Implementation of Conservation Compliance Provisions: Experience in the U.S. with Highly Erodible Land and Wetlands Conservation

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Conservation Compliance Concepts

The concept of cross compliance, or conservation compliance as it is known in the United States, is a simple one of *quid pro quo*. As a condition on some preexisting beneficial program, producers are required to meet some minimum environmental performance standards. Because it merely places conditions on payments from another program, conservation compliance is neither a subsidy nor a regulation. In order for conservation compliance to succeed, there must first be a reasonably large pre-existing program of benefits to leverage the conservation behavior. Second, one or more reasonably specific environmental or conservation objectives must be stated. These can be positive actions, such as developing a conservation plan to reduce erosion, or they can be negative, such as forbidding agricultural production on environmentally sensitive lands.

The effectiveness of conservation compliance provisions is subject to spatial and temporal variations of participation in the leveraged benefit program. For example, if participation in farm program subsidies is low in certain areas, especially areas with environmental or conservation problems, leveraging the payments will produce little result. Spatial "slippage" can occur if producers subject to compliance provisions can expand production on land not subject to compliance, or if producers not participating in the leverage program can expand production. Similarly, if participation in subsidy programs rises and falls with agricultural business cycles, and there is no requirement to maintain participation in peak years, environmental gains made in the trough will tend to be erased when market prices rise.

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Conservation compliance provisions of U.S. farm legislation, first introduced in the 1985 Food Security Act, require agricultural producers to comply with certain resource conservation standards in return for benefits from selected Federal agricultural programs. Producers can lose Federal farm program benefits if they crop highly erodible land without applying an approved conservation system or if they convert wetlands for agricultural production. In this paper, we describe the origins and evolution of conservation compliance in the U.S., outline the present status and accomplishments of the provisions, and look ahead to potential changes in the U.S. farm policy milieu that may alter the effectiveness of conservation compliance.

Conservation Compliance in the U.S.

Forms of conservation compliance were first discussed in the 1981 Farm Bill debate and the development of the 1985 Farm Bill (USDA, RCA, 1981; Reichelderfer, 1985). Conservation compliance provisions were first enacted as part of the Food Security Act of 1985 (1985 Farm Act) and amended by the Farm Acts of 1990 and 1996 (Hyberg). Producers who violate these conservation provisions may be denied price and income support benefits, Conservation Reserve Program (CRP) payments, Wetland Reserve Program (WRP) payments, eligibility for Federal agriculture-related loans or loan guarantees, including loan deficiency payments (LDP), and other benefits from agriculture-related Federal programs (7 CFR 12, 61 FR 47019).

There are two general conservation problems dealt with by conservation compliance provisions: highly erodible land conservation and wetland conservation. Under wetland conservation provisions, widely known as “swampbuster,” agricultural producers can lose Federal farm program benefits if they convert wetlands to make agricultural production possible. Under highly erodible land (HEL) conservation provisions, producers lose benefits if they crop highly erodible land without applying an approved conservation system. For HEL that was cropped during 1981-85, producers must be actively applying conservation systems designed to “substantially reduce" soil erosion. An erosion reduction of 75 percent is currently defined as “substantial,” although plans approved prior to July 1996 may require smaller reductions (*National Food Security Act Manual*, third edition, 1996). These provisions are widely referred to as “conservation compliance.” For HEL not cropped during 1981-85, conservation systems must hold soil erosion to no more the soil loss tolerance level (T) *and* prevent a “substantial increase” in erosion, defined as 25 percent of potential erodibility (*National Food Security Act Manual*, third ed.). These provisions are widely referred

to as "sodbuster." Policy associated with conservation compliance is discussed in Claassen and others (2000), Zinn (1998), Norris and Clark (1995), and Clark (1989).

Complements to Compliance

Conservation compliance is not the sole conservation or environmental program for U.S. agriculture. It was intended to be part of a system of regulatory and voluntary programs providing negative and positive incentives for environmental behavior. Chief among these is the Conservation Reserve Program (CRP), which also focused on highly erodible land, at least initially. HEL was the primary eligibility criteria for CRP in the first 12 signup periods. Land for which the costs of meeting conservation compliance requirements were high, relative to the yield and profit potential of continued crop production, could be idled, enrolled in CRP, and planted to a conservation cover and receive annual rental payments under 10-15 year contracts.

The Environmental Quality Improvement Program (EQIP), a voluntary program subsidizing soil erosion practices, provides cost-sharing and technical assistance for practices to reduce soil erosion, including erosion on highly erodible land (AREI, Conservation Overview, Ch. 6.1, 2000). EQIP, as well as various state programs for cost-sharing and technical assistance, complements conservation compliance by helping to reduce the costs of practices needed to comply. However, funding is not sufficient to assist all producers subject to conservation compliance.

After 1990, the Wetland Reserve Program (WRP) offered an alternative similar to CRP for the swampbuster provisions. Wetlands that had been cropped could be idled under permanent easements and restored to fully functioning wetlands. However, enrollment in WRP was limited to 975,000 acres, so relatively few acres subject to swampbuster could avail themselves of this alternative.

Conversion of wetlands to crop production is also regulated under the dredge and fill permits required by Section 404 of the Clean Water Act, administered by the U.S. Army Corps of Engineers and the Environmental Protection Agency (Heimlich, et al., 1998). Originally passed in 1972 and amended in 1977 and 1987, Section 404 had not been very successful at reducing agricultural conversion of wetlands, partly because of the incentive for conversion provided by farm program benefits.

Conservation compliance, along with CRP, WRP, EQIP, and wetland regulation, provides part of a system of environmental measures affecting agriculture. While developed at different times, these programs have been harmonized to provide a consistent framework that is complementary and reinforcing.

Evolution of Compliance

The 1996 Act mandated a variety of changes in compliance provisions (7 CFR 12, 61 FR 47019; Osborn). Notably, Federal crop insurance indemnities are no longer withheld for violation of wetland or highly erodible land conservation provisions. The 1996 Act also modified HEL conservation provisions to allow more flexibility in developing and implementing conservation systems, to allow self-certification of compliance, expedite approval of variances to solve problems affecting application of specific plans, and to allow producers a grace period to remedy compliance problems that arise despite "good faith" efforts to apply conservation systems. Under new wetland conservation provisions, producers have more flexibility to offset wetland losses through mitigation (creation or restoration of wetlands to offset any unavoidable wetland losses). Also, some activities causing minimal effect on wetlands can be approved under expedited procedures.

Leverage for Compliance

The value of farm commodity program payments leveraging compliance has fluctuated significantly since 1986, but commodity program design changes in the FAIR Act made payments more stable and predictable. Between 1986 and 1995, farm income support payments fluctuated, peaking at $11.7 billion in 1988 and declining to $4.0 billion by 1995 (Young and Westcott). Over this period, overall commodity program participation varied but remained quite high. For the seven major commodities combined, the participation rate ranged from 77-87 percent, although participation rates for individual commodities varied more widely. FAIR mandated fixed income support payments, which are independent of commodity price or production decisions. Production Flexibility Contracts providing basic income support payments peaked in 1997 at $6.4 billion (for all seven major commodities) and are scheduled to decline to $4.0 billion in 2002 (table 1;Young and Westcott).

However, basic income support has been supplemented by disaster payments approved by Congress for fiscal year 1999 and by marketing loans and loan deficiency payments triggered by low commodity prices in 1998 and 1999 (Shields and Westcott; USDA-FSA). Total direct payments for commodity, conservation and risk management programs leveraging conservation compliance increased from $4.9 billion in 1996 to $24.2 billion in 2000, even as the direct income supports in the Production Flexibility Contracts decreased to $5 billion (table 1; figure 1).

Producer participation is very high under the 1996 Farm Act (more than 98 percent for all seven major commodities) largely because producer costs of participation are low. Participating producers are no longer required to comply with costly annual acreage reduction requirements or even base acreage restrictions. With the exception of conservation provisions regarding highly erodible land and wetlands, producers are free to expand or contract cropland acreage and allocate acreage among crops in response to market factors.

However, participation across all farm types is lower. Only 42 percent of all farms in 1999 received any kind of government payment, and 22 percent received Production Flexibility Contract payments. While 91 percent of cash grain farms received government payments, only 13 percent of hog producers did (figure 2). Across all programs and all farm types, the average payment in 1999 was $6,966, but cash grain farmers received $25,460 on average, of which $9,119 was from Production Flexibility Contracts and $9,852 was from Loan Deficiency Payments. Many, but not all U.S. producers thus have a substantial amount of payments at risk from conservation compliance, at least among cash grain farmers. Payments are geographically concentrated in the Heartland, Mississippi Portal, and Northern Plains regions of the U.S. (figure 3).

Because farm program payments are concentrated within certain farm types, and geographically, not all environmental problems can be attacked equally well using conservation compliance. Problems occurring on some farm types in some regions have little incentive to comply because they have few payments at risk.

Status of Compliance: 1997

To comply with conservation provisions for highly erodible land, producers must be actively applying an approved conservation system. Most producers who farm HEL are complying with HEL conservation provisions. Based on

NRCS status reviews, less than 0.1 percent of operators subject to conservation compliance were not actively applying conservation systems in 1997 (table 2). Variances are offered to producers when climatic conditions prevent implementation of the full conservation system. For example, drought may prevent the establishment of a cover crop. Hardship variances are offered when circumstances such as family illness or crop failure prevent a farm from implementing the conservation system. Because drought or floods can be widespread, variances can be important, not only for individual farmers, but also for broader production regions.

Since 1986, violations of HEL conservation provisions have resulted in $15.9 million in benefits being denied on over 280,000 acres of cropland (table 3). Prior to 1990, violations occurred only when HEL was brought into production without an approved conservation system. Since 1990, persons without approved conservation systems on previously cropped HEL could be found in violation of conservation compliance provisions. Since 1995, producers failing to implement approved conservation systems could be found in violation of conservation compliance. Land in violation peaked in 1990 (the first year plans were required) at 60,295 acres and declined until 1996 (the first year producers were required to fully implement conservation systems), when violations again increased to 45,540 acres.

To comply with wetland conservation provisions, producers must refrain from wetland conversion except in the context of an explicitly permitted activity, which generally requires replacement (mitigation) of wetlands converted to agricultural production. Since 1986, a total of 26,597 acres of wetland have been drained in violation of swampbuster by 1,136 producers resulting in the loss of $12.3 million in Federal farm program benefits (table 3). Swampbuster violations increased from 12 in 1987 to 165 in 1991, but have dropped since then and have been below 100 in every year since 1993. Benefits denied also peaked in 1991 at $2.0 million and have been below $0.5 million in every year since 1993. However, the amount of wetland found in violation, by year, has been more erratic. Acreage in violation peaked in 1996 at 13,920 acres. The next highest years were 1992 (3,221 acres) and 1993 (2,225 acres).

Critics of conservation compliance have cited the small number of violations as evidence that the provisions are not being adequately enforced by USDA (Cook and Art, 1993). Program officials respond that the large penalties for the small number of violations have a powerful demonstration effect. They contend that the evidence instead shows that producers generally comply with the provisions because they have such a large financial stake at risk. There is no systematic independent information to assess these claims, but opposition to the provisions by farm groups provides some corroboration that the constraints imposed are binding. The effectiveness of this demonstration effect depends on producers' beliefs that compliance is being monitored, which may be receding. Producers' expectations that monitoring had a 50-50 chance of detecting a violation declined from 31 percent in 1992 to 16 percent in 1996 (Essex and others, 1996).

HEL Conservation Systems and Plans

Conservation compliance plans specify the use of economically viable conservation systems that substantially reduce erosion. Conservation systems are composed of one or more conservation practices. The fact that the 1997 status review found over 1,674 different conservation systems (combinations of practices) applied nationwide is evidence that considerable flexibility is needed for producers to meet conservation compliance requirements (table 4). Conservation systems vary with climate, topography, soils, major crops, and pre-existing production practices. A system or practice acceptable in one location may be infeasible in another. The effectiveness of a system in controlling erosion depends on several factors, including the frequency, timing, or severity of wind and precipitation; the exposure of land forms to weather; the ability of exposed soil to withstand erosive forces; the plant material available to shelter soils; and the propensity of production practices to reduce or extenuate erosive forces.

However, conservation systems involving only conservation cropping sequences, conservation tillage, crop residue use, or a combination of these practices were used on 54 percent of HEL cropland, indicating that most producers can comply using a few relatively inexpensive practices. Conservation cropping sequences were included in conservation systems applied to 81 percent of HEL cropland, while crop residue use and conservation tillage were applied to 51 and 33 percent, respectively (table 4).

Erosion Reduction on HEL

Large reductions in total soil erosion have occurred on land subject to conservation compliance (figure 4). After conservation compliance, the proportion of land with erosion rates of 0-8 TAY is significantly increased. The proportion of land with erosion rates above 8 TAY declined significantly, particularly for erosion rates above 10 TAY. The proportion of land subject to conservation compliance with erosion rates above 20 TAY dropped almost to negligible levels.

Wetland Conversion

Between 1954 and 1974, the net rate of wetland conversion averaged about 458,000 acres per year, with 81 percent of wetlands converted to agricultural uses and 8 percent to urban (AREI Chapter 6.5, 2000; figure 5). After enactment of U.S wetland regulation in Section 404 of the Clean Water Act in 1972, wetland losses were reduced somewhat. Between 1974 and 1983, net wetland conversion dropped to about 290,000 acres per year; gross conversions to agricultural use accounted for 53 percent and urban uses for 3 percent (an additional 38 percent converted to "other" uses was cleared and drained, possibly intended for agricultural use). The most dramatic reductions in wetland conversion, particularly from agriculture, did not occur until after swampbuster provisions were enacted in 1985. Between 1982 and 1992, the net rate of wetland conversion dropped to 70-90,000 acres per year, with agriculture accounting for only 20 percent of gross wetland conversions and urban uses for 57 percent (Heimlich and Melanson, 1995).

Costs of Compliance

The cost of highly erodible land conservation on existing cropland is the cost of applying a conservation system. As noted above, more than half of all conservation systems are some combination of conservation cropping practices, conservation tillage, and crop residue use. The cost of conservation cropping practices may include production of less profitable crops or the cost of establishing cover crops for a particular portion of the season. With crop residue use, producers plant into a clean tilled seed bed, but allow previous crop residue to remain on the surface for a longer period of time to protect the soil from erosion. With conservation tillage, residue cover must be at least 30 percent year-round.

To date, the evidence on costs and benefits of conservation tillage is somewhat mixed (Sandretto). Producers who switch to conservation tillage may save on labor, fuel, and net capital investment in equipment. Other costs, such as those for herbicide or fertilizer, may rise (Siemens and Doster, 1992). Some studies have found that conservation tillage systems produce modest yield advantages, particularly on well drained to moderately well drained or sloping soils (Hudson and Bradley, 1995; Conservation Tillage Information Center, 1996). In less humid regions, retaining crop residue on the surface may help retain soil moisture and increase yields (Clark and others, 1994). However, increased crop residue has been blamed for delayed plantings, uneven stands, and lower corn yields when planting conditions are cool and wet (Griffith and others, 1988). Recent research (McBride, 1999; see box "Costs and Yields with Conservation Tillage") suggests that corn producers who use conservation tillage methods generally have lower *per bushel* costs of production than producers who use conventional tillage methods. This research suggests that producers who have reduced production costs using conservation tillage methods might continue to use them even if they were not required to do so to comply with conservation requirements.

For highly erodible land that was not cropped in any year 1981-85, the costs of compliance are the lower of (1) the net return forgone from not converting highly erodible land to crop production or (2) the cost of applying an approved conservation system. Non-cropped HEL that cannot be profitably converted to crop production has no conservation compliance opportunity cost. Conservation systems on land converted from "native vegetation" are acceptable only if soil erosion is held to no more than the soil loss tolerance (T) and crop production will not result in a "substantial increase" in erosion *(National Food Security Act Manual*, Third Edition, 1996). These plans may be different and, potentially, more costly than conservation systems on previously farmed highly erodible cropland. For wetlands, the situation is relatively simple: compliance costs are the net return lost in forgoing conversion of wetlands to crop production or zero, whichever is larger.

Cropland Potential without Compliance

Looking to the future, a key question is how many acres of non-cropped HEL and wetland could be profitably converted to crop production *in the absence of sodbuster and swampbuster*. Analysis of this type helps determine

how much HEL and wetland may be at risk for conversion *if* there is a significant reduction or restructuring of Federal farm program benefits (See box "Estimating Cropland Potential and Economic Consequences," for details). There is substantial acreage of both HEL and wetland that could be profitably converted to crop production if economic conditions are favorable and compliance provisions are eliminated or ineffective.

Nationwide, total wetland and highly erodible land that could be profitably converted to crop production in the absence of compliance requirements ranges from 7.1 million acres in the low-price scenario to 14.1 million acres in the high-price scenario (figure 6). Potentially convertible wetland acreage ranges from 1.5 million acres to 3.3 million acres, while potentially convertible HEL ranges from 5.6 million acres to 10.9 million acres. The cropland potential of HEL is based solely on the productive potential of the soil. However, farmers may be less likely to farm steeply sloping or highly erodible land because of additional wear and tear on equipment, restrictions on equipment size, or larger loss of applied inputs (e.g., fertilizers or pesticides) with eroding soil or runoff. If so, potential conversion may be overestimated.

If compliance provisions were eliminated or ineffective, increased crop production and decreased crop prices would result in an aggregate decline in net farm income of roughly $3.5 billion from baseline projections, about 3.5 percent (table 5). While acreage and production rise in most farm production regions, price declines more than offset increased production resulting in lower overall farm income. Declines would be largest in the Corn Belt, Northern Plains, and Lake States farm production regions. Although crop acreage increases would be relatively large in the Corn Belt and Northern Plains, these changes would be minor when compared with overall acreage in these regions, so the effect of declining prices would outweigh the effect of increased crop acreage in determining farm income. In the Appalachian region, on the other hand, where the potential change in crop acreage is large relative to the existing cropland base, aggregate farm income would increase.

Future Effectiveness of Compliance

The future effectiveness of compliance mechanisms in reducing erosion from highly erodible cropland or deterring the conversion of wetland for agricultural production depend on: (1) the value of program benefits that can be withheld; (2) the extent to which producers with highly erodible land or wetland on their farms participate in these

programs; and (3) the direct and indirect (opportunity) costs to the farm of complying with highly erodible land or wetland conservation requirements. The future value of payments is critical to the continued success of compliance mechanisms, but is difficult to predict. The 1996 FAIR Act is widely considered to be a transitional policy, but there is no clear consensus on what policy will emerge to replace FAIR when it expires at the end of 2002. The cost of compliance depends on the type of land involved. On highly erodible cropland, the cost of maintaining conservation practices may be quite low and can be offset by modest farm program benefits. Some producers have even reduced per-unit production costs through adoption of conservation tillage. On HEL and wetland that is not cropped, the key question is whether the value of farm program benefits will exceed the value of production forgone if the land is not converted to cropland use. An important and related question is the extent to which conversion of HEL and wetland for crop production would be profitable in the absence of sodbuster and swampbuster disincentives.

References

Agricultural Resources and Environmental Indicators (2000) Chapter 6.1 Conservation and Environmental Programs Overview; Chapter 6.3 Conservation Compliance for Soil and Wetland Conservation; Chapter 6.5 Wetlands Programs, U.S. Dept. Agr., Econ. Res. Serv. at http://www.ers.usda.gov/briefing/arei/newarei/index.htm

Claassen, Roger, Ralph E. Heimlich, Robert M. House, and Keith D. Wiebe. "Estimating the Effects of Relaxing Agricultural Land Use Restrictions: Wetland Delineation in the Swampbuster Program." *Review of Agricultural Economics*. 20(Fall/Winter 1998):390-405.

Clark, Richard T., James B. Johnson, and Jennifer Brundson (1994). "Economics of Residue Management," *Crop Residue Management to Reduce Erosion and Improve Soil Quality: Northern Great Plains Region,* (W.C. Moldenhauer and A.L. Black, eds.). U.S. Dept. Agr., Agricultural Research Service, Conservation Research Report No. 38.

Conservation Technology Information Center (1996). *A Checklist for U.S. Farmers*, West Lafayette, IN.

Cook, K.A. and A.B. Art. (1993). *Countdown to Compliance: Implementation of the Resource Conservation Requirements of Federal Farm Law.* Center for Resource Economics, Washington, D.C.

Esseks, J.D., S.E. Kraft, E.J. Furlong, B.L. Myers, and V.S. Clarke (1996). *Conservation Compliance and Producers in the Corn Belt: Comparisons Across 1992, 1993 and 1995 Surveys*. American Farmland Trust Center for Agriculture in the Environment. DeKalb, Ill. In Press.

Griffith, D. R., E. J. Kladivko, J. V. Mannering, T. D. West, and S. D. Parsons (1988). "Long Term Tillage and Rotation Effects on Corn Growth and Yield on High and Low Organic Matter, Poorly Drained Soils." *Agronomy Journal* No. 4, Pages 599-605.

Heimlich, Ralph E., Wiebe, Keith D., Claassen, Roger, Gadsby, Dwight, and House, Robert M. *Wetlands and Agriculture: Private Interests and Public Benefits*. AER-765, U.S. Department of Agriculture, Economic Research Service, September, 94 pp.

Heimlich, R.E., and J. Melanson. 1995. "Wetlands Lost, Wetlands Gained," National Wetlands Newsletter 17(3): 1-25. May-June.

Hudson, E. H., and J. F. Bradley (1995). "Economics of Surface-Residue Management," *Crop Residue Management to Reduce Erosion and Improve Soil Quality: Southeast Region* (G.W. Langdale and W.C. Moldenhauer, eds.). U.S. Dept. Agr., Agr. Res. Serv., Conservation Research Report No. 39.

Hyberg, Bengt (1997). "Conservation Compliance," *Agricultural Resources and Environmental Indicators, 1996-97*, AH-705, U.S. Dept. Agr., Econ. Res. Serv., July.

Kramer, Randall A., and Leonard Shabman. "The Effects of Agricultural and Tax Policy Reform on the Economic Return to Wetland Drainage in the Mississippi Delta Region." *Land Economics.* 69(3)(1993): 249-62.

McBride, William D. "The Economics of Crop Residue Management in U.S. Corn Production." Paper presented at the Southern Agricultural Economics Association Meetings, Memphis, TN, January 30- February 3, 1999.

Norris, Patricia E. Clark, Richard T. (1995) Conservation Compliance Policy. http://www.ianr.unl.edu/farmbill/comply.htm

Osborn, C. Tim. (1996) "Title III, Conservation" in *Provisions of the Federal Agricultural Improvement and Reform Act of 1996*, Frederick J. Nelson and Lyle P. Schertz, eds. U.S. Dept. Agr. Econ. Res. Serv., Agriculture Information Bulletin No. 729, September, pp. 43-49.

Reichelderfer, K.H. 1985. *Do USDA Farm Program Participants Contribute to Soil Erosion?* AER-532, U.S.Dept. Agr., Econ. Res. Serv., April, 73 pp.

Sandretto, Carmen (1997). "Crop Residue Management," *Agricultural Resources and Environmental Indicators, 1996-97*, AH-705, U.S. Dept. Agr., Econ. Res. Serv., July.

Shields, Dennis A., and Paul C. Westcott. "Low Prices Test 1996 Farm Act." *Agricultural Outlook*. October 1998, pp. 12-14.

Siemens, John C., and D. Howard Doster (1992). "Costs and Returns" in *Conservation Tillage Systems and Management, Crop Residue Management with No-till, Ridge-till, Mulch-till*. Midwest Plan Service, MWPS-45, First Edition, Agricultural and Biosystems Engineering Department, Iowa State University, Ames, IA, pp. 34-41.

Tolman, Jonathan. "How We Achieved No Net Loss." *National Wetlands Newsletter*. 19(4)(1997):1-22.

U.S. Department of Agriculture, Farm Service Agency, world-wide web site: *http//:www.fsa.usda.gov*.

U.S. Department of Agriculture, Nat. Res. Con. Serv. *National Food Security Act Manual, Third Edition*. 1996.

U.S. Department of Agriculture. 1981. Soil and Water Resources Conservation Act, Program Report and Environmental Impact Statement, revised draft. November, p. 6-41.

U.S. Department of Agriculture, World Agricultural Outlook Board. *Agricultural Baseline Projections to 2007.* Staff Report WAOB-98-1. February 1998.

Young, C. Edwin, and Paul C. Westcott. *The 1996 U.S. Farm Act Increases Market Orientation*. U.S. Dept. Agr., Econ. Res. Serv., Agriculture Information Bulletin No. 726, August 1996.

Zinn, Jeffrey (1998) Conservation Compliance for Agriculture: Status and Policy Issues, 96-648 ENR Environment and Natural Resources Policy Division, Congressional Research Service, Washington, D.C. http://www.cnie.org/nle/ag-45.html

Glossary

Approved conservation system—A set of field-specific cropping and managerial soil conservation practices designed in cooperation with local NRCS agents to reduce soil erosion. Basic conservation systems reduce erosion to the soil tolerance level (see definition below). Alternative conservation systems provide a significant level of erosion reduction without excessive economic burden on producers.

Applied conservation system—An approved conservation system that has been applied and is being maintained, based on standards contained in the NRCS field-office technical guide.

Conservation Compliance provision—Since 1985, this provision requires all farmers producing on HEL who receive or request certain USDA benefits to have an approved conservation system applied on those lands. Violations may result in disqualification from USDA programs or reduction of benefits.

Conservation cropping sequence—A crop rotation (multi-year sequence of crops) designed to improve or maintain good physical, chemical, and biological conditions of the soil; help reduce soil erosion; improve water use efficiency and water quality; improve wildlife habitat; or break reproduction cycles of plant pests.

Conservation tillage—Any tillage and planing system that covers 30 percent or more of the soil surface with crop residue, after planting, to reduce soil erosion by water. Where soil erosion by wind is the primary concern, any system that maintains at least 1,000 pounds per acre of flat, small grain residue equivalent on the surface throughout the critical wind erosion period.

Crop residue use--Managing the amount, orientation, and distribution of crop and other plant residues on the soil surface during part of the year, while growing crops in a clean tilled seedbed.

Erodibility index (EI)—The natural erosion potential of a soil divided by the soil's tolerance level.

Highly erodible land (HEL)—Designations made by NRCS field staff include cropland in fields that have at least one-third or 50 acres (whichever is less) of highly erodible soils. HEL soils were defined as soils with an erodibility index (EI) greater or equal to 8. An EI of 8 indicates that without any cover or conservation practices, the soil will erode at a rate 8 times the soil tolerance level. HEL designations currently total 146 million acres. This number has changed over time as more producers apply for benefits and more determinations are made.

Loan Deficiency Payment-- A payment equal to the difference between the loan rate and the posted county price for a commodity. LDPs are only paid when the market price falls significantly below the loan rate. They are subject to conservation compliance provisions and are annually limited to a $75,000 per person.

Mitigation--Compensation through wetland restoration, enhancement, or creation for functions and values that are lost on a converted wetland. *Restoration* of a wetland means the re- establishment of wetland conditions, including hydrologic conditions or native hydrophytic vegetation, to an area where a wetland had previously existed. *Enhancement* of a wetland means the alteration of an existing wetland to increase its specific functions and values. *Creation* of a wetland means the development of the hydrologic, geochemical, and biological components necessary to support and maintain a wetland where a wetland did not previously exist.

Production Flexibility Contract--7-year contracts to receive market transition payments under the 1996 FAIR Act. Producers with base acreage under the pre-1996 farm programs are eligible for PFCs. They are subject to conservation compliance, must use the land for agricultural activities, and must be enrolled in the crop insurance program.

Soil tolerance level (T)—The rate of soil erosion that can continually occur without reducing productivity.

Tract or operating unit—All fields farmed by a single operator. The entire unit is subject to the penalties of noncompliance, provided any field in the unit is determined to be highly erodible and the operator of that field has not applied or maintained the approved conservation system before receiving certain USDA program benefits.

Variances—Variances are offered to producers when **climatic** conditions such as flood or drought prevent implementation of the full conservation system. One example would be where a drought prevented the establishment of a cover crop. **Hardship** variances are offered when circumstances such as family illness or crop failure prevent a farm from implementing the conservation system. Because drought or floods can be widespread, variances can be important for not only individual farmers but also production regions.

Violations/disqualifications—Determined by FSA on recommendations of NRCS field staff, based on the guidelines of the approved conservation system. Before January 1, 1995, they occurred when an HEL field failed to have a partially applied conservation system by specified interim deadlines. After January 1, 1995, they occur when an operator requests or receives certain USDA program benefits without fully applying or maintaining an approved conservation system on HEL. Operators can request the development of a new plan or may be granted a temporary variance.

Estimating Cropland Potential and Economic Consequences

Wetlands and HEL are considered *potentially convertible* if (1) they are within a quarter mile of existing cropland and (2) the net present value (NPV) of returns to crop production after conversion, at expected future prices, exceeds total costs of conversion (the NPV of return to land in its pre-conversion use plus conversion costs) by at least 6 percent of the total cost of conversion. Close proximity to existing cropland ensures that wetland or HEL is located such that it could easily be incorporated into an existing farm.

Expected commodity prices are projected in the February 1998, USDA long-term agricultural baseline (USDA-WOAB). We use projections for 1999, 2001, and 2004 for low, medium, and high expected price scenarios (table 5.3.6). Net present values are defined over a finite time horizon which varies by prior land use. For forested land, the time horizon is the length of a single forestry rotation. Other wetland sites are assigned a 10-20 year time horizon, depending on the drainage technology used. Other HEL sites are assigned a 10-year time horizon. We assume a discount rate of 6 percent for all net present value calculations. A full description of data and methods is available in Claassen et. al. (1998).

Costs and Yields with Conservation Tillage

McBride (1999) estimated costs per bushel of corn production under conventional and conservation tillage methods using data from a national survey of corn producers cost and yields. Per bushel costs are calculated for four tillage systems, two rotations, and four distinct regions. Pre-harvest costs for each tillage system by region were estimated from the 1996 Agricultural Resource Management Study (ARMS). Yields for each tillage system, rotation, and region were estimated using Cropping Practice Survey (CPS) data from 1990-96. Both the ARMS and CPS data were collected by the U.S. Department of Agriculture, Economic Research Service (USDA-ERS) and National Agricultural Statistical Service (USDA-NASS). The cost-to-yield ratios are reported in table 5.3.7. Tillage systems are defined according to estimated residue cover after planting as reduced tillage (15%-30% residue cover), mulch-till (>30% residue cover) and no-till (>30% residue cover and no tillage operations).

Potential benefits of conservation tillage appear to be largest for dryland corn production in the Plains States. All forms of conservation tillage result in lower costs and higher yields, probably due to moisture conservation. Under irrigated conditions, when moisture retention is not an issue, no clear economic benefit could be attributed to conservation tillage, perhaps confirming the role of moisture conservation in conservation tillage benefits for Plains producers. Corn producers in the Lake States also appear to reap economic benefits from all forms of conservation tillage. For each tillage and rotation, yields are not significantly different but production costs are significantly lower. Results are more mixed for Corn Belt producers. Despite significantly lower yields, unit costs were less than for conservation tillage for no-till systems in both the Eastern and Western Corn Belt. Reduced till and mulch till produce significantly higher yields on corn-soybean rotations in the Western Corn Belt. Both reduced and mulch tillage appear to increase yields and/or reduce costs for corn-corn and corn soybean rotations in the Eastern Corn Belt.

One caveat is particularly worth noting. Comparing the costs and yields of producers who use conservation tillage versus those who do not implies that non-users have similar resource situations and could also reap similar benefits from conservation tillage. However, it is likely that some producers have adopted conservation tillage because it is particularly suited to their specific situations. While it is not possible to say that conservation tillage methods would result in cost savings for all producers, those who are successfully using conservation tillage systems will likely continue to use them for economic reasons, even without conservation compliance requirements.

Table 1--USDA Commodity and Conservation Program Expenditures

	1996	1997	1998	1999	2000 current estimate	2001 budget request
			Million dollars			
Commodity Programs:						
Production Flexibility Contracts	1,612	6,350	5,719	5,476	5,049	4,057
Loan Deficiency Payments		-1,128		3,360	7,222	6,374
Market Loss Assistance Payments				3,011	6,062	0
Noninsured Assistance Payments		63	69	54	185	196
Disaster Assistance	100	48	15	2,264	1,813	2
Other Direct Payments			144	277	501	355
Cotton User Marketing Payments			204			
Supplementary Income Assistance Payments					600	2,464
Farm Storage Facility Loans					350	150
Subtotal: Commodity Programs	1,712	5,333	6,151	14,442	20,832	10,984
Conservation Programs:						
Conservation Reserve Program	1,836	1,774	1,798	1,462	1,610	1,742
Environmental Quality Incentives	75	200	200	170	174	325
Wetlands Reserve Program	77	119	219	123	176	289
Conservation Security Program	0	0	0	0	0	600
Subtotal: Conservation Programs	1,988	2,093	2,217	1,755	1,960	2,356
Risk Management Programs:						
Gross Indemnities	1,834	1,072	2,112	1,988	2,417	2,461
Producer Premiums	-641	-842	-982	-775	-959	-968
Net Indemnities	1,193	230	1,130	1,213	1,458	1,493
Subtotal: Risk Management Programs	1,193	230	1,130	1,213	1,458	1,493
Total programs leveraging compliance	4,893	7,656	9,498	17,410	24,250	14,833

Source: ERS, based on data from Office of Budget and Program Analysis, U.S. Department of Agriculture.

Table 2--Conservation compliance status, 1997

Region	Actively applying approved plan	Actively applying plan with variances	Conditionally applying	Not actively applying (potential violation)	Other[2]
			Percent of operating units [3]		
Heartland	94.3	3.7	0.1	0.1	1.8
Northern Crescent	93.5	1.7	0.1	*	4.7
Northern Great Plains	97.8	*	*	*	2.2
Prairie Gateway	96.9	0.1	*	*	3.0
Eastern Uplands	98.2	0.1	*	0.1	1.6
Southern Seaboard	96.2	2.2	*	0.1	1.5
Fruitful Rim	96.9	1.3	0.3	0.1	0.5
Basin and Range	95.8	2.9	*	0.1	1.8
Mississippi Portal	95.7	1.8	*	*	2.5
Total/average	95.9	2.0	0.1	*	2.0

[1] Acreage total excludes HEL in the CRP.
[2] Other includes wetlands on HEL or acres not required to apply plans.
[3] Determination based on operating units, not acreage.
* less than 0.1 percent.
Source: AREI Chapter 6.3, 2000

Table 3--Violations of conservation compliance provisions, 1986-98[1]

Year	HEL provisions				Wetland provisions		
	Producers in violation	Land in violation	Benefits denied	Producers losing all benefits	Producers in violation	Land in violation	Benefits denied
	Number	*Acres*	*Million Dollars*	*Number*	*Number*	*Acres*	*Million dollars*
1986	2	10	*	2	na	na	na
1987	66	3,289	0.2	66	12	100	0.1
1988	174	3,745	0.5	174	127	1,490	1.2
1989	83	2,957	0.2	83	121	693	1.1
1990	342	60,295	1.6	342	105	560	1.3
1991	584	42,675	2.9	na	165	1,428	2.0
1992	693	38,503	1.8	na	156	3,221	1.6
1993[2]	859	36,252	3.2	341	86	2,225	0.4
1994	632[3]	25,933	2.1	261	43	674	0.3
1995	118[4]	3,266	1.0	40	11	105	*
1996	677	45,540	1.6	238	154	13,920	1.3
1997	125	10,012	0.6	66	99	907	1.2
1998[4]	49	8,115	0.2	26	57	1,274	1.8
Total[5]	11,159	280,582	15.9	1,639	1,136	26,597	12.3

[1]Includes producers and violating land for which price support or disaster benefits were denied. Benefits denied include price support payments, farm storage facility loans, crop insurance (through 1996), and insured or guaranteed loans, but do not include a value for price support loans or disaster payments.
[2] Benefits denied under Swampbuster are before appeals and reinstatements prior to 1993, and after such adjustments in 1993 and later years.
[3] Preliminary.
[4] As of December 1998.
[5] Totals incomplete where detailed data are not available.
na=data not available.
* Less than $100,000.
Source: AREI Chapter 6.3, 2000

Table 4--Conservation management systems and technical practices applied on cultivated HEL subject to compliance, 1997

Item	Percent of cultivated HEL
Conservation magement systems	
Conservation cropping/crop residue use	27.5
Conservation cropping/conservation tillage	10.8
Conservation cropping only	7.8
Crop residue use only	4.9
Cons. cropping/conservation tillage/contouring/grassed waterway/terrace	2.4
Conservation cropping/contouring/crop residue use/terrace	2.2
Conservation cropping/conservation tillage/crop residue use	1.6
Conservation cropping/crop residue use/surface roughening	1.5
Conservation tillage only	1.5
Conservation cropping/conservation tillage/contouring	1.5
Conservation cropping/contouring/crop residue use/grassed waterway/terrace	1.5
Conservation cropping/conservation tillage/contouring/terrace	1.4
Conservation cropping/crop residue use/wind stripcropping	1.4
Conservation cropping/conservation tillage/grassed waterway	1.2
Total, 15 most frequently used systems	65.9
Conservation Technical Practices[1]	
Total with conservation cropping	81.1
Total with crop residue use	51.3
Total with conservation tillage	33.0
Total with contour farming	19.3
Total with terrace	13.0
Total with grassed waterway	9.2
Total with surface roughening	4.6
Total with cover/green manure	3.4
Total with field border	3.0

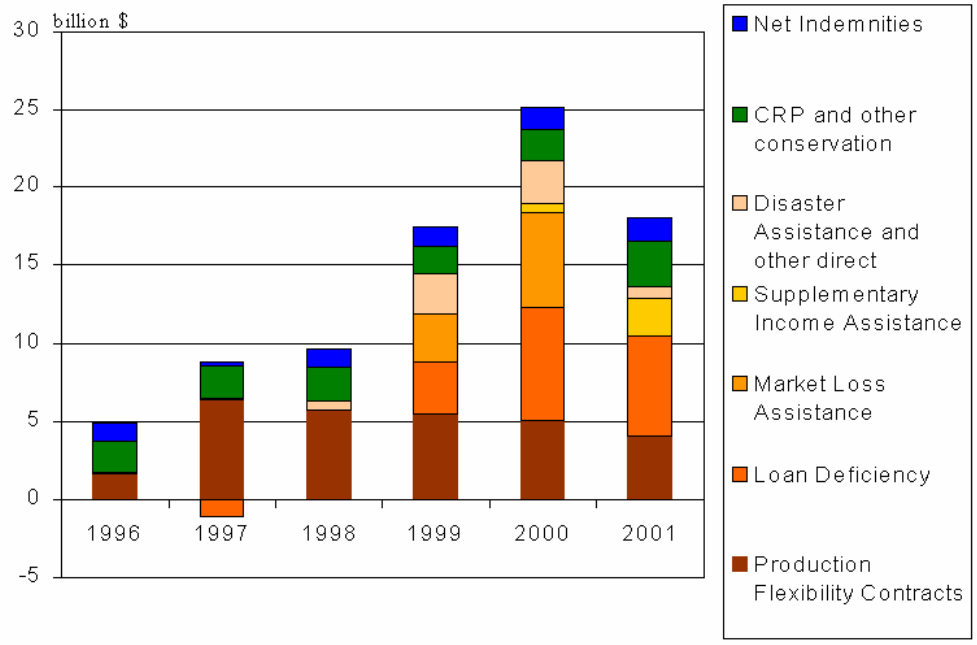
[1]Percentages sum to more than 100 because of multiple practices being applied to same land.
Source: AREI Chapter 6.3, 2000

Table 5--Estimated acreage and farm income impacts if potentially convertible wetland and highly erodible land were placed into production

Farm production region	Potentially convertible acreage of Wetland and HEL	Estimated change in crop acreage[1]	Estimated change in Farm income[1]
	Million acres	Million acres	Million $
Northeast	0.7	0.6	-59.5
Lake States	0.6	0.4	-521.4
Corn Belt	2.3	1.7	-1,696.0
Northern Plains	1.9	0.6	-705.8
Appalachia	2.7	2.3	109.1
Southeast	1.2	1.2	85.6
Delta States	0.8	0.5	-153.8
Southern Plains	0.6	0.0	-249.9
Mountain States	**	-0.7	-180.7
Pacific Coast	0.1	0.1	-128.6
U.S.	10.8	6.6	-3,501.0

[1]Change from USDA baseline projections for crop acreage and farm income for 2001 (*USDA Agricultural Baseline Projections to 2007*, February 1998.)
**Fewer than 50,000 acres.
Source: AREI Chapter 6.3, 2000

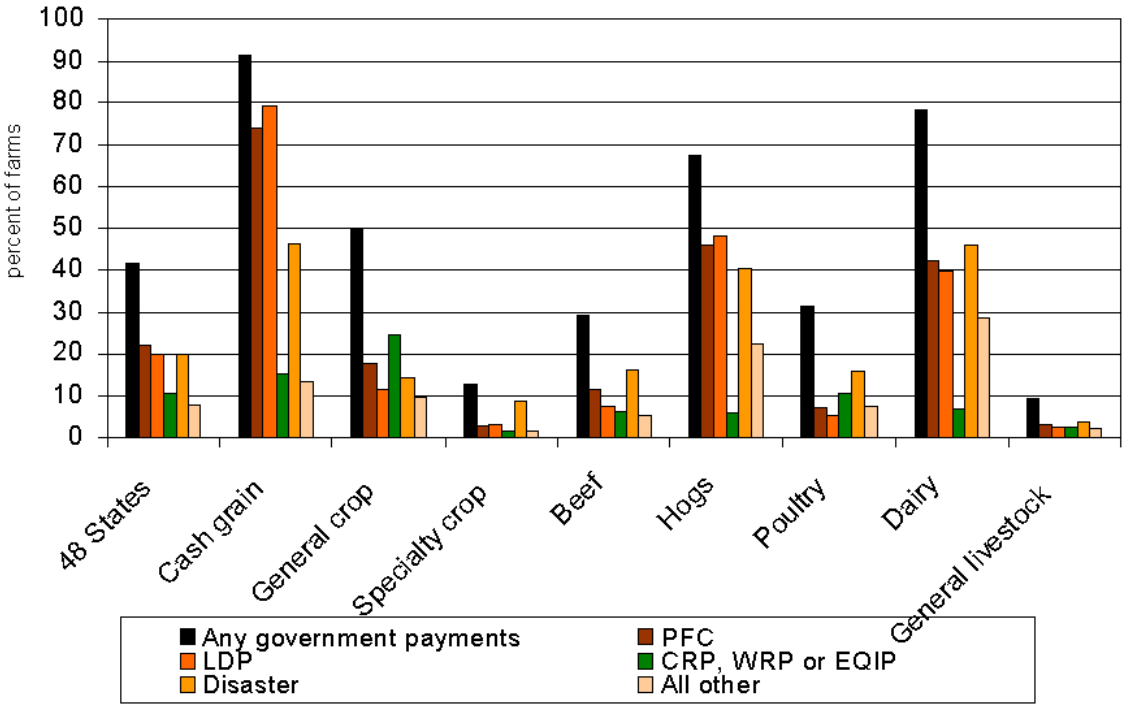
Fig. 1--USDA Commodity and Conservation Program Expenditures



2000 is current estimate, 2001 is budget request.

Source: ERS analysis of OBPA data.

Fig. 2--Government Payments by Farm Type, 1999



Source: ERS, USDA, 1999 Agricultural Resource Management Study data.

Figure 3--Production Flexibility Contract, Market Loss Assistance, and Loan Deficiency Payments by County, 1998

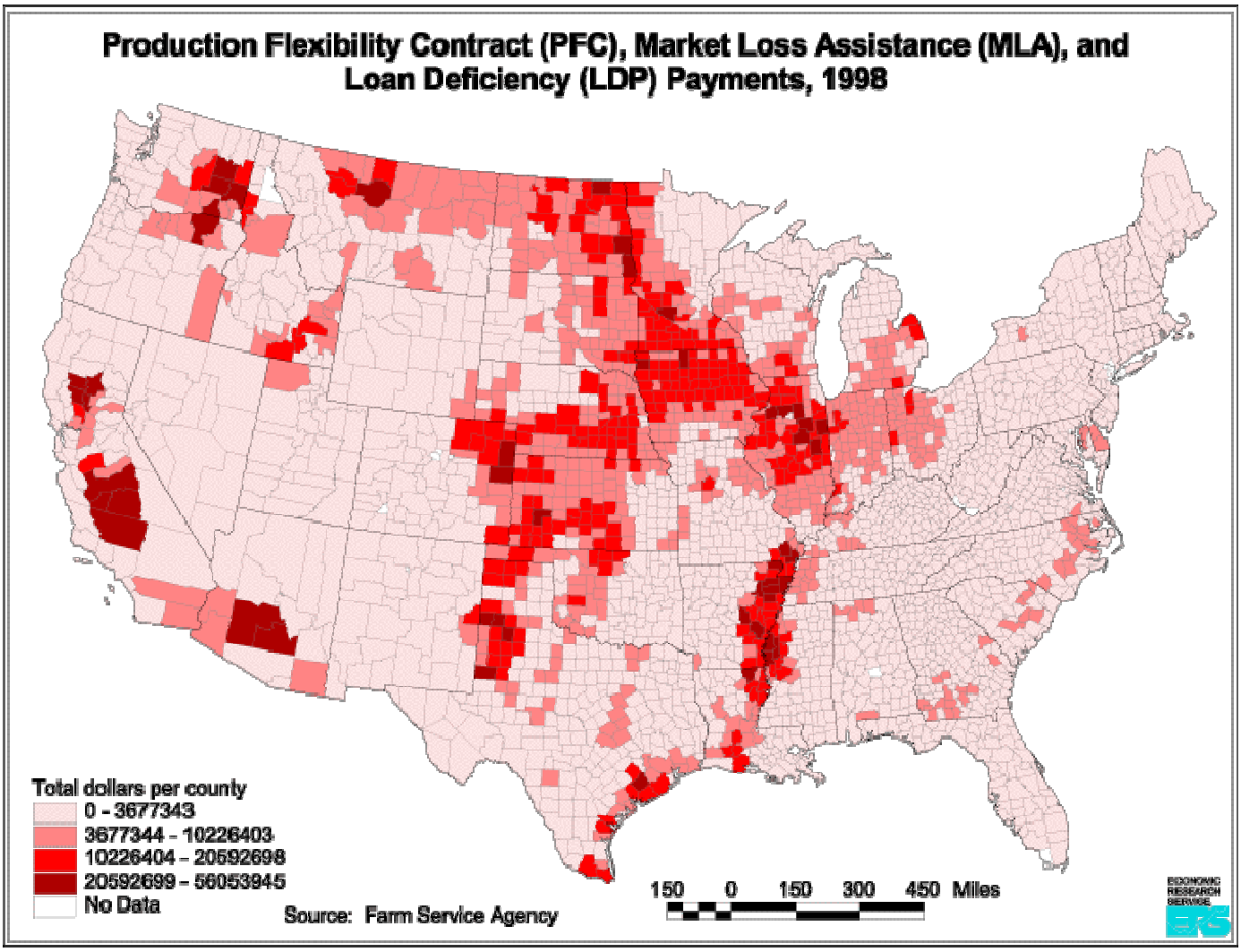
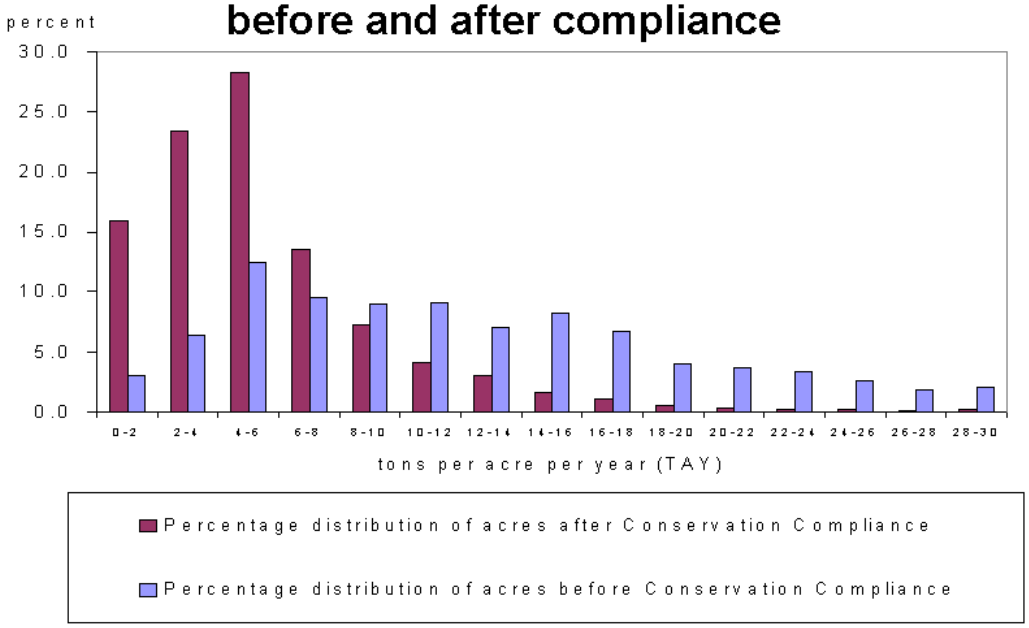


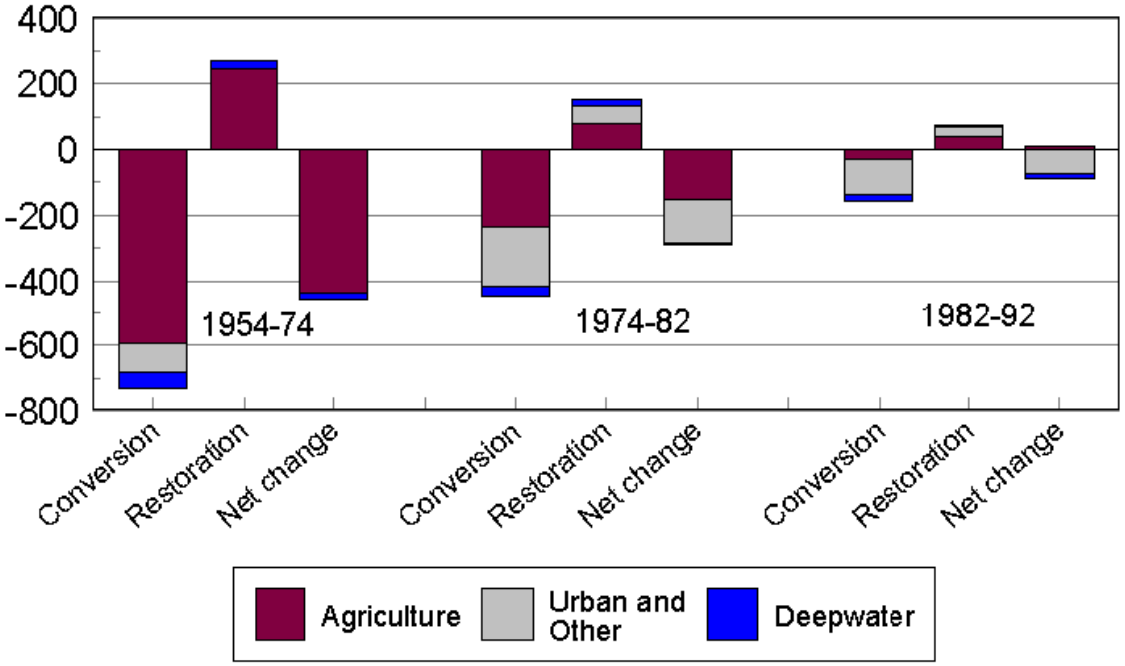
Fig. 4--Distribution of land subject to conservation compliance, by erosion rate, before and after compliance



Source: AREI Chapter 6.3, 2000

Figure 5 -Wetland conversion, restoration, and net change, contiguous States, 1954-92

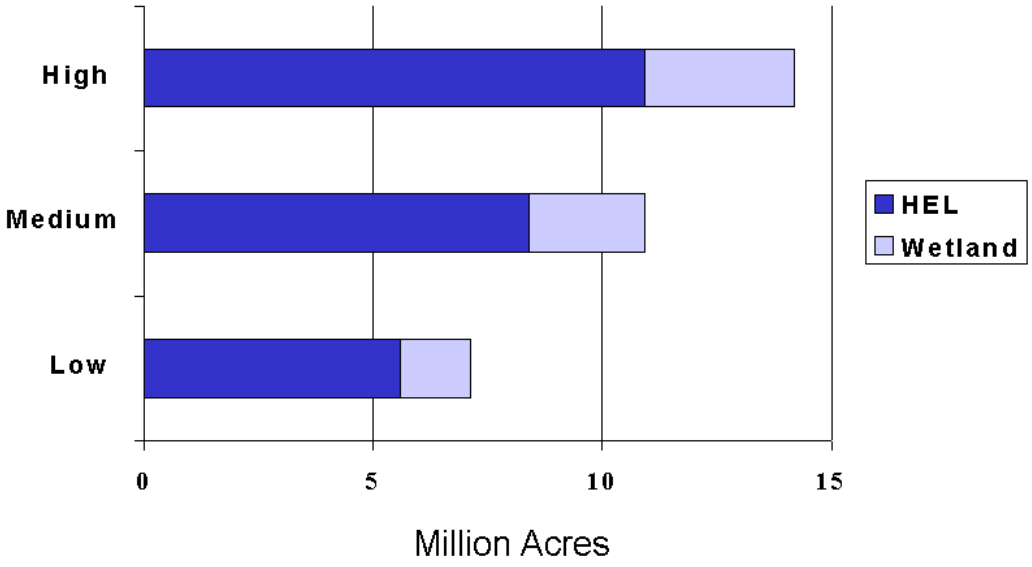
Thousand acres/year



Source: AREI, Chapter 6.5, 2000

Fig. 6--Potentially convertible acreage of wetland and highly erodible land (HEL)

High-, medium-, and low- price scenarios*



*High-, medium-, and low-price scenarios correspond to projections for 2004, 2001, and 1999, respectively, from *USDA Agricultural Baseline to 2007*, February 1998.

Source: AREI, Chapter 6.3, 2000