

Decreasing Groundwater May Change

USDA Farmline News Service

WASHINGTON — What happens when turning on the pump for irrigation water no longer helps farmers turn a profit?

Faced with declining water levels and well yields, farmers in the Texas High Plains were among the first to ask themselves that question. Since the mid-1970's, producers there have halted groundwater irrigation on about 2 million acres, largely because of the "economic exhaustion" of the underground water reserves, or aquifers, they were "mining."

But the same question may soon be asked by other farmers—mostly in the Far West and Midwest—who are also encountering diminishing levels of groundwater stored in aquifers, and the costs of going deeper into the earth to draw it out.

"Aquifer levels have been dropping substantially in 11 states beneath 14 million acres of land irrigated from groundwater," says economist Gordon Sloggett, formerly of USDA's Economic Research Service. In these states—which account for 85 percent of the total U.S. acreage irrigated from aquifers—groundwater levels are falling from a half-foot to more than five feet each year.

By citing these figures in a recent issue of the Agriculture Department's *Farmline* magazine, Sloggett and fellow researcher, economist Clifford Dickason, aren't suggesting any serious danger to the state of food and fiber production in the United States.

"Groundwater levels do not seem to pose a significant national threat to irrigated agriculture in the foreseeable future," Sloggett says. "Still, major changes may be likely for the areas dependent on irrigation from underground aquifers, and some areas will be affected sooner and more extensively than others."

When Pumping No Longer Pays

Areas showing rapid rates of decline in groundwater levels and deep pumping depths are likely candidates for widespread change, Sloggett says.

"Pumping depths of more than 200 feet and sharply falling aquifer levels (more than three feet per year) are common in parts of Arizona, California, Idaho, Kansas, Texas, and the Oklahoma Panhandle." Other states with areas which may experience severe strains on groundwater resources further into the future are Arkansas, Colorado, Florida, Nebraska and New Mexico.

Along with increased pumping costs and declining well yields, Sloggett says, farmers drawing water from progressively deeper wells find their pumping efficiency is decreasing. "In a problem area, the combination of these factors eventually will economically exhaust the groundwater resource. In other words, it will cost so much to bring the water up and put it on the crops that groundwater irrigation will no longer pay."

The Texas High Plains was the first major section of the country to feel these effects. "Farmers in Texas began extensive use of groundwater for irrigation earlier than other Plains states," says Sloggett.

Moreover, "Texas relies more than any other state on natural gas for pumping, and the price of natural gas has risen much faster since the early 1970's than that for other types of energy."

The rate of groundwater decline in Texas no ranges from one to four feet per year. Instead of accelerating, though, this depletion trend shows signs of slowing. The average annual rate of decline has been reduced by about half a foot since the 1950's in the southern

Texas High Plains, and by about three-quarters of a foot in the northern Texas High Plains.

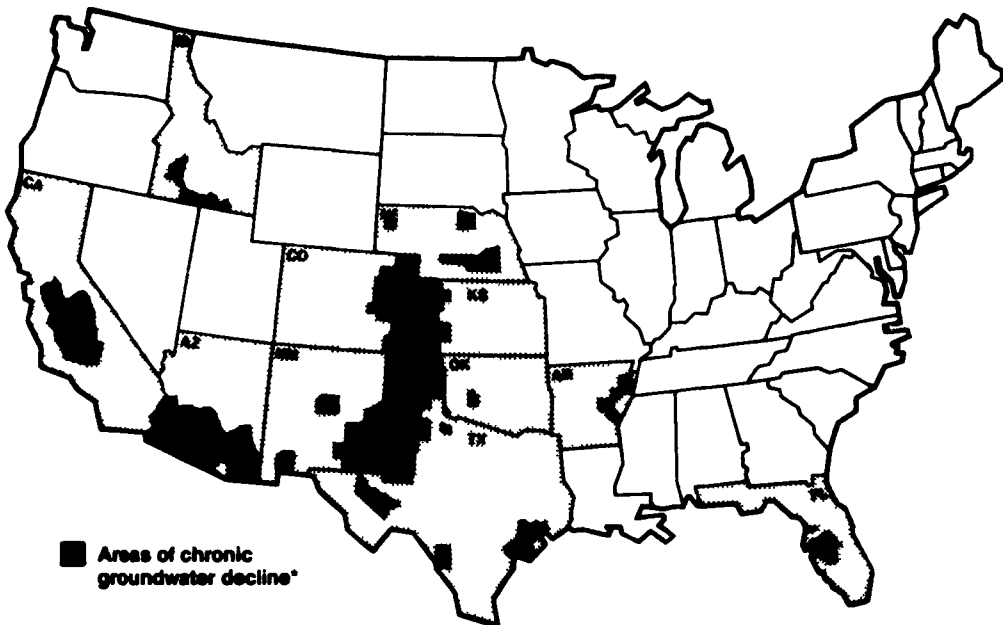
Several factors have contributed to the slowdown.

"Well yields have dropped along with falling water levels, reducing the amount of water that may be pumped in a given period. Farmers have also become more efficient irrigators by adopting better irrigation techniques with existing technology and by shifting to more advanced technology, thereby cutting water application rates. Crops with lower water requirements are being substituted for crops with higher water needs. And the amount of irrigated land has declined by about 15 percent in the last few years because of economic exhaustion of the aquifer in parts of the Texas High Plains," Sloggett says.

This pattern of slower groundwater declines may hold true in other affected areas as well.

"Although we don't have sufficient long-term data on annual water levels in most other groundwater mining areas," he says, "the rate of decline will likely slow in some of those areas because they share many of the

The Major Areas of Groundwater Decline Are Concentrated in the Irrigation-Dependent Southwest



conditions found in the Texas High Plains."

What Happens to Production?

In addition to identifying specific geographic areas where groundwater is being depleted in sub-

stantial quantities, the two researchers have also pinpointed the particular crops that may be affected.

"The impact on some crops would be more significant than on others," says economist Dickason.

Currently, the leading crops harvested in areas where groundwater levels are falling sharply are grapes, cotton, grain sorghum, citrus fruit, and rice. For grapes, 33 percent of total U.S. harvested acreage is in fast-

