, Block Enforcement of Odor Regulations*, 30 Env't Rep. (BNA) 952 (1999) (discussing dispute over attempt by Missouri to promulgate ambient air standard for hydrogen sulfide); Kip Betz, *State's Largest Hog Producer Submits Plan to Control Odors, Risk of Waste Spills*, 30 Env't Rep. (BNA) 1338 (1999) (large hog farm agrees to odor control measures as part of consent agreement in settlement of state environmental law violations); Trevor Oliver, *Fighting Corporate Pigs: Citizen Action and Feedlot Regulation in Minnesota*, 83 MINN. L. REV. 1893, 1901-04 (1999) (discussing Minnesota's ambient air standard for hydrogen sulfide from feedlots, which has no federal counterpart).

258. 7 U.S.C. §§ 136-136y (1994). For an overview of the FIFRA program, see WILLIAM H. RODGERS, ENVIRONMENTAL LAW ch. 5 (2d ed. 1994). For an excellent summary of how FIFRA applies to farms, see Michael T. Olexa, Institute of Food and Agricultural Sciences, Fact Sheet FRE-71, Laws Governing Use and Impact of Agricultural Chemicals: Registration, Labeling, and the Use of Pesticides (rev. ed. 1995).

259. *See* 7 U.S.C. § 136a(a) (1994). EPA reviews about 15,000 pesticide registration applications annually, most of which involve new formulations containing active ingredients which have already been registered. Only about 15 new active ingredients are registered each year. *See* Rao et al., *supra* note 97, at 2. FIFRA allows states to register pesticides for use in their respective boundaries, subject to EPA review. *See* 7 U.S.C. § 136v(c) (1994).

260. *See* 7 U.S.C. § 136a(c)(5) (1994) (EPA must find that the pesticide "will

re-registered, which involves a thorough review of available data about the pesticide.[261] The end result of FIFRA's registration program, assuming the pesticide is approved and retains its registration, is a label describing, among other things, how the pesticide must be used.[262]

By regulating which pesticides can be made and sold, FIFRA clearly has a direct effect on farm pesticide use.[263] Direct regulation of farms, however, is not a main concern of FIFRA; the statute does little more than require that pesticides be applied by certified persons and consistent with their label instructions. Pesticides are approved for either "general use," in which case anyone can apply them,[264] or "restricted use," which requires application by a certified applicator.[265] For purposes of restricted pesticide use on farms, FIFRA divides users into "private applicators" who use or supervise the use of restricted pesticides for agricultural commodity production on property owned or leased by them or their employers,[266] and "commercial applicators" who are hired to apply restricted pesticides or otherwise do not qualify as private applicators.[267] Commercial applicators must pass a rigorous certification test administered by EPA or a state-approved program;[268] private applicators must also obtain certification, but may not be required to take an examination.[269] In addition to following worker safety rules,[270] all

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perform its intended function without unreasonable adverse effects on the environment.").

261. *See id.* § 136a-1.

262. *See id.* § 136a(c)(1)(C). It is a violation of FIFRA "to use any registered pesticide in a manner inconsistent with its labeling." *Id.* § 136j(a)(2)(G).

263. *See* Looney, *supra* note 6, at 796-97. EPA can take its product restriction authority one step further toward direct regulation of farm practices by conditioning the legal use of a pesticide. A current example is EPA's proposed rule to restrict the legal sale and use of five pesticides that are in common use on farms— alachlor, atrazine, cyanazine, metolachlor, and simazine— except in compliance with an EPA-approved state management plan outlining measures farms must employ for groundwater protection. *See* 61 Fed. Reg. 33,260 (1996) (to be codified at 40 C.F.R. pts. 152 & 156).

264. *See* 7 U.S.C. § 136a(d) (1994).

265. *See id.* § 136a(d)(1)(C)(i). A pesticide must be classified as restricted if EPA determines that it "may generally cause, without additional regulatory restrictions, unreasonable adverse effects on the environment, including injury to the applicator." *Id.* § 136a(d)(1)(C).

266. *See id.* § 136e(2).

267. *See id.* § 136e(3).

268. *See id.* § 136i. EPA has promulgated rules for states to use in administering the certified applicator tests. *See* 40 C.F.R. pt. 171 (1999).

269. *See* 40 C.F.R. § 171.5 (1999).

270. Thousands of farm workers have become ill or died from exposure to pesticides in the farm workplace. *See generally* Carpenter, *supra* note 4, at 191-95

certified applicators— private and commercial— must maintain records of restricted pesticide applications, showing product, amount, date, location, and area of application, and comply with any additional state recordkeeping requirements,[271] but they need not report the applications to anyone unless a federal agency (acting through the USDA), state agency (acting through a designated lead state agency), or health professional administering medical treatment so requests or state law requires regular disclosure.[272]

In short, so long as the label instructions are followed, the applicator is properly certified and the applicator follows worker safety and recordkeeping requirements, FIFRA imposes no direct restrictions or requirements on farms. While this does not amount to a complete safe harbor for farm use of pesticides, FIFRA's hands-off approach to farms— the primary users of pesticides— pales in comparison with the CAA and CWA's regulatory approach to their targeted industries. Under FIFRA, with regard to farmers, no permits are required, no environmental or efficiency performance standards are imposed, no technology-based standards are applied, no regular public reporting of pesticide applications is required, and no monitoring of pesticide levels in soils, runoff, or groundwater is required. Although some states regulate pesticide applications more aggressively than does FIFRA, it is fair to say that the nation has no comprehensive regulatory framework governing farm use of pesticides.

Farm use of fertilizers is subject to even less federal and state control. The Toxic Substances Control Act (TSCA)[273]

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(summarizing studies of farming occupational health threats). Regulations to protect farm workers from the dangers of exposure to pesticides have been controversial, though ultimately limited in effect, for over twenty-five years. *See* Haugrud, *supra* note 6, § 8.2(C)(2)(h), at 366-67. Most such regulation at the federal level is channeled through EPA's authority to regulate the uses of pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act, under which EPA has promulgated rules regarding hazard notification to workers and restriction of workers from areas where pesticides have recently been applied. *See* 40 C.F.R. pt. 170 (1999). EPA continues to explore other ways of directly and indirectly ensuring farm worker protection through this and other authorities. *See, e.g., Setting Residue Limits Not Way to Reduce Farm Children's Exposure, Industry Says*, Daily Env't Rep. (BNA), Dec. 22, 1998, at A8 (discussing issue of whether EPA should establish food pesticide residue limits as a way of reducing risks to children in farm occupational settings).

271. *See* 7 U.S.C. § 136i-1(a) (1999).

272. *See id.* § 136i-1(b) to (c). Certified commercial applicators must provide copies to the person for whom the application was performed. *See id.* § 136i-1(a)(2). USDA and EPA must also survey certified applicator records to develop a database sufficient to compile annual reports concerning pesticide use. *See id.* § 136i-1(f).

273. 15 U.S.C. §§ 2601-2692 (1994).

requires pre-manufacture registration of the chemical ingredients of fertilizers;[274] however, TSCA imposes no use restrictions equivalent to FIFRA's labeling, certification, worker safety, or recordkeeping provisions, and few states impose more rigorous controls.[275] As previously explained, the CWA and CAA offer a mixture of active and passive safe harbors for pollution that results from farm use of fertilizers. Other federal environmental laws contain numerous express exemptions for "normal application of fertilizers."[276] Overall, then, fertilizers are simply not in the sights of federal environmental laws.

### 5. *Chemical Storage and Release Reporting Laws*

One of the most prominent trends that has unfolded with the proliferation of federal environmental statutes is the use of information disclosure devices as an adjunct to direct regulation of pollution behavior.[277] These measures range from the requirements in Superfund[278] and the Emergency Planning and Community Right-to-Know Act (EPCRA)[279] that persons who release designated hazardous substances in specified quantities must report such events to public authorities,[280] to EPCRA's broader emergency planning and toxic release inventory (TRI) programs.[281] These programs have significantly increased the information available to the government and citizens about the sources and magnitude of chemical releases to the

274. *See id.* § 2604(a).

275. Washington recently enacted fertilizer registration legislation that imposes restrictions on the metals content of fertilizers. *See* Nan Netherton, *Governor Signs Bill on Dairy Farms, Changes to Commercial Fertilizer Rules*, 30 Env't Rep. (BNA) 186 (1999).

276. *See, e.g., infra* notes 284 (hazardous substance release reporting), 286 (chemical storage reporting), and 299 (contaminated site remediation liability).

277. *See* Paul R. Kleindorfer & Eric W. Orts, *Informational Regulation of Environmental Risks*, 18 RISK ANALYSIS 155 (1998) (describing the regulatory impact of several environmental information disclosure programs). The growing importance of information disclosure and other "right-to-know" mechanisms to environmental regulation and enforcement is evidenced by EPA's recent decision to create a new Office of Information. *See* Sara Thurin Rollin, *New Information Office to Focus On TRI, Confidential Information, FOIA Rule Changes*, Daily Env't Rep. (BNA), June 16, 1999, at AA-1.

278. Superfund is the shorthand name for the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675 (1994). For an overview of the Superfund remediation and liability programs, see RODGERS, *supra* note 258, ch. 8.

279. 42 U.S.C. §§ 11001-11050 (1994). For an overview of the EPCRA program, see JAMES M. KUSZAJ, THE EPCRA COMPLIANCE MANUAL (1997).

280. *See* 42 U.S.C. §§ 9603(a) (1994) (Superfund) & 11004 (EPCRA).

281. *See id.* §§ 11022 (emergency planning) & 11023 (toxic releases).

environment.[282] But not surprisingly, farms have been left out of the information revolution in environmental law.

Superfund, for example, excludes "the normal application of fertilizer" from the definition of release[283] and excludes from reporting requirements any application of a FIFRA-registered pesticide.[284] EPCRA excludes from the definition of hazardous chemicals subject to emergency planning and storage notification any substance in "routine agricultural operations,"[285] and the EPCRA TRI emission reporting regulations specifically incorporate the CERCLA exemption for FIFRA-registered pesticides.[286] Farms also are outside the categories of facilities subject to the TRI program.[287] Information transfer from farms to the public concerning agrochemical use and release is simply not a part of the CERCLA and EPCRA programs.

### 6. *Hazardous Waste Management Laws*

Farms handle large volumes of chemicals, much of which are disposed either directly as spent or residue materials or indirectly as excess fertilizer or pesticide. Most industries in this position must deal with the mind-numbing complexity of the Resource Conservation and Recovery Act (RCRA), the nation's principal hazardous waste management and disposal regulation law.[288] Farms, however, do not.

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282. One of the most innovative uses of the information derived from the TRI and other information disclosure programs is found at the Environmental Defense Fund's "Scorecard" web page where a wealth of information about reporting facilities and the chemicals they emit can be obtained on a site-specific basis in a matter of seconds. *See* Environmental Defense Fund, *Scorecard* (visited Aug. 8, 1999) <http://www.scorecard.org>. As previously noted, *see supra* note 272, although FIFRA requires recordkeeping for restricted pesticide applications, there is no equivalent to the TRI public disclosure requirement under FIFRA.

283. *See* 42 U.S.C. § 9601(22)(D) (1994).

284. *See id.* § 9603(e).

285. *See id.* § 11021(e)(5).

286. *See* 40 C.F.R. § 355.40(2)(iv) (1999).

287. *See* 42 U.S.C. § 11023(b)(1)(A) (1994) (limiting the TRI requirements to "facilities . . . that are in Standard Industrial Classification Codes 20 through 39"). Courts have also ruled that EPA may not designate chemicals, including fertilizer components such as phosphoric acid, as toxic under the EPCRA TRI program based on their environmental effects; rather, only inherent toxicity may be considered. *See* Fertilizer Inst. v. Browner, 1999 U.S. Dist. LEXIS 9298 (D.D.C. Apr. 15, 1999). Although farms would not be required to report their applications of such fertilizers in any event, fertilizer manufacturers would be subject to reporting their emissions in manufacturing the chemicals.

288. *See* 42 U.S.C. §§ 6901-6992k (1994). For an overview of the RCRA program, see AMERICAN BAR ASSOCIATION, THE RCRA PRACTICE MANUAL (Theodore L. Garrett ed., 1994).

For example, EPA has not classified solid wastes generated from growing and harvesting crops and from raising livestock as hazardous wastes subject to RCRA's comprehensive "cradle-to-grave" regulations.[289] Similarly, farm irrigation return flows are not considered solid waste and are not subject to RCRA regulation, notwithstanding the fact that such return flows carry significant quantities of fertilizers, pesticides, contaminated soil, and animal wastes.[290] Farms disposing of waste pesticide from their own use are exempt from RCRA waste management regulations so long as empty containers are triple rinsed and the pesticides are disposed of consistent with label instructions.[291] Farms generating less than 25 gallons per month on average of used oil are exempt from RCRA's used oil management and disposal regulation,[292] and farms generating less than 100 kilograms per month on average of specified "universal wastes," which include obsolete or unused pesticides, enjoy exemptions from a variety of hazardous waste regulations.[293] Finally, wind dispersal of chemicals used in pesticides is generally not considered a RCRA problem, but instead is handled under the Clean Air Act— which does not regulate it in any meaningful way.[294] Although a farm that engages in hazardous waste management not related to farming would fall squarely within RCRA's scope, farms that stick to farming are outside that scope, notwithstanding the large volume of chemicals they dispose.

### 7. *Contaminated Site Remediation Laws*

Superfund's enactment in 1980 acknowledged that we had begun the process of beefing up environmental law too late to prevent the proliferation of thousands of contaminated properties around the country. While laws such as the CWA, CAA, and RCRA helped to stem the tide, Superfund was designed to establish a remedial program focused primarily on the contaminated sites that had been created before those laws were promulgated.[295]

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289. *See* 40 C.F.R. § 261.4 (1999).

290. *See* 42 U.S.C. § 6903(27) (1994).

291. *See* 40 C.F.R. §§ 261.4, 262.70 (1999).

292. *See id.* § 279.20(a)(4).

293. *See* 40 C.F.R. §§ 273.3, 273.10 to 273.20 (1999).

294. *See* RCRA PRACTICE MANUAL, *supra* note 288, at 9 ("Although air emissions from industrial facilities may exhibit hazard characteristics . . . , they ordinarily would not be 'solid wastes' within the meaning of RCRA, thus avoiding an overlap in the Clean Air Act and RCRA regulatory programs.").

295. For a discussion of Superfund's objectives and an overview of its remedial

While the administrative, legal, and remedial costs of Superfund have grown difficult to justify under any cost-benefit calculus,[296] the farm industry has not paid its share in any way. Despite the persistence of many agrochemicals in soils and sediments and the growing realization that urban expansion into converted farmland contains those latent chemical threats,[297] Superfund does not impose liability for any response costs resulting from application of FIFRA-registered pesticides,[298] and excludes the "normal application of fertilizer" from remediation and liability provisions.[299] Farms also enjoy a significant exemption under the related program for the remediation of petroleum product releases from underground storage tanks.[300]

### 8. *Common Law Nuisance and Statutory "Right-to-Farm" Laws*

It has often been said that the statutory form of modern environmental law is built on the backbone of the common law of nuisance.[301] Given the extent to which modern environmental law is prevented from reaching farms, it is no surprise that nuisance law continues to play an important role in efforts to control the environmental impact of farms. Particularly in areas where suburban development has encroached upon existing farm operations, new residents are likely to object to the resulting dust, noise, and odors, and nuisance provides an obvious cause of action.

It should also be no surprise that farms enjoy a substantial safe harbor even on this front. All states have enacted so-called "right-to-farm" laws, which generally exempt farms from common law nuisance attack.[302] Although the degree of protection

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and liability program, see RODGERS, *supra* note 258, ch. 8.

296. One recent study found that each case of cancer that Superfund-led remediations have purported to avoid in the future has carried a median cost of $418 million. *See Study Says Faulty Risk Perceptions, Political Influences Bias Site Remediation*, Daily Env't Rep. (BNA), June 1, 1999, at A-5.

297. *See supra* text accompanying note 105.

298. *See* 42 U.S.C. § 9607(i) (1994).

299. *See id.* § 9601(22).

300. The underground storage tank program is found in subchapter IX of RCRA. *See* 42 U.S.C. §§ 6991-6991i (1994). The program exempts from the definition of underground storage tank any "farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for non-commercial purposes." *Id.* § 6991(1)(A). For an overview of the underground storage tank program, see RICHARD P. FAHEY, UNDERGROUND STORAGE TANKS: A PRIMER ON THE FEDERAL REGULATORY PROGRAM (2d ed. 1995).

301. *See, e.g.*, RODGERS, *supra* note 258, ch. 2.

302. *See generally* Neil D. Hamilton, *Right-To-Farm Laws Reconsidered: Ten Reasons Why Legislative Efforts to Resolve Agricultural Nuisances May Be Ineffective*,

afforded by these laws varies,[303] the basic theme is to protect farms from private nuisance actions by codifying the "comes to the nuisance" rule.[304] Although the tide is turning against such laws in some areas,[305] they remain a significant obstacle to the use of common law environmental remedies against farms.

### *B. Significant Exceptions to the General Rule of Safe Harbor*

The breadth and depth of the safe harbor that farms enjoy from environmental regulation make it all the more remarkable that three regulatory programs have managed to levy a significant degree of environmental controls on farming. The three programs represent three different approaches to environmental regulation. First, the regulation of concentrated animal feeding operations under the Clean Water Act NPDES program constitutes direct regulation of a limited class of farms; second, the Endangered Species Act is a general environmental protection program that has no safe harbor exceptions for farming; and third, the so-called "Swampbuster" provisions of the 1985 and 1990 Farm Bills indirectly regulate environmental impacts of farms through the manipulation of farm subsidy policies. In each case, farms have felt the unaccustomed pinch of environmental law.

#### *1. Regulation of Concentrated Animal Feeding Operations*

Only 190,000 of the 640,000 farms in the United States that

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3 DRAKE J. AGRIC. L. 103 (1998); McElfish, *supra* note 232, at 10,190-91; Alexander A. Reinert, *The Right to Farm: Hog-Tied and Nuisance-Bound*, 73 N.Y.U. L. REV. 1694 (1998). Prior to the advent of these laws in the past two decades, it was not uncommon for farms to be declared a nuisance. *See* Hank W. Hannah, *Farming in the Face of Progress*, PROB. & PROP., Sept.-Oct. 1997, at 9, 9-11.

303. *See generally* McElfish, *supra* note 232, at 10,191 (explaining variation among state laws); Hannah, *supra* note 302, at 11-13 (discussing plaintiff tactics for circumventing right-to-farm laws); Haugrud, *supra* note 6, § 8.2(B)(1), at 485-87 (dividing the laws into three models based on scope of covered farms and scope of the safe harbor). Most of the right-to-farm laws deny the protection when the farm is operated negligently in violation of federal or state laws or so as to cause water pollution or soil erosion.

304. *See* Hamilton, *supra* note 302, at 104; Haugrud, *supra* note 6, § 8.2(B)(1), at 484-85; McElfish, *supra* note 232, at 10,191.

305. Most significantly, the Iowa Supreme Court recently found that Iowa's right-to-farm law constituted an illegal taking of property adjacent to protected farms, and the United States Supreme Court let the decision stand. *See* Bormann v. Board of Supervisors, 584 N.W.2d 309 (Iowa 1998), *cert. denied sub nom.* Girres v. Bormann, 525 U.S. 1172 (1999). *But see* Pure Air and Water, Inc. v. Davidsen, 246 A.2d 786 (N.Y. App. Div. 1998) (differing result from *Bormann*); Jeff Feirick, *Upholding the New York Right to Farm Law*, AGRIC. L. UPDATE, Aug. 1999, at 1 (discussing *Davidsen*).

raise or keep livestock rely on pasture land to feed the livestock.[306] The remaining farms use animal feeding operations (AFOs) known as confined feedlots— food is brought to animals kept in confined quarters.[307] The size of an AFO is measured by the number of cows, hogs, chickens, or turkeys translated into "animal units" (AUs).[308] Many AFOs squeeze an impressive number of AUs into confined feedlots, resulting in what is known as a concentrated AFO (CAFO) and, consequently, a point source within the meaning of the Clean Water Act.[309] There were about 6,600 such CAFOs holding more than 1000 AUs each in operation in the United States in 1992.[310]

Anyone who has visited a CAFO is unlikely to forget the odoriferous experience. Most CAFOs handle their massive quantities of animal waste by collecting the manure and urine in large impoundments and applying it to farmland as crop fertilizer or simply as a method of disposal.[311] This practice results not

306. *See* Office of Enforcement and Compliance Assurance, U.S. Envtl. Protection Agency, *Compliance Assurance Implementation Plan for Concentrated Animal Feeding Operations* 2 (1998) (visited Feb. 4, 2000) <http://es.epa.gov/oeca/strategy.html>.

307. In their joint policy on AFOs, EPA and USDA explain that AFOs "congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking food in pastures, fields, or rangeland." USDA/U.S. Envtl. Protection Agency, *Unified National Strategy for Animal Feeding Operations* ¶ 2.1 (Mar. 9, 1999), *available at* <http://www.epa.gov/owm/finafost.htm> [hereinafter *Unified National Strategy*]. To qualify as an AFO, the confined feeding must occur at least 45 days per year and prevent any sustained vegetative production on the lot. *See* 40 C.F.R. § 122.23(b)(1) (1999).

308. One AU is equal to roughly 1 beef cow, 2.5 hogs, 5 horses, 10 sheep, 55 turkeys, or 100 chickens. *See* 40 C.F.R. pt. 122, app. B (1999).

309. *See* 33 U.S.C. § 1362(14) (1994) (including "concentrated animal feeding operation" within the CWA definition of point source). Generally any AFO is a CAFO if it either (1) confines at least 1000 AUs, (2) confines at least 300 AUs and discharges pollutants through a point source, or (3) confines under 300 AUs but is designated a CAFO on a case-by-case basis by the relevant permitting authority because it is a significant source of water pollution. However, such operations are not CAFOs if they discharge pollutants only in the event of a 25-year, 24-hour storm event. *See id.* The more technical details of deciding whether an AFO is a CAFO requiring an NPDES permit took EPA ten pages to explain in a recent draft guidance document on CAFO permits. *See* OFFICE OF WASTE MANAGEMENT, U.S. ENVTL. PROTECTION AGENCY, GUIDANCE MANUAL AND EXAMPLE NPDES PERMIT FOR CONCENTRATED ANIMAL FEEDING OPERATIONS 2-1 to 2-10 (1999) (review draft) (on file with author).

310. *See Unified National Strategy*, *supra* note 307, ¶ 4.5. EPA and USDA estimate that the number of large CAFOs has grown to 10,000 since the 1992 figure was compiled. *See id.* The vast majority of AFOs confine fewer than 250 AUs. *See id.* ¶ 2.1. Nevertheless, the proliferation of large CAFOs has boosted livestock production even as the total number of AFOs has decreased, indicating that the industry is consolidating into fewer, but larger, AFOs. *See id.*

311. For vivid descriptions of AFO operations, see generally Frarey & Pratt, *supra* note 15, at 8; Oliver, *supra* note 257, at 1895-97.

only in an intensely unpleasant odor, but it also increases the potential for environmental degradation and the transport of pathogens to human populations.[312] Given their intense and pernicious impacts on surrounding communities, CAFOs have become lightning rods for local land use controversy.[313]

Although regulation of CAFOs is a significant exception to the general rule that farms enjoy a safe harbor, the story has two sides. In 1998— over 25 years after Congress included CAFOs in the CWA's definition of point source— only 2,000 of the nation's 450,000 AFOs had NPDES permits or state equivalents.[314] One large safe harbor for AFOs from the CWA, of course, is the regulatory definition of a CAFO and its relatively high AU threshold. Even those AFOs which attain CAFO status through sufficient AUs or because of the nature of their discharge have another safe harbor in the exclusion of AFOs that only discharge pollutants through a point source in significant storm events. These two filters winnow the nation's 450,000 AFOs down to the 2,000 presently required to follow NPDES permitting requirements.

Clearly, the AFO issue encompasses more than the 2,000 farms presently under the thumb of NPDES permitting requirements. That reality has become a major focus of federal and state regulators in the past several years. The federal focus recently culminated in the issuance by USDA and EPA of a Unified National Strategy for Animal Feeding Operations (Unified National Strategy).[315] The cornerstone of the Unified National Strategy is a "national performance expectation" that all AFOs will develop and implement technically sound and economically

312. *See Unified National Strategy*, *supra* note 307, ¶ 2.2. Recent studies suggest that CAFOs present a measurable public health threat to surrounding communities. *See* Terry Hammond, *Study Finds Hog Lagoon Neighbors Report Higher Levels of Respiratory Illness*, Daily Env't Rep. (BNA), May 14, 1999, at A-5.

313. *See generally* Williams, *supra* note 120; Fern Shen, *Md. Hog Farm Causing Quite a Stink*, WASH. POST, May 23, 1999, at A1; William Claiborne, *Despite Stink, Hog Farm Proceeds on Tribal Land*, WASH. POST, Apr. 4, 1999, at A3.

314. *See Unified National Strategy*, *supra* note 307, ¶ 4.2.

315. *See Unified National Strategy*, *supra* note 307. The Clinton Administration's 1998 Clean Water Action Plan called for USDA and EPA to compile the National Uniform Strategy as one of 111 specific action plans. *See id.* ¶ 1.1. The agencies released a draft for public comment in September 1998. *See* 63 Fed. Reg. 50,192 (1998). For a detailed overview of the proposal, describing it as a sign that "AFOs and CAFOs are now entering the meat grinder of regulatory politics," see Gregory Blount et al., *The New Nonpoint Source Battleground: Concentrated Animal Feeding Operations*, 14 NAT. RESOURCES & ENV'T 42 (1999). For a comprehensive overview of the Unified National Strategy, see Dana R. Flick, *The Future of Agricultural Pollution Following USDA and EPA Drafting of a Unified National Strategy for Animal Feeding Operations*, 8 DICKINSON J. ENVTL. L. & POL'Y 61 (1999).

feasible nutrient management plans addressing such operational matters as feed management, manure handling and storage, and land application of manure.[316] Because the Unified National Strategy imposes no new regulatory requirements, preparation of a plan for most AFOs will be purely voluntary unless state law requires one.[317] On the regulatory front, the Unified National Strategy outlines provisions for CAFOs that will effectively expand the coverage of permitting controls. For example, the Unified National Strategy will expand the number of AFOs requiring NPDES permits to 15,000-20,000 by including most large (over 1000 AUs) operations as well as AFOs that are either operating under unacceptable conditions or are otherwise contributing to water quality impairment, regardless of their size.[318] Moreover, all AFOs needing an NPDES permit may be required to prepare nutrient management plans and comply with feedlot effluent standards.[319] EPA has begun to implement these proposals through TMDL rules [320] and guidance documents.[321]

Predictably, reaction to the Unified National Strategy has been mixed, with few interest groups fully in favor. Environmental groups contend the measures do not reach far enough, while farm groups assert that a purely voluntary program will be sufficient.[322] Many state government

316. *See Unified National Strategy*, *supra* note 307, ¶¶ 3.1-3.5.

317. *See id.* ¶ 4.1.

318. *See id.* ¶ 4.5. The Unified National Strategy envisions that the permitting program will be implemented over several phases and will rely on general permits for all but the larger (over 1,000 AUs) CAFOs, which will need to obtain individual permits. *See id.* ¶ 5.0 (Strategic Issue #3).

319. *See id.* ¶ 4.6. The effluent guidelines presently impose a "zero discharge" condition on CAFO feedlots with NPDES permits. *See* 40 C.F.R. pt. 412 (1999). EPA has announced plans to revise the standards, including measures to address phosphorous levels in runoff. *See* 63 Fed. Reg. 62,469 (1998) (codified at 40 C.F.R. §§ 412 & 122.23 (1999)). Farming interests have vociferously opposed EPA's efforts. *See USDA Proposal to Include Phosphorous in Nutrient Plans Concerns Farm Group*, 29 Env't Rep. (BNA) 610 (1998) (quoting American Farm Bureau official).

320. *See supra* note 223.

321. For example, EPA has issued a draft NPDES permit for CAFOs and other AFOs subject to permitting. *See* Office of Wastewater Management, U.S. Envtl. Protection Agency, *Draft Guidance Manual and Example NPDES Permit for Concentrated Animal Feeding Operations* (visited Sept. 9, 1999) <http://www.epa.gov/owm/afoguide.htm>.

322. *See Environmentalists Fault Feedlot Plan While Farmers Want Voluntary Approach*, Daily Env't Rep. (BNA), Sept. 17, 1998, at A-6; Susan Bruninga, *Farmers, Public Interest Groups Debate Merits of Animal Runoff Control Strategy*, 29 Env't Rep. (BNA) 1645 (1998); Susan Bruninga, *Ranchers and Farmers in the West Sound Off on Pollution Control Strategy*, 29 Env't Rep. (BNA) 1646 (1998). Farm groups have pointed to several significant voluntary efforts initiated by different farm sectors to improve nutrient management. *See, e.g.*, Registration and Agreement for Clean Water Act Section 301 Compliance Audit Program for the Pork Production Industry, 63 Fed.

representatives have expressed the concern that the Unified National Strategy will constrain state efforts to respond to the CAFO issue with locally-designed measures,[323] even though environmental groups have argued that past state efforts have been weak and poorly implemented.[324] Moreover, some congressional representatives have questioned whether EPA and USDA have the legal authority to issue and implement the National Uniform Strategy as a "strategy" without following

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Reg. 69,627 (1998) (recommending that EPA and pork producers agree to initiate voluntary third party compliance audit program for hog farms in return for reduced penalties and increased EPA educational support). Environmental groups contend that such efforts, while salutary, should not deter efforts to regulate CAFOs more stringently. *See Millions to Be Spent on Training, Oversight of EPA Agreement with Pork Producers*, Daily Env't Rep. (BNA), Nov. 30, 1998, at A-9.

323. EPA has compiled a comprehensive summary of state laws dealing with CAFOs, proving the states' claims that they are addressing CAFOs in ways that often go beyond EPA's regulations. *See* U.S. ENVTL. PROTECTION AGENCY, STATE COMPENDIUM: PROGRAMS AND REGULATORY ACTIVITIES RELATED TO ANIMAL FEEDING OPERATIONS (1999).

324. In the time it took for the Unified National Strategy to go from draft to final stages, a flurry of initiatives to address AFOs through increased regulation were passed by a variety of states. *See, e.g.*, Michael Blogna, *State Adopts New Reporting Rules for Spills from Livestock Waste Lagoons*, Daily Env't Rep. (BNA), Feb. 17, 1999, at A-3 (Illinois); Thomas R. Head, III, *Local Regulation of Animal Feeding Operations: Concerns, Limits, and Options for Southeastern States*, 6 ENVTL. LAW. 503 (2000) (canvassing federal law and the law of eight southeastern states); Theresa Heil, *Agricultural Nonpoint Source Runoff—The Effects Both On and Off the Farm: An Analysis of Federal and State Regulation of Agricultural Nonpoint Source Pollutants*, 5 WIS. ENVTL. L.J. 43, 50-63 (1998) (Wisconsin); Drew Kershen, *Clean Water and Concentrated Animal Feeding Operations*, LOOKING AHEAD: ABA SECTION OF NATURAL RESOURCES, ENERGY, & ENVTL. L. NEWSLETTER, Mar.-Apr. 1999, at 2 (Oklahoma, Colorado, and Mississippi); Oliver, *supra* note 257 (Minnesota); Carolyn Whetzel, *Regulators Issue Waste Discharge Plan for Dairy Farms in Southern California*, Daily Env't Rep. (BNA), Apr. 13, 1999, at A-4 (California); *Large Hog Farms to Have Releases Regulated by Water, Multimedia Permits*, 30 Env't Rep. (BNA) 71 (1999) (Mississippi); *Proposed Rules for Corporate Hog Farms Ready for Comment, State Official Says*, 29 Env't Rep. (BNA) 1215 (1998) (Missouri). Indeed, the Unified National Strategy recognizes that many states have already implemented permitting programs for CAFOs that equal or exceed the federal NPDES program requirements and has invited such states to seek delegation of authority to administer the NPDES program. *See Unified National Strategy*, *supra* note 307, ¶ 5.0 (Strategic Issue #3); Susan Bruninga, *Nonpoint Sources: Animal Waste Strategy to Recognize State Programs, Hold Corporations Liable*, 29 Env't Rep. (BNA) 2225 (Mar. 12, 1999). Nevertheless, state water regulators maintain that the Unified National Strategy will be too expensive to implement fully and have proposed an AFO initiative that relies more on incentives and voluntary measures. *See State Group Seeks More Flexibility in Regulation of Livestock Waste*, Daily Env't Rep. (BNA), Feb 26, 1999, at A-4; Susan Bruninga, *Faulting EPA-USDA Livestock Strategy, States Say Their Programs Already Work*, 29 Env't Rep. (BNA) 1757 (1999). Environmental groups charge that the state programs are inconsistent and ineffective. *See, e.g.*, AMERICA'S ANIMAL FACTORIES, *supra* note 125, at ix-xii (identifying 15 major deficiencies in the existing state-level regulation of AFOs).

rulemaking procedures.[325] In any event, issuance of and debate on the Unified National Strategy signals continuing federal and state commitment to retain the lone exception to farming's safe harbor from water pollution regulation and suggests that at least some components of the farming industry are amenable to direct, concerted environmental regulation.

### 2. *Endangered Species Act*

The Endangered Species Act (ESA)[326] is a rare example of an environmental law with sharp teeth and no safe harbor for farms. Once designated as endangered or threatened,[327] a species is protected through several provisions with virtually no federal, state, local, or private actor beyond the ESA's reach. Given their pervasive impact on wildlife habitat, farms have increasingly been at the center of ESA controversy.

Most of the ESA's land use battles begin through the application of one of two regulatory provisions. Section 9 of the ESA prohibits any federal, state, local, or private entity from "taking" a listed animal species,[328] which has been construed to

325. Susan Bruninga, *Small Livestock Facilities May Get More Time to Comply with AFO Strategy*, 29 Env't Rep. (BNA) 2131, 2132 (1999).

326. 16 U.S.C. §§ 1531-1544 (1994). For an overview of the ESA programs, see MICHAEL J. BEAN & MELANIE J. ROWLAND, THE EVOLUTION OF NATIONAL WILDLIFE LAW 193-281 (3d ed. 1997).

327. For a discussion of the listing process and criteria, see J.B. Ruhl, *Section 4 of the ESA—The Cornerstone of Species Protection Law*, 8 NAT. RESOURCES & ENV'T 26 (1993); Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 WASH. U. L.Q. 1029, 1049-50, 1117-29 (1997).

328. 16 U.S.C. § 1538(a) (1994). For an overview of the take prohibition as implemented, see Frederico M. Cheever, *An Introduction to the Prohibition Against Takings in Section 9 of the Endangered Species Act of 1973: Learning to Live with A Powerful Species Preservation Law*, 62 U. COLO. L. REV. 109 (1991); Albert Gidari, *The Endangered Species Act: Impact of Section 9 on Private Landowners*, 24 ENVTL. L. 419 (1994). Section 9(a) species protections vary according to whether a species is plant or animal and whether it is listed as endangered or threatened. Thus, Section 9(a)(1), the cornerstone of ESA regulation, applies only to "endangered species of fish or wildlife," making it unlawful for "any person subject to the jurisdiction of the United States to . . . take any such species within the United States or territorial sea of the United States." 16 U.S.C. § 1538(a)(1) (1994). Threatened species of fish or wildlife receive the same level of protection by regulations authorized under Section 4(d) of the ESA. *See id.* § 1533(d); 50 C.F.R. § 17.31(a) (1999); *see also* Keith Saxe, *Regulated Taking of Threatened Species Under the Endangered Species Act*, 39 HASTINGS L.J. 399 (1988). Plants receive less protection under Section 9(a) than do fish and wildlife species and are not in any circumstance protected from take in the broad sense used in the context of fish and wildlife species. Rather, Section 9(a)(2)(B) provides that endangered plants on federal lands are protected from being removed, maliciously damaged, or destroyed. *See* 16 U.S.C. § 1538(a)(2)(B) (1994). Endangered plants on non-federal lands are protected only if removing, damaging, or destroying

prohibit "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering."[329] As farming can involve both the conversion of habitat to farm uses and the degradation of farm and non-farm habitat through pollution, sedimentation, water resource depletion, and other farming impacts, the ESA's habitat modification restriction has increasingly become an issue for farming practices.[330]

While the Section 9 "take" prohibition applies directly to private actions, including farming, Section 7 of the ESA adds another layer of regulation for farms by restricting the practices of federal agencies that fund, carry out, or grant approvals to state, local, and private actions. Federal agencies must ensure that their actions conserve listed species[331] and do not jeopardize

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them would constitute "a knowing violation of any law or regulation of any State or . . . violation of a State criminal trespass law." *Id.* § 1538(a)(2)(B). Hence, farming implicates the ESA's take prohibition primarily through its effects on terrestrial and aquatic wildlife species.

329. 50 C.F.R. § 17.3 (1999). The Supreme Court recently upheld the regulation defining take to include habitat modification, albeit emphasizing the narrow criteria of actual death or injury required to make habitat modification into a prohibited take. *See* Babbitt v. Sweet Home Chapter of Communities for a Great Oregon, 515 U.S. 687 (1995). For a description of the controversial administrative and judicial developments leading up to and culminating in the *Sweet Home* case, see Steven G. Davison, *Alteration of Wildlife Habitat as a Prohibited Taking Under the Endangered Species Act*, 10 J. LAND USE & ENVTL. L. 155 (1995).

330. A current and highly controversial example is the black-tailed prairie dog, which is under consideration for listing as a threatened species. *See* 64 Fed. Reg. 14,424 (1999) (proposed to be codified at 50 C.F.R. pt. 17). Most of the reasons contributing to the species' impaired status relate to farming— for example, conversion of habitat to farming; sport and varmint shooting; competition and predation from species introduced through farming; habitat fragmentation through farming; and poisoning. *See id.* at 14,426-28. Farming interests have decried the potential listing of the species as "propaganda" and contend that the Section 9 prohibitions that would come with listing the species will destroy "the agricultural way of life . . . because it is not compatible with uncontrolled prairie dog populations." Jake Cummins, *Target on Prairie Dogs* (visited June 10, 1999) <http://www.fb.com/mtfb/newnews/ prairiedogs.htm> (statement of Montana Farm Bureau official); *see also Prairie Dog Receives Positive Petition Finding*, ENDANGERED SPECIES & WETLANDS REP., Apr. 1999, at 13. Recognizing the potential constraints Section 9 places on farming practices after a species is listed, the Farm Bureau has become active in challenging species listings. *See, e.g.*, Idaho Farm Bureau Fed'n v. Babbitt, 58 F.3d 1392 (9th Cir. 1995) (upholding listing of a small snail deemed endangered because of water depletion through farm irrigation and other farming practices).

331. Conservation is defined in the ESA as "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary." 16 U.S.C. § 1532(3) (1994). Section 7(a)(1) of the ESA directs federal agencies to "utilize their authorities in furtherance of the purposes of this chapter by

the continued existence of any listed species.[332] As farming in the United States depends heavily on federal support through subsidies and access to federal public resources, Section 7 conditions have also become major battlegrounds between farming and the ESA.[333]

Although the restrictions in Sections 9 and 7 of the ESA are mitigated by the availability of permits for "incidental take" of listed species,[334] farms have no special status under the relevant permitting provisions and enjoy no general exemptions from Sections 9 and 7. Moreover, neither Section 9 nor Section 7 contains any threshold criteria or gaps in coverage that would allow farms to escape regulatory consequences covertly. While a farm that poses no on-site or off-site consequences to listed species need not take affirmative conservation steps to promote a listed species,[335] the ESA stands virtually alone among the major federal environmental laws as offering farms no safe harbor from its prohibitions and permitting requirements.[336]

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carrying out programs for the conservation of endangered species and threatened species." *Id.* § 1536(a)(1). Though mandatory on its face, agencies and courts have construed the conservation provision as a discretionary guideline for agency action. *See* J.B. Ruhl, *Section 7(a)(1) of the "New" Endangered Species Act: Rediscovering and Redefining the Untapped Power of Federal Agencies' Duty to Conserve Species*, 25 ENVTL. L. 1107 (1995).

332. Section 7(a)(2) of the ESA initiates a complicated set of procedures implementing the duty of federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of habitat of such species which is determined . . . to be critical." 16 U.S.C. § 1536(a)(2) (1994). Section 7(a)(2) has by far been the dominant ESA provision affecting federal agencies. *See* Ruhl, *supra* note 331, at 1119-20.

333. *See, e.g.*, Bennett v. Spear, 520 U.S. 154 (1997) (involving application of the Section 7(a)(2) "no jeopardy" provision to a federal agency granting ranching interests access to federal irrigation water); Sierra Club v. Glickman, 156 F.3d 606 (5th Cir. 1998) (involving application of the Section 7(a)(1) conservation duty to federal agency subsidization of farm irrigation water supplies).

334. Section 7(b)(4) provides for issuance of "incidental take statements" allowing projects that are carried out, funded, or authorized by federal agencies to obtain permission to commit take of listed species. 16 U.S.C. § 1536(b)(4) (1994). Section 10(a)(1)(B) of the ESA provides "incidental take permit" procedures and standards for all other projects. *Id.* § 1539(a)(1)(B). Both permitting paths involve complicated and expensive procedures and impact mitigation requirements. *See generally* J.B. Ruhl, *How to Kill Endangered Species, Legally: The Nuts and Bolts of Endangered Species Act "HCP" Permits for Real Estate Development*, 5 ENVTL. LAW. 345 (1999).

335. Section 7(a)(1) is the only provision of the ESA that imposes a conservation duty. By its terms it applies only to federal agency programs and thus does not extend to private actors whose actions do not require funding or approval from federal agencies.

336. *See generally* Lewandrowski & Ingram, *supra* note 54, at 252-55, 261-62.

### 3. Subsidy-Based Conservation Programs

Given the size of the farm economy, even without its related agricultural industries, federal farm policy has been a centerpiece of national politics since its emergence in the New Deal. The primary objectives of federal farm policy have been stabilizing commodity prices and supporting farm income.[337] Indeed, even what passes today as the "conservation" component of federal farm policy began as a means of controlling farm commodity production.[338] Nevertheless, the important role federal farm programs play today in the economics of farming[339] has created opportunities to influence environmental performance through means other than direct regulation.

For many decades the core of federal farm policy, and the feature that provides leverage for influencing farms' environmental record, has been a complicated web of commodity and income support programs.[340] These rely on a mixture of loan support and forgiveness measures, crop set-aside payments, government purchases, marketing agreements, low-cost insurance, benefit payments, price support payments, and import restrictions. When combined, these and other price and farm income supports create a remarkably convoluted and inconsistent set of incentives and disincentives with respect not only to farm production decisions[341] but also to the environment.[342] Notwithstanding recent changes in some federal

337. For an excellent overview and history of these objectives, see AGRICULTURAL POLICY REFORM IN THE UNITED STATES (Daniel A. Sumner ed., 1995).

338. *See* Charles E. Grassley & James J. Jochum, *The Federal Agriculture Improvement and Reform Act of 1996: Reflections on the 1996 Farm Bill*, 1 DRAKE J. AGRIC. L. 1, 4 (1996). For a concise history of the conservation side of federal farm policy, see Christopher R. Kelley & James A. Lodoen, *Federal Farm Program Conservation Initiatives: Past, Present, and Future*, 9 NAT. RESOURCES & ENV'T 17 (1995).

339. Farm income attributable to government payments exceeded $5 billion in 1997. *See* CENSUS, *supra* note 17, at United States Data 66, tbl.47.

340. *See* Grassley & Jochum, *supra* note 340, at 3 ("The commodity title is the heart of any farm bill."). For a brief history of these programs, see Haugrud, *supra* note 6, § 8.1(B)(3), at 465-70.

341. For example, crop set-aside payments reduce supply to increase commodity prices, but commodity price support programs provide incentive to increase supply, which reduces prices. *See* Kelley & Lodoen, *supra* note 338, at 19.

342. For example, commodity price support programs generally focus on crops with high agrochemical input and soil erosion impacts and discourage farmers from crop rotation. *See* Grossman, *supra* note 6, at 332-34; Kelley & Lodoen, *supra* note 338, at 19. For a thorough review of the environmental impact of the crop payment subsidy programs, see WALTER N. THURMAN, ASSESSING THE ENVIRONMENTAL IMPACT OF FARM POLICIES (1995).

farm commodity and income subsidy programs,[343] determining the amount and methods of federal support for farming through these and other mechanisms remains an annual rite of passage for American politics,[344] and the bill to taxpayers remains massive.[345]

A relatively recent appendage to these "crop payment" programs is a grab-bag of four major "green payments" programs designed to pay farmers *not* to put land into commodity production, with an ancillary objective being conservation of soil and wildlife resources.[346] The Conservation Reserve Program (CRP) pays farmers to take highly erodible land out of production

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343. Ostensibly to move closer to a market-based farming economy, in 1996 Congress overhauled the subsidy programs to wean farmers from their reliance on fixed, guaranteed payments by reducing subsidy levels in return for relaxing crop restrictions. *See* Freedom to Farm Act, Federal Agriculture Improvement and Reform Act of 1996, Pub. L. No. 104-127, 110 Stat. 888 (1996).

344. *See, e.g., Farmers' Plight Takes Campaign Spotlight*, USA TODAY, Aug. 9, 1999, at 4A (describing the politics behind the 1999 bill). As an example of how complicated and laden with specialized programs the farm bills have become, USDA's highly condensed title-by-title summary of the 1996 Farm Bill is 16 single-spaced pages long. *See* Office of Communications, Dep't of Agric., *The Federal Agricultural Improvement and Reform Act of 1996: Title-by-Title Summary of Major Provisions of the Bill* (visited Oct. 6, 1999) <http://www.usda.gov/farmbill/title0.htm>.

345. Notwithstanding Congress's professed theme of moving toward a market-based farm economy, the federal government will spend $15 billion in 1999 on direct payments to farmers, the highest of any fiscal year on record. *See Published Comments by Glickman on the Future of Agriculture*, AGRIC. L. UPDATE, Aug. 1999, at 7 (published speech of USDA Secretary Dan Glickman). Moreover, the combination of sagging export markets, bumper domestic and worldwide crops, increased domestic harvested cropland, and domestic droughts and floods led Congress to approve $6 billion in emergency farm support in 1998 and an $8.7 billion bailout in 1999. *See generally Congress Passes a Record $8.7B Farm Bailout Package*, USA TODAY, Oct. 14, 1999, at 4A; James Cox, *Farmers' Tough Row to Hoe*, USA TODAY, Aug. 24, 1999, at 1B; Debbie Howlett, *Farmers' Crops, Worries, Pile Up*, USA TODAY, Aug. 2, 1999, at 1A; Judy Keen, *In Iowa, a Full Harvest of Political Discontent*, USA TODAY, Aug. 9, 1999, at 4A.

346. Some commentators condemn the green payment programs, which are "putatively designed to protect the environment," as being "more honestly described as programs for boosting commodity prices and farm incomes by restricting output." Chen, *supra* note 4, at 343. For concise summaries of the grab-bag of green payment programs, which consists of a number of provisions in addition to the four major programs covered here, see Econ. Research Serv., Dep't of Agric., *Conservation and the 1996 Farm Act*, AGRIC. OUTLOOK, Nov. 1996, *available at* <http://usda.mannlib.cornell.edu/reports/erssor/economics/aob/1996/complete/agricultural_outlook_10.28.96>; Natural Resources Conservation Serv., Dep't of Agric., *USDA Conservation Programs* (visited Dec. 3, 1998) <http://www.nrcs.usda.gov/NRCSProg.html>. The four major programs discussed here were introduced through the 1985, 1990, and 1996 Farm Bills. *See* Federal Agriculture Improvement and Reform Act of 1996, Pub. L. No. 104-127, 110 Stat. 888 (1996); Food, Agriculture, Conservation, and Trade Act of 1990, Pub. L. No. 101-624, 104 Stat. 3359 (1990); Food Security Act of 1985, Pub. L. No. 99-198, 99 Stat. 1354 (1985).

for extended periods.[347] The Wetlands Reserve Program (WRP) pays farmers to remove wetlands from production for extended periods or permanently.[348] The Wildlife Habitat Incentives Program (WHIP) pays farmers to restore and develop wildlife habitat.[349] And finally, the Environmental Quality Incentives Program (EQIP) consolidates and expands financial incentives to farmers who agree to participate in conservation plans prescribing structural, vegetative, and land management practices.[350]

Almost no one is completely satisfied with the crop payment/green payment system of farm conservation policy. Although an impressive amount of farmland has been placed in temporary or permanent conservation status as a result of the four programs,[351] the results have come only at huge taxpayer cost.[352] Moreover, the crop payment and green payment programs have not dovetailed as completely as intended in terms of recipients.[353] Evidence suggests that farmer participation in the green payment programs is highly sensitive to market commodity prices and does not reflect any newly found farm stewardship ethic.[354] Farmers, like most of us, follow the money.

Hence, rather than relying entirely on an incentive-based approach to farm conservation policy, the so-called

347. *See* 16 U.S.C. §§ 3831-3836 (1994); *see also* Haugrud, *supra* note 6, § 8.2(B)(2)(a), at 493-99.

348. *See id.* §§ 3837-3837f.

349. *See id.* § 3836a.

350. *See id.* §§ 3839aa-3839aa-8.

351. Total acreage conserved under the CRP and WRP combined was 29.5 million acres in 1997, divided among 225,000 farms. *See* CENSUS, *supra* note 17, United States Data at 19, tbl.7.

352. There is considerable debate over whether the green payment programs are the most cost-efficient means of attaining lasting farm conservation progress. *See generally* Grossman, *supra* note 6, at 324; Ralph E. Heimlich & Roger Claassen, *Paying for Wetlands: Benefits, Bribes, Taxes*, NAT. WETLANDS NEWSLETTER, Nov.-Dec. 1998, at 1. Indeed, many commentators are quick to point out that the green payment programs violate the polluter pays principle that provides a common thread to most of environmental law— that is, while most landowners must obtain permits and pay mitigation costs to develop their land for productive purposes, farmers are paid not to develop their land. *See* Chen, *supra* note 4, at 344. The green payment programs are not an anomaly in this respect. For example, in 1999 federal agencies doled out $144 million to help CAFOs better manage their livestock wastes. *See Large Scale, Intensive Livestock Operations Getting USDA Help with Waste Management*, 30 Env't Rep. (BNA) 661 (1999).

353. For example, many farms favored by and thus heavily invested in the crop payment programs are not located in areas where the green payment programs are likely to focus. *See* Kelley & Lodoen, *supra* note 338, at 67.

354. *See* Tina Adler, *Prairie Tales*, 149 SCI. NEWS 44, 45 (1996) (discussing research showing "commodity prices determine the popularity of the [CRP] program among farmers").

Swampbuster and Sodbuster programs add a punitive element to farm conservation policy. The Swampbuster program makes farmers ineligible for all crop payment program benefits if a farmer converts certain wetlands to agricultural production.[355] Meanwhile the Sodbuster program imposes the same sanctions on farmers who put any highly erodible land into production without an approved conservation plan.[356] Unlike the green payment programs, these payment ineligibility provisions work close to the core of federal farm policy. Indeed, the subsidy programs have been so important to the farming industry that farmers may perceive any prerequisites to receiving subsidies as regulatory requirements.[357] Nevertheless, because the Swampbuster and Sodbuster programs remain coupled to crop payment subsidy programs, they depend on the subsidy programs for their force and thus do little to alter the fundamental incentives in federal farm policy.[358] Moreover, through a litany of exemptions from ineligibility and a lackluster enforcement record, the programs no doubt have accomplished less than they could have even given their inherent limits.[359] Including the Swampbuster and Sodbuster programs as the third major exception to the general rule of safe harbor for farms thus illustrates how paltry the universe of environmental regulations is for farms.[360]

355. *See* 16 U.S.C. §§ 3821-3824 (1994); *see also* Grossman, *supra* note 6, at 323-24; Haugrud, *supra* note 6, § 8.2(A)(2)(c), at 480-81; Linda A. Malone, *Reflections on the Jeffersonian Ideal of an Agrarian Democracy and the Emergence of an Agricultural and Environmental Ethic in the 1990 Farm Bill*, 12 STAN. ENVTL. L.J. 3 (1993).

356. *See* 16 U.S.C. §§ 3811-3813 (1994); *see also* Grossman, *supra* note 6, at 322-23; Haugrud, *supra* note 6, § 8.2(C)(1)(d), at 518-20; Karen R. Hansen, *Agricultural Nonpoint Source Pollution: The Need for an American Farm Policy Based on an Integrated Systems Approach Recoupled to Ecological Stewardship*, 15 HAMLINE J. PUB. L. & POL'Y 303 (1994).

357. *See* PERCIVAL ET AL., *supra* note 218, at 970; *see also* Looney, *supra* note 6, at 799.

358. *See* Kelley & Lodoen, *supra* note 338, at 67. Of the 78 million acres of wetlands in the United States, only 17 million acres are suitable for conversion to croplands, and of those only 6 million acres would depend heavily on crop program payments to make production viable. *See* ECON. RES. SERV., USDA, AGRIC. INFO. BULL. NO. 587, THE U.S. FARMING SECTOR ENTERING THE 1990'S 27 (1990) [hereinafter U.S. FARMING SECTOR].

359. *See* Kelley & Lodoen, *supra* note 338, at 67.

360. Some commentators point to the CRP, WRP, and Swampbuster programs as providing "extensive evidence of agriculture's greatly improved [environmental] performance in recent years." Neil D. Hamilton, *Agricultural Production and Environmental Policy: How Should Producers Respond?*, 1 DRAKE J. AGRIC. L. 141, 142 (1996). Yet CRP, WRP, and Swampbuster are but small specks in the sea of environmental policy, under which farms stand out as one of the dirtiest of America's

## III

## FARMS AS A SPECIAL CASE IN ENVIRONMENTAL LAW— SEPARATING FACT FROM FICTION

The first two Parts of this Article demonstrate that farms cause substantial harms to the environment, and that, with a few minor exceptions, environmental law at federal and state levels has all but licensed those harms.[361] The problem is that each of the many exemptions to various environmental laws detailed earlier finds at least some justification from a variety of administrative, political, and economic perspectives. The collective body of anti-law, however, cries out for an immediate and comprehensive response. Yet environmental law would be tested to the limits if farms were included immediately in regulatory programs by simply removing all farm environmental exemptions. Instead, environmental law must address farms differently; it must reflect the attributes of farms that led to the creation of the safe harbors in the first place.

The conventional model of environmental law relies on prescriptive regulation and punitive, deterrent-based enforcement, both of which are designed primarily by federal authorities and implemented primarily by the states.[362] But the geographic, economic, and political demographics of the farming industry challenge any approach that attempts to use this conventional model. EPA recognized this at the dawn of modern environmental law when it sought a way out of regulating farm irrigation return flows under the CWA.[363] Even today, EPA thrusts the TMDL program on state and local governments as a

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dirty industries. Even if farming has improved its overall environmental performance record in recent years, an assertion that finds little support in the data presented *supra*, it clearly has not improved its position relative to other industries.

361. I have done so in detail here because I do not believe it is prudent to propose sweeping legal reform before it is clear that legal reform is needed. Elsewhere I have advocated that legal reform should be initiated to address sociolegal problems only when it is clear that other social institutions (for example, volunteerism, non-governmental groups) cannot or will not address the issue and only when legal reform can avoid exacerbating problems of social inequity and legal complexity. *See* J.B. Ruhl & Harold J. Ruhl, Jr., *The Arrow of the Law in Modern Administrative States: Using Complexity Theory to Reveal the Diminishing Returns and Increasing Risks the Burgeoning of Law Poses to Society*, 30 U.C. DAVIS L. REV. 405 (1997). My objective in Parts I and II of this Article has been to demonstrate beyond doubt that we have a problem with respect to the environmental performance of farms, and that the law has not merely stood by while other social institutions created the problem, but has endorsed the process all along. The issue, therefore, is not whether to initiate significant legal reform, but how. I address this issue in Parts III and IV of the Article.

362. *See* Clifford Rechtschaffen, *Deterrence vs. Cooperation and the Evolving Theory of Environmental Enforcement*, 71 S. CAL. L. REV. 1181, 1181-90 (1998).

363. *See supra* text accompanying notes 185-93.

means of controlling nonpoint source water pollution.[364] EPA is in no better position to "instruct each individual farmer on his farming practices" now than it was in the 1970s.[365] In short, because the farm industry is geographically, economically, and politically complex, farms present a special case in environmental law and require a special response.

### A. *Geographic Dimensions*

Farms are unlike most industries in their number (about 1.9 million to be more precise),[366] their distribution throughout the nation, and their diversity. Given these characteristics, adopting the model of federally-designed, nationally-uniform, technology-based performance and emission standards would be difficult without vastly increased budgets for farm-by-farm permitting, monitoring, and enforcement.

Regulating the farming industry is thus a daunting prospect. EPA has observed that "[t]oo large a regulated community can make it impossible to implement and enforce requirements."[367] The dispersal of farms throughout the nation, including deep into rural areas,[368] further compounds the implementation issue. It also means that farms diverge based on the variety of local environmental and social conditions. For example, farms must respond differently to local conditions such as weather, soil salinity,[369] soil erosion potential,[370] leaching potential,[371] and

364. *See supra* text accompanying notes 220-30.

365. NRDC v. Costle, 568 F.2d 1369, 1380 (D.C. Cir. 1977). For example, in its recent policy statement on the development of nutrient criteria for water quality, an issue profoundly affected by and affecting farms, EPA stated that "EPA's custom of developing water quality criteria guidance in the form of single numbers for nationwide application is not appropriate for nutrients. EPA believes that distinct geographic regions and types of ecosystems need to be evaluated differently and that criteria specific to those regions and aquatic ecosystems need to be developed." 63 Fed. Reg. 34,648, 34,649 (1998); *see also* Zaring, *supra* note 61, at 10,133 ("EPA has concluded that in the context of nonpoint source pollution, site-specific decisionmaking that considers the nature of the watershed, the water body, the point sources, and the management practices to be regulated are more effective than uniform technical controls.").

366. *See* CENSUS, *supra* note 17, United States Data at 10, tbl.1.

367. U.S. ENVTL. PROTECTION AGENCY, PRINCIPLES OF ENVIRONMENTAL ENFORCEMENT 3-11 (1992).

368. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 23.

369. *See id.* at 33-34.

370. *See id.* at 40-41.

371. *See id.* at 45-48; *see also* Robert L. Kellogg et al., *The Potential for Leaching of Agrichemicals Used in Crop Production: A National Perspective*, 49 J. SOIL & WATER CONSERVATION 294 (1994).

freshwater availability.[372] Social conditions that vary include proximity to metropolitan areas[373] and surrounding land use.[374] Farms also vary tremendously in terms of crop type[375] and production practice,[376] livestock type and concentration,[377] use of irrigation,[378] participation in the CRP,[379] tillage practices,[380] sediment runoff,[381] fertilizer runoff,[382] and pesticide runoff.[383] The environmental law of farms thus must balance the desire to establish a national policy of environmental protection against the reality that farms are too numerous, too dispersed, and too diverse to address through a one-size-fits-all regulatory framework.

### B. *Economic Dimensions*

Farms in the United States have tremendous economic value and are a critical economic link to vast supplier and consumer industries. Part of the economic potency of farms has to do with the dispersal of the farm economy among many small farms. But the economic climate for farms is highly volatile today in terms of both individual farm profitability and industry-wide structure. Both factors will play an important role in shaping environmental policy for farms.

Financially speaking, farms are doing poorly. Predictions in the early 1990s that "the farm sector seems to be overcoming the financial difficulties of the mid-1980s"[384] have not come to pass. Today, many farms are crashing economically as commodity prices plummet below costs of production throughout the industry.[385] In addition to weak export markets, many farm

372. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 49-51.
373. *See id.* at 28, 50.
374. *See id.* at 26-27.
375. *See id.* at 27.
376. *See* Office of Pest Management Policy, Dep't of Agric., *Completed Crop Profiles, By State/Territory* (visited Mar. 17, 1999) <http://ipmwww.ncsu.edu/opmppiap/proindex.htm> (describing crop production practices for various crops in many different states).
377. *See* GEOGRAPHY OF HOPE, *supra* note 34, at 42.
378. *See id.* at 31.
379. *See id.* at 36.
380. *See id.* at 37.
381. *See id.* at 40-41.
382. *See id.* at 43.
383. *See id.* at 46.
384. *See* U.S. FARMING SECTOR, *supra* note 358, at 2.
385. *See* Warren Cohen, *The Seeds of Discontent*, U.S. NEWS & WORLD REP., May 24, 1999, at 26; Daniel Eisenberg, *Lean Times on the Farm*, TIME, Jan. 11, 1999, at 40; Gary Strauss, *Far from Hog Heaven: Farms Fold Under Price Crunch*, USA TODAY,

advocates point to the changing economic structure of the farm and related industries as a major culprit. Faced with the increasingly sophisticated and expensive technology needs of farming,[386] the agriculture industry, from chemical producers to farms to food processors, is consolidating at a rapid pace. Roughly 3.6% of farms generate over $500,000 in annual product value each, accounting for over 56% of total farm production value.[387] Upstream and downstream industries exhibit even greater concentration and a propensity toward vertical integration,[388] leading to concerns about the viability of less advanced farms, the prospects for farm employment, and the impact on rural farm communities.[389] Increased environmental regulation of farms may reduce the economic viability of farms by raising costs, contributing to further concentration of the industry. Given the economic climate of the farm industry, this may be disastrous. This is not to suggest that our commitment to environmental regulation of farms should be based primarily on the industry's economic health. It does suggest, however, that the distribution of economic impacts on farms resulting from increased regulation will play a large role in the third factor to be considered— the politics of farm policy.

### *C. Political Dimensions*

Farms possess immense political power not only because of their number, but because most are family-owned businesses. Of 1.9 million farms in operation in 1997, 1.6 million were family owned.[390] This is a substantial block of similarly situated voters. Moreover, farms are so widely distributed in the nation that few federal, state, or local politicians can escape pressure from the farm constituencies, and in farming areas, politicians are dominated by them.[391]

Although the broad dispersal of farms might hinder their

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Feb. 2, 1999, at 1B.

386. *See* U.S. FARMING SECTOR, *supra* note 358, at 41-45.

387. *See* CENSUS, *supra* note 17, at 6, fig.2. *See generally* Dina Temple-Raston, *Corporate Competition Puts Hog Farmers in a Pinch*, USA TODAY, Apr. 6, 2000, at 12A (discussing competitive pressures in the hog industry).

388. *See generally* WILLIAM HEFFERMAN ET AL., CONSOLIDATION IN THE FOOD AND AGRICULTURE SYSTEM 1-13 (1999).

389. *See id.* at 13-16.

390. *See* CENSUS, *supra* note 17, United States Data at 10, tbl.1.

391. Over 500 counties in the United States are "farming dependent," meaning at least 20% of total business and labor income is from farming, and many more are "farming-important," meaning 10 to 20% of income is from farming. *See* U.S. FARMING SECTOR, *supra* note 358, at 14.

collective political action, this effect is offset by two important political forces. First, farms play a critical role in the economic fate of their suppliers and customers. The vast agrochemical and food processing industries are characterized by greater corporate presence and concentration of economic power than is found in the farm industry. These industries rely heavily on farms and can be expected to align themselves politically with the interests of farms. For example, the Chemical Manufacturers Association, the Fertilizer Institute, and the National Agricultural Chemicals Association regularly weigh in on farm policy issues.[392] Second, the American Farm Bureau Federation has amassed tremendous financial strength through its farm services arm and purports to speak for all farms; it has become one of the most powerful lobbying forces in the nation.[393] The Farm Bureau has fought steadfastly, and apparently quite successfully, against any and all proposed environmental regulation of farms.[394] To put it bluntly, any proposal for comprehensive environmental regulation of farming faces stiff political opposition.

The political scene is growing even more complex daily. An emerging political wrinkle in farm policy results from the concentration of the industry, which has left the so-called "small farms" in dire circumstances.[395] Smallness, of course, is not a particularly distinguishing factor for farms.[396] Nevertheless, with

392. *See* Armour-Garb, *supra* note 34, at 346-47.

393. *See* Vicki Monks, *Farm Bureau vs. Nature*, DEFENDERS, Fall 1998, at 14, 14.

394. *See* N. William Hines, *The Land Ethic and American Agriculture*, 27 LOY. L.A. L. REV. 841 (1994); Monks, *supra* note 393, at 14. The Farm Bureau or its state offices are frequent plaintiffs and interveners in litigation challenging increased levels of environmental regulation, such as through implementation of Endangered Species Act programs. *See, e.g.*, Sierra Club v. Glickman, 156 F.3d 606 (5th Cir. 1998) (intervention in suit challenging irrigation subsidies under ESA); Idaho Farm Bureau Fed. v. Babbitt, 58 F.3d 1392 (9th Cir. 1995) (plaintiff in suit challenging listing of an endangered species); Defenders of Wildlife v. EPA, 882 F.2d 1294 (8th Cir. 1989) (intervention in suit challenging EPA approval of poison bait for farm animal predators); Wyoming Farm Bureau v. Babbitt, 987 F. Supp. 1349 (D. Wyo. 1997) (plaintiff challenging reintroduction of endangered wolves).

395. *See, e.g.*, William Claiborne, *Fighting the New Feudal Rulers*, WASH. POST, Jan. 3, 1999, at A3 (referring to "small family farms"); *What Price Pigs*, AUDUBON, Sept.-Oct. 1995, at 14 (referring to "smaller farmers").

396. USDA has noted that "most U.S. farms are small, noncommercial, and family owned and operated." U.S. FARMING SECTOR, *supra* note 359, at 1. But as most farms are family owned, small cannot mean simply family owned. USDA's "noncommercial" category describes farms with gross annual sales of less than $40,000, which often requires that the owners work outside the farm to make ends meet. *See id.* Recall, however, that over half of all farms generate less than $10,000 in revenue, *see* CENSUS, *supra* note 17, at 6, fig.1, meaning that well over half are in noncommercial status. Over half of all farms also are under 500 acres. *See id.*

absolutely no empirical foundation,[397] a "small is better" mentality has invaded all facets of farm policy, including environmental issues,[398] and made it politically imperative that any farm policy should save small farms.[399] Thus even assuming it can overcome political opposition from a multitude of powerful upstream and downstream industries, any proposal for comprehensive environmental regulation of farming must also somehow take into account the "save the small farm" factor. Yet, given the fact that most farms are small, is it unreasonable to conclude that small farms are a major part of the problem of environmental harm and should thus bear a major portion of the regulatory burden?[400] The politics of environmental law for farms are daunting indeed.

## IV

## MERGING THE ENVIRONMENT AND FARMING— A PROPOSED FRAMEWORK FOR A POSITIVE LAW OF FARMS AND THE ENVIRONMENT

Although the process has been undertaken cautiously and not without considerable debate, environmental law is increasingly testing models other than prescriptive regulation as means of influencing industry behavior.[401] Several approaches

397. Small farms "do not significantly affect the local economy's income and employment," *see* U.S. FARMING SECTOR, *supra* note 396, at 1, and are worse per unit of production than large farms for many environmental performance indicators. *See* Chen, *supra* note 4, at 345.

398. Chen refers to this as the "'microecological' variation on the agroecological theme," that is, "the frequently invoked but rarely tested assumption that small farm size and family ownership guarantee sound stewardship." Chen, *supra* note 4, at 336, 341.

399. For example, USDA has established a National Commission on Small Farms, which has devoted considerable attention to attacking corporate farming as the chief threat to small farms. *See, e.g.*, National Comm'n on Small Farms, Dep't of Agric., *A Time to Act: A Report of the USDA Nat'l Comm'n on Small Farms* (visited Apr. 4, 2000) <http://www.reeusda.gov/agsys/smallfarm/report.htm> (describing "the small farm as the cornerstone of our agricultural and rural economy" and proposing over 100 measures to assist small farms, particularly the position of small farms versus corporate farms). USDA has also in the past few years established a Deputy Secretary level Small Farms Council, a Small Farms Federal Advisory Commission, and a Small Farms Coordinator position in each USDA office. *See* Dep't of Agric., *Small Farms @ USDA* (visited Aug. 12, 1999) <http://www.usda.gov/oce/smallfarm/sfhome.htm>.

400. Much of the small farm rhetoric is lodged against "corporate farms." *See* Claiborne, *supra* note 313, at A3 (referring to "corporate farming ventures"); *What Price Pigs*, *supra* note 395, at 14 (referring to "corporate giants"). The "small" rhetoric thus appears to be intended to single out the much smaller universe of farms that are corporate owned, large in size, and very large in revenue. Those farms, while presenting many environmental challenges, by no means have caused the bulk of environmental harms inventoried in this Article. Small farms are a major part of the problem.

401. *See generally* Rechtschaffen, *supra* note 362; C. Boyden Gray, *Regulatory*

have established records of success, and are adaptable to the farming industry's complex demographics. These include information-based programs, taxation programs, incentive programs, and pollutant trading programs.[402] Even the most ardent defenders of the conventional environmental law model concede some role for these second-generation approaches.[403] Moreover, as centrally-planned prescriptive regulation becomes less dominant in the mix of instruments, decisionmaking must take place increasingly at the field level and consequently will require greater reliance on state and local authorities, albeit with a continuing federal role in national policy formation.[404] The core of a positive environmental law for farming thus should borrow from many models to assemble a cohesive approach that involves federal, state, and local authorities working in partnership rather than in feudal arrangements. This reformed law of farms and the environment will only work to its fullest potential, however, if policies in the related fields of farm subsidy, upstream and downstream agriculture industries, and foreign trade are aligned accordingly.

### *A. Core Programs*

There are two paths that can be followed to craft a positive federal environmental law for farming. One path uses the existing structure of environmental statutes to correct the safe harbors problem and bring farming back into the various regulatory programs. That approach, however, would inherit the failings and pitfalls of the fractured system of environmental law, including multiple agency authorities, nonintegrated

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*Reform: Past and Future*, 12 NAT. RESOURCES & ENV'T 155 (1998).

402. Although instrument choice is a recurring issue throughout environmental law, perhaps only the field of international environmental law rivals the farm-environment question for "anti-law" and the consequent need to make sweeping governance and instrument choice decisions in the immediate future. *See* Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677 (1999). A comprehensive review and evaluation of all the environmental law instrument reform models that have been proposed is outside the scope of this Article. I discuss the basic themes of each of the five programs covered herein *infra*. For an overview of the basic policy issues and the various instruments that comprise the complete reform "toolbox," see PERCIVAL ET AL., *supra* note 218, at 131-79.

403. *See* Rechtschaffen, *supra* note 362, at 1243-65.

404. This so-called "devolution" of authority to the states in environmental policy has become a common refrain and an adjunct to the broader debate over instrument choice reform. *See, e.g.*, Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 MICH. L. REV. 570 (1996); *Environmental Protection Needs to Rest More With Local Governments, NEPI Says*, Daily Env't Rep. (BNA), Apr. 29, 1999, at A-6.

decisionmaking, media-specific statutory focus, and dominance of the prescriptive regulation model. The other path— the path I propose— simply abandons the existing structure and forges a new law built around a core body of environmental law programs tailored specifically for farming. Given how difficult it has proven for the existing mix of statutes to tackle the farms problem, and given how difficult it may be to fit farms into the usual models of those statutes, there is no way to begin to meaningfully regulate farms without starting from the ground up.

### *1. Regulation— Use Conventional Methods to Address CAFOs and Other Agro-Industrial Low-Hanging Fruit*

As the proliferation of CAFOs illustrates, industrialization, technology, and economics have changed the farming industry dramatically since the day when EPA declined to apply the NPDES program to farms. Indeed, when one cuts through the protectionist rhetoric of the small farms movement, there is something to the small farm/corporate farm distinction: there are subcategories of farms that present opportunities for the use of direct prescriptive regulatory models to capture immediate gains at a relatively low administrative cost. Many commentators believe that within the diversity of the farm industry lie identifiable and manageable sectors, such as CAFOs and large crop irrigation farms, which ought to be treated as industrialized operations no different than refineries or steel mills.[405] When these "industrial farming" sectors are carved out of the larger farm universe, the number of individual operations requiring direct regulatory attention is less daunting,[406] the problems

405. As one prominent agriculture law scholar recently observed, "As agriculture becomes industrialized, it should be treated like the 'industrial' sector, meaning the 'command and control' style of environmental laws applied to 'smoke stack' industries should apply." Neil D. Hamilton, *Reaping What We Have Sown: Public Policy Consequences of Agricultural Industrialization and the Legal Implications of a Changing Production System*, 45 DRAKE L. REV. 289, 299-300 (1997). EPA has recently embarked on efforts to develop sector-based approaches to industrial pollution control and prevention, through which problem identification and problem solving is organized around industry sectors sharing common environmental issues. *See EPA Draft Fiscal 2000 Action Plan on Sector-Based Environmental Regulation*, 30 Env't Rep. (BNA) 723 (1999).

406. For livestock operations, recall that of the nation's 450,000 animal feeding operations, EPA believes only about 15,000 are concentrated animal feeding operations requiring permits under the Clean Water Act. *See supra* text accompanying notes 319-22. For crop production, in 1997 only 74,000 farms were larger than 2,000 acres, *see* CENSUS, *supra* note 17, United States Data at 69, tbl.47, and only 25,000 farms spent more than $50,000 on agricultural chemicals, *see id.* at 64, tbl.47.

associated with geographic diversity diminish,[407] and the cost of compliance is focused on the farms most capable of passing them on to consumers.[408] In short, these agro-industrial farm operations are low-hanging fruit, ripe for the picking.

Conventional regulation of such industrialized farming operations would go well beyond the halting approach EPA has taken toward regulation of animal waste discharges from CAFOs. Consistent with the trend in other industries toward integrated multi-media pollution permits,[409] an environmental regulatory program for industrial farms would initiate a fully integrated permitting program covering all sources and pathways of pollutants from such operations, including saline water from irrigation return flows, air pollutants, soil erosion, chemical waste runoff, and animal waste discharges.[410] As is currently done under the conventional prescriptive approach for other industries, these permits would require "best management practices" designed to reduce overall farm pollutant releases and would identify technology-based standards for specific media.[411]

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407. For example, although waste handling methods for CAFOs vary to some extent, "In general, wastes are held in storage structures until they can be applied to agricultural land as a fertilizer or soil conditioner. Irrigation equipment can be used to pump liquid waste from storage structures onto fields; dry waste is usually applied with a tractor-drawn manure spreader." U.S. GENERAL ACCOUNTING OFFICE, GAO/RCED-99-205, ANIMAL AGRICULTURE: WASTE MANAGEMENT PRACTICES 8-9 (1999).

408. *See* Hamilton, *supra* note 405, at 300 ("[A]n industrialized agriculture will be better able than farmers to pass the costs of environmental protection on to consumers in higher prices.").

409. There is a growing consensus that modern environmental law, because of its fracture into media-specific statutes, has largely overlooked pollution prevention and control issues and approaches that focus on product life-cycles, mass materials flows, multi-media pollution effects, and industrial production systems. *See generally* Charles W. Powers & Marian R. Chertow, *Industrial Ecology: Overcoming Policy Fragmentation*, *in* THINKING ECOLOGICALLY, *supra* note 6, at 19-36; John C. Dernbach, *Pollution Control and Sustainable Industry*, 12 NAT. RESOURCES & ENV'T 101 (1997). EPA has embraced the movement toward multi-media permitting in its sector-based initiative. *See EPA Draft Fiscal 2000 Action Plan on Sector-Based Environmental Regulation*, 30 Env't Rep. (BNA) 723 (1999).

410. Because of the multiple pathways farm pollution can take, researchers have concluded that integration of air, land, and water protection in permitting decisions is critical to comprehensive management of the farm-environment interface. *See Water Quality Policies Must Be Integrated Among Air, Water, Land, USGS Official Says*, Daily Env't Rep. (BNA), Mar. 8, 1999, at A-2. United States Geological Survey's National Water Quality Assessment found that 85% of nitrogen contributed to the Chesapeake Bay is from groundwater and the atmosphere, and suggested that integrated management will be needed to address watersheds, nonpoint source pollution, total maximum daily loads, and wetlands protection. *See id.*

411. For an overview of the various water runoff restrictions and best management practice instruments presently in use for CAFOs and, in some states, for other types of farms, see generally McElfish, *supra* note 232. No program, however, resembles the fully-integrated, multi-media permitting system proposed

The point is that if a sector-based approach is used to identify farming operations that exhibit high-impact polluting effects, such as CAFOs and large-scale crop operations, conventional prescriptive regulation can yield significant environmental benefits at manageable administrative cost levels.

### 2. *Information— Use Reporting Requirements to Create a National Database of Farms' Chemical Releases*

The proposal to address industrial farms through conventional prescriptive regulation requires that we know as much as possible about the identified farm sectors. Moreover, any program directed at the remainder of farms— and there must be one— will require massive amounts of information to enable the use of other instruments such as taxes, incentives, and trading to work effectively. Information, in other words, is a critical component of the administration of an environmental law for all farms, and one that is in short supply. Nowhere is this more true than for the use and release of agricultural pesticides and fertilizers.

The Toxic Release Inventory (TRI) program for reporting toxic chemical releases from manufacturing industries[412] illustrates how information can facilitate education of regulators, the public, and industry about the magnitude of pollutant releases. This aspect of the TRI alone has had beneficial pollution reduction effects.[413] A similar program for agro-chemical releases— a Farm Release Inventory (FRI)— would provide a crucial source of information for the industrial farm permitting program discussed above, would feed directly into the tax, incentives, and trading programs discussed below, and could

herein, although this is the direction in which EPA slowly is moving for CAFOs, *see supra* text accompanying notes 316-26, and in which some states are moving with respect to other farming issues, *see, e.g.*, Carolyn Whetzel, *Regulators Issue Waste Discharge Plan for 350 Dairies in Southern Part of State*, 29 Env't Rep. (BNA) 2489 (1999) (noting that Southern California regional water authorities propose a general permit for dairy farms requiring development of waste management plans).

412. *See supra* text accompanying notes 281-83.

413. Companies subject to the TRI reporting provision reported a total release of 10.4 billion pounds of specified toxic chemicals into the environment in 1987, down to 2.8 billion pounds in 1993. *See* PERCIVAL ET AL., *supra* note 218, at 464-65; *see also Toxic Chemical Releases Decrease by 8.6 Percent in 1994, Report Says*, 27 Env't Rep. (BNA) 531 (1996); *Toxic Chemical Releases Cut by 400 Million Pounds, Chemical Manufacturers Association Reports*, 27 Env't Rep. (BNA) 501 (1996). Industry sources believe the reporting requirement galvanized industry into voluntary pollution reduction goals that in many cases exceed anything required by law. *See CMA Initiative Cuts Toxic Emissions 49 Percent Over Six Years, Official Says*, 27 Env't Rep. (BNA) 11 (1996).

yield the same release reduction incentives the TRI has yielded.

The administration and pollution reduction benefits of an FRI program are already apparent in California, where state pesticide application reporting requirements exceed those of FIFRA.[414] Although the state's reporting data are not assembled as accessibly as TRI data,[415] Californians for Pesticide Reform was able to assemble a comprehensive analytical report for the period from 1990 to 1995[416] and a series of internet-accessible maps showing total use for different regions of the state.[417] These accomplishments demonstrate that a national FRI that fully adopts the TRI data collection and reporting system is feasible, not cost-prohibitive to farmers or the public, and of potentially tremendous benefit to future policy decisions. Indeed, I believe that no meaningful environmental regulation of farms will happen without this critical step.

### *3. Taxes— Use Tax-Based Instruments to Control Agrochemical Input Levels*

Tax instruments have often been proposed as a means of influencing pollution behavior by internalizing the social costs of pollution in the polluter.[418] Many forms of farm pollution would be difficult to tax in this manner because of the difficulty in measuring pollution and the factors causing it. Runoff of pesticides and fertilizers, however, is directly linked to chemical application levels, which, under the information-based FRI program outline above, would be reported for all farms and thus amenable to measurement. If linked, the FRI and a farm chemical tax would provide a precise and powerful means of

414. California requires filing of a pesticide use report after each use of a restricted pesticide. *See* CAL. FOOD & AGRIC. CODE §§ 12979 & 14011.5. For a thorough description of California's so-called "full reporting system" for pesticide applications, see Dep't of Pesticide Reg., Cal. Envtl. Protection Agency, *Pesticide Use Reporting: An Overview of California's Unique Full Reporting System* (1995), *available at* (visited Apr. 21, 2000) <http://www.cdpr.ca.gov/docs/dprdoc/userptng/purhtm.htm>.

415. Access to California's pesticide use reporting databases is available at Dep't of Pesticide Reg., Cal. Envtl. Protection Agency, *DPR Databases* (visited Apr. 21, 2000) <http:www.cdpr.ca.gov/dprdatabase.htm>.

416. *See* James Liebman, *Rising Toxic Tide: Pesticide Use in California, 1991-1995* (1997), *available at* <http://www.igc.org/panna/risingtide/textoftide.html>.

417. These maps may be viewed at Californians for Pesticide Reform, *California Pesticide Use Maps* (last visited Aug. 18, 1999) <http://www.igc.org/cpr/resources/maps.html>.

418. Under this Pigouvian tax model, polluters subject to taxes per unit of pollution will reduce pollution to the point where marginal cost of abatement and the cost of the tax are equal. *See* Weiner, *supra* note 402, at 706-08.

influencing farm chemical inputs as well as a source of revenue for mitigation of their effects.

C. Ford Runge has outlined such a program, which he calls the "negative pollution tax," designed to use taxes to achieve desired levels of chemical inputs on farms.[419] Farms using chemicals in excess of the desired threshold would be subject to a progressive tax rate; farms using chemicals below the target level would be rewarded through decreased taxes or even subsidies.[420] Building on Runge's proposal, the French Ministry of the Environment recently recommended a new tax on pesticides and fertilizers that would be imposed directly on farmers and modulated based on each chemical's eco-toxicity. Based on maximum acceptable levels of each chemical set on a per-crop basis with regional adjustments, revenues from the taxes would be refunded to farmers who use less than the maximum ceiling, making the tax a burden only to farmers who exceed the ceiling. Moreover, organic farmers who use no chemicals would receive a payment equal to farmers who use chemicals up to the ceilings, so that the tax reimbursement scheme would not competitively disadvantage organic farming.[421]

Particularly for small farms, which contribute to the pesticide and fertilizer pollution problem but which would be difficult to regulate directly under a permit program, such a tax system would provide a means of addressing behavior on every farm in an economically and administratively efficient manner. Moreover, if small really is "better," as small farm rhetoric insists, small farmers will only benefit from a negative chemical input tax. The tax, in other words, will become the arbiter of performance. As it stands now, tax policy does little to promote environmental protection on farms and in many states actually promotes farm chemical usage.[422] By adopting tax programs such as those Runge has proposed and the French Ministry of the Environment has outlined, U.S. tax policy would point farms in the right direction for the environment.

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419. Runge, *supra* note 6, at 213-14.

420. For similar but less detailed proposals, see David E. Ervin, *Shaping a Smarter Environmental Policy for Farming*, ISSUES IN SCI. & TECH., Summer 1998, at 73, 78; Zaring, *supra* note 61, at 10,133-34.

421. *See* Lawrence J. Speer, *Report Blames Agriculture for Damages to Environment, Recommends Eco-Taxes*, Daily Env't Rep. (BNA), Mar. 15, 1999, at A-7; *Taxes on Fertilizers, Pesticides Said to Adapt "Polluter Pays" to Agriculture*, Daily Env't Rep. (BNA), Feb. 24, 1999, at A-3.

422. For example, 29 states exempt farm chemicals from state sales taxes. *See Sales Tax on Farm Chemicals Could Add $674 Million to State Revenue, Groups Say*, Daily Env't Rep. (BNA), July 1, 1999, at A-8.

*4. Incentives— Build on the CRP and WRP to Implement Incentive-Based Retirement of Farmland with Important Habitat Value*

There is a growing consensus that farmland conservation policy simply is not working. The regulation, information, and tax programs proposed above assume that farmers will continue farming— there is nothing inherent in either program that would prompt farmers to retire land for conservation purposes. The existing green payment programs designed to do so— principally the CRP and WRP— are temporary and dependant upon commodity market prices for farmer participation. Conservation-based prescriptive regulation of farming, such as the Endangered Species Act, may achieve some conservation goals, but it provokes farmers to oppose it legally or politically,[423] or to sell out to developers willing to weather the maze of permitting requirements.[424] Farmland protection laws designed to thwart developer takeovers of farms also do nothing to promote conservation of farmland. Overall, then, existing farmland conservation programs do not promise much in the way of permanent conservation.

The problem is that current approaches focus on *farmland* conservation policy and keep environmental objectives subordinate to farm policy. In short, conservation policy and farm policy must be decoupled if we are to make any significant farmland habitat conservation gains. Thus, for example, when New York City decided to protect its water supply watershed, it embarked on a $10 million farmland retirement program.[425] Federal efforts to restore the Everglades also involve significant farmland retirement plans.[426] The point is that where farms exist on environmentally critical lands, targeted social investments will permanently secure the social benefits of those lands. The public dollars presently being cycled through the CRP and WRP programs, however, are inefficiently deployed when not reaping permanent land conservation, leaving farmers in the decisionmaking role as to which lands to conserve, when, and for how long. This funding should be diverted to permanent

423. *See* Hamilton, *supra* note 405, at 300.

424. *See supra* note 335.

425. *See $10 Million Farm Land Retirement Plan Launched to Aid New York City Watershed*, 29 Env't Rep (BNA) 937 (1998). The federal funding share for this effort, however, is from USDA CRP funding and thus not for permanent acquisition.

426. *See* Drew Douglas, *New Deal for Everglades Land Purchase Would See 60,000 Farm Acres Acquired*, Daily Env't Rep (BNA), Jan. 12, 1999, at A-9.

acquisitions of land conservation easements and fee titles that environmental authorities (not farm policy authorities) deem worthy of public investment.[427] For example, researchers have concluded that restoration of wetlands and riparian zones in the Midwest would significantly reduce the hypoxia effects in the Gulf of Mexico.[428] Rather than having farmers decide when to receive subsidies for temporary conservation of lands *they* select, a land acquisition program oriented toward environmental protection would prioritize agricultural lands that can deliver the most benefits, secure them through permanent conservation easements or fee title, and finance restoration efforts.

### 5. *Trading— Use Area-Based Planning Frameworks and Market-Based Trading Mechanisms to Address the Local Farm-Environment Interface*

The regulation, information, tax, and incentives programs discussed above have the advantage of avoiding the more vexing problems of farm demographics: each is amenable to decisionmaking and policy implementation at federal levels, though state and local participation is to be expected; the costs of compliance for each are not inherently prohibitive; and they do not collide head-on with small farm protection policy. But they also leave much unaddressed, such as what to do when, even under the FRI and chemical tax program, a particular watershed is seriously impaired as a result of farm runoff.

Thus, there must be some core component of the environmental law of farms that takes national policy to the local level so as to respond to problems that operate on smaller geographic scales and which will be most efficiently solved through locally-based planning authority. My proposed solution combines two different kinds of programs that have had measurable success in other environmental law applications.

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427. Some commentators warn that aggressive habitat conservation on farmland "may be overdoing it" because "some of this land will be needed to produce more food as U.S. and world demand grows." Ervin, *supra* note 420, at 76. This concern seems unwarranted given that, notwithstanding the trend of reducing U.S. farm acreage through conversion to other uses and habitat conservation, U.S. farms continue to improve in productivity and efficiency, national average crop yields remain high, and export demand has been stagnant as other countries boost their agricultural productivity. *See Outlook for the Farm Economy in 2000*, AGRIC. OUTLOOK, Apr. 2000, at 2; *The Ag Sector: Yearend Wrap-up*, AGRIC. OUTLOOK, Dec. 1999, at 2-3. Moreover, at some point U.S. domestic environmental protection must take precedence over foreign demand for U.S. domestic food production.

428. *See* William J. Mitsch, *Hypoxia Solution Through Wetland Restoration in America's Breadbasket*, NAT'L WETLANDS NEWSL., Nov.-Dec. 1999, at 9.

Many environmental laws use local planning areas as the mechanism for implementing nationally-designed policy objectives. However, to avoid the pitfalls of some of those programs, which rely heavily on prescriptive regulation, I propose relying primarily on pollutant trading models that have been successfully employed in several contexts. The result is an area-wide, market-based approach that can adapt to the diverse geographic, economic, and political settings in which farming takes place.

*a. Establishing Watershed-Based Planning Areas*

Area-based planning and implementation of national environmental policy has a long tradition in federal environmental law. For example, the Clean Air Act's NAAQS program establishes uniform nationwide standards but gives states considerable discretion to allocate the burdens of compliance through local air quality control regions.[429] Similarly, the Coastal Zone Management Act[430] enlists states to develop comprehensive plans for land use and resource protection in coastal areas in return for federal funding assistance and the assurance that federal agencies will act consistently with the plan.[431] The Endangered Species Act has also utilized area-based planning approaches; regional habitat conservation planning permits allow local developing areas to balance endangered species and development needs.[432] Each of these federal programs allocates field-level decisionmaking authority to local government, while retaining strong components of national policy setting and enforcement.

To import this theme of area-based planning and implementation of nationally-designed policy objectives to the environmental law of farms, a unit of area-based planning must be selected. Given the close relationship between farming and water pollution, the most appropriate unit from the perspective of administration, compliance, monitoring, and enforcement will undoubtedly be the watershed. Watershed-based area planning is an old idea that is gaining new vitality and support in many

429. *See supra* text accompanying notes 239-43.

430. 16 U.S.C. §§ 1451-1465 (1994).

431. *See id.* §§ 1455 (coastal plan) & 1456(c) (federal consistency).

432. *See generally* TIMOTHY BEATLY, HABITAT CONSERVATION PLANNING: ENDANGERED SPECIES AND URBAN GROWTH (1994) (reviewing the background of several regional plans adopted in urbanizing areas).

applications.[433] There are several good reasons why watersheds are becoming the planning unit of choice to implement environmental policy at the landscape level: they can be defined topographically; their flows and processes have been the subject of study for many decades; the effects of human intervention have been well-documented; and the watershed concept is a familiar one.[434] Hence, it is no surprise that the Clinton Administration's Clean Water Action Plan emphasizes watershed-based planning, EPA has a division devoted specifically to watersheds, and the Fish and Wildlife Service uses watersheds as the building block of its new ecosystem-based focus for endangered species.[435]

The use of watersheds as the planning unit for the environmental law of farms is even more compelling given the growing importance of the Clean Water Act's total maximum daily load program[436] and the pressing need to integrate farms into it.[437] We know that the waterbody "segments" to which the TMDL program apply are often impaired, in many cases, by nonpoint source water pollution that begins in watersheds far from the segment itself. Until some connection is made between what is happening in the watersheds and what results in the segments, the TMDL program cannot reasonably be expected to make significant progress. Thus, although he does not focus attention on farming specifically, Professor Robert Adler has made a compelling case for implementing the TMDL program through watershed-based units.[438] Regardless of how TMDLs are implemented, addressing pollution from farms in general will work best when farms in a common watershed are viewed as

433. For brief histories of the use of watersheds as environmental policy planning units, see Robert W. Adler, *Addressing Barriers to Watershed Protection*, 25 ENVTL. L. 973 (1995); Anderson, *supra* note 202, at 367-83; William Goldfarb, *Watershed Management: Slogan or Solution?*, 21 B.C. ENVTL. AFF. L. REV. 483 (1994); William E. Taylor & Mark Gerath, *The Watershed Protection Approach: Is the Promise About to Be Realized?*, 11 NAT. RESOURCES & ENV'T 16, 18 (1996).

434. *See generally* J.B. Ruhl, *The (Political) Science of Watershed Management in the Ecosystem Age*, 35 J. AM. WATER RESOURCES ASS'N 519 (1999) (discussing the politics of and political framework for ecosystem management, focusing on a watershed-based exosystem delineation standard).

435. *See id.* at 522.

436. *See* Barney Tumey, *States Lack Resources to Develop TMDLs Despite Support for New Program, EPA Told*, 30 Env't Rep. (BNA) 1026, 1027 (1999).

437. For background, see *supra* text accompanying notes 220-30.

438. *See* Adler, *supra* note 221, at 291-92; *see also* John H. Davidson, *Commentary: Using Special Water Districts to Control Nonpoint Sources of Water Pollution*, 65 CHI.-KENT L. REV. 503 (1989) (suggesting that farm water irrigation supply and return flow management districts established in many states could serve as planning units and regulatory targets for control of farm water pollution).

part of a shared problem, and managed as part of a shared solution.[439]

*b. Implementing Watershed-Based Pollutant Trading*

One advantage of dividing farms into watershed-based planning areas is that it will allow state and local governments to implement the permitting, tax, information, and incentives programs discussed above. The principal purpose of the watershed approach, however, will be to provide an efficient and flexible medium in which farms sharing responsibility for water pollution can share in the solution. As information about water quality in each watershed comes on line through the TMDL program and information about agrochemical usage becomes available through the FRI as I have proposed, we will be able to make more reliable linkages between farming and water quality impairment at the watershed level. In other words, we will be able to identify more precisely water quality impairment in a waterbody segment attributable to farms in that segment's watershed.

Once that component is identified and quantified, we can begin to manage farms within the watershed as part of the TMDL *problem*, without having to deal with each individual farm as part of the TMDL *program*. It is important for the success of the TMDL program that farms within a watershed that contribute to impairment of a waterbody segment are brought under the compliance umbrella. It is not necessary to treat each farm as if it were an individual point source, so long as all farms are in the solution on an equal footing with each other. This is essentially a pollution control trading system. When put into operation along with the FRI and negative pollution tax programs, the trading program can be expected to promote adoption of integrated pest management practices and other alternatives to present styles of chemical use.[440]

The success story of pollutant trading systems is the Clean Air Act's (CAA) program to allow large coal-burning electric utilities to trade units of sulfur dioxide pollution as part of a

439. For example, the French Ministry of the Environment recently recommended that in addition to a pesticide taxing scheme, agricultural zones with "critical agricultural pollution problems" will require tighter regulation and funding. *See* Speer, *supra* note 7, at A-7.

440. *See, e.g.*, N. Seppa, *Coming: A New Crop of Organic Pesticides*, 156 SCI. NEWS 228 (1999) (discussing use of certain plants that emit pesticidal toxins as a natural pest control measure); *New, Nonchemical Pest Control Proposed*, 284 SCI. 1249 (1999) (discussing use of less potassium in fertilizer as weed control measure).

national policy of reducing total industry emissions over time. A market incentive to engage in such trading was created by the combination of a declining ceiling of total industry emissions coupled with annual allotments of pollutant units based on historical usage. Facilities able to achieve emission levels lower than their respective allotments could sell allotments in an open market to those unable to do so. By most accounts the program has proven a success from administration, compliance, and pollution reduction perspectives alike.[441]

The farming scenario shares key features with the CAA's successful sulfur dioxide trading program. The objective of the CAA program is to control acid rain. Based on the assumption that sulfur dioxide emissions contribute to acid rain, major emission sources are the focus of the control program. Rather than dictate facility-specific emission levels, the CAA program allows facilities to respond to falling emission ceilings over time by balancing the financial burden of new technology with the financial burden of buying allotments. A similar program for farms is not difficult to construct. The objective of the farm emissions trading market is to improve water quality. The focus on farms is based on the evidence that farm emissions impair ambient water quality in a defined waterbody segment. The FRI program proposed above will supply data on the usage of fertilizer and pesticide by each farm located in the problem watershed. Those data will allow for computation of the total farm usage in the watershed. Regulators may then impose a total (and declining) agrochemical application ceiling for the watershed as a whole and individual allotments for each farm in the watershed. Most basically, this data will enable regulators to keep track of trades and compliance. Each individual farmer will obtain an allotment of fertilizer and pesticide usage. Whether he or she uses them, banks them for future use, sells them, or purchases additional allotments will depend on that farmer's decision whether to invest in best management practices or other technological solutions that reduce usage, or forgo them and play the market. As total usage in the watershed declines, total load of pollutants attributable to farming should decline, and water quality in the waterbody should improve. The key benefit is that each individual farmer can maximize the efficiency of his or

441. *See* MARKET-BASED APPROACHES TO ENVIRONMENTAL POLICY 95-136 (Richard F. Kosobud & Jennifer M. Zimmerman eds., 1997); Frank S. Arnold, *$SO_2$ Trading Success Not Easily Replicable*, ENVTL. F., May-June 1999, at 11.

her response to that regulatory program.[442]

The watershed-based chemical usage trading program thus satisfies what many environmental economists believe are necessary factors for pollutant trading programs to work: a large number of sources emitting the same pollutant, each with different abatement costs; a common "pollution-shed" in which each source's location is not of great consequence to the outcome so long as all sources are included in the trading regime; and a closed market in which the total quantity of allowable pollution being traded is capped.[443] The program is also consistent with EPA's general policies on watershed-based effluent trading,[444] and with the agency's recent effort to create pollutant trading markets in connection with the water quality TMDL and anti-degradation programs.[445]

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442. One key difference between the CAA's $SO_2$ trading program and the proposed farm chemical application program is that success under the $SO_2$ program is measured solely by emission reductions— acid rain reductions are not a direct criterion in the operation of the program— whereas in the farm program success would be measured by the reduction in total waterbody pollutant load attributable to farms in the watershed. The farm program uses source reduction rather than emission control to achieve that goal, that is, the reduction of chemical applications that lead to emissions rather than the treatment or reduction of farm runoff itself. In the event that farm runoff continues to impair a waterbody even after the farms in the watershed have reduced total applications below the prescribed ceiling, the options would be to lower the ceiling further or to impose emission control measures on farms in the watershed in the form of best management practices. The objective of the trading program is to avoid prescriptive regulation of farming practices to the extent practicable. At some point, farmers in the watershed may view the marginal costs of emission control as less than the marginal costs of further reductions in the chemical application ceilings. When farmers in the watershed agree that that point has been reached, they ought to be in a position as a group to choose emission controls over further reductions in the application ceiling.

443. *See* Arnold, *supra* note 441, at 11; Kurt Stephenson et al., *Toward an Effective Watershed-Based Effluent Allowance Trading System: Identifying the Statutory and Regulatory Barriers to Implementation*, 5 ENVTL. LAW. 775 (1999). For additional legal commentary on watershed-based pollution trading programs, see Elise Fulstone, *Effluent Trading: Legal Constraints on the Implementation of Market-Based Effluent Trading Programs Under the Clean Water Act*, 1 ENVTL. LAW. 459 (1995); Ann Powers, *Reducing Nitrogen Pollution on Long Island Sound: Is There a Place for Pollutant Trading?*, 23 COLUM. J. ENVTL. L. 137 (1998).

444. *See* OFFICE OF WATER, U.S. ENVTL. PROTECTION AGENCY, DRAFT FRAMEWORK FOR WATERSHED-BASED TRADING (1996). EPA's focus in the watershed context has been on trading the costs of pollution control measures rather than trading units of pollution as is done in the $SO_2$ program. *See id.* at xiii-xiv. Nevertheless, EPA appears fully committed to the policy of developing trading frameworks that operate on watershed levels.

445. *See* 64 Fed. Reg. 46,058, 46,068-70 (1999) ("EPA is seeking to establish a market for pollutant trading, in the hopes of creating more effective and efficient mechanisms for restoring water quality.").

### B. Peripheral Problems

I have designed the proposed environmental law for farms with the key demographic constraints of farming in mind. Prescriptive, centrally-planned regulation is kept to a minimum, targeted mainly at true agro-industrial operations. The FRI is an information-based measure applied to all farms to increase public awareness of farm chemical usage and to facilitate the tax and trading programs. The agrochemical tax program applies an economic incentive solution to the problem of pesticide and fertilizer usage. The watershed-based trading program allows for focus on local water quality problem areas through a market-based instrument that maximizes overall efficiency. And the incentive program uses federal funding to acquire valuable conservation habitat instead of attempting to regulate its use. Overall, this package of instruments balances national authority with local authority, big farm with small farm, and prescriptive controls with flexible controls in a way that responds to the realities of the farm industry.

Nevertheless, this reform package cannot work alone. A separate federal environmental law for farms does not mean state and local initiatives are unwelcome or unnecessary. Indeed, the core programs this Article proposes do not address all of the harms that farms cause, much less offer solutions for them. Water resource depletion, water salinization, soil erosion, and air pollution remain unsettled. Because they are profoundly local in nature, strong initiatives from the states will be needed on these fronts. The proposed regulatory instruments are not intended to thwart other promising incentive-based programs.[446] Indeed, the watershed-based planning units I propose may provide a suitable planning base for local efforts.

A separate federal environmental law for farms also does not mean that reform of federal agricultural and environmental policy in general is unnecessary. Key additional changes will be needed if the environmental law of farms is to operate to its fullest potential. First and foremost, farm commodities subsidies and income subsidies must be reformed to support the objectives of the environmental program.[447] Second, upstream and downstream industries should be enlisted to facilitate the farm-

446. *See also* ENVIRONMENTAL DEFENSE FUND, PLOWING NEW GROUND: USING ECONOMIC INCENTIVES TO CONTROL WATER POLLUTION FROM AGRICULTURE (1994) (describing other possible economic incentives, including trading mechanisms).

447. For background, see *supra* text accompanying notes 341-55.

based environmental program.[448] Finally, international trade policy must be changed to eliminate the concern that further financial burdens on U.S. farmers will put them at competitive disadvantages with less environmentally responsible countries.[449] Each of these initiatives involves major challenges, and they merit more complete coverage at a later time. But none of them is worth worrying about until we build the core of a federal environmental law for farms.

## CONCLUSION

I do not envy American farmers. They face dire economic circumstances, criticism from labor rights activists, animal rights activists, neighborhood activists, environmental activists, and an increasing industrialization and concentration of their livelihood that threatens their cherished ideals. Nevertheless, in addition to needing the food that farms produce, I also need the water, air, and land they pollute. The anti-law of farms and the environment has essentially left the balance between food and pollution up to farmers. It is no longer credible to suggest they have used that discretion wisely.

Because the debate about whether to forge a positive environmental law of farming needs to be put to rest once and for all, I have documented the environmental harms farms cause and the environmental safe harbors they enjoy. Based on that evidence, it is reasonable to ask farmers to leave their safe harbor and think unconventionally about farming and

448. For example, some states are experimenting with measures that place restrictions on how food processing companies deal with their farm feedlot contractors. *See, e.g., New NPDES Permit Condition to Hold Chicken Producers Accountable for Waste*, Daily Env't Rep. (BNA), Mar. 22, 1998, at A-2. Maryland proposes requiring producers to buy chickens only from growers who have an approved comprehensive nutrient management plan required by state law for any farm that uses animal manure or sludge as a fertilizer. *See id.* EPA recently has suggested that it will move in that direction with its CAFO regulations, or encourage states to do so generally. *See* GUIDANCE MANUAL AND EXAMPLE NPDES PERMIT FOR CONCENTRATED ANIMAL FEEDING OPERATIONS, *supra* note 309, at 2-10; Susan Bruninga, *Animal Waste Strategy to Recognize State Programs, Hold Corporations Liable*, 29 Env't Rep. (BNA) 2225 (1998) (discussing possible federal proposals to make processors co-permittees with CAFOs under NPDES program).

449. Trade liberalization and environmental protection have collided numerous times in the international arena; concerns that environmental standards will be used as non-tariff import barriers have made it increasingly difficult for a nation to impose strong domestic environmental responsibilities on its industries without exposing them to competitive disadvantages in international markets. *See* Steve Charnowitz, *Free Trade, Fair Trade, Green Trade: Defogging the Debate*, 27 CORNELL INT'L L.J. 459 (1994); Thomas Schoenbaum, *Free International Trade and Protection of the Environment: Irreconcilable Conflict?*, 86 AM. J. INT'L L. 700 (1992).

environmental policy.

I have sought to do so in this Article. Conventional, prescriptive, centrally-planned and rigidly-implemented environmental regulation is appropriate for only a small slice of the farm industry but can achieve significant benefits when applied to that narrow sector. For the rest of farming, the combination of information, tax, incentive, and trading programs I propose offers farmers opportunities to abate pollution flexibly and efficiently, rather than at the direction of bureaucrats. The question is whether the farm industry will use its substantial political clout to keep the debate at the "whether to" level, a battle they cannot win in the long run, or take action now in the "how to" debate to shape a positive environmental law of farming they can live with well into the future.