ENVIRONMENTAL WORKING GROUP

Losing Ground

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Acknowledgments

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The findings, conclusions and recommendations in this report are solely the responsibility of the Environmental Working Group.

Executive Summary

Across wide swaths of Iowa and other Corn Belt states, the rich, dark soil that made this region the nation's breadbasket is being swept away at rates many times higher than official estimates.

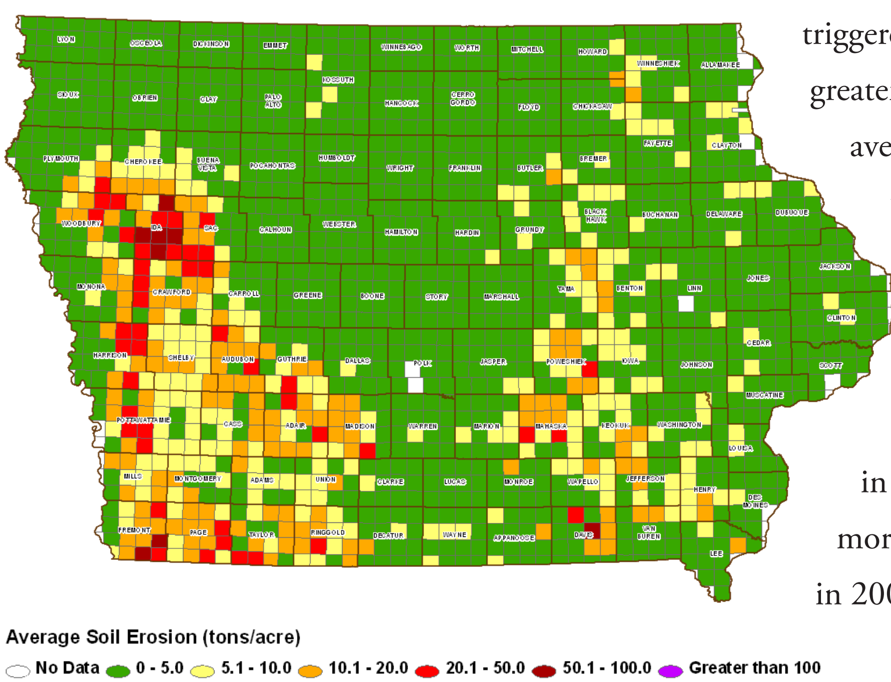
That is the disturbing picture revealed by Iowa State University (ISU) scientists tracking soil erosion in Iowa after every storm that hits the state, a method that produces an unprecedented degree of precision in soil erosion estimates. The Environmental Working Group corroborated the scientists' findings with aerial surveys that revealed striking visual evidence of the damage.

In April 2010, USDA's Natural Resources Conservation Service (NRCS) released data estimating the rate of soil erosion on agricultural land in the United States. On the surface, the data from the 2007 National Resources Inventory (NRI) were reassuring. Erosion in Iowa *averaged* 5.2 tons per acre per year, only slightly higher than the allegedly "sustainable" rate of five tons per acre per year for most Iowa soils — the amount that can supposedly be lost each year without reducing agricultural productivity. Across the entire Corn Belt, erosion averaged only 3.9 tons per acre per year, according to the NRCS data.

There is compelling evidence, however, that soil erosion and runoff from cropland are far worse than these estimates suggest. Indeed, it appears that the nation is losing ground in the decades-old fight to gain control over this most fundamental and damaging environmental problem in agriculture.

In some places in Iowa, recent storms have triggered soil losses that were 12 times greater than the federal government's average for the state, stripping up to 64 tons of soil per acre from the land, according to researchers using the new techniques. In contrast to the reassuring statewide averages, the new data indicate that farmland in 440 Iowa townships encompassing more than 10 million acres eroded faster in 2007 than the "sustainable" rate. In 220

Six million acres eroded at twice the "sustainable" rate in 2007.



townships totaling 6 million acres, the rate of soil loss was twice the "sustainable" level.

The aerial survey conducted by EWG in the spring of 2010 indicated that soil erosion and runoff are likely far worse than even the ISU numbers suggest, because researchers' current models do not account for the effect of widespread "ephemeral gullies." During heavy rains, these gullies reappear rapidly where farmers have tilled and planted over natural depressions in the land and form "pipelines" that swiftly carry away the water the earth cannot absorb.

The ISU data and EWG's survey reinforce long-standing doubts about the current system used to define the so-called "sustainable" level of erosion—how much soil loss the land can tolerate before it loses its ability to sustain a healthy crop. These "T values" are gauzy estimates at best, and there is substantial and growing evidence that they greatly overstate the ability of cropland to remain fertile in the face of the ravages of soil erosion and water runoff, especially at a time when a warming climate is producing ever more frequent severe storms. For lack of a better alternative, however, this report's discussion does use T values as a point of reference.

The runoff from vulnerable farmland not only washes away soil – the fertile legacy of thousands of years of geological processes — but also carries with it a potent cargo of fertilizers, pesticides and manure that flows into local creeks and streams and eventually into the Mississippi River. Ultimately it ends up in the Gulf of Mexico, generating the notorious dead zone — a zone of depleted oxygen that forms each year and suffocates marine life.

Gullies Scar Iowa Fields

Accelerating soil loss is being driven by federal farm policies that encourage and subsidize sowing commodity crops on even the most fragile terrain, as well as by intense rainstorms that occur with increasing frequency as Earth's climate warms. The recent history of severe springtime flooding across the Midwest is but the most immediate consequence of this trend, but the impact on the region's agriculture and environment will be the greater and more lasting disaster.

Meanwhile, efforts to curb soil erosion, many of them launched under a 1985 law that temporarily produced a 40 percent reduction in erosion and runoff from the most vulnerable cropland, have faltered badly. The backsliding began in 1996 when Congress made an abortive attempt to phase out the farm subsidy program, along with its soil conservation requirements. In the end, lawmakers instead returned to plowing billions into farmers' hands through ad hoc disaster payments. By 2002, they had restored the earlier farm subsidy program with a vengeance.

Although provisions of the 1985 farm bill remain on the books and require famers who accept subsidies to implement soil conservation measures on their most vulnerable cropland, official reports and anecdotal evidence show that enforcement has waned.

EWG's findings are an urgent reminder that the Corn Belt's carpet of immensely fertile soil, a resource that accumulated over millions of years before European settlers introduced organized agriculture, is not inexhaustible. From the Dust Bowl of the 1930s to the barren moonscapes of today's Haiti and Madagascar, history is littered with evidence that what nature has provided, unwise practices and policies can rapidly squander.

Today, the soil erosion problem in Iowa and nearby states is nowhere near the scale of those historic calamities, but the data show that the situation is getting worse. Chronically underfunded voluntary conservation programs are failing to blunt the damage caused by federal policies that push farmers to plant crops fencerow to fencerow.

Between 1997 and 2009, the government paid Iowa farmers $2.76 billion to put conservation practices in place. It paid out six times as much — $16.8 billion — in income, production and insurance subsidies that encouraged maximum-intensity planting, not conservation. Across the Corn Belt, the gap was even greater — $7.0 billion for conservation and $51.2 billion for income, production and insurance subsidies.

Gullies like those in these photos scarred most of the fields EWG surveyed in May 2010, visible evidence of serious erosion that is likely far in excess of rates considered "sustainable." Water that cuts gullies into unprotected fields carries with it mud, fertilizers, pesticides, herbicides and sometimes bacteria. As in these photos, many gullies empty directly into streams or ditches, becoming direct pipelines carrying polluted runoff to waterways. Polluted agricultural runoff is the single most important source of water pollution in Iowa and the nation.

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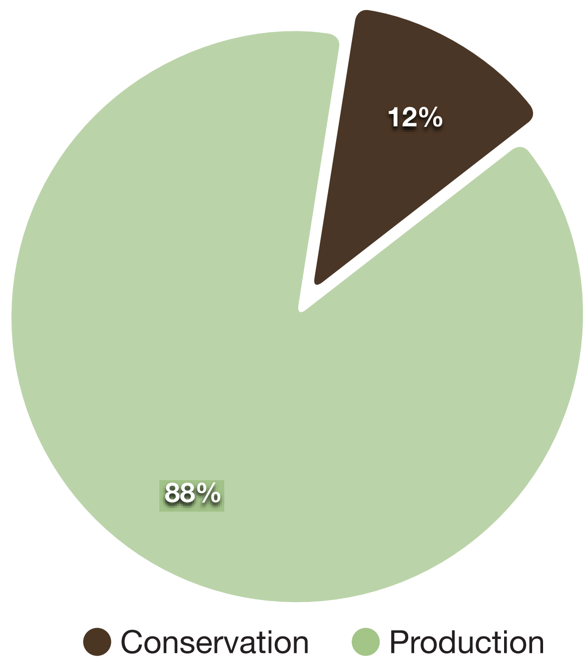
The $18.9 billion spent to subsidize expansion of the corn ethanol industry, along with misguided federal mandates to produce increasing amounts of ethanol, further increase the pressure to intensify production.

To turn this situation around, the US Department of Agriculture (USDA) must step up enforcement of the groundbreaking 1985 farm bill provision — called conservation compliance — that required producers to take action to conserve soil in order to stay eligible for billions in farm subsidies. USDA must increase its annual inspections to determine whether producers are maintaining the required soil conservation practices and must make full use of its authority to impose graduated penalties on farmers who fail to keep the required practices in place.

In addition, EWG believes that Congress must:

- Reopen and revise all the legacy conservation compliance soil conservation plans approved and applied before July 3, 1996, requiring that they reduce erosion to a truly "sustainable" level and prevent ephemeral gully erosion on highly erodible cropland.
- Require treatment and/or prevention of ephemeral gully erosion on *all* agricultural land — not just highly erodible land — owned by producers or landlords receiving income, production, insurance or conservation subsidies.
- Require vegetative buffer zones at least 35 feet wide between row crops and all lakes, rivers and smaller streams.
- Require all producers participating in existing or new crop and revenue insurance programs to meet conservation compliance standards.
- Ensure that farmers who convert native prairie or rangeland to row crops are not eligible to receive income, production, insurance or conservation subsidies on those acres.
- Adequately fund the USDA technical staff — out of funds for programs covered by compliance provisions — so it can plan and implement the required conservation practices and conduct annual inspections to certify that those practices are in place.

Seven times more subsidies for all-out production than conservation (1997 to 2009)



Fooling Ourselves

In April 2010, USDA's Natural Resources Conservation Service (NRCS) released data estimating the rate of soil erosion on agricultural land in the United States.[1] On the surface, the data from the 2007 National Resources Inventory (NRI) were reassuring. Erosion in Iowa *averaged* 5.2 tons per acre per year, only slightly higher than the allegedly "sustainable" rate of 5 tons per acre per year. Across the entire Corn Belt, erosion averaged only 3.9 tons per acre per year.

Scientists tracking soil erosion in Iowa, however, are producing compelling evidence that soil erosion and runoff from cropland are far worse than these estimates suggest. These new data count the amount of soil lost after each storm that hits the state and produce a far more detailed picture of erosion's toll on soil and water. These numbers are far more informative than the superficially reassuring national, regional or statewide averages of soil erosion. There is every reason to expect that applying the Iowa project's methods to other states would reveal the same disturbing picture.

Averaging soil erosion over states, regions or the nation obscures the real situation, because erosion and polluted runoff do not occur "on average." They occur when it rains. How much rain falls, how fast it falls, how wet the soil was before it started raining, how steeply the field slopes, how prone the field is to forming gullies, how much the soil is covered by a growing crop or crop residues, how well the field and adjacent streams are protected by conservation practices — all these factors determine how much damage is done by any one storm.

The new, more precise estimates of erosion — corroborated by EWG with aerial surveys that produced striking visual evidence of the damage — make it clear that farmers and policy makers must do much more to protect agricultural land from this old enemy. Indeed, it appears that the nation is losing ground in the decades-old fight to gain control over this most fundamental and damaging environmental problem in agriculture.

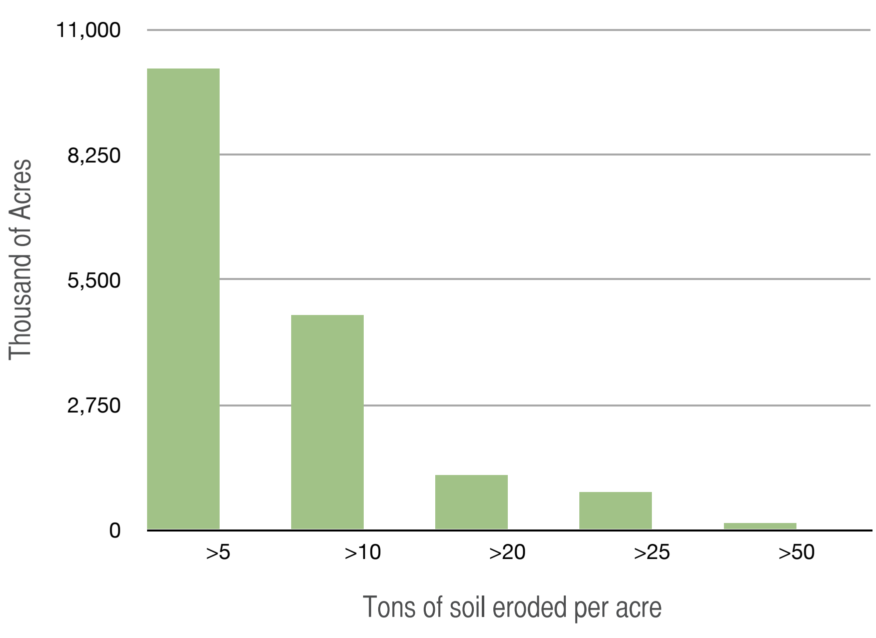
Events versus Averages

The Iowa Daily Erosion Project (IDEP), led by Iowa State University (ISU) scientists working with a long list of partners, is producing compelling evidence that soil erosion is far worse than the National Resources Inventory (NRI) estimates. Combining information on daily rainfall amounts, soil type, slope, crop rotation and conservation practices, the project is able to generate — for the first time ever — detailed estimates of erosion caused by each individual storm that hits Iowa over the course of a year.[2] The scientists then estimate minimum, average and maximum rates of soil erosion and runoff that likely occurred on agricultural land (cropland, pasture, hay fields) in each of 1,570 Iowa townships after each storm (see sidebar, page 11).

The project has built the most significant new tool for measuring soil erosion since the NRI was developed in the 1980s. The inventory, which set up a system of collecting data on wind, water, soil type and land use changes at some 800,000 points across the country, revealed for the first time that some farmed areas were eroding far more rapidly than others. That allowed policymakers and program managers to target conservation efforts on the most sensitive areas and led, for a time, to significant progress in slowing erosion rates.

The new techniques developed at Iowa State are an advance of similar importance, yielding dramatic new insights into the pace and location of severe erosion events. This far more precise information shows that larger storms can cause serious damage that is largely obscured by the long-term, statewide averages generated by the NRI. These new data produce a detailed picture of the toll erosion takes on soil and water — down to the level of individual townships — and make clear that farmers and policymakers must do much more to protect agricultural land from this old enemy.

Figure 1: Millions of acres in Iowa eroded at more than 5 tons per acre — the so-called "sustainable" rate — in 2007.



Source: Iowa Daily Erosion Project

Townships are key components of the Public Land Survey System (PLSS), which is regulated by the U.S. Department of Interior's Bureau of Land Management.[3] Each township is a square six miles long by six miles wide, made up of 36 smaller squares called sections that are each one square mile in size. A section encompasses 640 acres. A township encompasses 23,040 acres. (An acre is about the size of a football field.) The Daily Erosion Project does not report how many acres in each township are farmed, but agriculture dominates the Iowa landscape.

In 2002, 88 percent of Iowa's land was in cropland, pasture or hay. There or water covered 9 percent, and 3 percent was urban. The project does not report estimates of soil erosion and runoff from predominantly urban townships.[4]

By focusing on individual storms, the project produces much more detailed and accurate estimates of soil erosion than the statewide average annual estimates produced by the National Resources Inventory.

The picture that emerges is alarming.

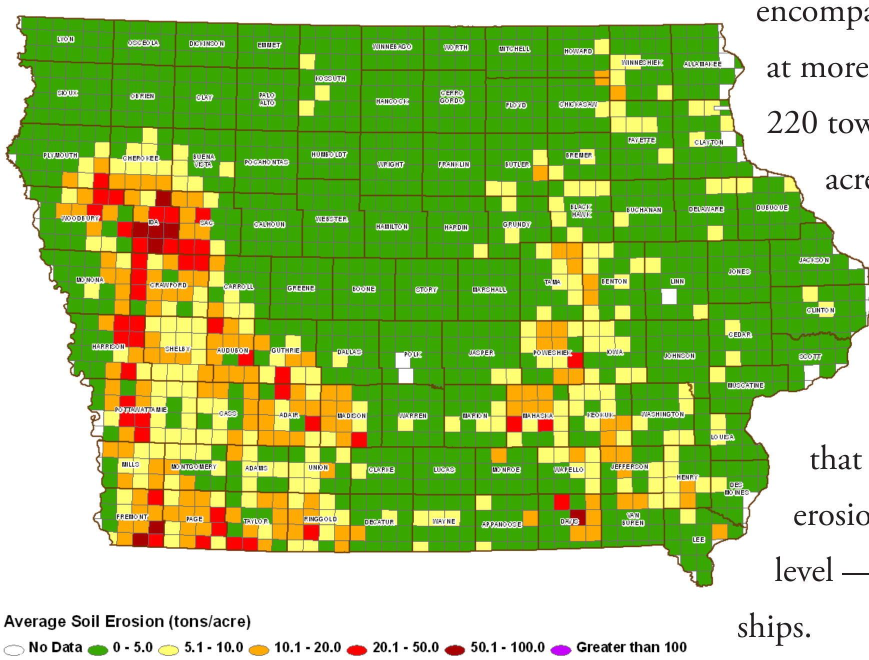
In 2007, the project estimated that storms resulted in rates of soil erosion in some townships ranging up to more than 64 tons per acre per year. That figure is 12 times greater than the statewide average annual erosion rate of 5.2 tons per acre per year estimated by the Inventory. The project estimates that agricultural fields in 440 townships encompassing 10.1 million acres may have suffered erosion at rates greater than the NRI statewide average and that eight townships encompassing 184,000 acres experienced utterly disastrous *average* erosion rates exceeding 50 tons per acre (Figure 1).

Statewide erosion averages — by necessity — provide a very poor picture of what is actually happening across large areas of Iowa or any other state or region. The *statewide* average erosion for agricultural land in 2007, according to IDEP data, was only 4.7 tons per acre — less than the amount reported by the 2007 Inventory.

The statewide average was low despite the likelihood that agricultural land in 440 townships encompassing more than 10 million acres eroded at more than the "sustainable" rate, and land in 220 townships encompassing almost 6 million acres likely eroded at twice the "sustainable" rate (Figure 2).

Iowa and its neighboring states experience multiple erosive rainfall events each year. Adding up the erosion that likely occurred in each storm reveals that erosion frequently exceeds the "sustainable" level — often by several times — in many townships.

Figure 2: Millions of Iowa acres eroded faster than the "sustainable" rate in 2007.



The Iowa Daily Erosion Project

The Iowa Daily Erosion Project is a collaboration of scientists at Iowa State University, USDA's National Soil Erosion Research Lab, USDA 's National Laboratory for Agriculture and the Environment and the University of Iowa (http://wepp.mesonet.agron.iastate.edu/). The project is designed to produce daily estimates for rainfall, runoff and soil erosion for the State of Iowa.

The project was developed because important factors that determine rates of erosion and runoff from agricultural fields, such as soil type, slope steepness and length, crops planted and conservation practices, vary greatly across the landscape. Moreover, localized heavy rainstorms commonly occur in Iowa and in other Corn Belt states. As a result, localized soil erosion losses and runoff volumes can be extreme. Most estimates of soil erosion and runoff, however, are based on rainfall amounts that are averaged over many years. Such long-term averages miss the effect of the highly variable and extreme rainfall events that cause the most damage from erosion and runoff in agricultural watersheds.

The Iowa Daily Erosion Project uses the Water Erosion Prediction Project (WEPP) model for estimating soil erosion and runoff from agricultural fields, including cropland planted to row crops or hay and pasture. Key information regarding topography, soils, crop rotations and management practices are taken from USDA's Natural Resources Conservation Service, 1997 National Resources Inventory (NRI). That information is coupled with rainfall amounts and other weather data provided by NEXRAD precipitation radar and the Iowa Environmental Mesonet (http://mesonet.agron.iastate.edu/).

The project uses information from 17,848 NRI sample sites in Iowa that include agricultural land. USDA provides information about NRI sample points within each 36-square mile township, but does not reveal the precise locations of NRI sample points within those townships. The rainfall data is provided in 15-minute intervals every day in the Hydrologic Rainfall Analysis Project (HRAP) projection grid. Each grid cell is about 2.5 miles by 2.5 miles in area.

Because the 6 by 6 mile township grid does not line up precisely with the 2.5 by 2.5 mile HRAP grid, the project uses a statistical procedure to estimate the erosion and runoff that likely occurred during a storm. Each HRAP grid cell is assigned to the township that contains its center point. Then all of the possible combinations of rainfall amounts and information from NRI points in a township are modeled in WEPP. The result is a large distribution of possible rates of erosion and runoff volumes for each township each day. The project reports that the average of all those possible erosion and runoff amounts as well as the maximum and minimum erosion and runoff prediction for each township each day.

As is the case with all the models currently used in conservation planning or national assessments, the model results are estimates of the erosion and runoff that likely occurred based on the combination of rainfall intensity and land characteristics in a particular township. The minimum estimate of erosion and runoff is best thought of as the best-case scenario—the erosion and runoff resulting from the least amount of rainfall falling on the least vulnerable or best protected agricultural land in the township. The maximum estimate of erosion and runoff is the worst-case scenario resulting from the most intensive rainfall falling on the most vulnerable or least protected land in the township. Both minimum and maximum erosion and runoff events likely occurred somewhere in the township during the same storm. The reported averages give an indication of the general risk of erosion and runoff across all agricultural land in a township during a particular storm.

The biggest problem that confronts the Iowa Daily Erosion Project is the lack of current, comprehensive and site-specific information about the presence or absence of conservation practices on the Iowa landscape. The lack of such information hampers all efforts to get an accurate and up-to-date picture of the health of Iowa's soil, waterways, and watersheds.

Surveys of conservation tillage completed by the Conservation Technology Information Center (CTIC), however, suggest that there has been relatively little increase in the percent of crop fields on which farmers practice conservation tillage.[5] The CTIC survey found that conservation tillage was used on 37 percent of crop acres in 1998. That percentage had grown to 42 percent in 2008. This is a welcome but not dramatic change from the situation in 1997 – the year used by IDEP to make its estimates of soil erosion following storms in Iowa.

***Source:** R. Cruse, D. Flanagan, J. Frankenberger, B. Gelder, D. Herzmann, D. James, W. Krakewski, M Kraszewski, J. Laflen, J. Opsomer, and D. Todey. 2006. Daily estimates of rainfall, water runoff, and soil erosion in Iowa, Journal of Soil and Water Conservation 61(4):191-199.*

Figure 3: Townships (36 square miles) where average erosion exceeded the "sustainable" rate

Year	> 5 Tons	> 10 Tons	>20 Tons	> 25 Tons	> 50 Tons
2002	360	126	25	11	0
2003	100	22	2	2	1
2004	184	48	1	0	0
2005	26	3	0	0	0
2006	0	0	0	0	0
2007	440	205	52	36	8
2008	606	305	84	44	3
2009	641	395	160	117	30
2010	133	41	8	3	0

Source: Iowa Daily Erosion Project

As Figure 3 shows, average soil erosion exceeded the "sustainable" rate in at least some townships every year except 2006. Agricultural land in six townships (encompassing about 138,000 acres) risked absolutely disastrous *average* erosion rates exceeding 100 tons per acre.

Cropland that sheds soil also sheds a great deal of water, often polluted with fertilizers, manure and pesticides. The volume of polluted water running off agricultural land varies dramatically depending on the time of year. In 2009 — the wettest year between 2002 and 2010 — runoff from agricultural land in 1,502 townships (encompassing 34.6 million acres, essentially the entire state) exceeded 136,000 gallons per acre. Runoff in 956 townships (22.0 million acres) exceeded 271,000 gallons per acre, and in 141 townships (3.2 million acres) it exceeded 543,000 gallons per acre. Total runoff was greater in 2009 and 2007 than in 2008, the year of devastating floods in eastern Iowa, which illustrates the importance of the timing and location of storms. In 2006, a dry year, runoff from agricultural land never exceeded 136,000 gallons.

Over time, almost all agricultural land sheds large quantities of runoff, just as it suffers large amounts of erosion. Between 2002 and 2010, for example, runoff from agricultural land in 1,393 townships (32 million acres) exceeded 543,000 gallons per acre; runoff exceeded 1 million gallons per acre in townships encompassing 9.4 million acres.

Perfect Storms

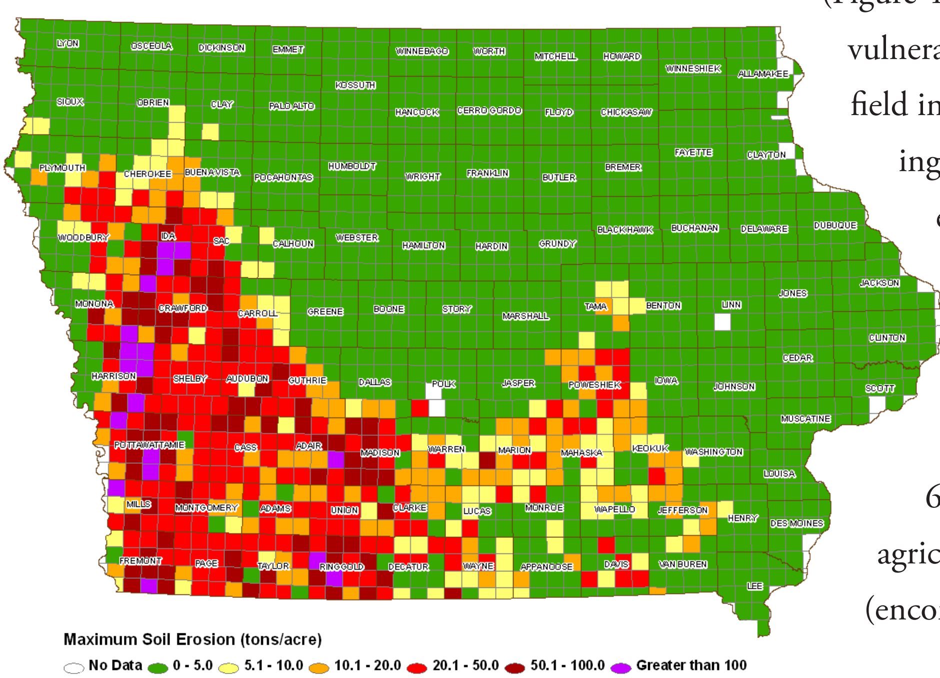
Intense storms that cause significant soil erosion and polluted runoff are frequent events in Iowa and are becoming more so all across the Corn Belt.[6]

A severe storm over poorly protected soil can cause permanent and irreversible damage in a single day — or even a few hours. Spring is the most dangerous season for soil erosion and runoff. The danger is greater if melting snow has already saturated the soil; more rain runs off than soaks in. No crop roots are there to stabilize the soil and take up water. Unless good soil conservation practices are in place, spring storms can, and often do, result in heavy runoff accompanied by severe soil erosion.

Over three days in 2007 (May 5-7), such a storm pummeled large portions of southwest Iowa. According to IDEP, average erosion exceeded "sustainable" rates in 198 townships (4.6 million acres). On May 6, the worst day, 182 townships encompassing 4.2 million acres suffered erosion exceeding the "sustainable" rate for an entire year. In 69 townships (1.6 million acres), soil eroded at twice the "sustainable" rate, an average of 10 tons per acre. In 14 townships (323,000 acres), the rate was more than 20 tons per acre.

The estimates of soil erosion averaged over a township can obscure much more extreme damage to the most vulnerable cropland. The maximum rates of erosion reported by IDEP occur on the single most vulnerable and poorly protected crop field represented by an NRI sample point in the township. The same storm will cause far less erosion on a pasture or a hayfield than on cropland because the grass cover provides much more protection than crop residue. Steeply sloping cropland, unprotected by good conservation practices, will erode dramatically. And the amount of polluted runoff will be much greater.

Figure 4: In early May 2007, a single storm eroded up to 100 tons of soil per acre.



The worst-case scenario painted by IDEP for the May 5-7, 2007, storm is truly sobering (Figure 4). In just three days, the single most vulnerable and poorly protected agricultural field in each of 665 townships (encompassing 15.3 million acres) may have suffered erosion at rates that exceeded the estimated *annual* T value. In 446 townships (encompassing 10.3 million acres), a year's erosion occurred on a single day — May 6. On that day, the most vulnerable agricultural field in each of 230 townships (encompassing 5.3 million acres) may have eroded at rates above 20 tons per acre. The single most vulnerable and poorly protected field in 10 townships (encompassing 230,000 acres) may have eroded at a catastrophic rate of 100 tons per acre in a single day.

IDEP statistical analyses cannot determine how representative the single most vulnerable and unprotected field is of other fields in each township. It is possible that there are no other fields that are as vulnerable and poorly protected. It is also possible that there are many. What the project's results do tell us is that a single storm can cause catastrophic damage on any poorly protected field.

Averages Mask Serious Problems

From early spring to the beginning of July, intense rainstorms, many of which are localized, cause extensive rill and gully erosion on Iowa farm fields. Such large erosion events are random. They don't happen every year, but when they do, they are significant. Even when experts declare average soil loss to be less than the soil loss tolerance or "T" value, some places are losing significant amounts of soil.

Only soils with dense vegetative cover are completely protected from soil erosion, and corn-bean ground is virtually bare from November through the end of June, when the crop canopy begins to close up. Even with no-till, terraces, grassed waterways, and all the other best management practices (BMPs), we can't escape this fact.

High-intensity rainstorms are predicted to increase in frequency because of climate change. Iowa must thus confront the potential for even more soil erosion if it is to attempt to reduce flooding and begin to improve water quality in the state's lakes and streams.

Laura L. Jackson, Professor of Biology
University of Northern Iowa, Cedar Falls

Gullies Ignored

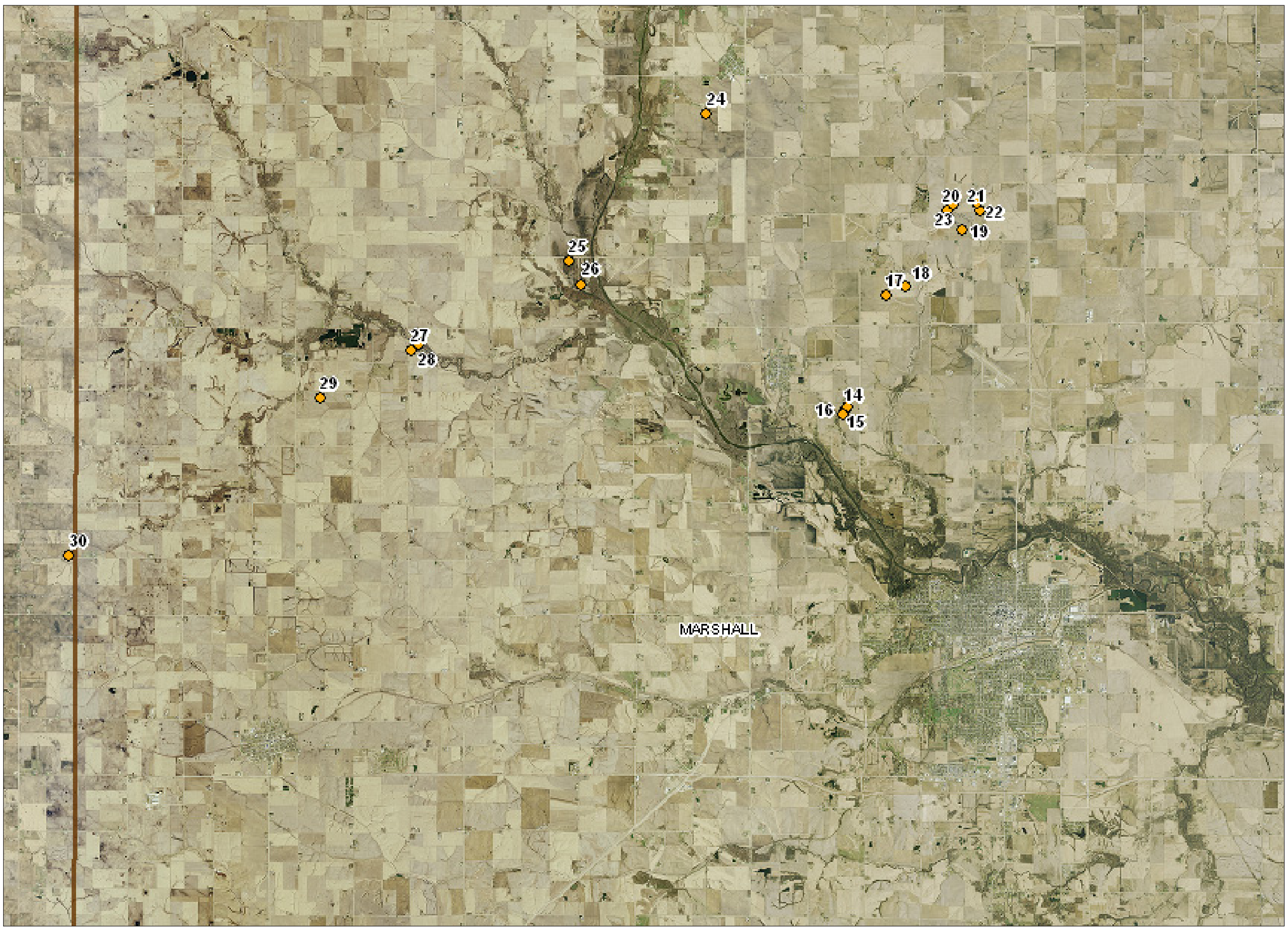
Soil erosion and runoff are actually worse — likely far worse — than even the alarming IDEP estimates because the currently available models cannot account for the erosion caused by ephemeral gullies. They are called "ephemeral" because tillage temporarily obliterates them, but they quickly reappear after the next storm.

Surprisingly little research or monitoring has been done to determine the impact of ephemeral gullies on erosion. A 2008 study published in the *Journal of Soil and Water Conservation* that simulated erosion in ephemeral gullies reported rates ranging from 2.23 tons to 4.91 tons per acre per year.[7] A survey conducted by the Natural Resources Conservation Service found that the erosion in ephemeral gullies ranged from 1.22 tons per acre per year in Michigan to 12.8 tons in Virginia.[8] This report concluded that if ephemeral gully erosion were included in national estimates, reported soil loss could more than double.

Aftermath of a Storm

On May 27, 2010, EWG staff and a cameraman climbed into a helicopter in Ames, Iowa, to look for signs of soil erosion and water runoff caused by a rainstorm two days earlier. We didn't have to fly far or long to find them. Everywhere we looked, recently planted fields of corn and soybeans were etched with dark gullies. Indeed, this telltale signature of erosion and runoff was evident even before we got to our original destination — an area of Marshall County (just 40 miles east of Ames) where rain had fallen two days earlier.

Figure 5: EWG's Aerial Survey



On May 27, 2010, EWG staff flew over a small area of Marshall County, Iowa, looking for telltale signs of severe erosion two days after rain fell on newly planted crop fields. Orange dots in this 2009 aerial photo show the locations where video photography documented what we saw.

The May 25 rainstorm was not unusually heavy for Iowa in the spring. According to rainfall data collected by the Iowa Environmental Mesonet, the rainfall that day ranged from 0.25 to 1.65 inches in the area surveyed.[9] A heavier storm two weeks earlier (May 12) produced an average of 1.45 to 1.93 inches in the area and may also have contributed to the obvious signs of erosion, runoff and gullying.

Storms that produce two inches or more of rain are common. Six occurred in Iowa in April 2010, three in May, 14 in June, 15 in July, 10 in August, six in September, one in October and one in November. The heaviest downpours occurred after EWG's May 27 aerial survey.

Figure 6: Gullies Everywhere

Gullies cut into crop fields like those in these photos scarred most of the fields EWG surveyed, visible evidence of serious erosion that is likely far in excess of rates considered "sustainable." Gullies form when rainwater flowing over a field concentrates into narrow channels that strip away soil and even newly emerged plants. Farmers till the soil each year to fill in the gullies, but this practice makes them more vulnerable to erosion the next spring.

Video: 6A

Video: 6B

Figure 7: Pollution Pipeline

Water cutting gullies into unprotected fields carries mud, fertilizers, pesticides and sometimes bacteria. As in these photos, many gullies empty directly into streams or ditches, becoming direct pipelines carrying polluted runoff to waterways. Polluted runoff from crop fields is the single most important source of water pollution in Iowa and the nation.

Video: 7A

Video: 7B

Figure 8: Fields in Streams

These photos show plowing and planting right next to ditches and streams, practices that greatly increase the chances that mud, farm chemicals and bacteria will end up in waterways. Crops and soil carrying fertilizers and chemicals flow directly into streams. Scenes like these are troublingly common.

Video: 8A

Video: 8B

Figure 9: Gullies Visible in Most Crop Fields

This April 2009 aerial image makes clear that what EWG researchers saw in 2010 was not unusual. The faint outlines of gullies, like those highlighted in red on the photo, are etched visibly into most crop fields. Highlighted in blue are a few waterways that have been seeded with grasses, a highly effective practice that heals gullies and protects waterways. Rather than using such methods, however, many farmers fill in these gullies with soil every year, only to have them erode again during the next storm. The repeated filling and reforming of gullies sends a steady stream of mud and polluted runoff to streams and rivers.

One Large "Construction Site"

Every spring in Iowa, we create the equivalent of a 20-million-plus-acre construction site with soils highly vulnerable to being washed away. It is common to see erosion's ugly scars on the state's farm fields — deep rills and gullies several feet deep after a 3-to-4 inch rain.

Over the last hundred years, Iowa has lost a significant portion of its most important treasure, the gift of excellent soil — the miracle that sustains us. Four inches of rain over two days is normal for our region of the world, but severe soil erosion caused by your basic spring showers is not.

We say we love America, but we are eroding its flesh and desecrating its waters by overt and careless acts. In spite of all the talk about conservation and stewardship, the obvious scenes of soil loss and evidence of polluted streams speak for themselves. By not doing our best to protect our soil and water, we in effect dishonor America and those before us who sacrificed so much. As Wendell Berry asked, to what extent do we defend against foreign enemies a country that we are ourselves destroying?

I admire farmers who practice long crop rotations, protecting the soils with deep-rooted crops, using few or no pesticides, and apply all other practices that enhance soil and water quality. If only our policymakers would structure markets and create public policies that encourage soil and water stewardship.

Kamyar Enshayan, Director,
Center for Energy & Environmental Education,
University of Northern Iowa, Cedar Falls

Erosion Adds Up

Looking at soil erosion and runoff storm-by-storm paints a troubling picture of the health of Iowa's soil, watersheds and waterways. The picture becomes even more disturbing when one studies the situation over a number of years (Figure 10). Agricultural land that escapes damaging erosion one year may well suffer badly the next. Over time, few plots of land manage to escape damaging storms. Moreover, many townships appear at risk of severe erosion year after year. Agricultural land in 258 townships (5.9 million acres) likely suffered erosion of five tons per acre in four of the nine years from 2002 to 2010. Agricultural land in 27 townships (622,000 acres) suffered that rate of erosion in seven of those years.

Total *average* erosion between 2002 and 2010 exceeded 20 tons per acre on agricultural land in 730 townships (16.8 million acres). Total *average* erosion exceeded 50 tons per acre in 257 townships (5.9 million acres) and 100 ton s per acre in 61 townships (1.4 million acres). *Average* erosion of this magnitude means that highly vulnerable and poorly protected land must have suffered serious damage, perhaps on more than one occasion, over the nine years.

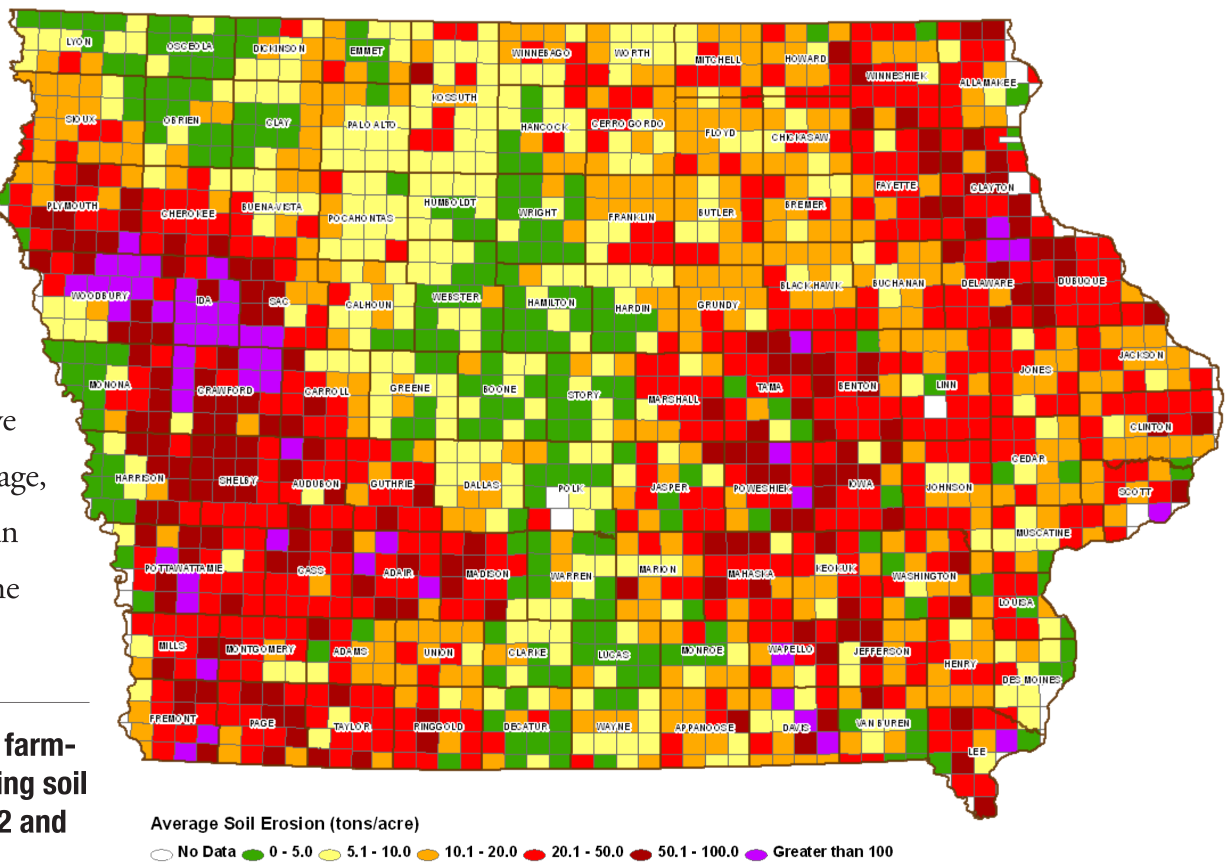


Figure 10: Most Iowa farmland suffered damaging soil erosion between 2002 and 2010.

Erosion's Long, Destructive Train

The gullies and unprotected stream banks captured by EWG's aerial survey are the beginnings of a long train of polluted water and degraded soils that stretches from Minnesota to the dead zone in the Gulf of Mexico.

Polluted Runoff

The sheer quantity of runoff can be enormous. A half inch of water running off a 40-acre crop field — small by Iowa standards — amounts to 543,000 gallons, almost enough to fill an Olympic-sized pool (660,000 gallons). The May 25 storm produced runoff ranging up to 10,500 gallons per acre in the area EWG surveyed. The more intense May 12 storm produced up to 19,800 gallons per acre, and downpours often result in far larger volumes.

Gullies like those observed in Marshall County are pipelines that carry mud, fertilizers, pesticides, manure — essentially anything that is applied to a crop field — into streams.

The pipeline is especially damaging when a gully runs right into a stream or ditch, as was often the case on the fields EWG surveyed. NRCS scientists estimate that 50- to- 90 percent of the soil in such gullies ends up in streams.[10] The amounts can be huge. A gully 3 inches deep, 2 feet wide and 100 yards long represents 6.8 tons of eroded soil, more than the load of a typical single-axle dump truck.

Farmers routinely fill in gullies in order to smooth out their fields. This practice keeps supplying more and more soft, erodible soil to the gully — soil that ends up in a stream when the next storm hits. Cumulative soil losses worsen dramatically as gullies are refilled and eroded over and over again.[11]

Sediment — mud — is itself a pollutant, as well as a carrier of other contaminants. Muddy water degrades fish habitat and clogs water treatment plants. Sediment is the most widespread pollutant damaging rivers and streams, according to the U.S. Environmental Protection Agency (EPA), and agriculture is the primary source.[12]

The water and mud running off crop fields carry with them a potent stew of pesticides, fertilizers, manure, bacteria and other pollutants.

According to the Iowa Policy Project, Iowa farmers apply 1.7 billion pounds of nitrogen and 635 million pounds of phosphorus to corn and soybean fields each year.[13] USDA's National Agricultural Statistics Service (NASS) reported that in 2005[14] — the latest year for which data are available — Iowa farmers used 14 different herbicides, including 2,4-D, acetochlor, atrazine, dicamba and glyphosate. Iowa also produces about 286 million tons of manure each year, most of which ends up on crop fields.[15]

A Glass Half Full…or Half Empty

I've always anguished over a half-full glass. One day, as I drive across our state, the land looks good; the next day all I see are imperfections. I honestly think we're doing better today than we did when I started farming 35 years ago. The Upper Iowa River is running clearer, gullies are smaller, and the soil has more crop residue left on it at the end of the year. Most farmers don't plow as close to their streams as they once did, and it's not unusual to see well-positioned vegetative strips on contoured hillsides. Some farmers clearly know how to farm well and have the tools to do so.

But the age-old problem of poor farming persists. Drive down any back road in Iowa today and chances are good that within a few miles you'll see some of the finest conservation and then some of the worst.

With the intense rainstorms that have hit our state over the last couple of years, I'm convinced that we're getting more careless, assuming always that we'll have an average or better than average spring. Then, wham! We're hit with a gully-washer, and we all wring our hands and say it was nature's fault, not ours. In other words, we are conservation planning for averages, not extremes. But nature doesn't seem to work that way. We need to rethink and upgrade our standards.

In recent years, on large sloping fields, we're seeing more and more black stripes where there should be grassed waterways. Those stripes represent plowed-in gullies. Because we're usually more concerned about sheet and rill erosion, "waterway gullies" are often seen as a normal cost of doing business.

One of the saddest sights I've seen was during springtime in southeastern Iowa a couple years ago. Field after field had dozers working up and down hills to fill in the deep gullies formed by the unusually hard spring rains. Last year, I drove through the same area and saw precious few well-constructed waterways. It's as if the farmers have decided that their one-in-a-hundred-year flood was past and they don't have to worry for another 99 years.

Frankly, I don't think our soil erosion problems need to be what they are. Many farmers do well but are not praised for it. On the other hand, the careless ones and those who might be termed outright vandals no longer even get their knuckles rapped. Voluntary conservation works well, but only if it's proactive. Our compliance laws can still work, too, but they need to be universal—applied to all cropland—and enforced.

Paul W. Johnson, Farmer and Former Chief,
U.S. Department of Agriculture,
Natural Resources Conservation Service,
Decorah, Iowa

In a seven-month period in 2008, an interdisciplinary team of scientists at Iowa State University studying runoff from small watersheds measured cumulative sediment loads of 10.8 tons per acre and phosphorus losses of 30 pounds per acre.[16]

This brew of fertilizers, manure, pesticides, bacteria and mud does serious harm to streams, lakes and rivers. The organic matter in rich topsoil, along with the nitrogen and phosphorus in fertilizers, spawns noxious algal blooms downstream and damages fisheries. The algal blooms kill fish by reducing the amount of oxygen in the water. Outbreaks of blue-green algae (cyanobacteria), which release chemicals that are toxic to people and animals, are particularly harmful.[17&18] Fields treated with manure commonly shed large amounts of *E. coli*, a type of bacteria that indicates fecal contamination. EPA guidelines consider water unsafe for swimming if there are more than 126 "colony forming units" or "cells" of *E. coli* in 100 milliliters (ml) of water.[19] Agricultural runoff often contains much higher concentrations of *E. coli*. One study measured 86,645 cells per 100 ml in water running off a crop field in Iowa.[20]

Agricultural runoff is a major contributor to the poor scores of Iowa's streams and rivers, measured by a water quality index maintained by the Iowa Department of Natural Resources. In 10 years of monitoring at 90 sites around the state, the index gave no site an excellent water quality rating; only two were ranked good. Seventeen were rated fair, 67 poor and 4 very poor.[21]

Nationwide, the impact is staggering. Among the documented problems in which agricultural runoff plays a critical role:

- 100 percent increase in drinking water violations because of nitrate contamination between 1998 and 2008;[22]
- nitrate contamination in 72 percent of 2,100 private wells sampled by the U.S. Geological Survey between 1991 and 2004;[23]
- 104,321 miles of rivers and streams rated as impaired;[24]
- 1,579,540 acres of impaired lakes, reservoirs and ponds;[25]
- 2,885 square miles of impaired bays and estuaries;[26]
- 383,822 acres of impaired wetlands.[27]

Do Farmers and Landowners Really See What Is Happening?

Iowa is getting more precipitation, more frequent rains and heavier rainfalls than when I was a farm boy in the 1950s and 1960s. Even then, I knew if we tilled through a swale that should have been kept in sod we would watch that soil wash away the rest of the year. It was very predictable then that concentrated runoff would carry the soil downstream, and it is even more predictable with the weather we have now. Some of the worst soil erosion now comes from heavy rains in late winter after freeze-thaw cycles have loosened the soil.

Each spring too many farmers still use their tillage equipment to fill in ephemeral gullies so they can plant through them another year. I wonder if the landowners are not watching, don't understand or just don't care. Most of Iowa's farmland is rented; about half was inherited or purchased for investment; and about one-third of landlords live out of state or far away from the farm.

Iowa's weather is changing and so is farmland ownership. Society can no longer assume that landowners see or comprehend what is happening with their precious land and with our priceless waters. Government needs to step up enforcement of soil conservation laws, especially with absentee landlords who are not around to see and be responsible for what is happening.

Duane Sand
Iowa Natural Heritage Foundation
Des Moines, Iowa

The fouled water flows downstream to the Gulf of Mexico, contributing to the largest dead zone in U.S. coastal waters and the second largest in the world.[28] The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force set a goal of reducing the size of the dead zone to less than 1,900 square miles, but since 1990 the dead zone has been larger than that every year except 2000. From 2003 to 2007, the five-year average was 5,600 square miles, more than twice the goal.[29]

In 2010 the dead zone swelled to 7,722 square miles, about the size of New Jersey.[30]

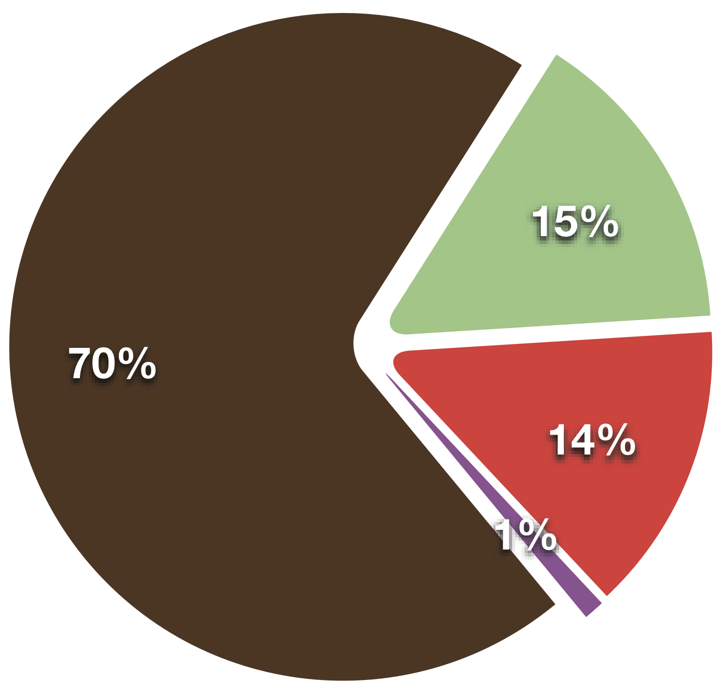
The "Tolerable" Erosion Myth

Conventional wisdom holds that there is some rate of soil erosion that can be tolerated before the productivity of the soil is damaged. This so-called "soil loss tolerance level" or "T value" is expressed as a number from one to five, representing an estimate of how many tons of soil can be lost per acre in a year without diminishing the land's fertility. The rate of reduction in soil depth reflected by the T value supposedly matches the offsetting growth in soil depth through natural processes of soil formation.

The Natural Resources Conservation Service establishes T values based on information from soil surveys. T values are higher, meaning more soil erosion can be tolerated, on deeper soils. In Iowa, T values range from one to five tons per acre per year. About 70 percent of Iowa soils have a T value of 5 tons. Less than 1 percent is assigned T values of less than two tons per acre per year (Figure 11).

However, the very notion of tolerable rates of soil erosion has been seriously questioned for decades. In 1987, retired soil conservation specialist L. C. Johnson, formerly with the USDA's Cooperative Extension Service, wrote in the *Journal of Soil and Water Conservation*: "The concept of tolerable soil loss, as now applied in soil conservation programs, does not serve the long-term interest of mankind in assuring the indefinite productive capability of cropland. Why? Because soil loss tolerances — T

Figure 11: Most Iowa soil loss tolerance levels (T values) are set at 5 tons/acre/year.



Source: Personal communication with Douglas Oelmann, Soil Scientist, Iowa Natural Resources Conservation Service.

values — presently assigned to cropland soils are based on faulty premises concerning rates of topsoil development and mineral weathering processes."[31]

How to put specific values on tolerable rates of soil erosion has been even more hotly debated, and today most scientists have concluded that current T values far exceed actual soil formation rates. In a 1982 paper published in an American Society of Agronomy publication, T. J. Logan estimated that most soil formation occurs at rates of less than 0.2 tons per acre per year.[32] A T value of five tons per acre per year is 25 times greater than that.

Moreover, T values say nothing about the impact of soil erosion on water pollution and other environmental consequences. Five tons of soil would fall just short of filling the bed of a single axle dump truck. A 160-acre crop field losing soil at far less than five tons per acre can deliver large amounts of sediment — mud that smothers aquatic life — to streams, lakes and rivers. Attached to the mud particles are many of the chemicals commonly applied each year to crop fields. And T values tell us nothing at all about the large volumes of polluted water running off crop fields.

Despite these deficiencies, T values are the only commonly used standards available for soil erosion calculations, so EWG uses them in this report. We present most of the data in relation to the most common T value applied to Iowa soils — five tons per acre per year — despite convincing evidence that this standard does not protect the long-term health of soils or of lakes, streams and rivers.

Our detailed analyses of soil erosion reveal that, far too often, soil is likely eroding at rates much greater than five tons per acre — the allegedly "sustainable" rate for most Iowa soils.

Simple Practices… Big Improvement

The year-after-year destruction of poorly protected land is all the more intolerable because simple conservation practices would make a big difference. Perhaps the simplest but most highly effective practice is to plant strips of grass or trees within or along the edges of crop fields. Grass strips are called filter strips because they filter out sediment and pollutants running off the edge of the field. Strips of grass or trees planted next to a stream are called riparian buffers. Riparian buffers are a last line of defense — filtering runoff water just before it enters a stream or ditch. Other types of strips can be planted within a crop field. Contour strips are planted, as the name implies, along the contours of a sloping field. Contour strips slow and diminished runoff and filter mud and pollutants out of water as it flows across a field. Vegetative barriers are very narrow strips of stiff-stemmed vegetation planted across a sloping field to slow the water running down the slope, allowing mud and other pollutants to settle out. All of these practices help reduce soil erosion, polluted runoff and gully erosion.

Grass waterways are specifically designed to prevent ephemeral gullies from forming. As the name implies, these strips of grass are planted along the depressions where water tends to collect and run downhill in a concentrated channel. Planting grass where those channels tend to form stops the water from cutting a gully and helps filter out pollutants.

These simple practices can be highly effective. A review of published studies found that properly designed and placed buffers reduce the speed and volume of runoff and trap, assimilate or transform pollutants that would otherwise end up in streams, lakes and rivers.[33] The review found that buffers trapped:

- 41 to 100 percent of the sediment,

Figure 12: Simple Solutions Work

Strategically placed strips of grass or trees dramatically reduce soil erosion and polluted runoff.

Video: 12A

Video: 12B

- 9 to 100 percent of the runoff water,
- 27 to 96 percent of the phosphorus, and
- 7 to 100 percent of the nitrate.

A project currently underway in Iowa called STRIPS provides additional, compelling and very encouraging evidence that devoting small amounts of cropland strategically placed strips would make a big difference.[34]

Two different arrangements are being tested. One converts 10 percent of the cropland into grass strips located at the bottoms of sloping fields. The second converts puts 10 percent into contour grass strips.

The first two years of results were stunning.

In the first year (2008), rainfall was more than three times the normal amount, and Iowa suffered devastating floods, with 85 of Iowa's 99 counties declared disaster areas.[35] But even in such a dangerous year, the strips provided an encouraging amount of protection:

- Strips at the bottom of sloping fields reduced runoff by 64 percent, sediment by 63 percent, total phosphorus loss by 93 percent and total nitrogen loss by 90 percent.
- Contour strips reduced runoff by 20 percent, sediment loss by 40 percent, total phosphorus loss by 90 percent and total nitrogen loss by 85 percent.

In the second year (2009), rainfall was about normal. That year:

- Strips at the bottom of sloping fields reduced runoff by 69 percent, sediment loss by 97 percent, total phosphorus loss by 94 percent and total nitrogen loss by 92 percent.
- Contour strips reduced runoff by 45 percent, sediment loss by 96 percent, total phosphorus loss by 93 percent and total nitrogen loss by 85 percent.

Grass or forest strips planted along stream banks not only filter out pollutants but also reduce pollution

Filter Strips for Clean Water and Wildlife

Today's farming practices have helped reduce soil erosion with tillage practices that leave more cover on large, modern-day crop fields. In the first half of the 1900s, every farmer had livestock that required pastures, hay land and fences around all fields. These fences acted like terraces, and the forage crops helped hold the water on the land. Now, fences and small fields are obsolete; large fields are the norm, creating serious soil erosion possibilities.

What can we as farmers do about lessening this possible catastrophe? There are a number of appropriate conservation practices that we can use, but filter strips along waterways, whether big or small, are absolutely essential, in my mind. Such strips are a wonderful way to control the speed of water as it leaves a field, and the water is filtered before it enters our creeks and larger waterways. These grassy strips are also very advantageous for wildlife, which is searching for just such a place to live and rear its young. It is critical that we maintain and increase the number of these filter strips in our rural areas, and it is also critical that our federal and state governmental agencies make it economically feasible for farmers and others who own the affected agricultural properties to use the practice.

Ted Schutte
Sibley, Iowa
Farmer

caused by collapse or erosion of the stream bank itself. A Minnesota study found that slumping stream banks contributed 31 to 44 percent of total sediment dissolved in the Blue Earth River in Minnesota.[36] Two studies of Walnut Creek in Iowa found that eroding stream banks contributed 50 to 80 percent of the sediment load.[37&38]

A long-term project in Iowa's Bear Creek found that stream banks bordered by row crops — a common sight — suffered the most stream bank erosion and total soil loss. Buffering the stream banks with strips of grass and/or trees reduced stream bank erosion by 80 percent.[39]

The practices of reducing the number of times a crop field is tilled and leaving more crop residue on the soil have been promoted for decades. An exhaustive review of the scientific literature as of 2006, found that no-till practices that leave the maximum amount of residue on the field can reduce erosion by as much as 100 percent and runoff by as much as 99 percent, depending on the site and the amount of soil covered by residue.[40]

In large areas of Iowa and the Corn Belt, the erosion and runoff problem is complicated by the practice of burying miles of pipes, generally called "tiles," three or four feet below the soil surface. These tiles drain water from the soil and send it to larger and larger pipes that empty into streams or ditches. Tile drainage has turned millions of acres of poorly drained soil into some of the most productive corn- and soybean-growing land in the world, but it short-circuits the natural filtering process that occurs when water percolates through the soil. As a result, tiles cause water to carry off large amounts of pollutants, including fertilizers, pesticides and bacteria.[41]

Most important, tile drains can defeat some of the pollutant filtering benefits of buffers by sending runoff water beneath, rather than over and through, the strips.[42] The problems caused by tile drainage have received a great deal of well-deserved attention, particularly the flow of nitrogen into the Mississippi Basin and the dead zone in the Gulf of Mexico.[43]

Surface runoff and erosion also play a profound role in degrading streams, lakes, and rivers in the Corn Belt. Water that falls on cropland has only two places to go. It can percolate into the soil or run over the soil surface. In big storms that produce intense rainfall, much or most of the rainwater flows over the soil, even on cropland underlain with tile drainage systems. Such intense storms that seriously erode soil deliver huge volumes of polluted runoff to lakes, streams, and rivers and cause lasting damage to agricultural watersheds.

Unprotected cropland and unbuffered streams deliver a one-two punch to the soil, to watersheds and to waterways. The scientific literature and practical experience make it clear that simple, sound and highly effective practices are available today that can help farmers reduce soil erosion, polluted runoff and watershed degradation.

The problem is not primarily a technical one. It is a problem of poor policy and institutional inertia.

Making It Right

In 1997, after a decade of historic progress cutting soil erosion and polluted runoff from farmers' fields, America's soil, streams, lakes and rivers were improving.

That historic achievement was driven by a 1985 federal law that required farmers to put conservation practices in place on their most vulnerable cropland in return for the billions of dollars of income and insurance subsidies they were getting from taxpayers. The "Highly Erodible Land Conservation" provisions of the 1985 Food Security Act required farmers to fully implement an approved soil conservation plan by 1995 on cropland that was determined to be "highly erodible." USDA's Economic Research Service (ERS) completed a comprehensive evaluation of those so-called conservation compliance provisions in 2004. ERS concluded that conservation compliance reduced soil erosion on highly erodible cropland by 331 million tons a year — a 40 percent reduction between 1982 and 1997.[44]

Unfortunately, those gains were short-lived. Enforcement of conservation requirements weakened and in 1996 went off the rails altogether when Congress made an abortive push to phase out farm subsidies — and with them the conservation requirements. The phase-out of farm subsidies turned out to be a mirage, and Congress immediately returned to its old habits — plowing billions into farmers' hands through ad hoc disaster payments and bringing all the farm subsidies back with a vengeance in the 2002 farm bill.

The only thing that turned out to be real was the phase-out of enforcement of conservation requirements. The result has been a decade of lost progress and mounting problems.

Destructive Fencerow to Fencerow Production

From 1997 to 2009 the federal government paid out $51.2 billion in income, production and insurance subsidies to farmers in the five Corn Belt states. Farmers in Iowa alone got $16.8 billion.[45]

On top of that, taxpayers shelled out another $18.9 billion dollars to subsidize expansion of the corn ethanol industry over the same period.[46] And in 2007 Congress went even further, passing a misguided energy bill that in effect mandates production of still more corn ethanol — topping out at 15 billion gallons a year by 2022 — more than tripling the amount produced in 2006.

Federal policy now is driving fencerow-to-fencerow farming again — just as it did in the 1970s — with the same perverse incentives that the 1985 conservation compliance law sought to blunt. Those incentives are even more dangerous today as damaging storms become more and more frequent in the Corn Belt.

It doesn't help that most of Iowa's cropland is farmed by people who don't own it. As renters, they have less ability to apply conservation practices to land they don't own and less reason to care about the long-term health of the land. They must push the land as hard as they can to make money in the face of escalating rental rates. In 2009, about 53 percent of Iowa's cropland was rented. The percentage is even higher in some other Corn Belt states. Out-of-state ownership increased from 6 percent in 1982 to 21 percent in 2007. Almost half (48 percent) of farmland in Iowa is operated by only 20 percent of all the farmers in Iowa; between 50 and 99 percent of that land is rented.[47] Moreover, in 2009 Iowa farmers paid about $2.5 billion to rent 13 million acres of cropland.[48]

A Bountiful Harvest of Crops and Cash

If the goal of federal farm policy since 1997 has been to extract every last bushel from every acre, it has succeeded. Iowa's corn production increased from 1.66 billion bushels that year to 2.44 billion bushels in 2009 — 47 percent. In the Corn Belt as a whole, corn production grew by 40 percent.

For farmers, it has been a bountiful harvest — of crops and cash. Farm household income has been above average U.S. household income every year since 1996. The five best years ever for farm income have all come since 2003.[49]

It has also been a bountiful harvest of taxpayers' cash, with most of it going to farm households that are doing far better than the average American family. The average household income of farms that received $30,000 or more in government payments in 2008 was above $210,000 — more than three times the average of all households ($68,424). Farms with household incomes of $110,000 received between $10,000 and $29,999 on average in government payments.[50]

Voluntary Programs Plowed Under

The few federal conservation programs in place are chronically underfunded and inadequate to counter the damage caused by federal policies that push farmers to plant their crops fencerow to fencerow. Between 1997 and 2009, the government paid Iowa farmers $2.76 billion to implement conservation practices. It paid out seven times as much — $16.8 billion — in income, production and insurance subsidies that encouraged maximum-intensity planting, not conservation. Across the Corn Belt, the gap was even greater — $7.0 billion for conservation and $51.2 billion for income, production and insurance subsidies.[51]

In 2008 alone, the two most important conservation programs — the Conservation Reserve Program (CRP) and the Environmental Quality Incentives Program (EQIP) — spent $208.8 million and $19.6 million respectively in Iowa to help farmers implement good conservation practices. Farmers got 4.5 times more — $1.03 billion — in production-related subsidies. The same imbalance holds true across the Corn Belt. The region's farmers received $3.1 billion in subsidies in 2008 — 5.3 times as much as the $522.7 million in CRP assistance and the $69.6 million in EQIP payments.[52]

Congressional promises to increase funding for conservation have never been kept. These programs have been funded below the authorized levels every year since 2002. From 2002 to 2010, Congress fell $2.55 billion short of the conservation commitments made in the 2002 and 2008 farm bills. If funding cuts planned for 2011 go through, the appropriations will be more than $1 billion short of authorized levels.[53]

Not coincidentally, there have been significant cuts in the NRCS staff that provides the technical expertise needed to produce effective conservation plans and to ensure that the prescribed practices are properly implemented and maintained. Agency staffing declined by 8 percent between 1995 and 2009 despite a dramatic increase in the number, size and complexity of programs.[54]

Back to Basics

Voluntary programs and technical help from government technicians and scientists are being overwhelmed by pressure to push the land harder and harder. Pressure for all-out production is intensified by profound changes in land ownership. Misguided farm and biofuel policies magnify the perverse incentives of a marketplace that turns a blind eye to soil degradation and water pollution.

It is time to make sure that the most basic, simple and traditional conservation practices that hold soil and watersheds together are in place everywhere they are needed. Science tells us that such practices dramatically improved the environment and sustain agricultural production in an increasingly volatile climate.

Figure 13: Lax Enforcement Worsens Erosion

According to the U.S. Department of Agriculture's database of "common land units," both of these gullied fields are designated as "highly erodible cropland" and by law should have conservation practices in place to reduce soil erosion.

Video: 14A

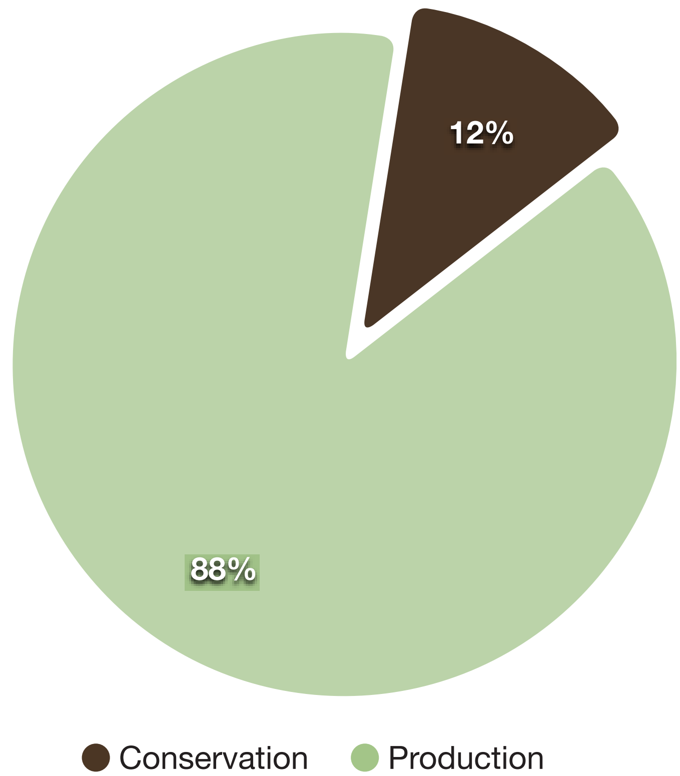
Video: 14B

These conventional practices will not solve all the problems we confront, but they will go a long way to building a foundation for more effective efforts.

It is time to go back to what works — requiring farmers to protect soil and water in return for the billions in income, production and insurance subsidies that taxpayers put up each year. That was good policy in 1985 and it is even more so now.

The first step is to get back to full enforcement of the conservation compliance law that has been on the books since 1985. The Natural Resources Conservation Service must intensify its annual inspections to determine whether farmers are maintaining the required soil conservation practices. The Farm Service Agency (FSA) must make full use of its authority to impose graduated penalties on farmers and landlords who fail to comply with conservation requirements.

Figure 14: Seven times more subsidies for all-out production than conservation, 1997 to 2009.



But more needs to be done. It has been 20 years since farmers were first asked to write and implement conservation plans. It is only reasonable that they now be asked to meet today's challenges in return for a continuing flow of income, production and insurance subsidies. Therefore, the Environmental Working Group calls on Congress to:

- Reopen and revise all legacy conservation compliance soil conservation plans (those approved and implemented before July 3, 1996). Practices prescribed in the revised plans must reduce soil erosion to the land's T value and prevent ephemeral gully erosion on highly erodible cropland.
- Require treatment and/or prevention of ephemeral gully erosion on all agricultural land — not just highly erodible land — owned by producers or landlords receiving income, production, insurance and conservation subsidies.
- Require a vegetative buffer at least 35 feet wide between row crops and all lakes, rivers and smaller streams.

- Require producers participating in existing and new crop and revenue insurance programs to meet conservation compliance provisions.
- Bar producers who convert native prairie or rangeland to row crops from receiving income, production, insurance or conservation subsidies on those acres.
- Use a portion of the funding provided for income, production, insurance and conservation programs to pay for the technical staff needed to plan and implement the required conservation practices and to complete annual inspections to certify that those practices are in place.

Enforcement of Conservation Compliance Is Critical

To be eligible for government farm payments, the 1985 farm bill required all producers with highly erodible land to have a conservation plan. It further required farmers to remain in compliance with those plans. Farmers found to be out of compliance could not receive U.S. Department of Agriculture program payments.

At that time, I served as a county commissioner and as a state soil conservation commissioner. Farmers in the early years of the law really did follow their farm plans and were in compliance. In 1996 a new farm bill was enacted called Freedom to Farm. Compliance has been downhill ever since then. Farmers have not followed their conservation plans, and each year we see many producers out of compliance. Fall cultivation has been on the increase. In my area of southwestern Iowa, we have steep slopes and highly erodible soils. Big machinery is used to plant in soils with little or no surface residue and multiple end rows; plus, many farmers have eliminated contour practices. This is a formula for severe soil erosion. Heavy rain prior to closure of the corn and soybean crop canopy is when we see unbelievable soil loss. My guess is that more than 50 percent of the farmers in our area are out of compliance, and very few of them are ever penalized.

Soil erosion can be held to a minimum with the use of terraces, no-till planting, the elimination of end rows, and use of filter strips and field borders. Heavy erosion not only moves soil, but also reduces soil fertility and organic matter. And with soil erosion comes increased pollution of our streams and lakes.

I think soil erosion in the Corn Belt is the worst I have ever observed. Our present cropping methods used to grow corn and soybeans are not sustainable or environmentally friendly.

Aldo Leopold provided a blue print for the conservation of our land. In his essays in A Sand County Almanac, he eloquently commented on land as a community, not as a commodity. I fear today we do treat land as a commodity, when we should view it as a community of people living in harmony with nature.

Dave Williams
Villisca, Iowa
Farmer active in the work of the Iowa Environmental Council and the Leopold Center for Sustainable Agriculture.

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