Highly Erodible Land and Swampbuster Provisions of the 2002 Farm Act

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Abstract

The Farm Security and Rural Investment Act of 2002 continued provisions for the conservation of highly erodible land and wetlands that had been enacted by the omnibus farm acts of 1985, 1990, and 1996. The effects these provisions have on wildlife conservation are reviewed in light of recent data and reports published about those programs. Strong evidence supporting the conservation benefits of these programs includes the significant reduction in cropland soil-erosion rates of 1.3 billion tons per year and the significant reduction in wetland losses due to agriculture in recent periods. The latter is highlighted by net wetland gains on agricultural lands during the period 1997–2002. While these 2 provisions generally do not create wildlife habitat directly, they play a very substantial role in supporting the conservation gains made by other U.S. Department of Agriculture (USDA) conservation provisions. Additionally they provide strong motivation for producers to apply conservation systems on their highly erodible lands, to protect wetlands from conversion to cropland, and to apply for enrollment in the other USDA conservation programs, especially the Conservation Reserve and Wetlands Reserve programs.

Introduction

The Highly Erodible Land (HEL) and "Swampbuster" (or Wetlands Conservation) provisions of federal farm acts were both initiated with the Food Security Act of 1985 (FSA, 16 U.S.C. 3801 et seq.). Subsequent farm acts (in 1990 and 1996) retained those provisions essentially intact. The HEL provisions are also referred to as "Conservation Compliance" and "Sodbuster". The effects of these provisions on wildlife conservation were summarized for the period 1985–2000 (Brady 2000) as part of a comprehensive review of Farm Bill contributions to wildlife conservation (Heard et al. 2000). This paper updates this information to include the Farm Security and Rural Investment Act of 2002.

Wetland and cropland interspersed in South Dakota (D. Poggensee, USDA-NRCS).

The Food Security Act of 1985 introduced a new era of agricultural conservation provisions that required an environmental standard to be achieved on certain classes of land for producers to maintain eligibility for many farm program benefits. The greatest direct environmental effects of the HEL and Swampbuster provisions were the following:

- reduction of soil erosion and associated sediments from highly erodible cropland,
- reduction in the conversion of other HEL to cropland, and
- the reduction in the conversion of wetlands to cropland.

These provisions generally did not create wildlife habitat directly but collectively supported the conservation gains made by other USDA programs, especially the Conservation Reserve and the Wetlands Reserve programs. There were substantial habitat gains made by other programs that would not have been achieved without the interaction of these compliance provisions with those other USDA programs (Brady 2000). The report by Zinn (2004) provided an excellent description of this legislation.

The definition of HEL is based on soil, climate, and topographic properties that when combined into a standardized "erodibility index" results in a value ≥8 (Brady 2000). This index does not include the effect of management practices, but represents an index of potential erosion based upon natural conditions. The HEL provisions consist of 2 parts, Conservation Compliance and "Sodbuster." Conservation Compliance applies to land that has been in use as cropland and that meets the definition of highly erodible. Sodbuster applies to HEL that is newly converted to cropland from permanent native vegetative cover such as rangeland or forest. Under both parts of this provision, producers who annually till HEL for the production of commodity crops are required to follow an approved conservation plan that would allow no substantial increase in soil erosion (<*T*, the tolerable or maximum level that maintains productivity). Failure to do so would result in the loss of eligibility for certain farm program benefits. When site-specific management practices (e.g., conservation tillage, terraces, contour farming, crop rotations, etc.) are applied, it is often possible to produce commodity crops on HEL and maintain soil erosion rates specified for the major HEL soil type in the field. The authors of this legislation recognized that there were numerous farmers who had participated in and abided by the rules of the programs but would not be able to farm their land and receive a reasonable return under the HEL provision. Therefore, they offered the Conservation Reserve Program (CRP) as a means to adapt their operations to the new program environment.

The 2002 Farm Act continued the Conservation Compliance and Sodbuster provisions; however, the law added the requirement that the Secretary of Agriculture cannot delegate authority to make a compliance determination to a private party or entity.

The Swampbuster provision applies to wetlands that may be converted to produce commodity crops. Such a conversion would also result in the loss of certain farm program benefits. However, there is a provision for conditions when minimal effects can be documented by USDA. The 2002 Farm Act also added the requirement that the Secretary of Agriculture cannot delegate authority to make a wetland compliance determination to a private person or entity.

Program Effects

Highly Erodible Lands

Declines in acreages of both cropland and grazing lands have been observed during the last 20 years (Table 1). Concomitant to the implementation of the Conservation Provisions of the recent Farm Acts have been shifts in the kind and management of land used for crop production. These changes are the net result of increased awareness on the part of agricultural producers, successful delivery of technical assistance, and the conservation provisions of the recent Farm Acts. Because of the confounding effect of these independent forces, it is not possible to single out specific cause-and-effect relationships, but it is evident that the “carrot and stick” approach to farm program benefits of the recent Farm Acts got the immediate attention of the agricultural community, particularly those producing commodity crops on HEL.

Table 1. Total surface area of the 48 contiguous states by land cover/use and year. Margins of error defining the 95% confidence intervals are in parentheses. The total surface area of the contiguous United States is 1,937.7 million acres (NRCS 2004).

	Major land cover/use (millions of acres)								
Year	Crop	Conservation Reserve Program	Pasture	Range	Forest	Other	Developed	Water	Federal
1982	419.6 (± 1.2)	0.0 (± 0.0)	131.0 (± 0.7)	415.5 (± 1.9)	403.0 (± 1.5)	48.0 (± 0.7)	72.8 (± 0.4)	48.6 (± 0.1)	399.1 (± 0.0)
1992	381.2 (± 1.1)	34.0 (± 0.1)	125.1 (± 0.7)	406.6 (± 1.7)	404.0 (± 1.4)	49.3 (± 0.7)	86.5 (± 0.5)	49.4 (± 0.1)	401.5 (± 0.0)
2002	368.4 (± 1.2)	31.6 (± 0.2)	117.3 (± 0.9)	405.3 (± 1.8)	404.9 (± 1.5)	50.6 (± 0.8)	107.3 (± 0.7)	50.4 (± 0.1)	401.9 (± 0.0)

Evidence of the positive effect of linking land stewardship with farm program benefits can be observed from reviewing results from the National Resources Inventory (NRI; NRCS 2003, 2004) and as reported by Flather et al. (1999). Soil erosion on all cropland declined from 3.1 billion tons per year in 1982 to 1.8 billion tons per year in 2001 (Figure 1), a net reduction of 1.3 billion tons/year or 42%. Sheet and rill erosion (i.e., rainfall induced) dropped by almost 41% during this period, while wind erosion dropped by 43%. Erosion rates per acre also declined. Sheet and rill erosion rates dropped from 4.0 to 2.7 tons per acre per year, and wind erosion rates dropped from 3.3 to 2.1 tons per acre per year (Table 2). Likewise cropland acreage eroding at excessive rates (>T, the tolerable or presumably the sustainable limit) dropped 39% from 170 million acres in 1982 to 103.8 million acres in 2001 (NRCS 2003).

Table 2. Soil erosion on cropland in the United States by year (NRCS 2003). Margins of error defining the 95% confidence interval are in parentheses.

	Sheet and rill erosion		Wind erosion	
Year	Millions of tons/year	Tons/acre/year	Millions of tons/year	Tons/acre/year
1982	1,680.1 (± 13.8)	4.0 (± 0.1)	1,389.2 (± 22.0)	3.3 (± 0.1)
1987	1,486.4 (± 12.8)	3.7 (± 0.1)	1,307.9 (± 22.0)	3.2 (± 0.1)
1992	1,182.0 (± 10.9)	3.1 (± 0.1)	919.6 (± 20.4)	2.4 (± 0.1)
1997	1,048.5 (± 9.3)	2.8 (± 0.1)	812.6 (± 18.2)	2.2 (± 0.1)
2001	997.2 (± 13.7)	2.7 (± 0.1)	789.8 (± 28.5)	2.1 (± 0.2)

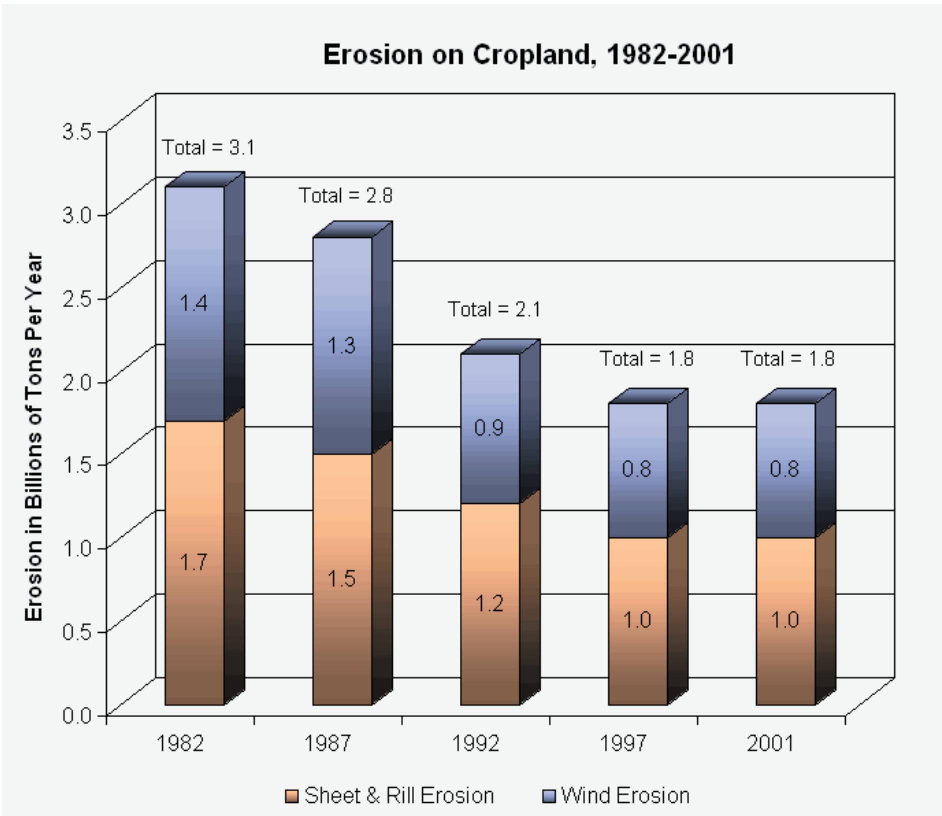


Figure 1. Sheet and rill– and wind-erosion rates on cropland from 1982 to 2001 (NRCS 2003).

Highly erodible cropland represents about 27% of the total cropland and is interspersed throughout that part of the country where cropland is a dominant land use (Figures 2–3). Erosion rates also declined substantially on HEL cropland. Only one-third of the HEL cropland exhibited erosion rates <*T* in 1982, but by 2001 nearly 46% of it met that goal (Table 3). Highly erodible cropland acreage declined from 123.9 million acres in 1982 to 101.1 million acres in 2001, most of which was eroding at excessive rates. Management of the non–highly erodible majority of cropland improved also as the proportion of cropland exhibiting tolerable erosion rates grew from 71% to 82% of the acreage from 1982 to 2001 (Table 3). These improvements stem from improved technology applied on the land (e.g., conservation tillage systems), technical assistance, and the conservation provisions of USDA Farm Acts since 1985, including the removal of 34 million acres of eroding cropland that was enrolled in the CRP. The CRP removed eroding cropland from cultivation and protected it with perennial vegetation for 10–15-year contracts, beginning in 1986. Conservation tillage in various forms has been applied extensively on both

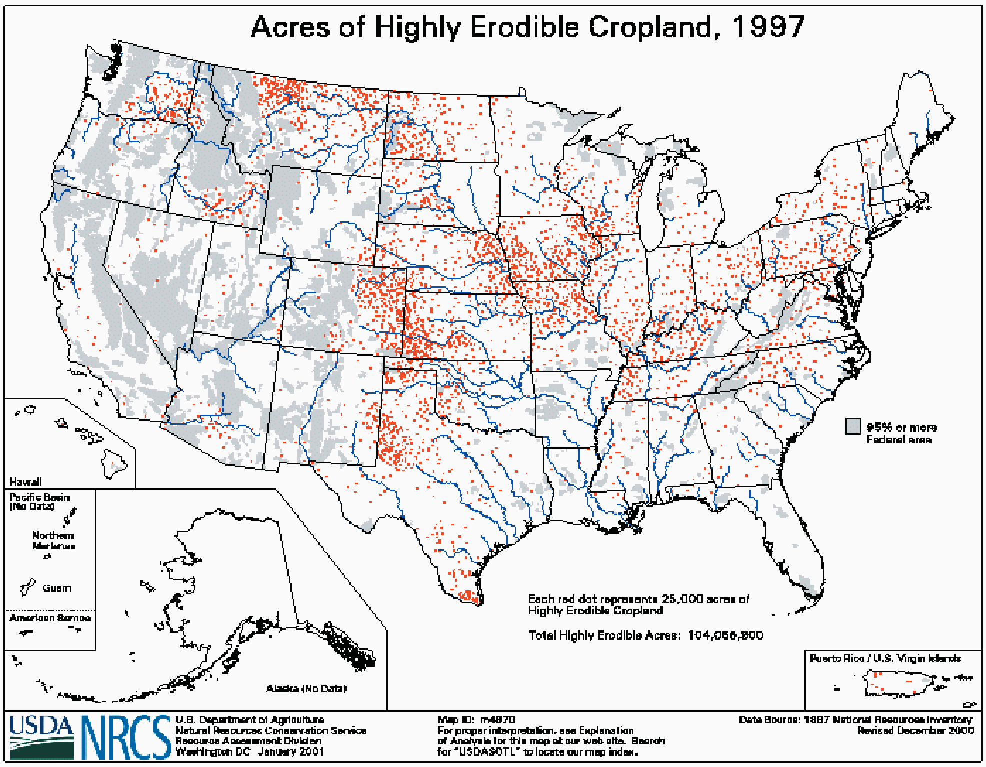


Figure 2. Distribution of highly erodible cropland in 1997 (NRCS 2000). Dots are aggregated by and placed randomly within 8-digit hydrologic units. Each red dot represents 25,000 acres.

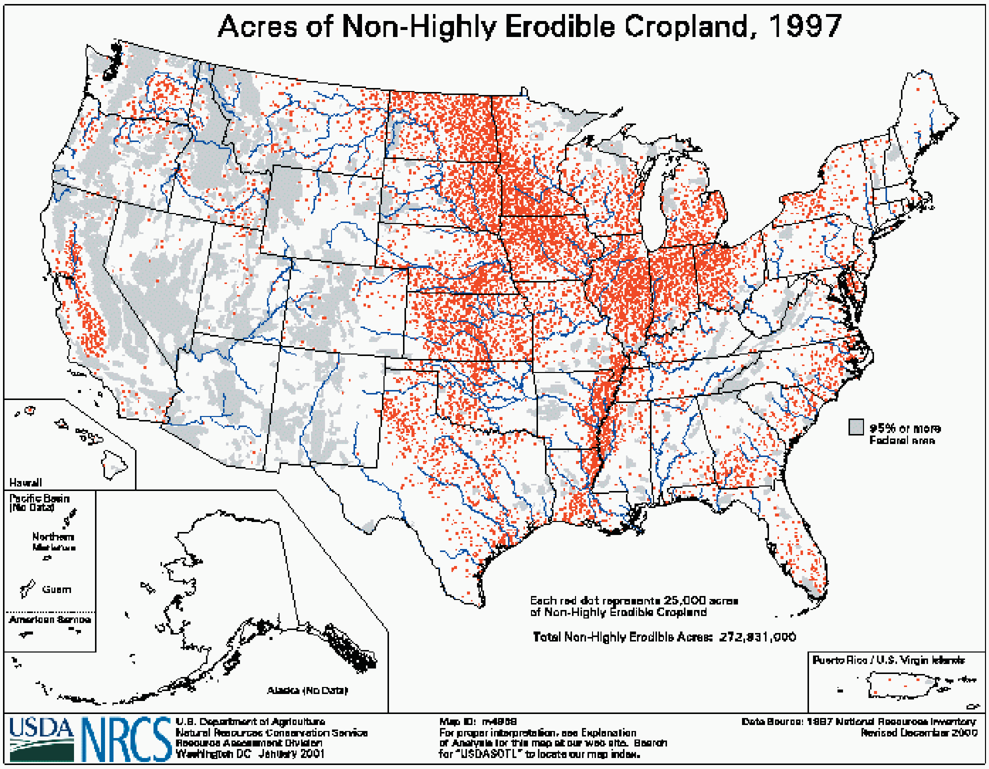
Cropland (millions of acres)

	Highly erodible				Non–highly erodible				All cropland	
Year	$<T$	$>T$	$<T$ (%)	Total	$<T$	$>T$	$<T$ (%)	Total	HEL (%)	$<T$ (%)
1982	41.0 (± 1.7)	82.9 (± 1.9)	33.1	123.9 (± 2.5)	209.5 (± 3.4)	87.1 (± 2.0)	70.6	296.6 (± 3.9)	29.5	59.6
1987	38.1 (± 1.6)	78.0 (± 1.9)	32.8	116.1 (± 2.6)	209.2 (± 3.4)	80.8 (± 1.9)	72.1	290.0 (± 3.9)	28.6	60.9
1992	41.6 (± 1.8)	63.1 (± 1.8)	39.7	104.7 (± 2.5)	221.0 (± 3.6)	56.0 (± 1.6)	79.8	277.0 (± 3.9)	27.4	68.8
1997	45.9 (± 1.8)	57.2 (± 1.6)	44.5	103.1 (± 2.5)	222.8 (± 3.6)	50.4 (± 1.5)	81.6	273.2 (± 3.9)	27.4	71.4
2001	46.0 (± 1.8)	55.1 (± 1.7)	45.5	101.1 (± 2.5)	219.9 (± 3.6)	48.7 (± 1.5)	81.9	268.6 (± 3.9)	27.3	71.9

Table 3. Highly erodible (HEL) and non–highly erodible cropland eroding at less than and greater than *T*, by year (NRCS 2003). *T* represents the maximum soil loss limit determined to be sustainable. Margins of error defining the 95% confidence interval are in parentheses.

HEL and non-HEL cropland to reduce erosion, conserve soil moisture and nutrients, and reduce trips across the field with large equipment. Modern applications of both conservation tillage and conventional tillage on croplands generally utilize chemical pesticides to control weeds, diseases, and insects. The biggest difference in these 2 systems is the frequency and timing of disturbances in the field and the retention of crop residues on

Figure 3. Distribution of non-highly erodible cropland in 1997 (NRCS 2000). Dots are aggregated by and placed randomly within 8-digit hydrologic units. Each red dot represents 25,000 acres.



the surface. While croplands and haylands are generally unsuitable for grassland nesting birds (Johnson 2000), there is evidence that conservation tillage is better than conventional tillage for some birds. Wildlife benefits from conservation tillage over conventional tillage have been summarized previously (Brady 2000). However, a recent addition to the literature (Martin and Forsyth 2003) adds support for the concept that minimum tillage appears to confer benefits in productivity to birds that nest in farmland over conventionally tilled cropland. Martin and Forsyth (2003) studied songbird productivity in prairie farmlands under conventional versus minimum tillage regimes in southern Alberta, Canada. They found that Savannah sparrows (*Passerculus sandwichensis*) in spring cereal and winter wheat and chestnut-collared longspurs (*Calcarius ornatus*) in summer fallow tended to prefer minimum tillage. McCown's longspurs (*Calcarius mccownii*) and horned larks (*Eremophila alpestris*) occurred more frequently on conventional- than on minimum-till spring cereal plots in at least 1 of the 2 years. For Savannah sparrows, minimum-till spring cereal and winter wheat were more productive than conventional-till habitat. Summer fallow of either tillage regime did not appear to be as productive as minimum-till cereal fields for this species. Chestnut-collared longspurs occurred predominantly in minimum-till summer fallow and spring cereal habitat and showed almost no productivity in conventionally managed plots. McCown's longspurs tended to have higher productivity in minimum-till plots. These represent comparisons between different tillage techniques on cropland, not between cropland and native grasslands. While some doubt about the effectiveness and enforcement of the HEL

Divided slope farming to reduce soil erosion in Washington. (T. McCabe, USDA-NRCS)

provisions has been expressed (GAO 2003), it is clear from the preceding discussion and data that these provisions made a substantial difference in reducing cropland erosion. The reduction of 1.3 billion tons per year of eroding cropland soils has effects both on- and off-site. On-site, fertility and soil quality are retained, and the long-term sustainability of the productive soil resource base is protected. Off-site, there are substantially less sediment and attached pollutants moving into wetlands and water bodies, thereby improving water quality, extending the lifespan of reservoirs, and reducing sediment damage, maintenance, and dredging costs. The net effect on aquatic habitat has not been quantified, but it can be inferred from the previous discussion that substantial improvement in aquatic habitat quality is also expected.

The national estimates presented above indicate that resource-management decisions are moving favorably towards more sustainable use of those HEL croplands. However "sodbusting" still continues in some forms, although not necessarily on HEL. Concurrent advances in technology have made it possible to produce row crops on lands previously thought to be unsuitable for that use. Higgins et al. (2002) reported that development of drought-resistant, genetically modified soybeans has been responsible for the conversion of native grasslands and extended the western expansion of soybeans into 48 counties in South Dakota that previously had been considered too dry to grow soybeans. Land area devoted to soybean production now exceeds land area used for corn production in South Dakota. Since 1987 in eastern South Dakota alone, about 68,000 ha (~168,000 acres) of native rangeland have been converted to cropland in the 21 counties most heavily impacted by the western expansion of soybeans (Higgins et al. 2002:46). They express concern that while the current westward expansion of cropland has obvious impacts on prairie ecology, it also has the direct effect of moving wetland drainage interest into formerly secure (i.e., rangeland) habitats (Higgins et al. 2002:48).

Swampbuster

Wetland losses due to agriculture have been declining in recent decades because of many factors, including Swampbuster, greater public awareness of wetland values, economic factors, and other federal, state, and local laws (Brady and Flather 1994, Flather et al. 1999, NRCS 2000, NRCS 2004; Figure 4). Recent studies reveal that the annual rate of wetland loss has continued to decline. Gross wetland losses from 1992 to 1997 were 506,000 (±43,600) acres (NRCS 2000), but declined by 44% to 281,600 (±79,000) acres during the subsequent period 1997–2002 (NRCS 2004). Gross wetland losses due to agriculture declined by 62% between the intervals 1992–1997 and 1997–2002. Swampbuster's effect has been significant since agriculture's role in gross wetland loss during the 1992–1997 period had declined to about 26% (NRCS 2000), then to about 18% during 1997–2002 (NRCS 2004). The synergistic effect of Swampbuster's deterrence of wetland losses and the gains derived from other wetland conservation programs, especially the Wetlands Reserve Program (WRP), resulted in a net wetland gain on agricultural lands of 131,400 (±70,000) acres from 1997 to 2002 (NRCS 2004). Most recent estimates for the 2001–2003 interval indicate a net wetland gain of 66,000 acres per year on agricultural lands (NRCS 2005), representing a major reversal of patterns observed prior to Swampbuster nearly 20 years ago. While Swampbuster's main impact has been to reduce agriculturally induced wetland conversions, it has also served to motivate landowners to submit bids for the CRP and for the WRP.

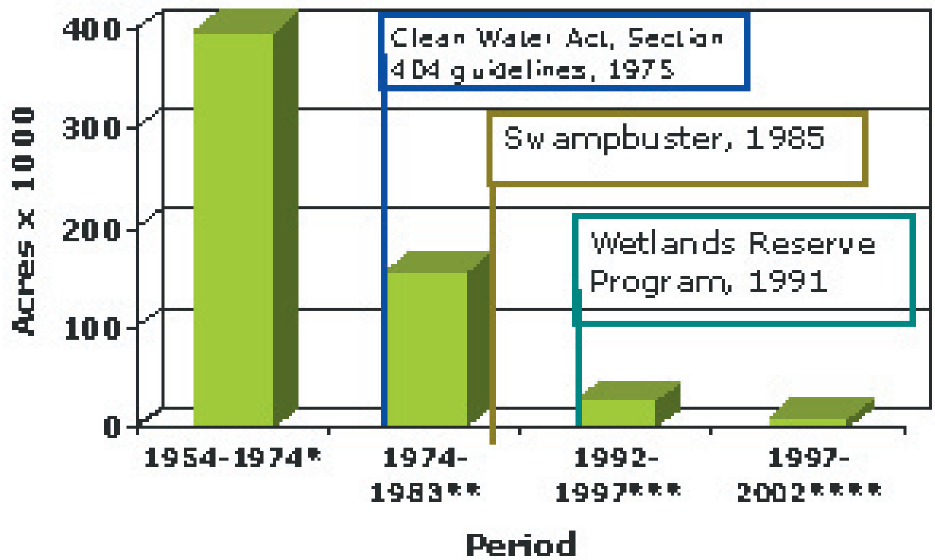
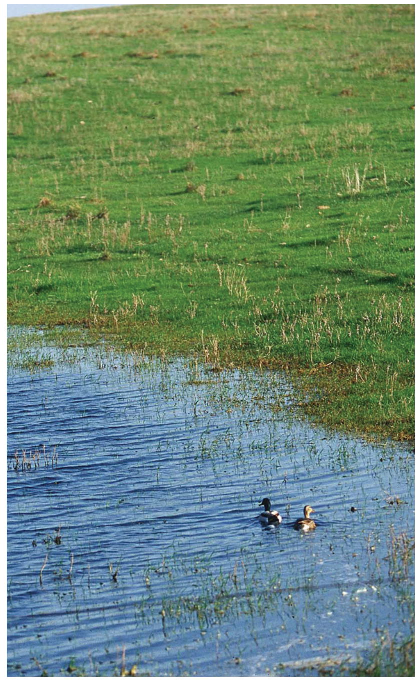


Figure 4. Average annual wetland loss due to agriculture, 1954–2002, and significant federal legislation (*Frayer et al. 1983, **Dahl and Johnson 1991, ***NRCS 2000, ****NRCS 2004).

The direct effect of Swampbuster is to reduce the rate of wetland loss, but it also has both synergistic and indirect benefits to wildlife. Reynolds (2005) studied the CRP and duck production in the Prairie Pothole Region (PPR) of the U.S. His results suggest that CRP cover planted around wetlands and the curtailment of disturbance associated with tilling and planting crops has improved the function of wetlands relative to breeding duck use. There were about 230,000 acres of small, shallow (temporary and seasonal) wetlands in CRP fields in the PPR. They attracted 492,000 duck pairs annually during the years 2000–2003, which was 210,000 more pairs per year than in the absence of the CRP. These small, shallow wetlands in the PPR are critical to brood survival by providing security from predators (Krapu et al. 2000) and food requirements for developing ducklings. Swampbuster has been effective in reducing wetland loss, but some question the need to protect small, shallow wetlands that interfere with tilling and planting. Reynolds (*this volume*) found that the types of wetlands in all land uses that showed the highest use by breeding ducks were temporary and seasonal classes (see Figure 2 in Reynolds [*this volume*]) that averaged only 0.6 and 1.46 acres in area, respectively. He also found that 63% of all dabbling ducks in the area depend on temporary and seasonal wetlands that were less than 1 acre in area and the majority of those wetlands occurred in crop fields. Reynolds (*this volume*) concluded: "Swampbuster provisions of the Farm Bill must be continued to protect wetlands habitat critical to breeding waterfowl and broods".



Mallard ducks in a prairie pothole in South Dakota. (D. Poggensee, USDA-NRCS)

Conclusions

Reduced erosion rates of 1.3 billion tons/year and net wetland gains on agricultural lands provide clear evidence that recent USDA farm program provisions are providing significant conservation benefits. The combined effect of these documented erosion reductions and greatly reduced wetland conversions in association with the Conservation Reserve Program (Farrand and Ryan, *this volume*; Johnson, *this volume*; Reynolds, *this volume*), Continuous Conservation Reserve Program (Clark and Reeder, *this volume*), the Conservation Reserve Enhancement Program (Allen, *this volume*), the Wildlife Habitat Incentives Program (Gray et al., *this volume*), the Wetlands Reserve Program (Rewa, *this volume*), Environmental Quality Incentives Program (Berkland and Rewa, *this volume*), and the Grassland Reserve Program (Wood and Williams, *this volume*) have very large synergistic benefits to the conservation of habitats for wildlife. While conservation tillage is not a panacea for wildlife management on highly erodible croplands, it does represent one additional increment improving cropland habitats over conventional tillage systems. Although the HEL and Swampbuster provisions generally do not create additional wildlife habitat, they collectively support the conservation gains obtained in the other programs and motivate producers to apply for enrollment in those programs. The net effect of the interaction of all these Farm Act Provisions results in substantial wildlife habitat improvements under existing patterns of land use that otherwise would not be possible if the various provisions were implemented independently of one another.

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