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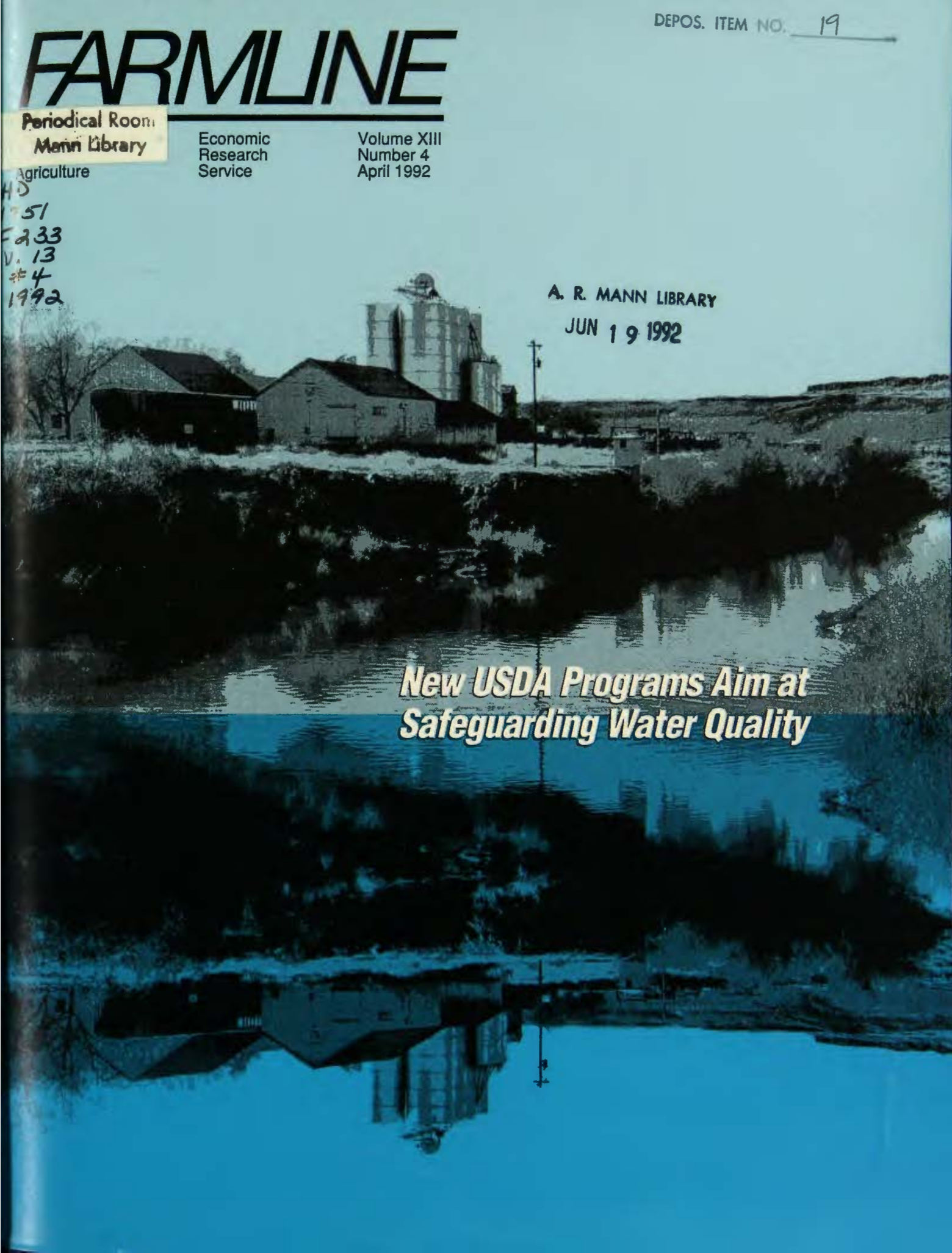
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***New USDA Programs Aim at
Safeguarding Water Quality***

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PERSPECTIVES

Concern about the Nation's surface and ground water has prompted policy makers to enlarge USDA's role in protecting water quality, and some of the resulting policy changes are having an impact on farmers and the environment. To help clarify some of these policies and how they are likely to influence current and future farming practices, this edition of *FARMLINE* highlights conservation issues.

"The loss of some soil sediment and agricultural chemicals to the environment is an inevitable part of agriculture," explains economist Marc Ribaud of USDA's Economic Research Service. Sediment and chemicals can enter surface water through runoff, and chemicals can reach ground water through leaching.

"Water quality initiatives attempt to influence farmers' behavior through specific approaches," says Ribaud. Legislation making farmers' receipt of crop program benefits contingent upon taking certain steps to protect the environment is an example of this approach.

Another approach is to provide technical assistance and cost-sharing to any farmer who wants to adopt soil or water conservation best management practices. "Conservation tillage, integrated pest management (IPM), soil nutrient testing, filter strips, and manure management are examples of farming practices that protect water quality," says Ribaud.

The Wetlands Reserve Program (WRP) provides for the restoration of up to 1 million acres of wetlands that were converted to cropland before 1985. Wetlands are critical to the preservation of water quality because they help replenish ground water and serve as a natural filter for surface water supplies. Under this program, introduced in the 1990 farm act, participants must allow the Government to acquire long-term easements on the restored acreage.

The Conservation Reserve Program (CRP) has also been modified and its focus largely shifted from just reducing soil erosion to protecting water quality in a variety of other ways. The 1990 farm act broadened the program to give it wider eligibility but more targeted acreage acceptance criteria.

The 1990 farm act also revised the Swampbuster and Sodbuster provisions to stiffen penalties for farmers participating in crop programs who violate their conservation compliance plans, plant without a plan, or plant on wetlands.

IPM, a technique that combines a variety of crop protection strategies with careful monitoring of pests and diseases, continues to gain acceptance, particularly among vegetable producers. Often associated with decreased pesticide use, this technique may gradually replace calendar-based pesticide use on some crops.

In addition to these new and revised programs, Federal agencies and State governments and universities across the country continue to provide an array of services to help farmers succeed in using techniques that safeguard natural resources.

— Priscilla B. Glynn

FARMLINE

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FEATURES

New USDA Programs Aim at Safeguarding Water Quality *Doug Martinez* 4

Now that factories, sewage treatment plants, and other facilities have significantly reduced the amount of pollution they discharge, Federal and State officials are turning their attention to curbing water pollution from agricultural sources. To that end, USDA is implementing several new programs to encourage farmers to use environmentally sensitive practices.

Wetlands Reserve Program To Restore Converted Acreage *Jack Harrison* 7

Once considered a nuisance, America's wetlands are now recognized as an integral part of a healthy ecosystem. The new Wetlands Reserve Program allows farmers to restore wetlands converted to cropland before 1985, retiring it and other eligible acreage in long-term easements. The first opportunity for farmers to sign up for enrollment is expected to take place this spring.

CRP Continues To Protect Natural Resources *Priscilla B. Glynn* 10

Authorized in 1985 with the primary goal of reducing soil erosion, the Conservation Reserve Program has been broadened to embrace water quality concerns. The program now has wider eligibility but more targeted criteria—so farmers who previously decided the CRP wasn't for them may want to reconsider participating in the program. The next sign-up will be in June.

Integrated Pest Management Cuts Use of Chemicals *Carol Lee Morgan* 13

This technique for controlling pests or diseases on crops incorporates many strategies, and is often associated with minimal use of chemical pesticides. Grower interest in using IPM on vegetable crops surged in the last decade, and analysts think it will remain an important production technique in the future.



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New USDA Programs Aim at Safeguarding Water Quality



Federal and State officials are trying to find ways to modify agricultural practices in order to limit water pollution.

They would like to accomplish this task without imposing restrictive controls on farmers, but say that such measures may be necessary in some instances.

Now that the Nation has succeeded in significantly reducing discharges of pollutants from factories, sewage treatment plants, and other "point" sources in the wake of water pollution laws, more attention is shifting to "nonpoint" sources of water pollution, including agriculture.

"The loss of some sediment and agricultural chemicals to the environment is an unavoidable part of agriculture," says economist Marc Ribaud of USDA's Economic Research Service (ERS). "Sediment, nutrients, and pesticides can enter surface water through runoff, and nutrients and pesticides may enter ground water through leaching."

In some instances, he says, these residues may impose costs on those who use water resources, or may have an impact on wildlife.

"The 1990 farm act enlarges USDA's role in improving water quality."

"With the increased concern over water quality, USDA has been changing the focus of its conservation efforts," says Ribaud.

Broadening Response

"The Food, Agriculture, Conservation, and Trade Act of 1990, commonly called the 1990 farm act, enlarges USDA's role in improving water quality," says Ribaud.

The 1990 legislation authorized several new programs, including the Water Quality Incentive Program (WQIP). This program provides financial assistance to farmers in "environmentally sensitive" areas who voluntarily adopt water quality-enhancing, best management practices. It is aimed at areas where nonpoint source pollution from agriculture is known to occur, such as those watersheds identified under the 1987 Water Quality Act.

"Another new initiative is the Environmental Easement Program, which allows USDA to acquire permanent easements from willing owners of eligible farms to ensure the continued long-term protection of environmentally sensitive lands or the reduction in the degradation of water quality," says Ribaud.

Also new in the 1990 farm act is the Integrated Farm Management Program (IFMP), a voluntary program to assist producers in adopting multiyear farm management plans that promote soil conservation and water quality.

Currently, the acreage and funding for the WQIP and the IFMP are relatively modest, but USDA's environmental initiatives may have a larger role in the future.

The Policy Mix

These programs are part of the policy mix that Government officials are sifting and refining to encourage farmers to use environmentally sensitive practices.

"In principle, USDA water quality initiatives attempt to influence farmer behavior through specific approaches," says Ribaud. "One is to make program benefits contingent upon taking certain steps to pro-

tect the environment, the so-called compliance approach."

The Sodbuster and Swampbuster provisions of the Food Security Act of 1985 (commonly called the 1985 farm act) and conservation compliance all fall into this category. But these programs affect only those producers who participate in USDA crop programs.

"A second approach for influencing farmer behavior is through education, technical assistance, and financial incentives," says Ribaud. "The Soil Conservation Service, Extension Service, and Agricultural Stabilization and Conservation Service have a number of programs for providing technical assistance and cost-sharing to any farmer who wishes to voluntarily adopt soil or water conservation best management practices."

In the past, these agencies emphasized soil erosion control, but new practices focusing on water quality are being encouraged.

"Farming practices that protect water quality include buffer strips, integrated pest management, soil nutrient testing, manure management, and conservation tillage," says Ribaud.

A third approach that could be taken is to alter the way price or income support programs are currently operated, he says.

A Need to Modify

"Many benefits associated with program participation are linked to the production of specific crops," says Ribaud. "Crop-specific support programs can lead to cropping practices that are more erosive or chemical-intensive than other kinds of farming, thus leading to larger risks of water quality impairment."

For example, base requirements of the commodity programs may discourage rotations with crops that may be less erosive or have lower chemical requirements.

"But the change in program rules contained in the 1990 farm act introduces greater planting flexibility for farmers and may result in reduced erosion and chemical use," says Ribaud. "Planting flexibility now al-

lows farmers to plant alternative crops—except for fruits and vegetables—on a portion of their base acreage without losing program benefits. If the alternative crops are less erosive or require less intensive use of chemicals than the program crops they replace, then water resources would benefit."

Under the legislation's flexibility provision, a producer's crop base acreage is split three ways—acreage in a program crop (wheat, feed grains, cotton, or rice) for which the farmer may get deficiency payments, acreage that is not planted under the acreage reduction program (ARP), and acreage that is "flexible" and can equal up to 25 percent of the crop base. Producers are entitled to receive nonrecourse and marketing loans on crops planted on the flexible acreage.

Ribaud cautions that these approaches—even if fully implemented—would not be uniformly effective throughout the country. He bases this judgment upon an analysis of agricultural counties.

"The potential effectiveness of agricultural programs for improving water quality was examined by conducting a statistical comparison of various physical and program characteristics of counties affected and not affected by nonpoint source pollution," he says. "Counties were compared within each farm production region and with the United States as a whole."

Data from the Environmental Protection

Agency (EPA) were used to characterize each county in terms of pollution of surface water from agricultural sources. "The Clean Water Act charged EPA with making periodic assessments of States' progress toward achieving national water quality goals," says Ribaud.

The most recent State assessments made to meet the requirements of the Clean Water Act indicated that sediment, pesticides, or nutrients originating on cropland adversely affect or threaten at least one



Stan Rolley, manager of a hog finishing operation, discusses plans to expand an animal waste lagoon with Rhett Grant, SCS District Conservationist



EPA water segment (lake or river segment identified by the EPA) in 60 percent of the counties in the lower 48 States.

Ribaudo goes on to say that a water segment was considered to be adversely affected if the State-determined designated use was not being met or was threatened. Some examples of designated use are warm water fishery, cold water fishery, domestic water supply, agriculture, irrigation, industry, recreation, and navigation. Each State sets designated uses for surface water and determines the extent of impairment.

Twenty-six percent of all counties reported at least 5 water segments affected or threatened by agricultural residuals, and 12 percent reported at least 10 affected water segments.

"Presumably, the higher the number of water segment impairments in a county, the more extensive its agricultural nonpoint source problem," says Ribaudo.

But he cautions that data do not permit a calculation of the percentage of surface

water that is impaired, which would be a better measure of the extent of the agricultural nonpoint source pollution problem. The State assessments were also incomplete, so some water segments that may have been adversely affected were not identified.

A Widespread Issue

All farm production regions have water segments identified as being affected by agricultural pollution. The counties identified as having at least one water segment affected contain large shares of most major crops, including 77 percent of oats acreage, 76 percent of soybean acreage, and 72 percent of barley acreage. Counties with at least five affected water segments contain 40 percent of corn acreage, 43 percent of soybean acreage, and 37 percent of barley acreage.

"If USDA programs are to significantly reduce the adverse water quality impacts from agricultural production, then the programs must influence farming practices in

those areas identified as having a nonpoint source problem," says Ribaudo.

But USDA's ability to address water quality problems depends on the approach it takes, he says.

A compliance program that links a variety of direct USDA program payments to adopting water quality-improving management practices presents an opportunity for influencing production in problem areas in most regions, he says.

"Even so, the level of incentive in some of these areas may not be sufficient to bring about a change in behavior," says Ribaudo.

In the Northeast, for example, direct payments as a percentage of net farm income are significantly greater in affected counties than in unaffected counties. But direct payments in the affected counties make up about 17 percent of net farm income, less than the national average. The incentive might not be sufficient to keep farmers in the crop programs if they have to adopt water quality best management plans.

"In addition, future reliance on farm programs is variable," says Ribaudo. "For example, increased demand for U.S. agricultural products from eastern Europe and the Third World could greatly reduce program participation and, as an unintentional consequence, the effectiveness of compliance incentives."

Ribaudo adds that the best way for USDA to address farm-related water quality issues is to develop programs that specifically target water quality. "Recent history, including the 1990 farm act, indicates that USDA is moving in this direction," he says.

Moreover, Ribaudo says, cooperation between USDA, EPA, and the States offers the best opportunity for cutting agricultural nonpoint source pollution without having to turn to more restrictive controls. ■

Based primarily on information provided by economist Marc Ribaudo, Resources and Technology Division, Economic Research Service.

Wetlands Reserve Program To Restore Converted Acreage

The Wetlands Reserve Program (WRP) is designed to restore up to 1 million acres of wetlands that were converted to cropland before 1985.

The program was created in the 1990 farm act (officially entitled the Food, Agriculture, Conservation, and Trade Act). The Government will acquire long-term easements on the restored wetlands.

The legislation called for the acreage to be enrolled over a 5-year period, fiscal years 1991 through 1995. No land was enrolled in fiscal 1991, however, because no funds were appropriated by Congress for that year, according to economist Henry Buist of USDA's Economic Research Service. For fiscal 1992, \$46 million was appropriated for the enrollment of up to 50,000 acres.

The first WRP sign-up is expected to take place this spring, USDA officials say. Economist Dan Colacicco of USDA's Agricultural Stabilization and Conservation Service (ASCS) says that this year the program may be limited to a small number of States, but next year it could be nationwide.

***The program provides
for enrollment of up to
1 million acres during
fiscal years 1991-95.***

"Congress has indicated that it wants to see how the first year of the program goes before it decides on funding for 1993," Colacicco says.

For fiscal 1992, the Administration requested \$124 million for restoration and permanent easements on 150,000 acres of cropped wetlands. The House of Representatives included no WRP funding in its original agriculture appropriations bill, but the Senate approved \$91 million for 98,000 acres. A conference committee compromised on \$46 million.

The WRP legislation provides for the enrollment of up to 1 million acres during FY 1991-95 at the rate of 200,000 acres per year. (The regulations implementing the

details of the program had not been finalized when this story was written.)

Buist describes the WRP, as outlined in the 1990 farm act, as follows:

- Lands eligible for enrollment are farmed or converted wetlands (if converted before December 23, 1985), and adjacent functionally related lands. In addition, farmed wetlands and adjoining lands enrolled in the Conservation Reserve Program (CRP) may be enrolled in the WRP if they have high wetland functions and values and are likely to return to production after they are removed from the CRP. USDA may also include in the program adjacent existing wetlands and riparian areas that link wetlands.
- Participants in the WRP must agree to long-term easements, rather than 10-year contracts as in the CRP. The easement contracts, as determined by the Secretary of Agriculture, can be made for 30 years, on a permanent basis, or for the maximum duration allowed under State law.



Wetland on a farm in South Dakota

Wetlands Definition Under Review

Before the creation of the Wetlands Reserve Program, other Government laws and regulations affected wetlands.

They include the Clean Water Act and the Wetland Conservation Program (commonly called "Swampbuster").

Though long considered a nuisance, wetlands are now recognized for such benefits as reducing flood peaks, replenishing ground water supplies, naturally filtering surface water to improve its quality, preventing shoreline erosion, and providing commercial and recreational fishing resources and wildlife habitats.

The Clean Water Act is scheduled for reauthorization this year. Some congressional hearings relating to the reauthorization already have been held.

The Clean Water Act requires landowners, including farmers, to obtain permits before taking actions that would destroy wetlands, according to ERS economist Henry Buist.

Since 1972, farmland and other lands have been subject to dredge-and-fill permit requirements under Section 404 of the Clean Water Act. Such requirements were reauthorized in 1977 and again in 1987.

Farmers were required to get Section 404 permits if they engaged in dredge and fill operations, but "normal agricultural activities" were exempt from permit requirements, Buist points out.

Such farming operations as plowing, seeding, cultivating, and harvesting are allowed without permits in agricultural wetlands. However, these

activities must be part of ongoing farming operations—they cannot be done to convert wetlands into agricultural production or agricultural wetlands into nonwetland use, Buist says.

The Swampbuster provision was a part of the 1985 farm act (officially entitled the Food Security Act). It denies farm program benefits to farmers who convert wetlands for crop production.

USDA, in enforcing Swampbuster, has used the definition of wetlands contained in the 1985 farm act—based on hydric soil conditions, hydrophytic vegetation, and certain hydrology, Buist says.

That definition states that wetlands consist of soils formed under saturated conditions (hydric soils) that are undrained, inadequately drained, or seasonally wet long enough to support plants normally found in wetlands (hydrophytic vegetation), even if the plants have been removed.

"Prior converted" wetlands, which are not subject to Swampbuster, are those that were converted before 1985 and no longer meet the wetland definition.

A definition of wetlands that is used by several Federal agencies is under review, and this could affect some Government wetlands policies, Buist says.

In 1989, four Federal agencies that oversee wetlands protection—USDA's Soil Conservation Service, the Environmental Protection Agency (EPA), the Army Corps of Engineers, and the Interior Department's Fish and Wildlife Service (FWS)—agreed

on a definition of wetlands. Different definitions had previously been used by various agencies.

The new definition, in the "Federal Interagency Manual for Wetland Identification and Delineation of Wetlands," was criticized by some farming and business interests that felt it expanded protected wetlands acreage unreasonably. The revised definition, proposed to address the expressed concerns, is under review.

One part of the 1989 definition describes wetlands as land saturated within 18 inches of the surface for at least 7 consecutive days during the growing season. The new definition would identify wetlands as land that is inundated for at least 15 consecutive days or saturated to the surface for at least 21 consecutive days during the growing season. (The complete definition also deals with types of soils and vegetation.)

Recent wetland losses (both natural and manmade) have been estimated at 124,000 to 290,000 acres a year. From the 1950's through the 1970's, the estimated totals had been 450,000 acres annually.

Rural nonfederal (not owned by the Government) wetlands totaled 83.2 million acres in 1982, according to the National Resources Inventory (NRI). This designation was based on an older definition used by the FWS.

The Nation's current area included an estimated 215 million acres of wetlands at the time of colonization. By the mid-1970's the total had fallen to 100 million acres or less. Over the years, a number of Government programs had encouraged conversion of wetlands to cropland.

- WRP participants must implement a wetland conservation plan providing for the restoration and protection of the functions and values of the wetlands. And participants must agree to the permanent retirement of any existing cropland base and allotment history for the land.
- WRP participants may receive 5 to 20 payments, plus 50 to 75 percent of the restoration costs, and technical assistance, as determined by the Secretary. For permanent easements, compensation may be made in a single lump-sum payment and cost sharing may range from 75 to 100 percent.
- Total compensation may not exceed the fair market value of the land. Except for permanent easements, compensation in any year may not exceed \$50,000 per

person. The payment limit does not apply to payments that a producer may receive from the State or other entities for participating in programs that enhance the environment in wetlands and easements.

- The Secretary may allow compatible economic uses of WRP land, including hunting and fishing, managed timber harvest, or periodic haying and grazing if specifically permitted by the conservation plan. Mowing or spraying chemicals on WRP land is prohibited unless permitted by a producer's plan or unless Federal or State laws or programs require it—for example, in pest treatment programs. ■

Based primarily on information provided by economist Henry Bulst, Resources and Technology Division, Economic Research Service.



Prairie potholes in South Dakota

CRP Continues To Protect Natural Resources



On the right, a lightly grazed pasture covered with vegetation; on the left, the effects of overgrazing

Agricultural production can have adverse effects on soil, air, surface and ground water, and wildlife. Rising environmental concerns have prompted policy-makers to curb those effects through legislation.

To help preserve the Nation's natural resources, the Conservation Reserve Program (CRP) was authorized by the Food Security Act of 1985 (commonly known as the 1985 farm act). Under this voluntary program, USDA pays farmers to retire highly erodible or environmentally sensitive cropland from agricultural production for 10 to 15 years.

Cropland enrolled in the CRP is planted with grass or trees, or converted to other conservation uses, such as permanent wildlife habitat, filter strips, and windbreaks. The next opportunity for farmers to sign up for enrollment will be June 15-26, 1992.

"Reducing soil erosion by wind and water was the primary goal of the original CRP," explains Tim Osborn of USDA's Economic Research Service. "But more recently its focus has largely shifted to improving sur-

The 1990 farm act gave the CRP wider eligibility but more targeted criteria.

face water quality and protecting ground water."

The Food, Agriculture, Conservation, and Trade Act of 1990 (usually referred to as the 1990 farm act) revised USDA operating and bid acceptance rules, and also broadened the CRP, giving it wider eligibility but more targeted acreage acceptance criteria. "Consequently, farmers who reviewed the CRP provisions before 1990 and decided it wasn't for them may want to reconsider participating in the program," Osborn says.

Why the CRP Is Needed

"Intensive agricultural production on highly erodible or environmentally sensitive land can impair surface and ground water quality, reduce soil productivity, and heighten

off-farm damage from wind erosion," says Osborn. "The CRP has produced benefits in each of these areas and has increased wildlife habitat."

Soil sediment, nutrients from chemical fertilizers (mainly nitrogen and phosphorus), and pesticide residues are often carried into surface water bodies by runoff and erosion caused by rainfall. Fertilizers and pesticides can also move into ground water through a process known as leaching.

"Erosion that exceeds soil formation reduces crop yields by lowering the soil's water-holding capacity and by removing plant nutrients," Osborn explains. "Conserving soil holds down longrun yield losses and helps contain fertilizer costs."

Wind erosion in the Great Plains and Southwest can raise maintenance and cleaning costs for households and businesses, damage machinery, and adversely affect health by contributing to particulate air pollution.

The CRP was established to achieve the following goals:

- Reduce soil erosion,
- Protect soil productivity,
- Reduce sedimentation,
- Improve water quality,
- Improve fish and wildlife habitat,
- Curb production of surplus commodities, and
- Provide income support for farmers.

The CRP requires participating farmers to plant permanent (perennial) vegetation on the enrolled cropland. It establishes and maintains better soil cover and wildlife habitat than could be achieved through annual acreage reduction programs, Osborn notes, because the CRP acreage is covered by long-term contracts and is therefore less likely to be disturbed.

Under the provisions of the 1990 farm act, total CRP acreage will be expanded to no less than 39 million nor more than 44 million

acres by 1995, including the 34 million acres that had already been enrolled before the legislation's passage.

How the CRP Protects Natural Resources

"Estimates of the effects of the CRP on natural resources vary among regions, depending on the amount of cropland retired and reductions in erosion rates," Osborn explains. Reductions of soil erosion through the CRP are currently estimated to be more than 655 million tons per year—about 21 percent of the erosion occurring on all U.S. cropland. The average savings per acre is 19 tons per year.

CRP participation is concentrated mainly in the Northern Plains, Mountain, and Southern Plains regions. Farmers in North Dakota have retired 3 million acres and those in Texas 4 million. Approximately 22 million acres were trimmed from commodity programs, with about 10.3 million acres coming from the wheat program.

"The CRP benefits both surface and ground water quality by reducing erosion and agricultural chemical use on cropland," Osborn points out. "In addition, surface water quality also has benefited from the 49,000 acres of CRP filter strips that prevent residual runoff."

A filter strip is an area 66 to 99 feet wide that separates a crop field from a river or lake, and is usually planted with grass or trees. "These areas are pretty effective at filtering out agricultural runoff—sometimes almost as effective as enrolling the entire field in the CRP would be," Osborn says, "so it's very cost-effective." But he cautions that proper placement of filter strips is critical to preventing runoff. In addition, they can only absorb so much runoff and become less effective over time.

The value of improved surface water quality over the life of the CRP is estimated to be between \$1.3 and \$3.9 billion. (All benefit and cost estimates are in discounted present values.)

"Per-acre benefits vary widely among different regions, depending on the amount of

soil retained, the intensity of local demand for water services, and the extent of local water pollution from nonfarm sources," Osborn notes.

Osborn states that there is no agreed-upon method for determining changes in ground water quality resulting from the CRP, but that the economic benefits are probably minor so far. Highly erodible cropland—the type of land the CRP was established to protect—is often located on slopes. Such land is susceptible to considerable water runoff, which carries away soil particles containing many of the chemicals that degrade water quality. "The chemicals tend to run off into the surface water supply and therefore usually don't leach into the ground water," Osborn says.

Also, CRP enrollment tends to be low in those areas where ground water supplies are most vulnerable to agricultural pollution, because there's not much overlap be-

tween this type of land and land originally eligible for the CRP. "However, now that the 1990 farm act has broadened the eligibility criteria to include some areas identified in the President's water quality initiative, it could safeguard ground water as well," Osborn says.

Research indicates that soil productivity benefits for the 33.9 million acres currently enrolled in the CRP range from \$0.6 to \$1.7 billion, with \$1.2 billion the most likely amount saved.

It is difficult to develop reliable estimates of the economic benefits from reduced wind erosion, but research indicates that they range from \$0.3 to \$0.9 billion, with \$0.4 billion the most likely figure.

The CRP benefits wildlife populations, too. Wildlife often use grassy areas close to cropland for nesting cover, food, winter cover, and migration corridors. "The grassland habitat created by the CRP is likely increasing wildlife populations," Osborn says. "In addition, about 2 million acres of CRP land contain areas especially suited to wildlife needs because they include permanent habitat, food plots, and shallow water areas."

Hunters are among those who benefit from the growing wildlife populations. The net value of wildlife hunting benefits resulting from the CRP (an estimate of the social value to hunters of increases in small game populations) currently range from \$1.9 to \$3.1 billion.

Costs and Savings

The CRP affects the Federal budget in two ways. First, there are the direct costs of operating the program, which include rental payments, the shared costs of establishing ground cover, bonus payments, and technical assistance. USDA pays farmers for each acre retired and also reimburses them for half of the costs of establishing ground cover.

It's estimated that direct program costs of the CRP will total \$14.6 billion over the life of the program, with rental payments, the largest component, reaching about \$13 bil-





Planting up and down the slope has accelerated erosion on this Minnesota cornfield

lion. Rental payments average about \$49 per acre per year.

But the CRP has another effect on Federal expenditures. It lowers the costs of commodity program payments because approximately 22 million acres of commodity program base acres have been retired as a condition of CRP participation. The resulting decline in production raises commodity market prices, which in turn trim farmers' deficiency payments.

Commodity program savings are estimated to range from \$5.3 to \$8 billion over the life of the program, but Osborn cautions that this estimate depends largely on the mathematical assumptions used to determine the level of supply control that would have ex-

isted without the CRP. "For example, the cost savings would have been much smaller had we assumed that acreage reduction programs and paid land diversions would have been expanded to obtain the same degree of supply control," he notes.

What's Ahead

Land currently enrolled in the CRP will remain out of production at least until 1996. At that time, contracts covering land enrolled in 1986 will expire, and USDA's annual rental payments will end.

"Because farmers will not be required to maintain the CRP conservation covers after the contracts expire," Osborn says, "a lot of CRP land will likely go back into crop production—if prevailing prices and commod-

ity programs make this option financially attractive to farmers."

In the 1990 farm act, Congress made three significant changes in the CRP that could affect the future of the acres currently enrolled. First, it gave the Secretary of Agriculture authority to extend contracts. Second, it authorized the Environmental Easement Program to establish long-term or permanent land easements. And third, it stated that farmers will continue to have their crop acreage base protected, provided the land remains in conservation cover.

Over the next few years, policymakers will consider ways to preserve the environmental gains achieved through the CRP—such as contract renewals, land purchases, and long-term or permanent easements.

"Many of these questions will be addressed in the 1995 farm bill," Osborn says. "The provisions of the 1990 legislation indicated a trend toward long-term easements and a desire for a more permanent solution." But concern for the environment will be tempered by budgetary constraints. The current CRP costs about \$1.7 billion a year in rental payments.

Extension of existing CRP contracts will mean that policymakers and others in Government must take a serious look at what tracts of land need extended or permanent protection most. "On the positive side, conservation compliance provisions apply to highly erodible cropland enrolled in the CRP," Osborn says, "so all farmers participating in USDA crop programs will be required to devise and implement conservation plans on such land—or risk losing their eligibility for other program benefits." ■

Based on information provided by economist Tim Osborn, Resource Technology Division, Economic Research Service.

Integrated Pest Management Cuts Use of Chemicals

Integrated pest management (IPM), a technique often associated with decreased pesticide use, is gaining favor with producers of some major and minor crops, according to economist Catherine Greene of USDA's Economic Research Service (ERS). IPM involves the control of pests or diseases by using an array of crop production strategies combined with careful monitoring procedures.

A national evaluation in the mid-1980's indicated that producers using IPM on nine major crops earned \$54 million more in net revenue annually from decreased chemical costs and similar or increased crop yields than those not using IPM.

In vegetable farming, the increase in IPM methods has been dramatic. "Vegetable growers are experiencing increased public pressure to reduce pesticides, and State and Federal laws have restricted more and

Under IPM, pesticides are applied only when pest damage seriously threatens a crop.

more chemical options," Greene says. "Also, some vegetable pests have developed resistance to all pesticides registered for use on those crops."

"Conventional approaches to pesticide use are becoming uncommon for cotton, canning tomatoes, and other crops where IPM is succeeding," Greene adds.

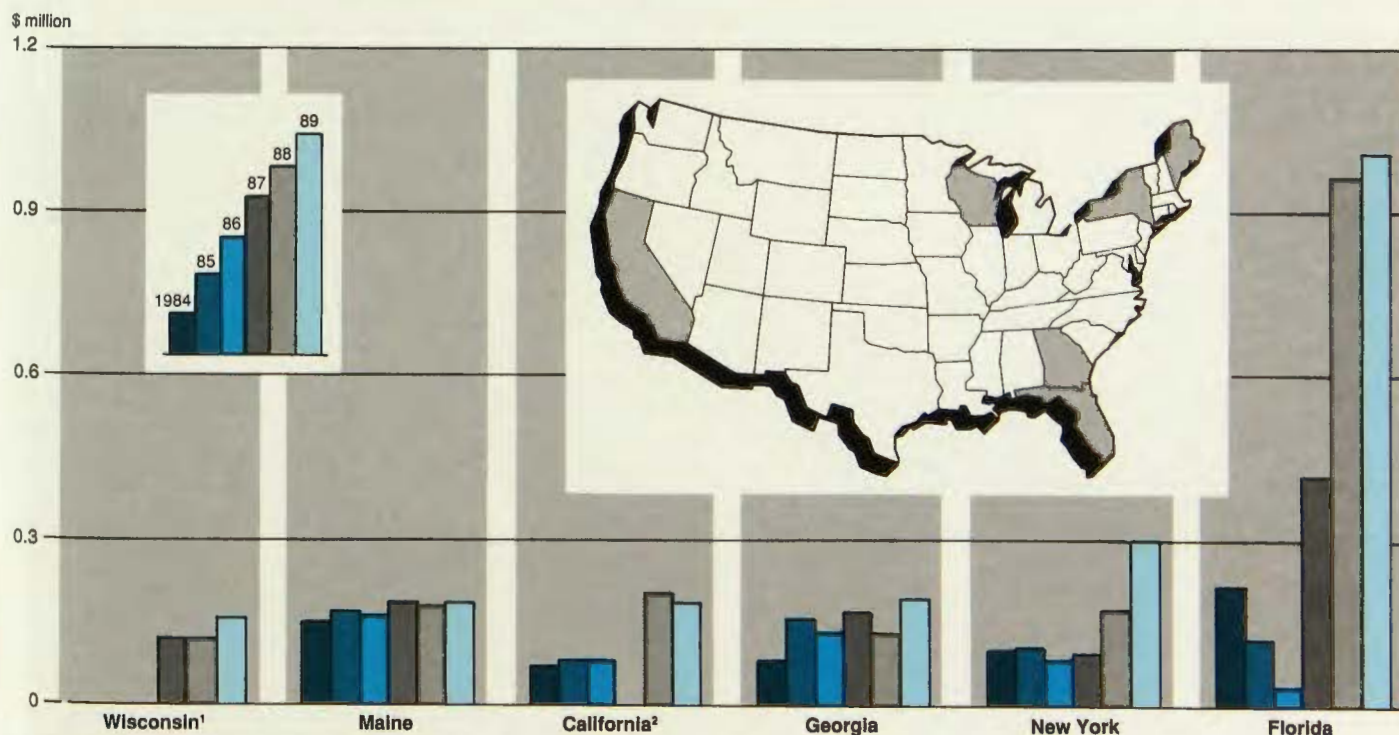
The number of States with vegetable IPM programs rose from only a few before the early 1980's to 17 in 1984 and 22 in 1989.

Greene points out that vegetable area under some form of IPM increased from 742,000 acres in 1984 to nearly 2 million in 1989. These estimates include IPM acreage managed under Extension Service programs, and by private consultants and firms, cooperatives and other grower organizations, representatives of chemical companies, as well as growers and others influenced by Extension recommendations.

"IPM combines the use of pesticides with biological, cultural, and other nonchemical techniques and management practices," Greene says.

Under IPM, pesticides are applied only when the level of pest damage seriously threatens the crop's quality and yield. Determining this level is difficult, however, because it varies according to the individual farmer's pest problems, the stage of crop growth, crop prices, pesticide costs, and

Outlays for IPM on Vegetables Have Increased Steadily in Top States



Industry Provides Most IPM Funding

"The combined outlays of Federal, State, and industry on vegetable IPM research have soared over the years, from \$64,213 in 1978 to \$2.8 million in 1989," says ERS economist Catherine Greene.

The Federal Government spends about \$7 million per year for IPM research on more than 100 crops, 8 percent of which goes for research on vegetables. But this amount is small compared with that spent by industry.

Between 1984 and 1989, industry outlays quadrupled to \$1.9 million in response to consumer concern about pesticide residues on food, Greene adds. In 1984, Federal funds made up 49 percent of total vegetable IPM funding, with industry and the States providing 38 and 13 percent, respectively. By 1989, industry accounted for 67 percent of total funding, the Federal Govern-

ment 17 percent, and States 16 percent.

In just 9 of the 22 States with vegetable IPM programs in 1984, the funding exceeded \$100,000. In most of these top vegetable-producing States, industry was the main source of funds.

Greene notes that Federal and State funds are used for the determination of economically harmful levels of pest damage, and for the development of resistant crop varieties, biological controls and other IPM practices, and projects to encourage adoption of IPM practices on a commercial scale.

Industry funds and grower payments are used for IPM services and include payments to grower co-operatives, private IPM consultants and firms, and the Extension Service.

other factors. Universities and Extension Services in the States generally provide guidance on the acceptable level of damage a farmer can sustain without economic loss.

Biological control uses parasites, predators, and pathogens (bacteria or viruses that can cause disease) to reduce pest populations. Cultural controls include crop rotation and field sanitation (destruction or utilization of crop refuse).

Central to IPM is scouting, or monitoring pest populations and applying pesticides only when the population exceeds an economically damaging level. Thus, the IPM approach differs from organic control, which excludes chemical pesticide use, and from conventional control, which uses routinely applied pesticides based on the calendar or when pests are presumed to be at a certain stage of development, without direct observation. Scouting, together with determining the level of economic damage (known as the threshold approach), were

the most popular techniques used by growers in the nationwide survey.

In addition to timely scouting assessments of the crop, farmers using IPM must be familiar with pest monitoring techniques and the factors that go into making pest management decisions. IPM also requires timely updates about factors needed to make pest management decisions.

Growers Point to Success

For Randy Stallman, a pecan grower near Las Cruces, New Mexico, the benefits of IPM are mainly economic. He calls his 3,500-acre pecan orchard the "second largest in the world."

He points to saving \$690,000 a year by importing lady bug beetles and lace wing flies to attack pests rather than buying and applying insecticides. "This amounts to spending about 71 cents an acre compared with \$190 an acre—quite a difference!" he says. By 1987, the insecticides Stallman was using to combat the yellow aphid and the complex black pecan aphid were no longer effective because the insects had developed a tolerance. "You sprayed them and they laughed at you," he recalls. Stallman called on the Entomology Department of the New Mexico State University for help, and eventually obtained the aphid predators from an insectary in Ventura, California. His solution falls under the "biological control" category of IPM techniques.

Similarly, Dr. William Moore of the Plant Pathology Department at Mississippi State University reports only one case of cyst nematode damage in 6 years among 7,500 soybean farmers working 1.9 million acres in that State. The farmers rely on crop rotation to keep the nematodes under control.

"In the 1970's, nematodes were a real problem," Moore says. The cyst nematode is a type of worm about one sixty-fourth of an

inch long that lives in the soil and attacks soybean roots. Farmers not practicing IPM techniques would find some plants 6 inches tall in one place and 20 inches tall in another place at maturity.

"Alternative planting to such non-host crops as sorghum, corn, cotton, or even a resistant variety of soybean plant reduces the cyst nematode population," Moore explains.

John Micheli, a fruit grower on a 600-acre farm near Live Oak, California, says IPM techniques "are cheaper than conventional treatment." In the spring, he sprays only the new top growth on his peach trees to eliminate the oriental fruit moth. This practice doesn't affect the beneficial mites on the lower parts of the trees, which then can prey on the harmful spotted mites.

Micheli also ties pheromone dispensers to the trees. The dispensers release the smell of the female oriental fruit moth, confusing the male moth and inhibiting mating.

Limiting spraying and pheromone release were developed with the help of the Extension Service at the University of California, where Micheli learned scouting. "If you don't have this, you don't have anything," says the fruit grower, who now hires entomologists to monitor pests.

IPM techniques also helped some cotton growers control the boll weevil, a pest that has historically caused problems and still ranges from the Atlantic coast to the Imperial Valley of California. In 1978, farmers and public agencies began a program to eradicate the weevil in parts of North and South Carolina.

The boll weevil eradication program resulted in a very high rate of return—97 cents on each dollar spent *per year* in North and South Carolina during 1978-87. In other words, according to ERS economist

John Schaub, each dollar initially invested in the program has returned 97 cents per year ever since—mainly through increased yields, lower pesticide expenditures, and increased value of cotton acreage. Cotton

yields rose by 69 pounds per acre, and producers saved about \$30 per acre through reduced pesticide use. Cotton land gained \$14 an acre in value as farmers switched from less profitable crops.

Courtesy Pacific Biocontrol



This dispenser releases a synthetic pheromone that disrupts mating of moths, which can damage fruit and nut trees

In 1986, IPM Was Used on 12 Major Crops

Crop	Total acres planted	Acres under IPM	% of Total under IPM
Alfalfa	26,748,000	1,273,000	4.7
Apples	461,000	299,000	65.0
Citrus products	1,057,000	700,000	70.0
Corn	76,674,000	15,000,000	19.5
Cotton	10,044,000	4,846,000	48.2
Peanuts	1,572,000	690,000	43.8
Potatoes	1,215,000	196,000	16.1
Rice	2,401,000	935,000	38.9
Sorghum	15,321,000	3,966,000	25.8
Soybeans	61,480,000	8,897,000	14.4
Tomatoes	378,000	312,000	82.5
Wheat	72,033,000	10,687,000	14.8

The program encompassed several IPM procedures. In the first year, the cotton acreage was treated with insecticide to kill any weevils that might survive in stalks or the ground.

In the second year, pheromone traps were placed in the fields. In the spring of that year, fields that showed substantial boll weevil populations in trap catches were treated with insecticides. In the third year,

only trap monitoring and cleanup of spot infestations were conducted as needed.

The success of this program led to its expansion on all North and South Carolina cotton acreage in 1983. The program has succeeded in eradicating the weevil, and may eventually be extended across the Cotton Belt.

IPM Outlook Is Bright

IPM research originally focused on field crops, including corn, soybeans, cotton, alfalfa, grain sorghum, and peanuts. But Greene explains that grower interest in using IPM on vegetable crops has surged since the 1980's. "Some analysts think adoption of IPM practices has decreased pesticide use on these crops since the early 1970's," she says.

Greene notes that although most vegetable IPM programs have lowered pesticide use in the States where they've been adopted, there is little pesticide data to document the reduction. "IPM studies are not designed to measure the exact volume of pesticides used, but it may be down," she says. "In the future, IPM will likely continue to be an important technique and will minimize the use of pesticides." ■

Based primarily on information provided by economist Catherine Greene, Commodity Economics Division, Economic Research Service, and other sources cited in the article.

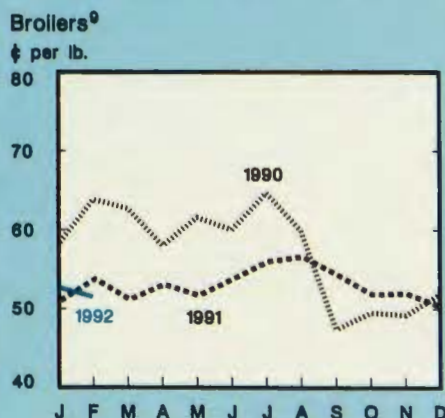
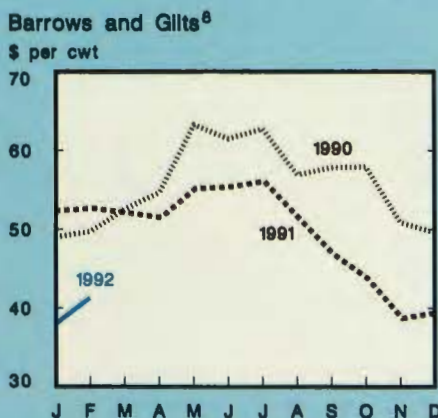
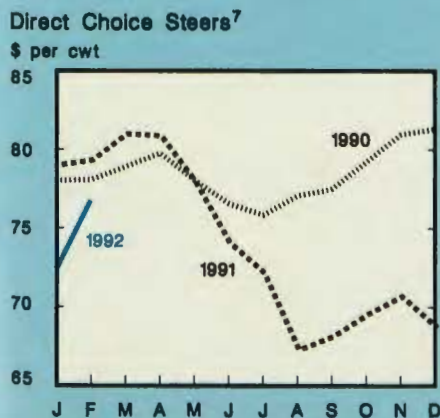
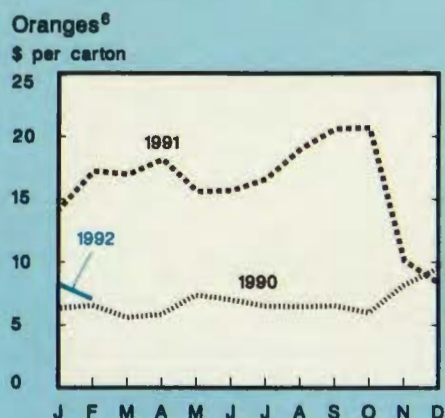
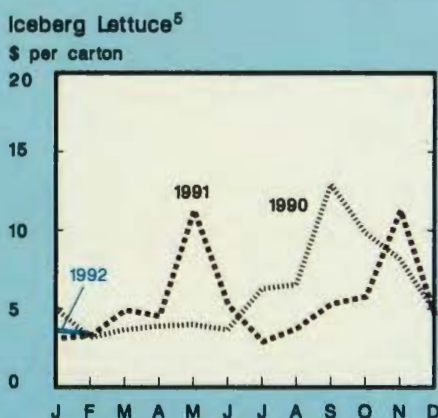
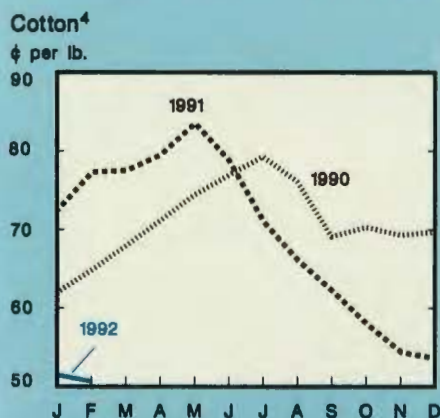
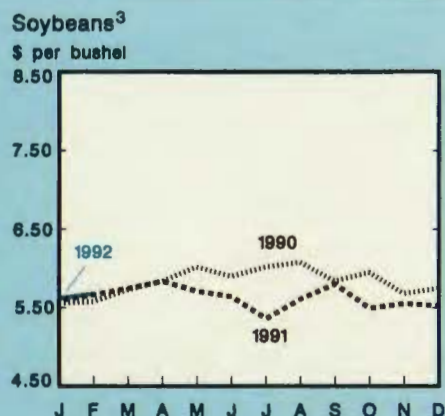
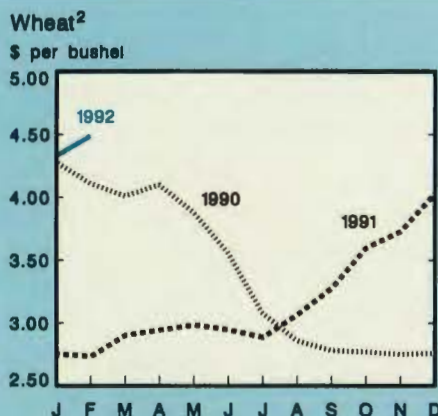
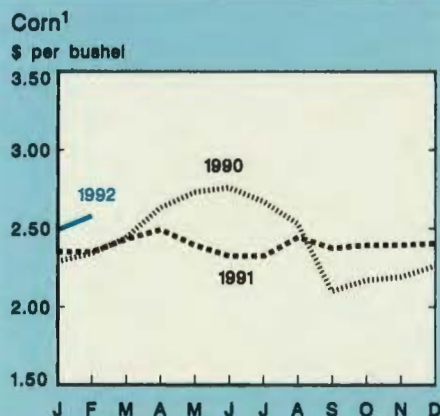
FARMLINE TRENDS

Monthly Price Monitor

USDA's February 1992 inflation-adjusted index of farm prices, from the National Agricultural Statistics Service's Agricultural Prices report, was 2.9% above January but 1.4% below a year earlier. Wholesale market prices follow. Corn rose 9¢ to \$2.58 per bushel, its highest price since July 1990.

Wheat increased by 16¢ per bushel to \$4.49, its highest level since May 1989. Soybeans rose 6¢ to \$5.68 per bushel. Cotton declined slightly to 50.8¢ per pound. Iceberg lettuce fell to \$3.44 per carton. Oranges dropped \$1.22 per carton to \$7.06. Direct choice steers jumped \$4.40

per cwt to \$76.76, the highest price since May 1991. Barrows and gilts also did well, increasing \$3.31 to \$41.27 per cwt, but \$11 less than the year-earlier average. Broilers slipped to 51.5¢ per pound.



¹No. 2 yellow, Central Illinois. ²No. 1 HRW, Kansas City. ³No. 1 yellow, Central Illinois. ⁴SLM 1-1/16", spot market price. ⁵Standard carton 24's, California-Arizona. ⁶Central California, Standard carton. ⁷Nebraska. ⁸Omaha. ⁹Wholesale, New York. All prices shown are monthly averages.

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- | | | |
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| <input type="checkbox"/> | <input type="checkbox"/> | America is losing the family farm. |
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